

# DATSUN

## MODEL 411 SERIES

The Nissan logo, consisting of the word "NISSAN" in a stylized font inside a circle, which is itself inside a square border.

NISSAN

# **DATSUN**

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## **MODEL 411 SERIES**

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# **SERVICE MANUAL**



**NISSAN MOTOR CO., LTD.**  
**OTEMACHI BLDG., OTEMACHI, CHIYODA-KU,**  
**TOKYO, JAPAN**

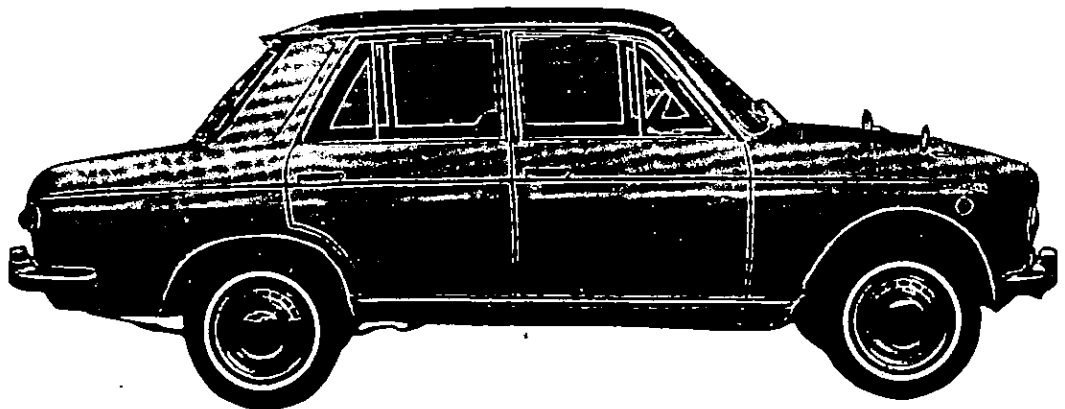
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**CABLE ADDRESS : "NISMO" TOKYO**  
**PHONES : (216) 2311**

# INTRODUCTION

This manual has been compiled for the purpose of assisting *DATSUN* distributors and dealers for effective service and maintenance of the Model P(L)411. Each assembly of the major components is described in detail. In addition, comprehensive instructions are given for complete dismantling, assembling and inspection of these assemblies.

It is emphasised that only genuine *DATSUN* Spