SUZUKI

SERVICE MANUAL

TS400
TM400

1971 - 1974

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FOREWORD

In this Service Manual are mainly explained the construction, the operation, the inspection and the adjustment of SUZUKI TS400 and TM 400.

To give satisfaction to all customers, it is most important for the mechanic to prevent even a trivial trouble of the motorcycle by proper inspection and adjustment.

However, if any trouble might happen, quick and suitable steps should be requested to the mechanic.

To cope with the above cases, we hope all the mechanics will read this manual repeatedly and comprehend throughly.

By the way, the metric system is adopted in our factory, and is also used in this manual.

Further, for mechanics in some foreign countries who are not strong at the metric system, dimensions in the foot-pound and inches system are described in brackets.

March 10, 1972
SUZUKI MOTOR CO., LTD
Export Service Section

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1. SIDE VIEWS

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1–2. TM400

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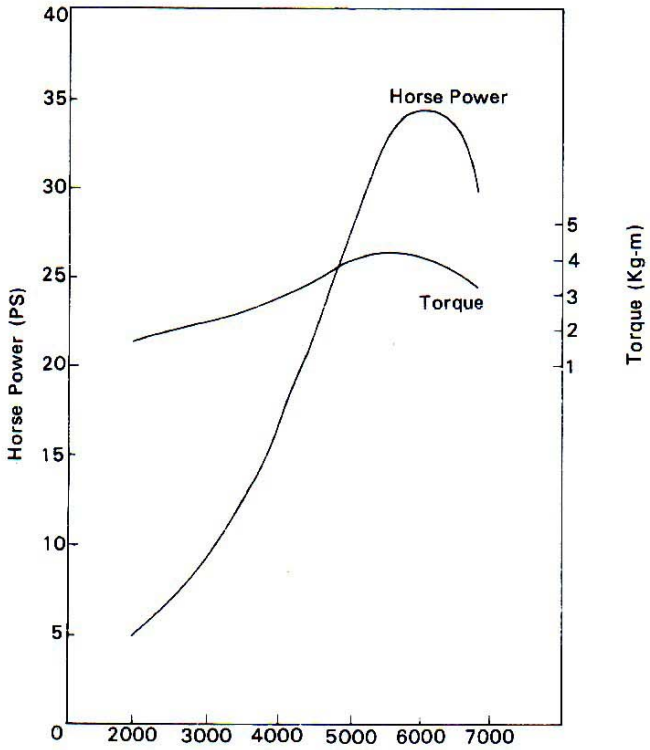
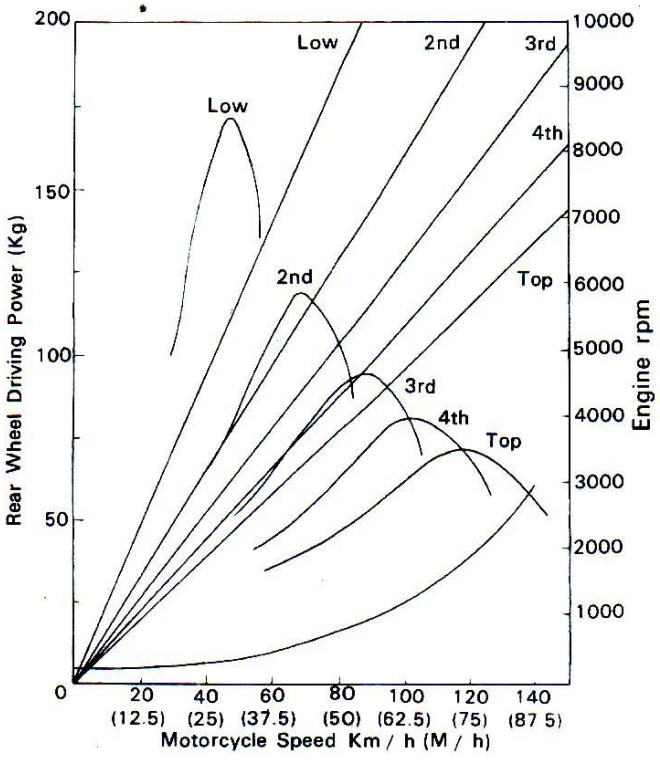
2–1–1. Engine performance curves



2–1–2. Motorcycle performance curves



Note : Final gear ratio 40 / 16

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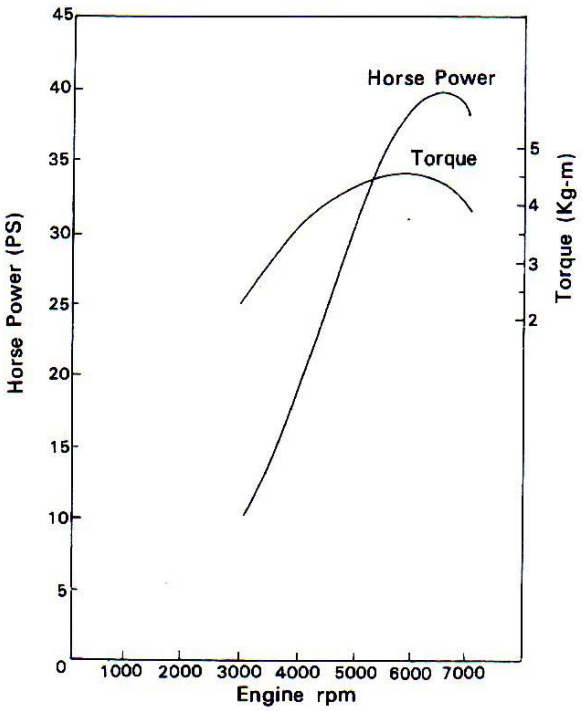
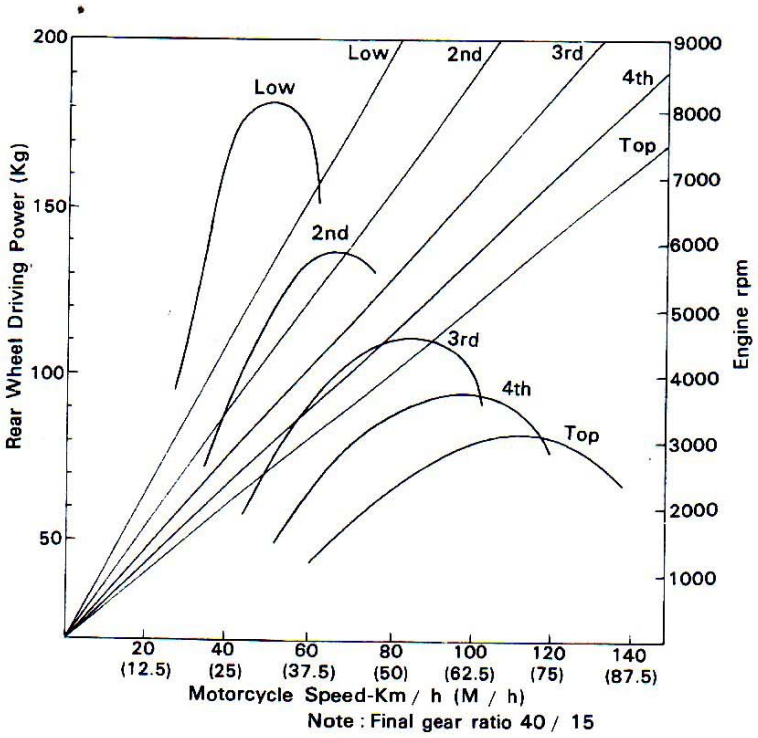
2–2. TM400

2–2–1. Engine performance curves



2–2–2. Motorcycle performance curves



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3. SPECIFICATIONS

	TS400	TM400
Dimension And Weight		
Overall length	2,215 mm (87.2 in)	2,160 mm (85.0 in)
Overall width	890 mm (35.0 in)	875 mm (34.4 in)
Overall height	1,125 mm (44.3 in)	1,135 mm (44.7 in)
Wheel base	1,385 mm (54.6 in)	1,410 mm (55.5 in)
Road clearance	200 mm (7.87 in)	220 mm (8.66 in)
Tire, front	3.25–19 4PR	3.00–21 4PR
rear	4.00–18 4PR	4.00–18 4PR
Dry weight	126 kg (277 lb)	105 kg (231 lb)
Performance		
Maximum speed	128 ~ 136 kph (80 ~ 85 mph)	——
Climbing ability	37°	40°
Braking distance	14 m (46 ft) at 50 kph (31 mph)	——
Engine		
Type	2-cycle, air coolded, piston valve	2-cycle, air coolded, piston valve
Cylinder	Sleeved aluminum, single cylinder	Sleeved aluminum, single cylinder
Maximum horse power	34 PS at 6,000 rpm	40 PS at 6,500 rpm
Maximum torque	4.11 kg-m (29.7 lb-ft) at 5,500 rpm	4.53 kg-m (32.8 lb-ft) at 6,000 rpm
Bore x Stroke	82 x 75 mm (3.25 x 2.95 in)	82 x 75 mm (3.23 x 2.95 in)
Piston displacement	396 cc (24.2 cu in)	396 cc (24.2 cu in)
Corrected compression ratio	6.8 : 1	7.3 : 1
Starter	kick (primary type)	kick (primary type)
Fuel System		
Carburetor	VM32SC	VM34SC
Air cleaner	Wet polyurethane air cleaner	Resin processed, fibrous tissue
Fuel tank capacity	9.0 ltr (2.4/2.0 gal, US/Imp)	9.0 ltr (2.4/2.0 gal, US/Imp)
Lubrication System		
Engine	CCI (posi-force lubrication)	CCI (posi-force lubrication)
Oil tank capacity	1.2 ltr (2.54/2.11 pt, US/Imp)	0.7 ltr (1.5/1.2 pt, US/Imp)
Gear box	1,200 cc (2.54/2.11 pt, US/Imp)	1,200 cc (2.54/2.11 pt, US/Imp)
Ignition System		
Spark plug	NGK B-8ES, DENSO W-24ES	NGK B-8ES, DENSO W-24ES
Ignition	PEI (pointless Electronic Ignition)	PEI (Pointless Electronic Ignition)
Ignition timing	22° at 3,000 rpm BTDC	19.5° at 3,000 rpm BTDC

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Transmission System		
Clutch	Wet multi-disc type	Wet multi-disc type
Speeds	5-speed, constant mesh	5-speed, constant mesh
Gear shifting	Left foot, lever-operated return change	Left foot, lever-operated return change
Gear ratio, Low	2.06 : 1 (31/15)	1.88 : 1 (30/16)
2nd	1.42 : 1 (27/19)	1.42 : 1 (27/19)
3rd	1.14 : 1 (25/22)	1.14 : 1 (25/22)
4th	0.96 : 1 (23/24)	0.96 : 1 (23/24)
Top	0.84 : 1 (21/25)	0.84 : 1 (21/25)
Primary reduction ratio	2.96 : 1 (68/23)	2.96 : 1 (68/23)
Final reduction ratio	2.50 : 1 (40/16)	2.67 : 1 (40/15)
Suspension		
Front	Hydraulically damped telescopick fork	Hydraulically damped telescopick fork
Rear	Swinging arm with 5-ways adjustable hydraulic damper	Swinging arm with 5-ways adjustable hydraulic damper
Steering		
Steering angle	38° (right & left)	40° (right & left)
Trail	126 mm (5.0 in)	140 mm (5.5 in)
Castor	60°	60°
Turning radius	2,600 mm (102.4 in)	2,300 mm (90.5 in)
Brakes		
Front	Right hand, internal expanding	Right hand, internal expanding
Rear	Right foot, internal expanding	Right foot, internal expanding
Electrical Equipment		
Generator	Flywheel magneto	Inner rotor type magneto
Battery	12V-5AH	———
Fuse	15A	———
Head lamp	12V, 35/25W	———
Tail/brake lamp	12V, 4/32CP	———
Turn signal lamp	12V, 23W (32 cp) x 4 (Option for USA & Canada spec.)	———
Neutral indicator lamp	12V, 3.4W	———
Speedometer lamp	12V, 3.4W	———
Turn signal indicator lamp	12V, 1.7W	———
High beam indicator lamp	12V, 3.4W	———

* The specifications subject to change without notice.

* TM400 is designed and manufactured for competition and off the road use only and is not equipped with such devices as lamps, speedometer, silencer, etc. for operation on public streets, roads or highways.

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4. TIPS ON OPERATING

Please advise your customers to follow these tips to keep the motorcycle in peak condition and it will give top performance at all time.

4–1. Breaking in for TS400

The life of the motorcycle depends greatly on the breaking in of the engine and the way the motorcycle is treated while it is new. Although all the engines are motor-lapped before they leave the factory, the frictional and rotational portions of the engines are not run in completely enough to bear high speed rotation or severe strain and stress, so the engine must be given the best care possible just as with a new-born baby. During the break-in period, keep the maximum speed of the motorcycle as follows.

For the first 800 km (500 mi) . . . . . below 3,000 rpm
Up to 1600 km (100 mi) . . . . . below 3,500 rpm

4–2. Breaking in for TM400

Breaking in should be performed for some 30 minutes with the throttle half-opened while checking the engine condition.

4–3. Fuel and Engine Oil

TS400 and TM400 needs no pre-mixed fuel. The engine sliding and rotating parts, crankshaft bearing, con-rod bearings, piston, cylinder, etc. are forced-lubricated by the oil pump.
This lubrication system is called SUZUKI CCI (posi-force Lubrication). Supply gasoline to the fuel tank, and engine oil to the oil tank. Regular gasoline with Octane-Rating 85–95 in Research Method is generally used for these models, and therefore high octane gasoline is not needed. As engine oil, use SUZUKI CCI oil, or in countries where it is not available, use good quality non diluent TWO Stroke Engine Oil with around SAE NO. 30.

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5. SPECIAL TOOL

Special tools listed here are used to disassemble, assemble the engine and perform other meintenance and services.

These special tools make works easy which cannot be done simply with ordinary tools. It is recommended to provide these special tools as shop equipment.

Ref. No.	Tool No.	Tool Name	Remarks
1	09910–10710	8 mm stud installing tool	
2	09910–11510	10 mm atud installing tool	
3	09910–20112	Piston holder	
4	09910–80113	Oil seal remover	
5	09913–50110	Crankcase separating tool	
6	09913–70122	Bearing and oil seal installing tool	
7	09913–80111	Bearing and oil seal installing tool	
8	09920–20310	Spring hook	
9	09920–51510	Clutch sleeve hub holder	
10	09920–60310	Clutch sleeve hub holder handle	
11	09920–70111	Snap ring opener (small type)	
12	09920–70120	Snap ring opener (big type)	
13	09930–10111	Spark plug wrench	
14	09930–30713	Flywheel rotor remover	For TS400
15	09930–31610	Inner rotor remover	For TM400
16	09930–40113	Flywheel/Engine sprocket holder	
17	09940–10122	Steering stem lock nut wrench	
18	09940–60112	Spoke nipple wrench	
19	09941–00110	Front fork outer tube nut wrench	For TS400
20	09900–21802	Chain joint tool	For TS400
21	09900–25001	Suzuki pocket tester	

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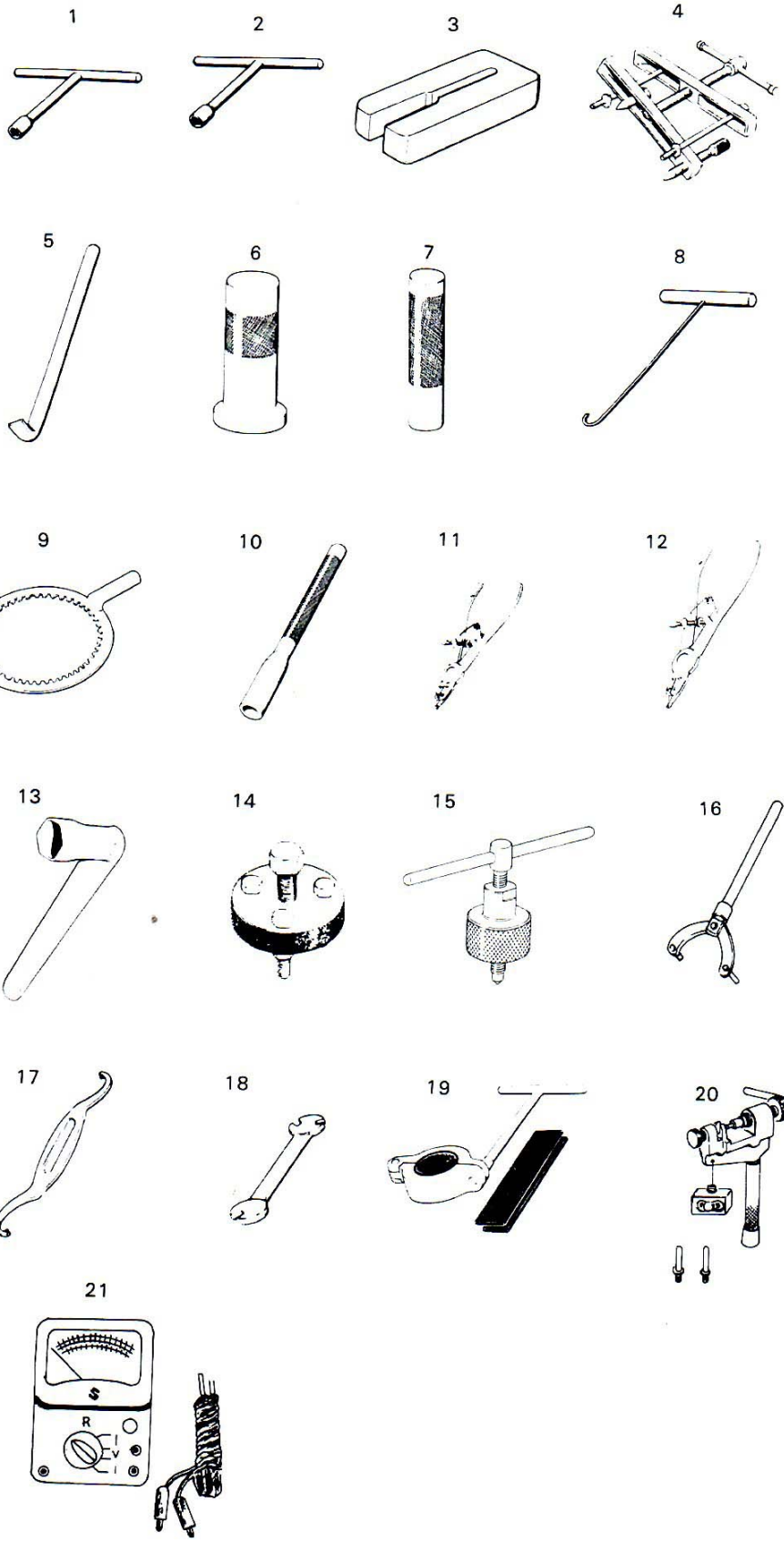

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6. ENGINE

When dismounting the TS400 engine from the frame, the footrestbar should be removed first.

6–1. Disassembling

Before beginning engine overhaul, thoroughly clean the engine with a cleaning solvent to remove road dirt after dismounting the engine from the frame.

1) Remove the engine sprocket, using a engine sprocket holder (Special tool 09930–40113) to hold the engine sprocket from turning.

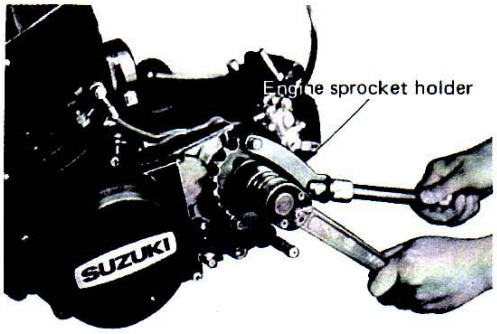

Fig. 6–1–1 Removing engine sprocket

2) Remove the magneto inner rotor using the rotor remover (Special tool 09930–31610), after removing magneto cover (TM400).

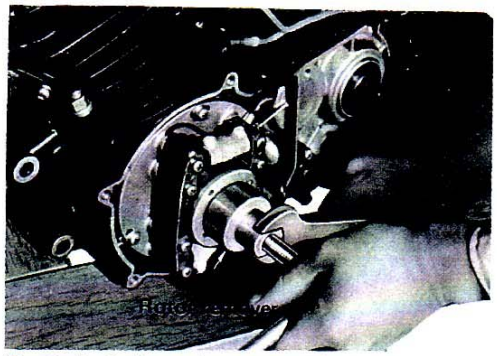

Fig. 6–1–2 Removing magneto inner rotor

3) Remove the flywheel magneto rotor using the rotor remover (Special tool 09930–30713) and the flywheel holder (Special tool 09930–40113). (TS400)

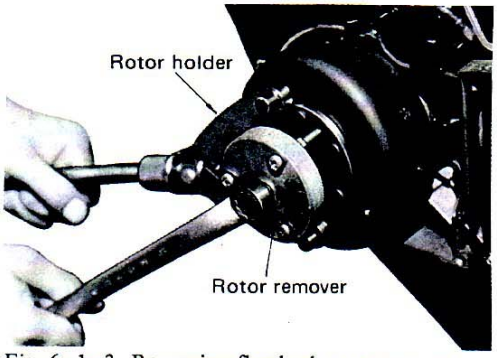

Fig. 6–1–3 Removing flywheel magneto rotor

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4) Remove the cylinder head and the cylinder.

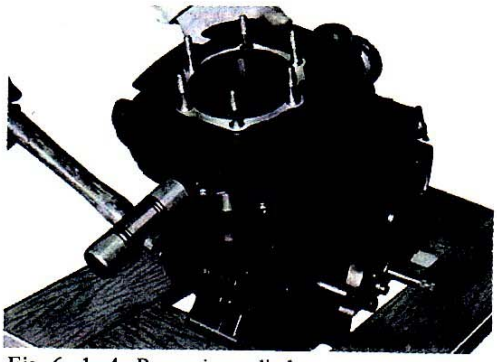

Fig. 6–1–4 Removing cylinder

5) Remove the piston pin circlip, the piston pin and the piston.

Fig. 6–1–5 Removing piston

6) Remove the clutch cable and the release arm.

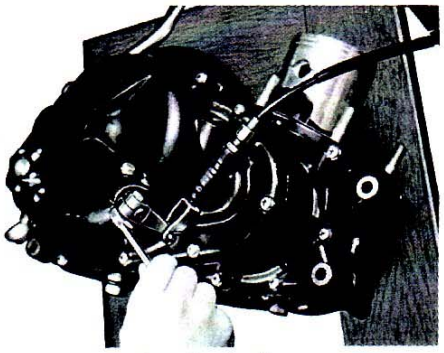

Fig. 6–1–6 Removing clutch release arm

7) To remove the engine right cover, tap the right cover around the kick shaft gently with a plastic hammer.

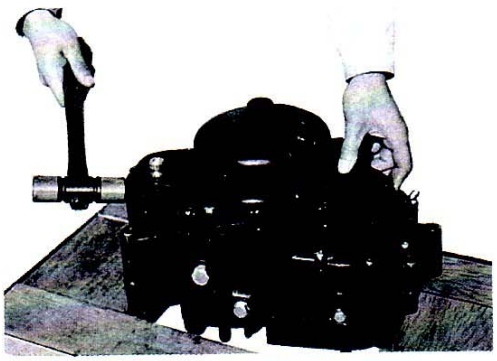

Fig. 6–1–7 Taking off engine right cover

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8) Straighten the primary pinion washer with a chisel and a hammer.
Loosen the primary pinion nut, using a piston holder (Special tool 09910–20113) to prevent the connecting rod and the crankshaft from turning.

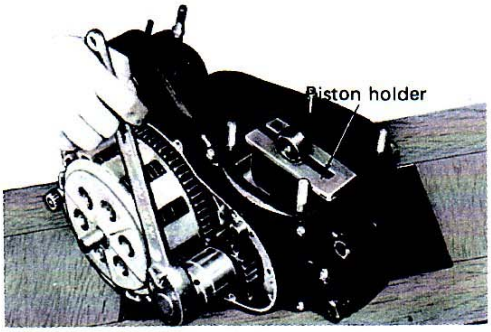

Fig. 6–1–8 Loosening primary pinion nut

9) Loosen the clutch spring bolts, using a piston holder (Special tool 09910–20113) to hold the crankshaft from turning.


Fig. 6–1–9 Loosening clutch spring bolt

10) After taking off the clutch plates, loosen the clutch sleeve hub nut holding the clutch sleeve hub with the clutch sleeve hub holder and the holder handle (Special tool 09920–51510 and 09920–60310).

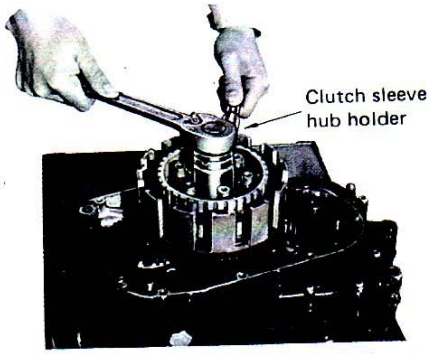

Fig. 6–1–10 Loosening clutch sleeve hub nut

11) Remove the clutch housing and the clutch housing spacer then remove the housing spacer knok pin on the counter shaft.

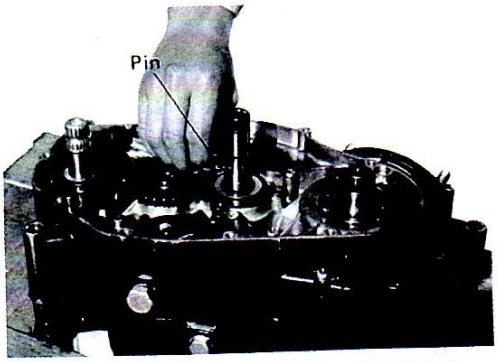

Fig. 6–1–11 Removing clutch housing spacer knock pin

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12) Remove the kick idle gear circlip with the snap ring opener (Special tool 09920–70120) and then remove the kick idle gear.

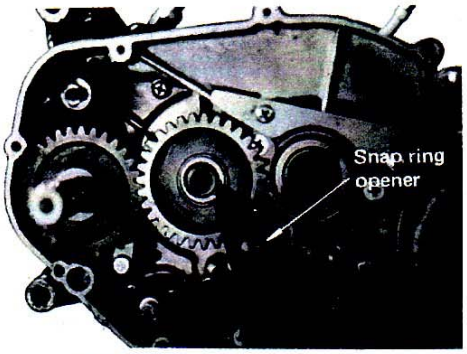

Fig. 6–1–12 Removing kick idle gear circlip

13) After taking off the kick starter drive gear, remove the gear shifting shaft, the shifting cam guide and the cam stopper.

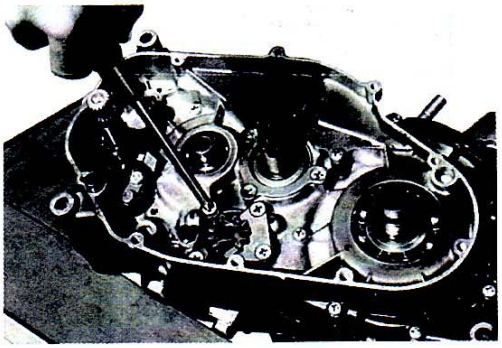

Fig. 6–1–13 Removing gear shifting cam guide

14) Remove the crankcase tightening screws and disassemble the crankcase with the crankcase separating tool (Special tool 09910–80113).

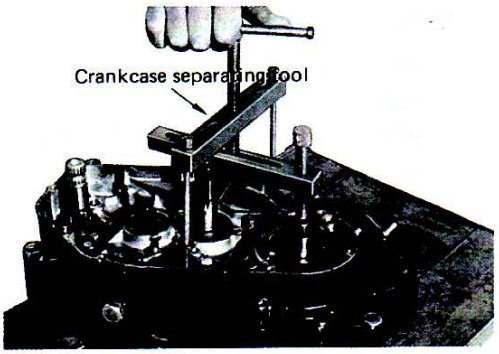

Fig. 6–1–14 Separating crankcase

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6–2. Operation, Checking and Reparing

6–2–1. Cylinder head

1) Removing carbon

Remove carbon on the cylinder head combustion chamber.

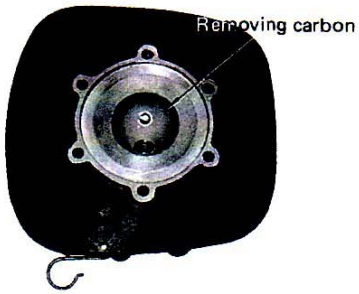

Fig. 6–2–1 Cylinder head

2) Compression leakage

If there is any leakage from the cylinder head fitting serface, replace the gasket or retighten the cylinder head bolts.

Cylinder head tightening torque
150–200 kg-cm (10.8–14.5 lb-ft)

6–2–2. Cylinder

1) Decompressor (TS400)

TS400 Cylinder has the built-in decompressor as a standard equipment to reduce compression for easy engine starting.

Operation of decompressor is as shown in Fig. 6–2–2.

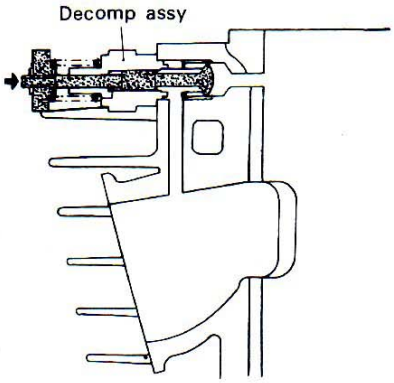

Fig. 6–2–2 Operation of decompressor

2) Measuring cylinder bore

Measurement should be made with a cylinder gauge in longitudinal and lateral directions at two points on three lengthwise positions, for a total of six measurements as shown in Fig. 6–2–3.

Standard cylinder bore	82.00–82.018 mm (3.228–3.229 in)

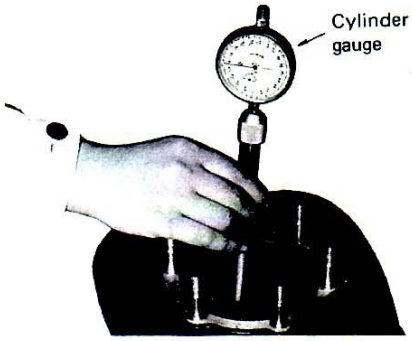

Fig. 6–2–3 Measuring cylinder bore

3) Measurement of wear amount

Wear amount is obtained by substracting the smallest measurement from the largest one measured in procedure 2).

If the wear amount exceeds the limit, perform boring. An oversize piston for boring of 0.5 mm is provided. After boring is carried out, be sure to chamfer each port.

Limit of wear	0.05 mm (0.002 in)

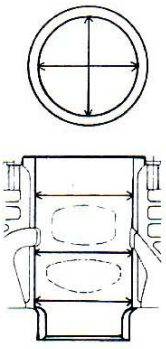

Fig. 6–2–4 Measurement direction

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4) Removing carbon

Remove the carbon on the exhaust port with the plain screw driver and around the top of the cylinder wall with the fine sand paper while taking care not to scratch cylinder wall.

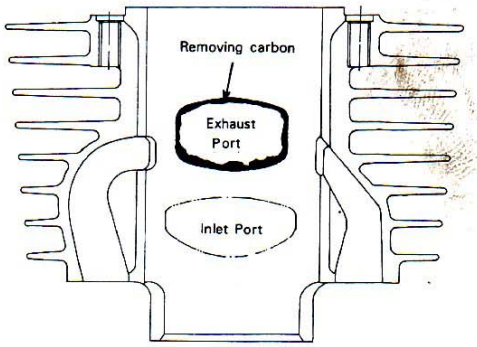

Fig. 6–2–5 Removing carbon

6–2–3. Piston Ring

1) Checking piston ring

Check if the piston rings move smoothly in the ring grooves. In case the ring movement in the ring groove is stiff, remove carbon and foreign particles adhering to the ring groove. Insert the piston ring to the cylinder skirt perpendicularly to the cylinder. Measure the piston ring end gap with a thickness guage, and if it exceeds the limit, replace the piston ring.

	Standard	Limit
End gap	0.2–0.4 mm (0.0078–0.0157 in)	1.0 mm (0.04 in)

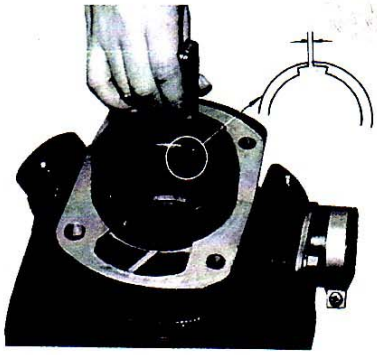

Fig. 6–2–6 Measuring piston ring end gap

6–2–4. Piston

1) Piston and cylinder clearance

The clearance is the difference between the cylinder bore and the piston outside diameter. The cylinder bore is the diameter measured at 5 mm (0.2 in) above the exhaust port and in front-rear direction and the piston outside diameter is that measured at 44.5 mm (1.75 in) above the piston skirt and at 90 degrees to the piston pin holes.

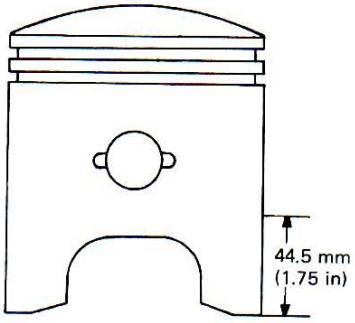

Fig. 6–2–7 Point to be measured

Models	Standard piston clearance
TS400	0.075–0.085 mm (0.0029–0.0033 in)
TM400	0.105–0.115 mm (0.0041–0.0045 in)

2) Check and repair of scratch

Once the piston has been scratched, the performance is fairly affected, seizure is sometimes induced from the scratch, and the scratch possibly develops. If you find a scratch, correct it with the sand paper of No. 400.

Fig. 6–2–8 Polishing piston surface

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3) Checking piston ring locating pins

Check the piston ring locating pins for wear or looseness, and if it is faulty, replace the piston.

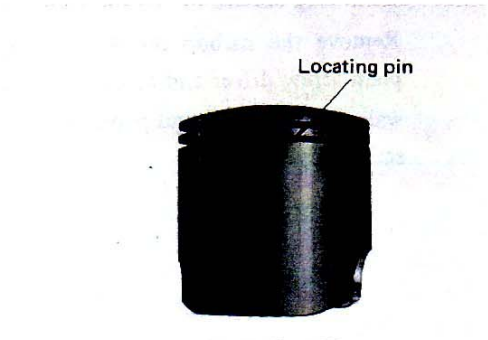

Fig. 6–2–9 Piston ring locating pin

4) Removing carbon

If the carbon deposits on the piston head, piston cooling is affected resulting in overheating. Every time disassembling the engine, remove carbon on the piston head as well as ring groove taking care so as not to scratch the piston surface and the ring groove.

Fig. 6–2–10 Removing carbon

6–2–5. Crankshaft

1) Crankshaft deflection

Support the crankshaft journals on V blocks and measure the deflection with a dial gauge. If it exceeds the limit, replace or correct the crankshaft.

Crankshaft deflection limit	0.06 mm (0.0024 in)

To correct deflection of the crankshaft, place the crankshaft on a hand and correct with a copper hammer until deflection becomes within the limit.

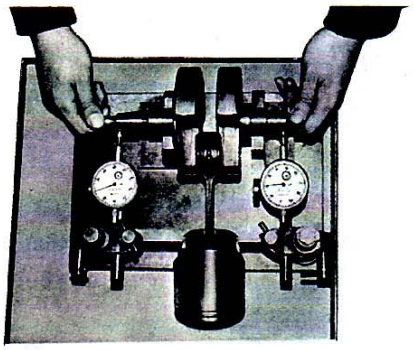

Fig. 6–2–11 Inspection crankshaft deflection

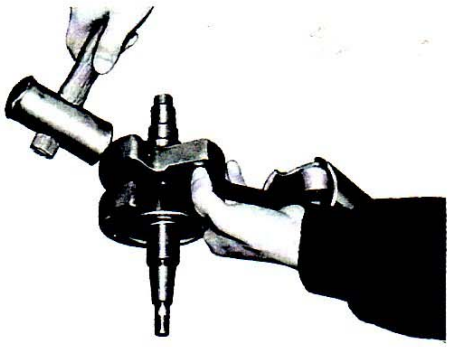

Fig. 6–2–12 Measuring clutch drive plate

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2) Connecting rod small end shake

Connecting rod small end shake is the distance between 2 and 3 as shown in Fig. 6–2–13. If this exceeds 3 mm (0.118 in), the large end bearing, the con-rod large end or the crank pin is worn, so replace it.

Note: There is a side clearance of 0.155–0.515 mm (0.006–0.020 in), at the connecting rod big end and be careful as this clearance is apt to be mistaken for small end shake.

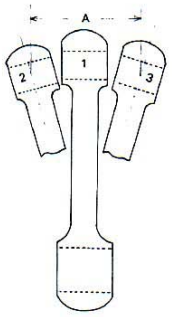

Fig. 6–2–13 Connecting rod small end shake

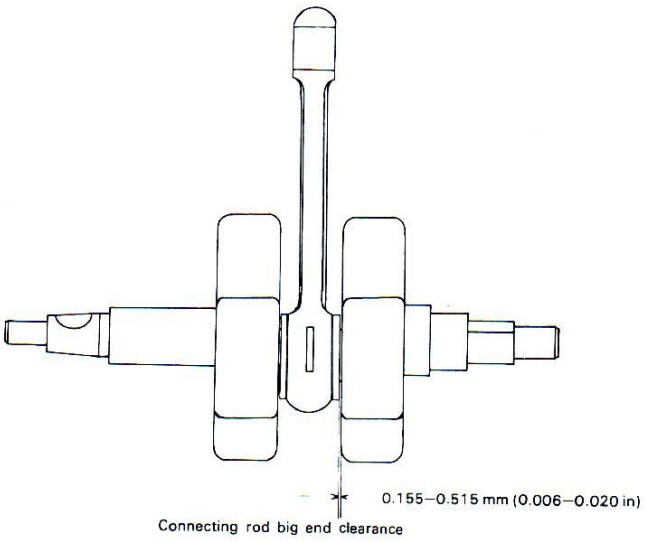

Fig. 6–2–14 Clearance of connecting rod big end

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6–2–6. Oil pump

TS400 and TM400 engines are lubricated by Suzuki CCI (Posi-Force Lubrication) system, but as mentioned below, the oil pump discharge volume differs each other. This is because the oil pump is designed to feed the most proper amount of oil to each model depending on the load and the speed of engine.

1) Oil pump performance

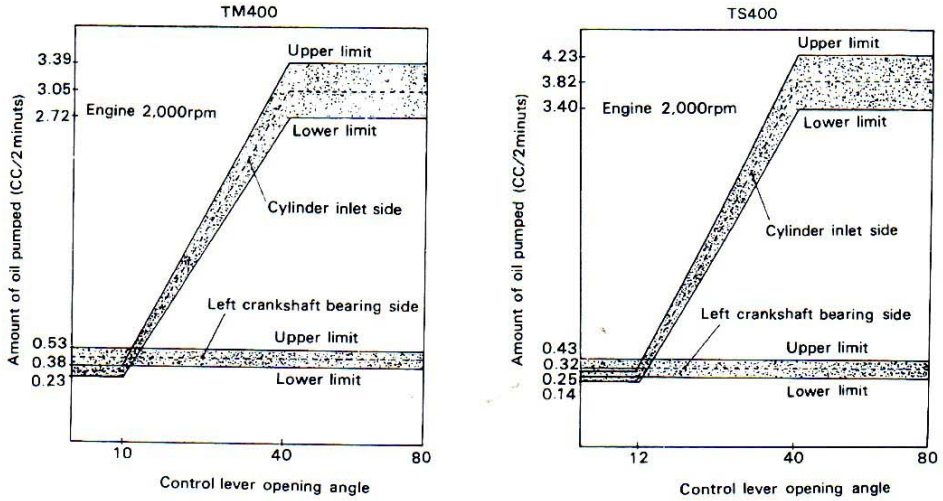

Fig. 6–2–15 Oil pump performance curve

Amount of oil pumped in 2 minuts with engine speed kept at 2,000 rpm, and oil pump control lever fully opened.

		For TM400	For TS400
Amount of oil for cylinder:	upper limit	3.39 cc	4.23 cc
	lower limit	2.72 cc	3.40 cc
for crankshaft bearing:	upper limit	0.53 cc	0.43 cc
	lower limit	0.38 cc	0.25 cc

2) Oil pump driving mechanism

The oil pump equipped on these models are driven by crankshaft through primary pinion (23 teeth), primary gear (68 teeth), kick starter driven gear (19 teeth), kick starter idle gear (31 teeth), kick starter drive gear (31 teeth), and oil pump drive gear (14 teeth).

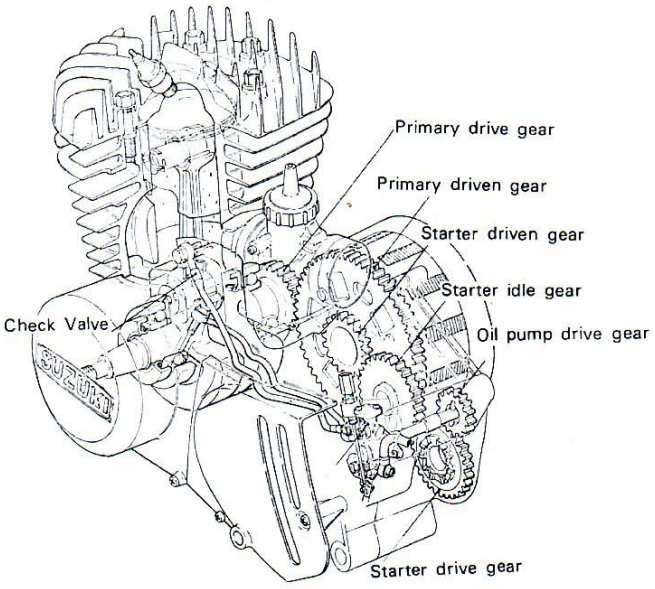

Fig. 6–2–16 Oil pump driving mechanism

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3) Air bleeding

Check the oil line for presence of air when the oil line is once removed and reinstalled. If air exists in the oil line, perform air bleeding.

To bleed air, if air exists in the oil line between the oil tank and the oil pump, loosen the oil pump air bleeding screw (A) until air is completely expelled.

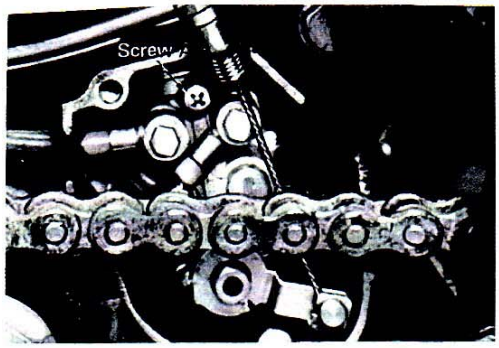

Fig. 6–2–17 Air bleeding screw

To bleed air between the oil pump and the oil line discharge side remove the oil outlet banjo bolts on the oil pump and inject oil into the oil line with an oil filler until air is completely expelled.

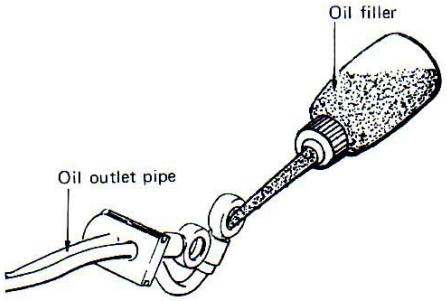

Fig. 6–2–18 Injecting engine oil to oil outlet pipe

4) Adjusting oil pump control lever

Adjustment of the oil pump control lever must be made with the throttle cable fitted. Open the throttle grip fully, and make adjustment by means of an oil pump control cable adjuster so that the line mark on the oil pump control lever (B) coincides with that on the oil pump body (A).

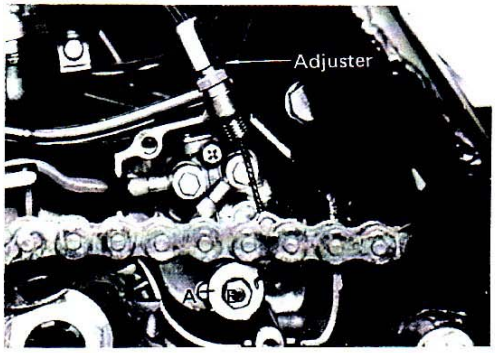

Fig. 6–2–19 Adjustment of oil pump control lever

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6–2–7. Clutch

1) Operation

To make the clutch operation smooth, a rack and pinion type clutch release is adopted instead of push rod type used on the conventional machine.

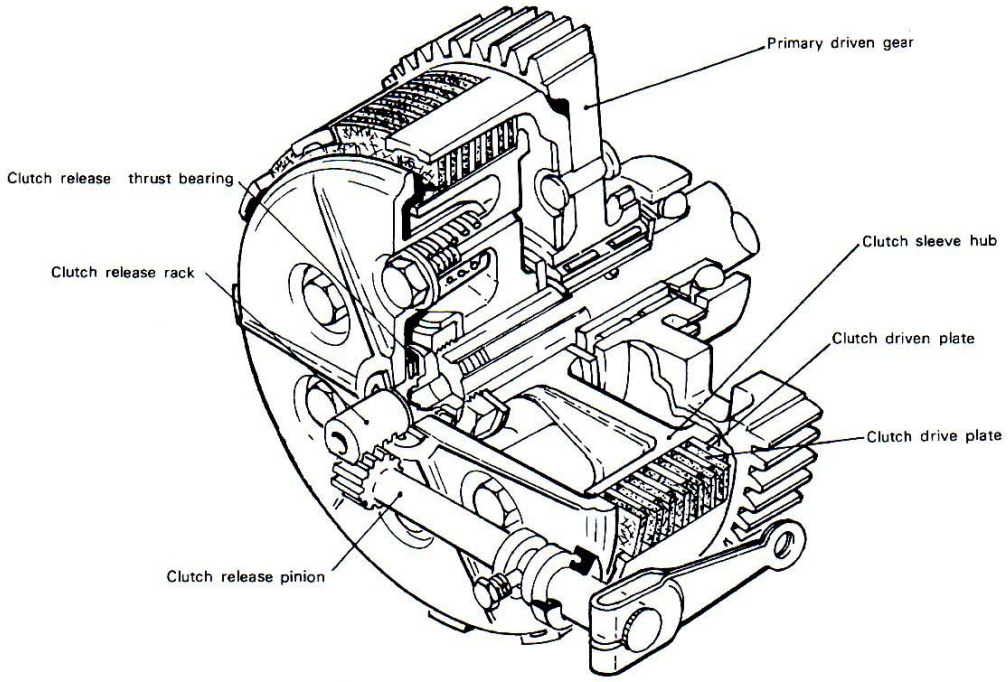

Fig. 6–2–20 Clutch operation

2) Clutch drive plate

As seven clutch drive plates are soaked in oil, drive plate wear is very rare, but after long period use the plate may change in color, because of burning which causes clutch slipping. If they have changed in color, replace with new ones.

	Standard	Limit
Width	3.5 mm (0.138 in)	3.2 mm (0.126 in)
Warpage	0.4 mm (0.016 in)	0.4 mm (0.016 in)

Fig. 6–2–21 Measuring clutch drive plate

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3) Clutch driven plate

There are seven clutch driven plates, which are provided with knurling in order to prevent, when the clutch is disengaged, clutch dragging caused by transmission oil under cold weather.

	Standard	Limit
Width	2.0 mm (0.08 in)	1.85 mm (0.07 in)
Warpage	0.1 mm (0.004 in)	0.1 mm (0.004 in)

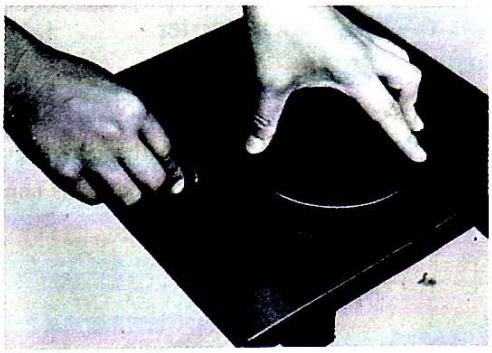

Fig. 6–2–22 Checking clutch driven plate

4) Clutch sleeve hub

The clutch sleeve hub always suffers the considerable force from the driven plate and a stepped wear may be caused after long period use, on the clutch sleeve hub spline by the driven plates moving on the clutch sleeve hub.

When the wear develops, the driven plates do not function properly and the clutch disengaging becomes difficult. So, if the clutch sleeve hub has a stepped wear, replace it.

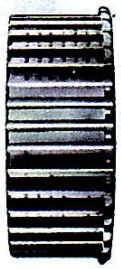

Fig. 6–2–33 Checking clutch sleeve hub

5) Clutch release rack

The clutch release rack thrust bearing inside the clutch pressure plate reduces the force to be impressed on the clutch lever when the clutch is in operation, thus improving controllavilty.

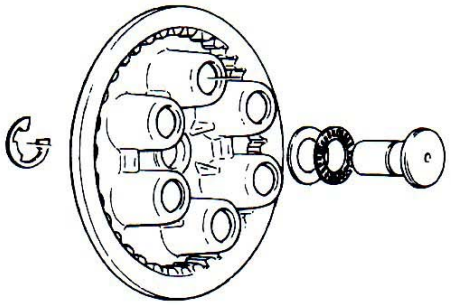

Fig. 6–2–24 Clutch release rack

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6–2–8. Kick Starter

1) General

The kick starter of TS400 and TM400 is of primary kick type and the engine can be easily kick started by disengaging the clutch even though in any position the transmission is shifted, and the rachet wheel type adopted in its engaging mechanism makes starting operation and mechanism more reliable and durable.

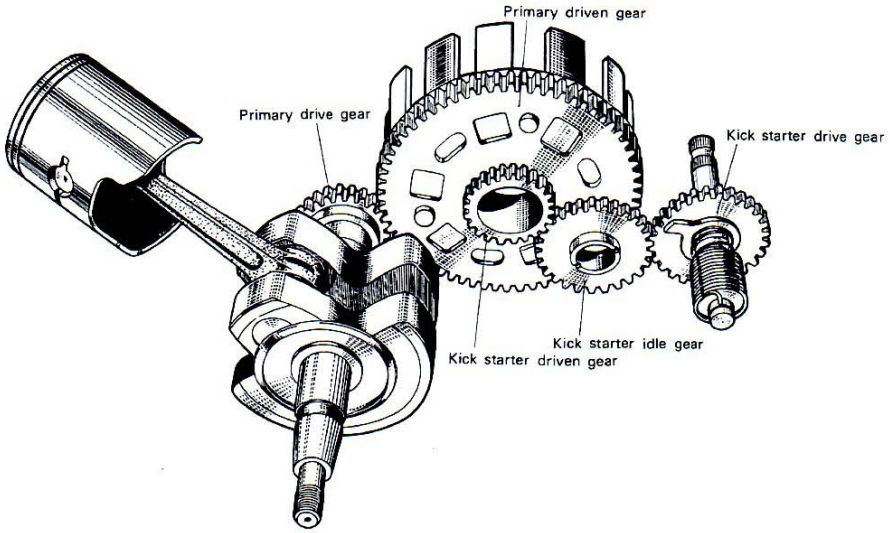

Fig. 6–2–25 Kick starter mechanism

2) Operation

Before kick starting, the ratchet wheel is held by the ratchet wheel guide. Upon kick starting, the kick starter shaft rotates in accordance with the kick lever. The ratchet wheel being in mesh with the kick starter shaft also turns, and on releasing from the ratchet wheel guide, the ratchet wheel is pushed toward the kick drive gear by the force of ratchet wheel spring, where it meshes against the side of kick drive gear. The kick drive gear through its related gears then turns the crankshaft.

* Force to start the engine is transmitted as follows.

Kick Lever ⟶ Ratchet Wheel ⟶ Kick Drive Gear ⟶ Kick Idle Gear ⟶ Kick Driven Gear ⟶ Primary Driven Gear ⟶ Primary Pinion ⟶ Crankshaft

On releasing the kick lever, the kick starter shaft is returned to its home position by the kick spring. At this time, the ratchet wheel which turns together with the kick starter shaft, due to the ratchet wheel guide, moves away and becomes free from the kick drive gear.

1. Kick starter shaft return spring
2. Kick starter spring guide
3. Thrust washer (17 x 3.4 x 1.5 mm)
4. Kick starter spring
5. Drive gear washer
6. Kick starter drive gear
7. Thrust washer (20 x 29 x 3 mm)
8. Kick starter rachet wheel
9. Kick starter guide
10. Kick starter shaft

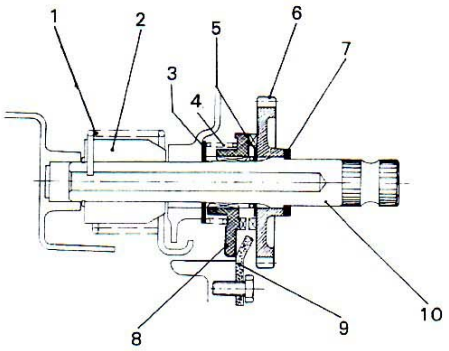

Fig. 6–2–26 Kick starter (Rachet wheel type) operation

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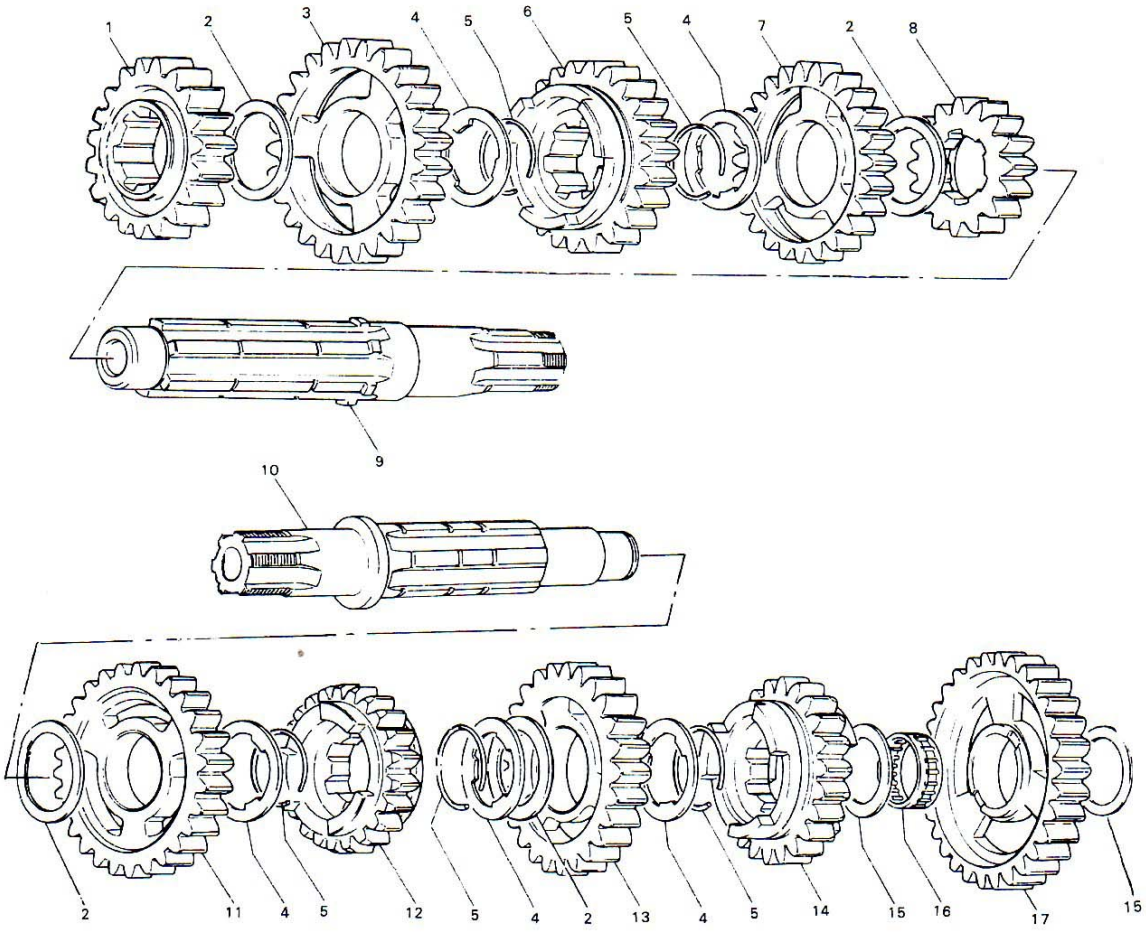
6–2–9. Transmission

1) General

The transmission of these models is of a constant mesh type having five speed change, and the construction of TS400 transmission is common to that of TM400 except for only low gear ratio, that is, while 2.06 for TS400, 1.83 for TM400.

As transmission oil, we recommend to use 20W/40 multi-grade good brand motor oil and the amount of oil is 1,200 cc (2.54/2.11 pt, US/Imp).



1. 2nd drive gear
2. Thrust washer (25 x 32 x 1 mm)
3. 5th drive gear
4. Washer
5. Circlip
6. 3rd drive gear
7. 4th drive gear
8. 1st drive gear
9. Countershaft
10. Driveshaft
11. 2nd driven gear
12. 5th driven gear
13. 3rd driven gear
14. 4th driven gear
15. Thrust washer (20 x 30.5 x 1 mm)
16. Needle bearing
17. 1st driven gear

Fig. 6–2–27 Exploded view of transmission

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2) Operation

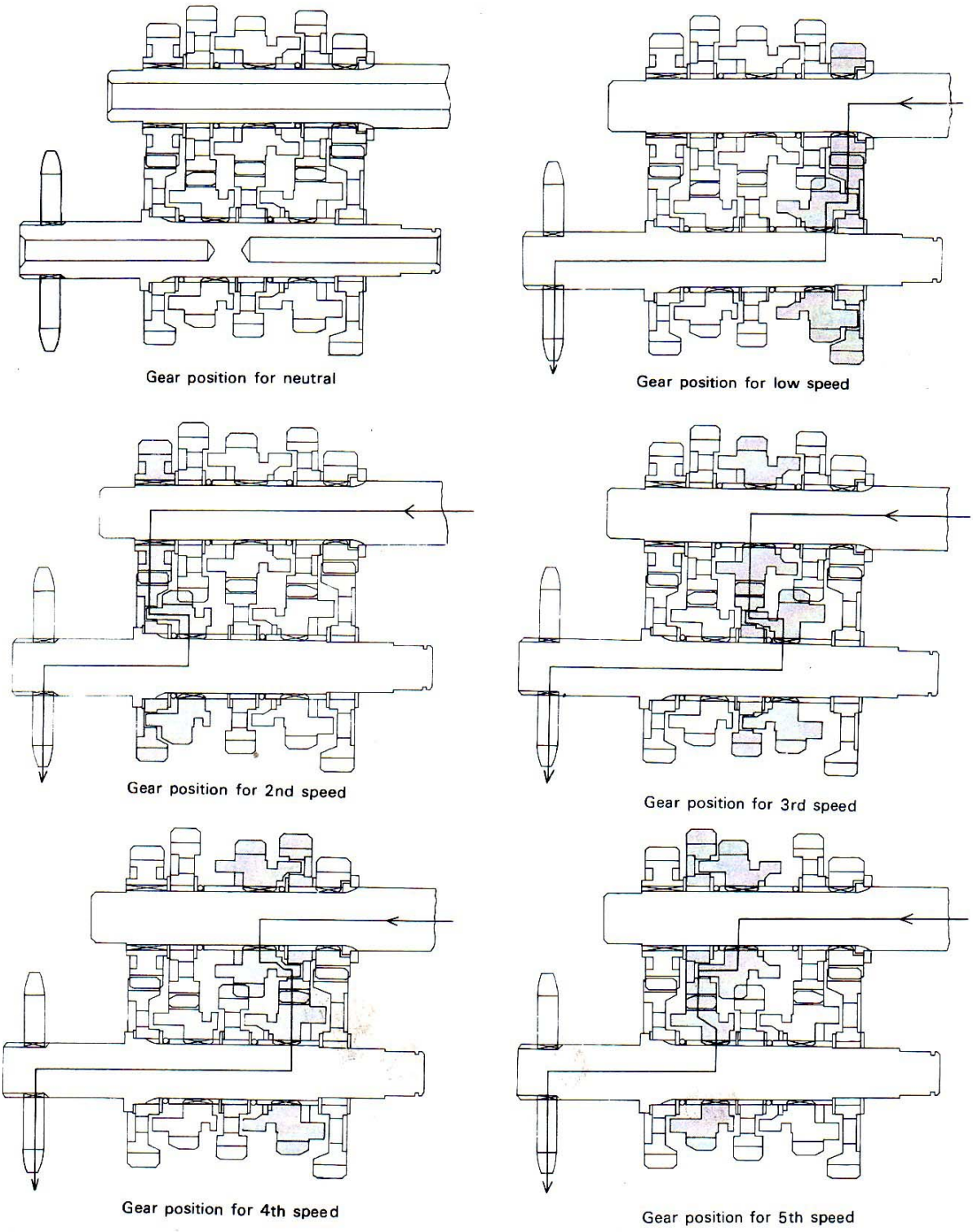

Fig. 6–2–28 Operation of transmission

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3) Checking each gear

When transmission is disassembled, check the teeth dogs and sliding part of each gear for damage, crack or wear and replace the gear if any defect is found.

4) Checking Needle bearing

The transmission employs two needle bearings. Check the roller operation, and the cage for damage. If faulty, replace.

5) Countershaft left bearing

To replace the countershaft left bearing, heat the crankcase around the bearing and pull out bearing as shown in Fig. 6–2–29.

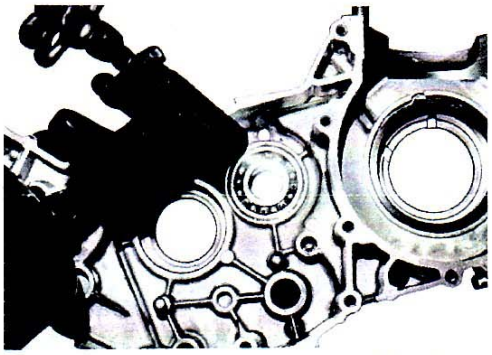

Fig. 6–2–29 Heating crankcase around bearing

6–2–10. Gear shifting

1) Mechanism

The gear shifting mechanism of TS400 and TM400 are as illustrated in Fig. 6–2–30. The mechanism which operates the gear shift cam drum is of sector gear type, which endures a sudden or severe gear shift, and offers quick and accurate gear changes.

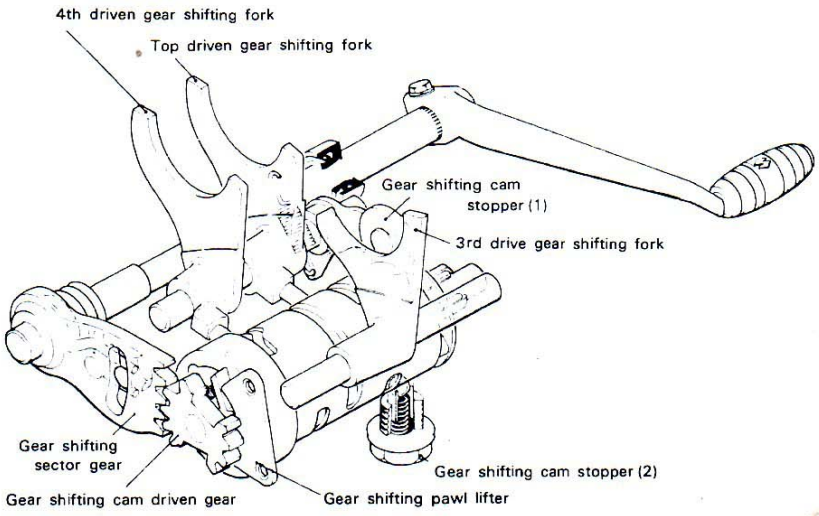

Fig. 6–2–30 Gear shifting mechanism

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2) Gear shifting fork

The three shifting forks (3rd drive gear shifting fork, 4th driven shifting fork and top driven gear shifting fork) on the two gear shifting fork shafts are shifted along the lead groove on the gear shifting cam in accordance with cam rotation.

Be sure to assemble the three shifting forks in a proper way referring to Fig. 6–2–31.

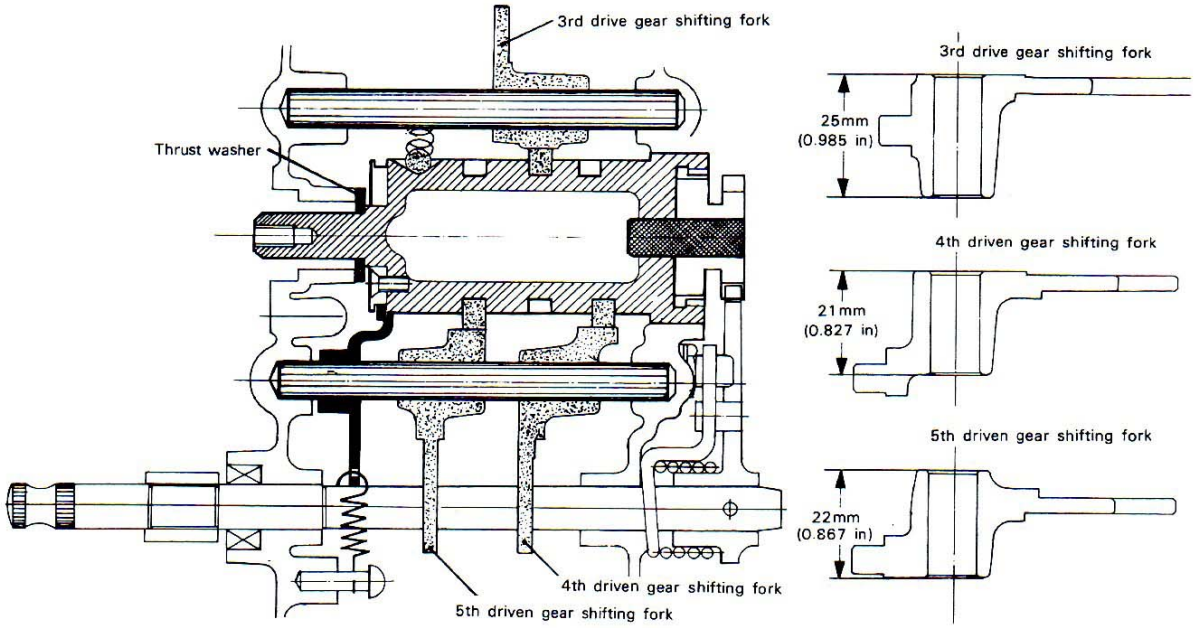

Fig. 6–2–31 Gear shifting forks

3) Checking gear shifting fork

If the gear shifting fork should be burnt or warn on its contact surface to the gear. Replace with new one. Besides check the gear for burning and scratch. If faulty, replace.

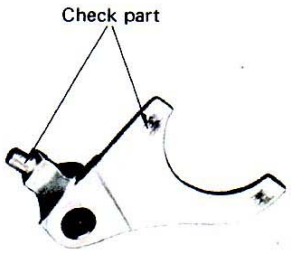

Fig. 6–2–32 Checking gear shifting fork end

4) Checking gear shifting pawl stopper

If there is dent at A and B of the gear shifting pawl stopper, it does not possibly function as a stopper. In this case replace the stopper.

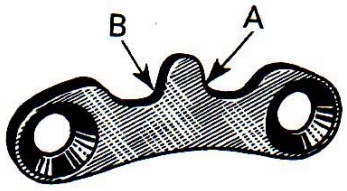

Fig. 6–2–33 Gear shifting pawl stopper

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5) Checking gear shifting pawl lifter

If there is an excessive humpy wear at A of the gear shifting pawl lifter, gear shifting becomes difficult or cannot be performed. If faulty, replace the lifter.

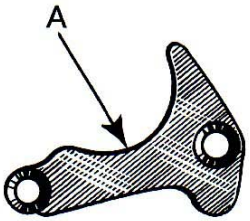

Fig. 6–2–34 Gear shifting pawl lifter

6) Checking gear shifting pawl and spring

If the edge of the gear shifting pawl is worn and the pawl spring is weakened, gear shifting operation becomes unsmooth. If any abnormity is found in this point, replace with new one.

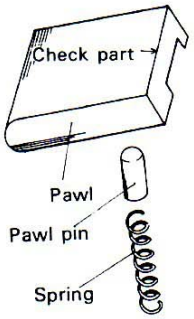

Fig. 6–2–35 Gear shifting pawl and spring

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6–3. Reassembling

1) Fit the crankshaft assembly to the left crankcase and then fit the drive shaft with the second, third and fifth gears having been assembled beforehand.

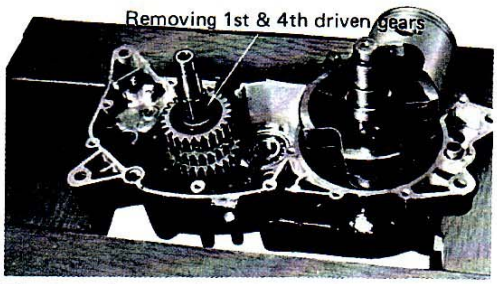

Fig. 6–3–1 Assembling drive shaft

2) Fit the counter-shafts assembly to the left crankcase. In this case never fail to attach the fifth drive gear spacer between the third and the fifth drive gear.

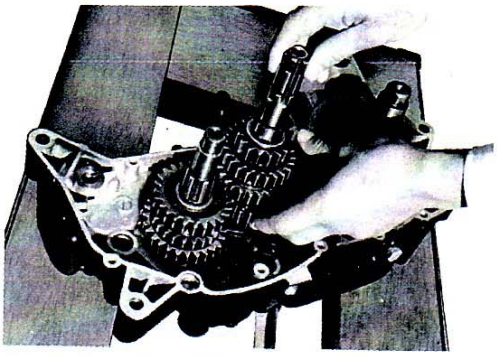

Fig. 6–3–2 Assembling counter shaft

3) Insert the shifting fork (smaller one) into the third drive gear on the counter shaft, then the gear shifting cam into the left crankcase. In this case place the shifting fork pin into the middle lead groove of the cam.

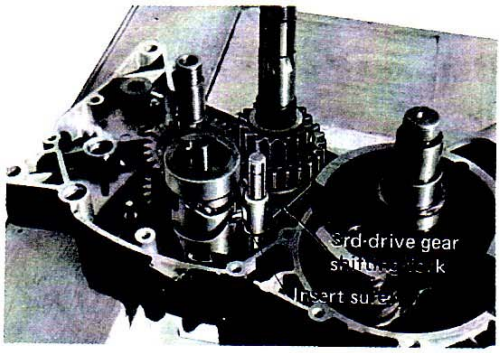

Fig. 6–3–3 Inserting shifting fork into the fourth and fifth drive gear

4) Insert the shifting fork shaft into the drive shaft side shifting fork (for fourth and fifth driven gear) and set it to the left crankcase. In this case fit the fourth and fifth gear shifting fork pins to the side grooves on the cam.

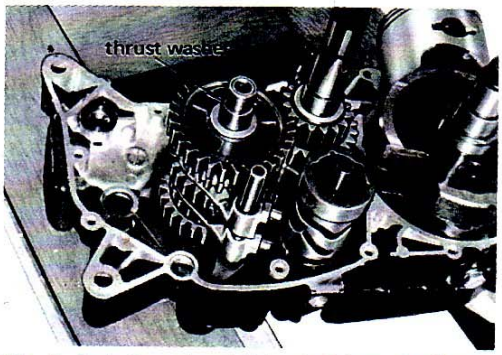

Fig. 6–3–4 Inserting shifting fork into the fourth and fifth drive gear

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5) At the same time with procedure No. 4, fit the gear shifting cam stopper and hook the cam stopper spring with spring hook (Special tool 09920–20310).

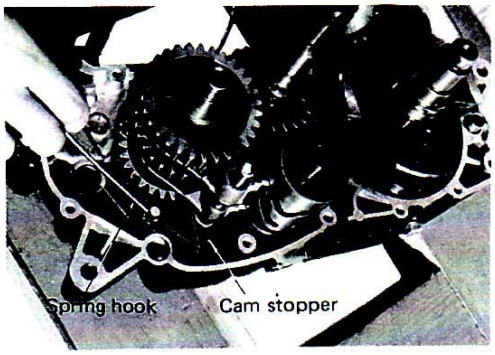

Fig. 6–3–5 Hooking cam stopper spring

6) Insert the kick starter gear into the kick starter shaft, aligning the punched marks on the kick starter gear with the starter shaft.

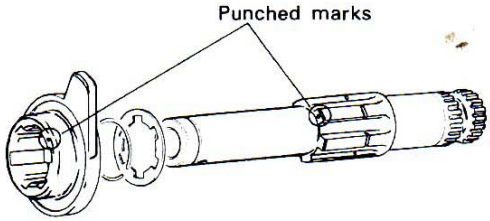

Fig. 6–3–6 Punched marks

7) Insert the kick starter shaft fitted with kick starter gear to the right crankcase, then fit the kick starter shaft return spring, the spring guide and the circlip.

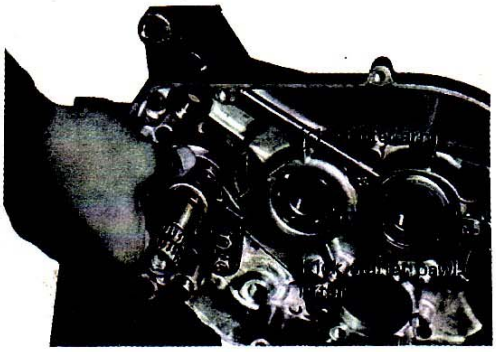

Fig. 6–3–7 Assembling kick starter shaft

8) When assembling the right and the left crankcase, make sure that the crankcase gasket is not damaged and that it has not shifted out of its proper position. Supply enough oil to the rotating parts and fit the crankcase.

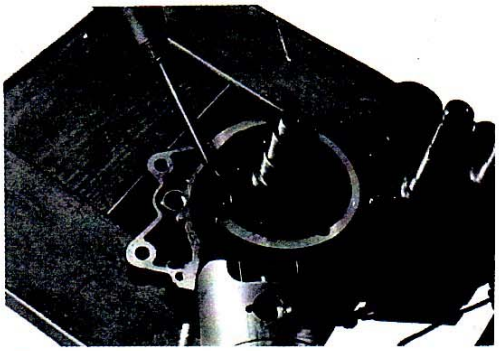

Fig. 6–3–8 Supplying oil

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9) After tightening crankcase fitting screws, fit the gear shifting pawl to the shifting pawl holder. In this case, be careful of the fitting direction of the pawls so that the wider part illustrated as A faces outside. Then fit the gear shifting stopper and the lifter.

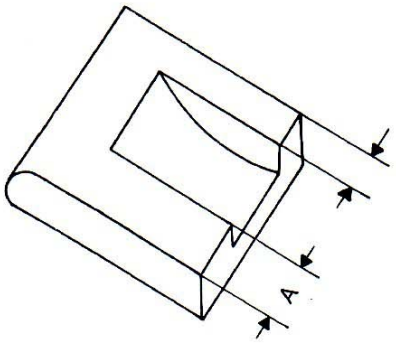

Fig. 6–3–9 Fitting direction of pawl

10) Fit the kick idle gear, the oil pump drive gear and the kick starter gear.

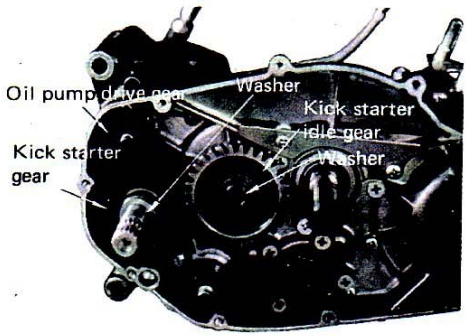

Fig. 6–3–10 Fitting kick starter relating parts

11) When inserting the gear shifting shaft, align the center of the sector located at the gear shifting shaft arm with the center of the five teeth side of the gear shifting pawl holder regardless of the gear shifting cam position. Do not align it with the four-teeth side of the pawl holder. If the components are installed in the wrong way, the gears can not be shifted.

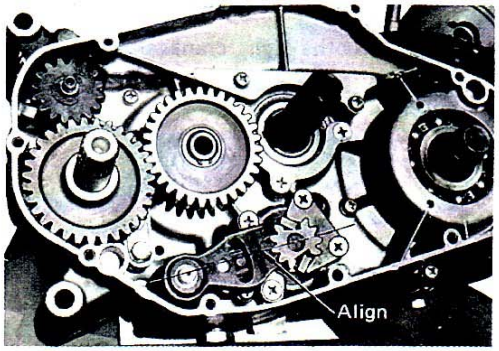

Fig. 6–3–11 Aligning center of sector with gear shifting pawl holder

12) Insert the clutch housing spacer pin into the counter shaft and fit the spacer making sure a pin on the counter shaft fits into the slot in the spacer.

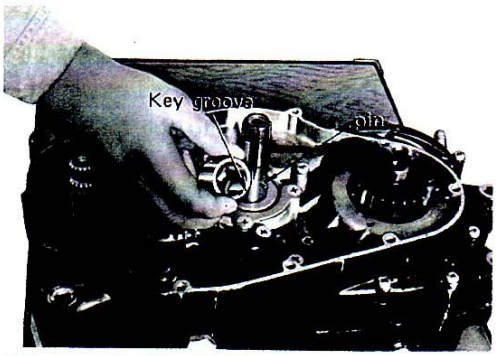

Fig. 6–3–12 Clutch housing spacer and pin

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13) After fitting the clutch pressure plate, fit the crankcase right cover. In this case be careful of the fitting direction of the clutch release rack, so that the teeth of the rack faces the gear shifting shaft as shown in Fig. 6–3–13.

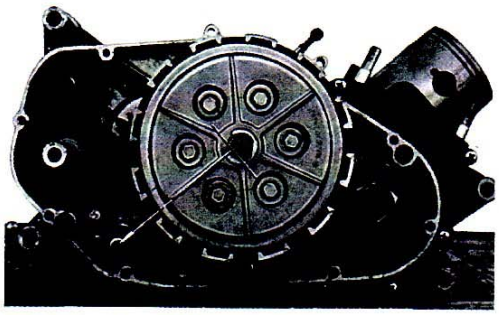

Fig. 6–3–13 Direction of clutch release rack

14) After inserting the drive shaft "O" ring to the drive shaft, install the drive sprocket spacer.
In this case, be careful of the fitting direction of the drive sprocket spacer so that the chamfered end of the spacer faces inward and contacts the drive shaft "O" ring.

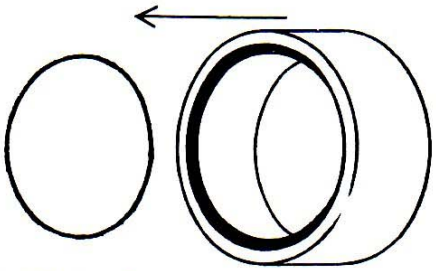

Fig. 6–3–14 Fitting direction of drive sprocket spacer

15) When installing the piston, arrow mark stamped on the piston head should be pointing forward.

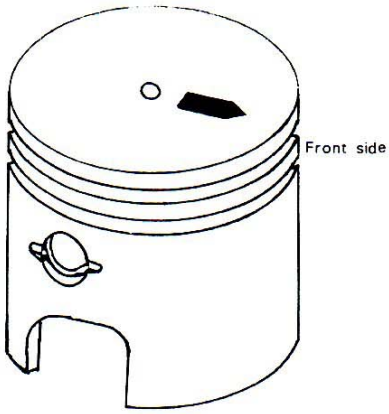

Fig. 6–3–15 Fitting direction of piston

16) The piston rings for top and second is quite same, and of key stone type. Be sure to fit the stamped mark side up, and check if the rings move smoothly in the ring grooves after installing them.

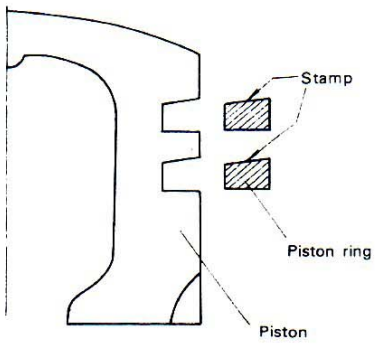

Fig. 6–3–16 Fitting piston ring

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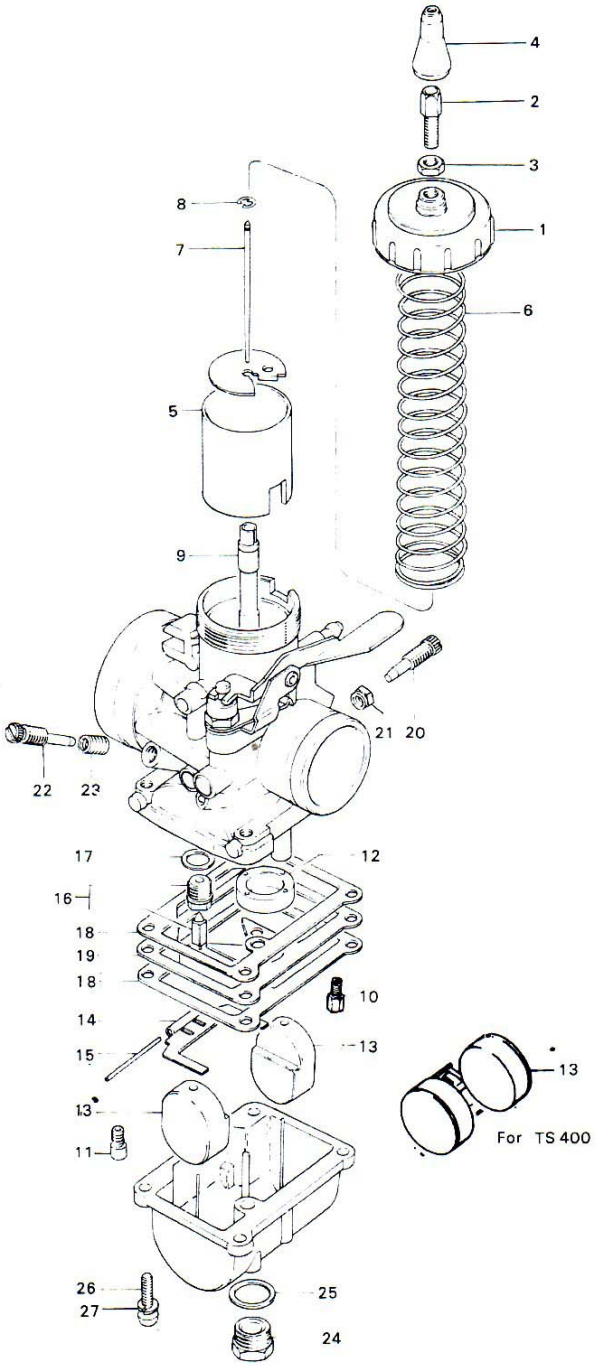
6–4. Carburetor

6–4–1. General

The carburetor for TM400 is VM34SC and for TS400 is VM32SC, and mechanism of these carburetor is not particular as compared with that of conventional carburetor.



1. Mixing chamber top
2. Cable adjuster
3. Cable adjuster nut
4. Cable adjuster boot
5. Throttle valve
6. Throttle valve spring
7. Jet needle
8. Needle clip
9. Needle jet
10. Main jet
11. Pilot jet
12. Ring
13. Float
14. Float arm
15. Float pin
16. Needle valve ass'y
17. Valve seat gasket
18. Float chamber gasket
19. Float chamber plate
20. Throttle valve adjusting screw
21. Throttle valve adjusting screw lock nut
22. Pilot air adjusting screw
23. Pilot air adjusting screw spring
24. Drain plug
25. Drain plug gasket
26. Screw
27. Lock washer

Fig. 6–4–1 Carburetor

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6–4–2. Specification

Item	TS400	TM400
Type	VM32SC	VM34SC
Main jet	#210	#310
Jet needle	6DP5, clipped into 3rd	6FJ6, clipped into 3rd
Needle jet	Q–6	Q–8
Throttle valve	3.0	2.0
Pilot jet	#40	#35
Pilot air adjusting screw	1¼ turns back open	1½ turns back open

The adequate carburetion is determined according to the result of various tests mainly in consideration of the engine power, fuel consumption and fuel cooling effect to the engine and the jets settings are done so as to satisfy and balance all of these conditions. Therefore, it is not recommended to replace the jet with the other size than original or to change the setting position of adjustable parts except when compensating the mixture ratio due to the different altitude or climate conditions.
When the adjustment is necessarily required, carry out the job referring to the section 6–4–3, 6–4–4 and 6–4–5.

6–4–3. Check of mixing ratio condition

When the air and fuel are not in proper mixing ratio, the engine will develop following symptoms.

* Mixture is too rich

1) Large amount of smoky exhaust gas, whitish in color.
2) Unsmooth engine revolution.
3) Wet spark plug porcelain, blackened with carbon.

* Mixture is too lean

1) Engine revolution fluctuates even if the throttle grip is held steady.
2) The engine tends to overheat.
3) The spark plug porcelain tends to burn out and to be whitish in color.
4) Engine condition improves when carburetor starter is operated.

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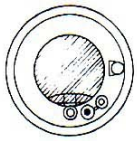
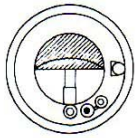
6–4–4. Adjustment at each opening of throttle valve

Prior to the following adjustment, the carburetor fuel level should be set correct.

Throttle valve opening	When too rich mixture	When too lean mixture
Idling (0–1/8) 	1) Screw out pilot air screw 2) Check the pilot air passage for clogging	1) Screw in pilot air screw 2) Check the pilot jet hole for clogging
Half (1/4–3/4) 	1) Raise jet needle clip position 2) Check the jet needle for wear 3) Check the air cleaner element for clogging by dust	1) Lower jet needle clip position 2) Check the needle jet hole for clogging
Full (3/4–Full) 	1) Replace with the smaller numbered main jet 2) Check the air cleaner element for clogging by dust	1) Replace with the larger numbered main jet 2) Check the main jet hole for clogging

For the use in high altitude, it is recommended to try a smaller main jet with decrescence of number 5 per every 1,000 meters (3,300 foot) of rise in the altitude, as a rule.

6–4–5. Fuel level

If the fuel level in the float chamber is out of the specified height, the mixture may become too rich or too lean. So it is necessary to check and adjust fuel level, especially when the float and float arm are replaced. Adjustment of fuel level is made in the following procedure.

For TS400

Turn the mixing chamber body up side down, and lower the float until the float arm tongue touches the end of the needle valve, holding the float.

Then, measure the distance A (Fig. 6–4–2) between the upper end of the float and the gasket on the mixing chamber body by means of calipers. If this measurement A is larger than STD 29~30 mm (1.14~1.18 in) the fuel level is low, while if it is smaller the fuel level is high.

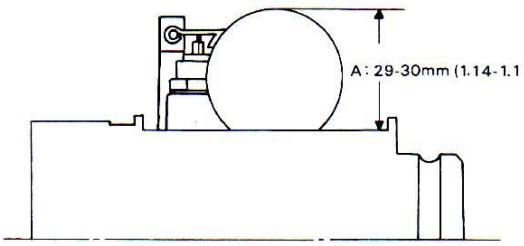


Fig. 6–4–2 Float level for TS400

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For TM400

Hold the carburetor mixing chamber upside down, while paying attention so that the float arm pin and the float arm may not come off.

If they should come off, fit float arm correctly so that tongue bent upward should face upside.

Then remove the main jet and main jet holder.

Under this condition measure the distance A as shown in Fig. 6–4–3 with calipers.

Measurement A indicates float level, and the STD figure is 10.5 mm (0.413 in).

When the A distance measured is less than STD, bend the tongue up.

If it is greater, bend the tongue down.

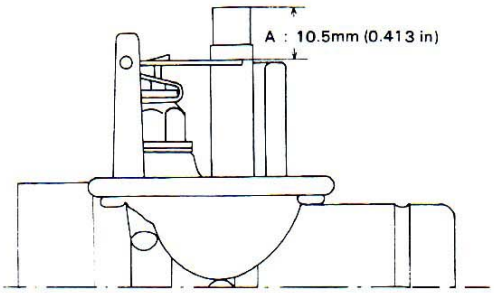

Fig. 6–4–3 Float level for TM 400

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7. ENGINE ELECTRICAL EQUIPMENT

The TS400 and TM400 employs a PEI (Pointless Electronic Ignition) system and no mechanical contact breaker point is included in this system.

7–1. Ignition Timing

7–1–1. Checking ignition timing

To check the ignition timing, start the engine and hold the engine speed at 3,000 rpm. With timing light, verify the ignition timing by observing whether the line stamped on the flywheel rotor (TS400) or inner rotor (TM 400) aligns with the mark on the crankcase (TS400) or core of pulser coil (TM400).

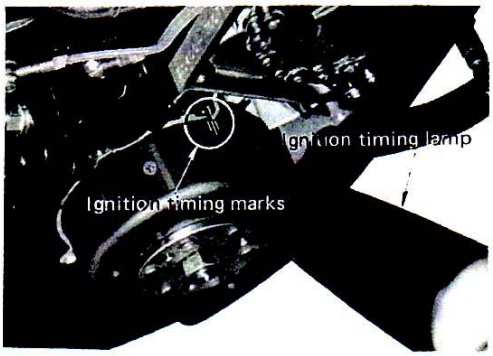

Fig. 7–1–1 Checking ignition timing for TS400

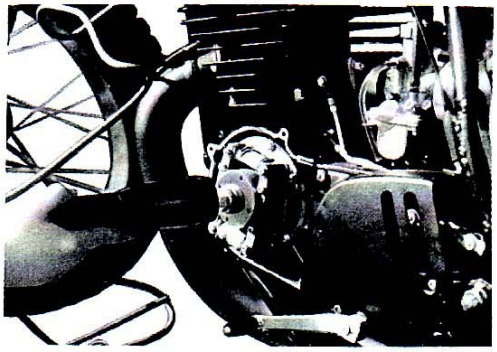

Fig. 7–1–2 Checking ignition timing for TM400

7–1–2. Adjusting ignition timing

If the aligning marks fail to match when the ignition timing is checked as described above, that is, if ignition timing adjustment is required, proceed as follows.

Loosen the three stator fitting screws and move the stator base so that stamped line A on stator and the center line of stator fitting screw will be in line. Then tighten the fitting screws.

Note: The ignition timing has been accurately adjusted during the engine manufacturing process. Therefore, just aligning the line stamped on the stator with the center line A of stator fitting screw hole as described above should virtually ensure perfect timing.

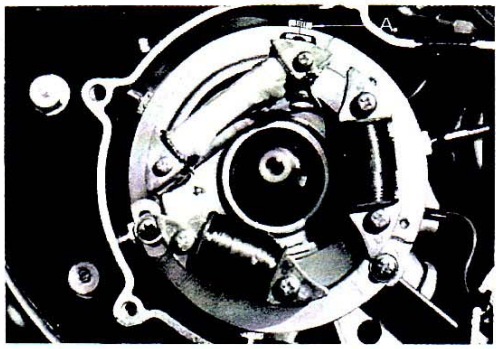

Fig. 7–1–3 Stator fitting position for TS400

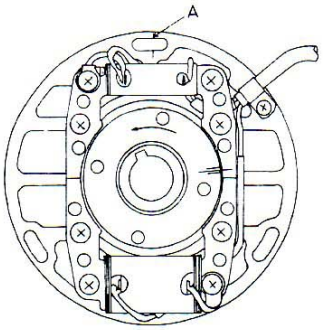

Fig. 7–1–4 Stator fitting position for TM400

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7–2. Inspecting PEI System

If the engine fails to start or misfires, check the following points with Suzuki Pocket Tester.

7–2–1. Exciter coil and Palser coil

Measure the resistance between the exciter coil lead wire (black/red), pulser coil lead wire (red/white) and coil plate.

	TS400	TM400
Normal exciter coil resistance	220 Ω	315 Ω
Normal pulser coil resistance	75 Ω	80 Ω

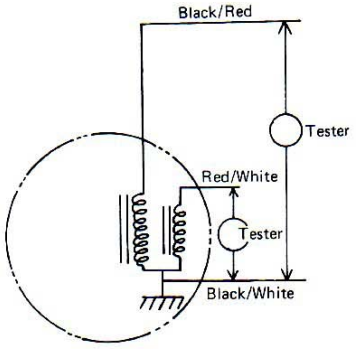

Fig. 7–2–1 Checking exciter and pulser coil

7–2–2. Ignition coil

Measure the resistances of the primary (white/blue and black/white wire) and secondary (black and black/white wire) windings.

	TS400	TM400
Normal primary coil resistance	0.7 Ω	1.5 Ω
Normal secondary coil resistance	12 k Ω	20 k Ω

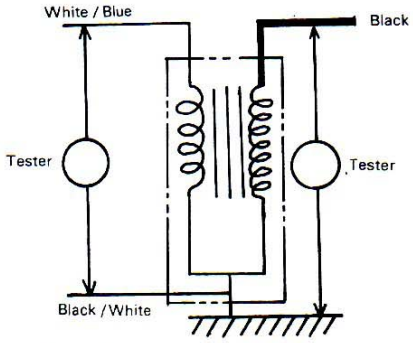

Fig. 7–2–2 Checking ignition coil

7–2–3. PEI unit

Check the PEI unit by using Suzuki Pocket tester. Do not check by Suzuki Service Tester, because use of Service Tester may cause breakage of PEI unit. If all conditions specified in the chart below are satisfied, the PEI unit is in normal state. Even if only one point is defective, the PEI unit should be replaced.

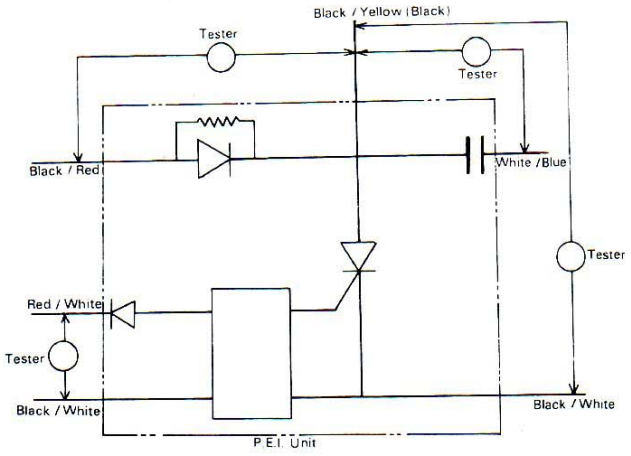

Fig. 7–2–3 Checking PEI unit

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PEI Unit Circuit Check Chart Using Suzuki Pocket Tester

Conneck to (–) terminal	Conneck to (+) terminal	Consequence
1) Black/Yellow (Black)	Black/White	No continuity
2) Black/Yellow (Black)	Black/Red	Approx. 2M Ω indication
3) Black/Yellow (Black)	White/Blue	Pointer diflects once and returns immediately
4) Red/White	Black/White	No continuity
5) Black/White	Red/White	100–500 Ω indication
6) Black/Red	Black/Yellow (Black)	Continuity
7) Black/White	Black/Yellow (Black)	Continuity

* Figures in ( ) are these for the TM400.

Note: The designation continuity in the above chart denotes the ON direction of the diode and does not signify short-circuit condition.

7–3. Charging System

The TS400 stator consists of two coils being connected in series for battery and head light.

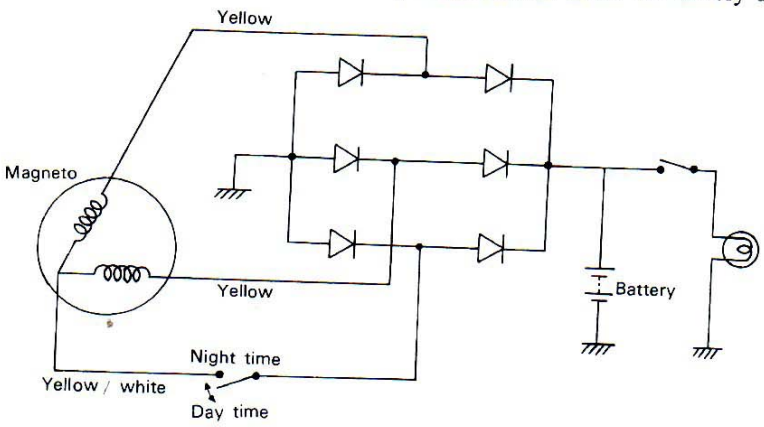

Fig. 7–3–1 Charging system wiring diagram

7–3–1. Charging capacity

1) Day time

Charging begins at below 1,500 rpm and 1.8 ± 0.5A at 7,000 rpm.

2) Night time

Charging begins at below 1,800 rpm and 2.2 ± 0.5A at 7,000 rpm.

7–3–2. Silicon rectifier

The alternate current, which is generated by the flywheel magneto, is rectified and charged to the battery. For rectification, six silicon diode rectifier is employed for TS400.

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1) Checking rectifier

Connect the rectifier wires to a tester one by one.

Check the conductivity in positive direction and negative direction in accordance with 1 to 6 in Fig. 7–3–2.

If any of the six checks is not satisfactory, it indicates that electric current flowing in the reverse direction from what is should.

Replace the rectifier with a new one as this indicates the rectifier is defective.

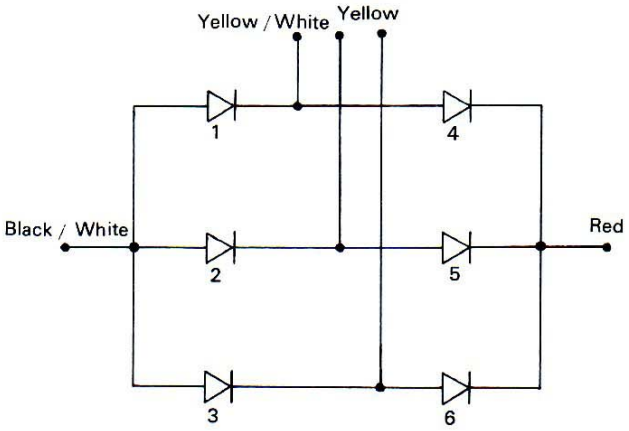

Fig. 7–3–2 Checking rectifire

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8. BODY

8–1. Air cleaner

The TS400 air cleaner element is made of washable spongy polyurethan and contains oil in it so as to further prevent the dust penetration. The construction is shown in Fig. 8–1–1.
TM400 element is made of fibrous tissue and it is not washable.

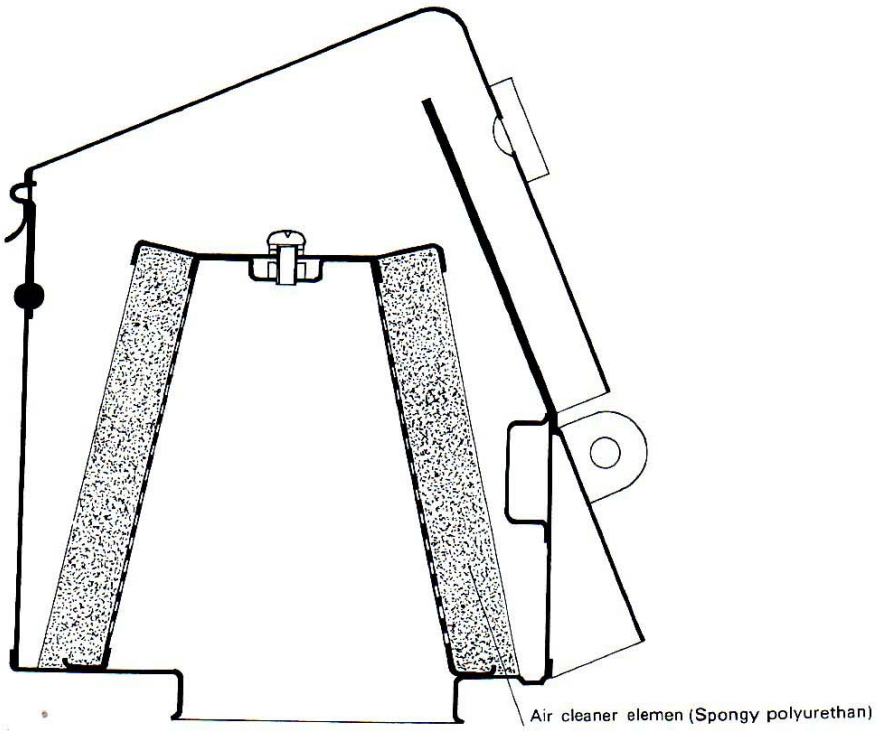

Fig. 8–1–1 Air cleaner for TS400

8–1–1. Cleaning Element

1) For TS400

When cleaning element, pull it off and wash with clean petrol. After draining the element, soak it into SUZUKI CCI oil or engine oil of around SAE NO. 30 and squeeze the oil from the element.

2) For TM400

Clean the air cleaner element by blowing compressed air.

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8–2. Front Fork

The TS400 and TM400 are equipped with telescopic double damping front fork, with the maximum stroke of 175 mm (6.9 in) for TS400 and 180 mm (7.1 in) for TM400.

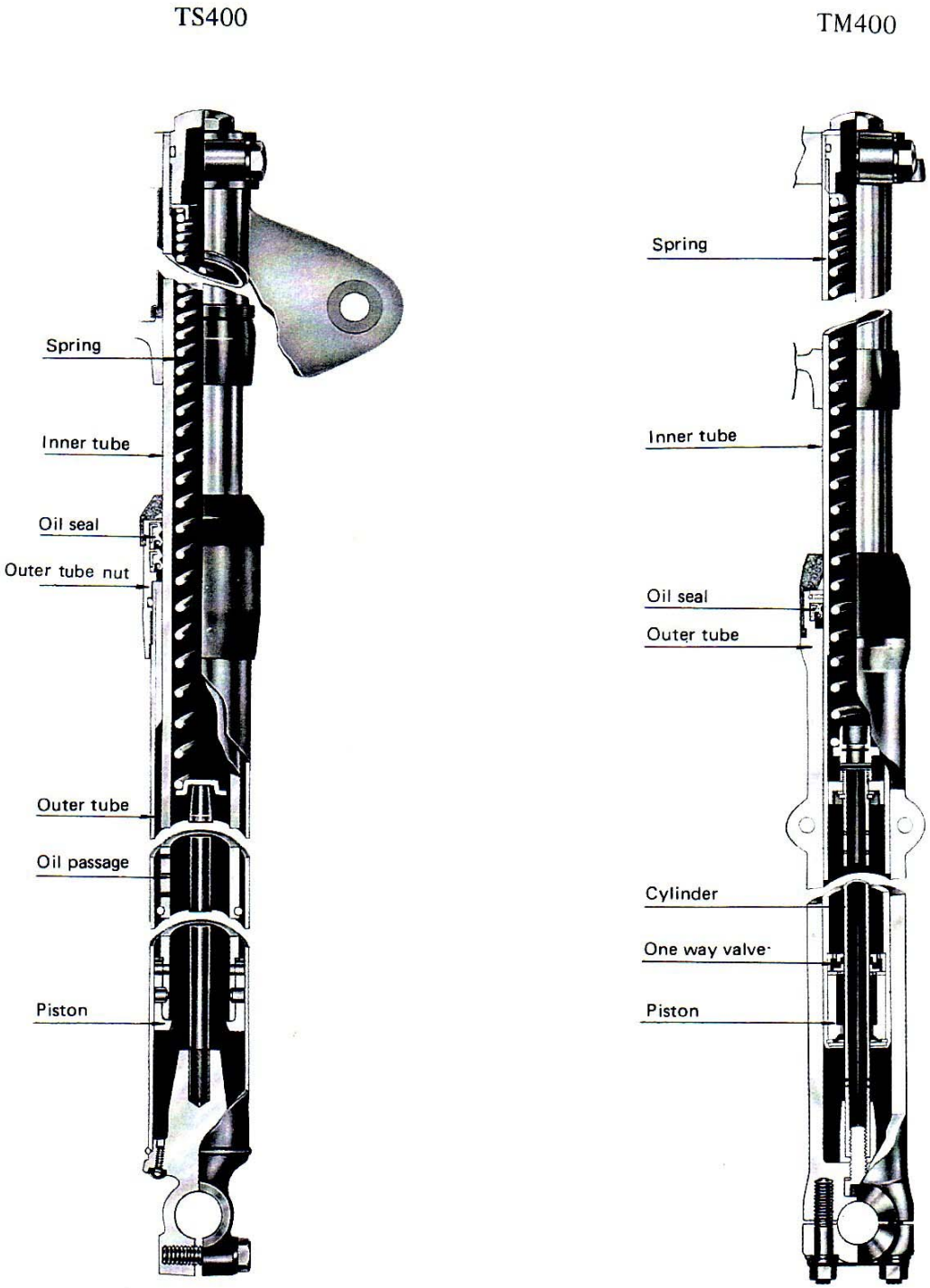

Fig. 8–2–1 Front fork

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8–2–1. Disassembling

For TS400

1) After taking off the front wheel, loosen the upper bracket clamp bolts, the inner tube cap bolts and the under bracket bolts.

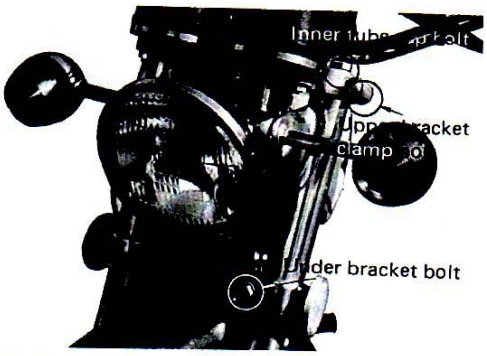

Fig. 8–2–2 Upper bracket clamp bolt, inner tube cap bolt and under bracket bolt

2) Pull out the front fork from the under bracket and remove the inner tube cap bolt.

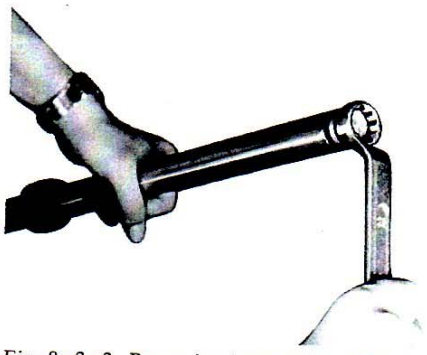

Fig. 8–2–3 Removing inner tube cap bolt

3) After pulling out the front fork spring, drain fork oil

Fig. 8–2–4 Pulling out fork spring

4) Remove the fork outer tube nut with the front fork outer tube nut wrench (Special tool 09941–00110).

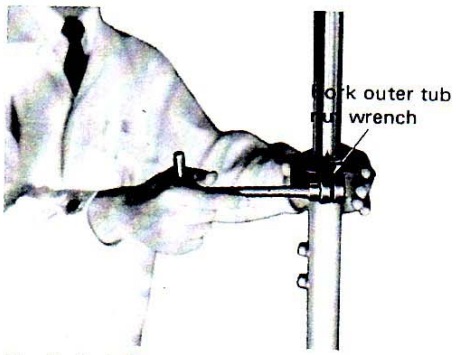

Fig. 8–2–5 Removing fork outer tube nut

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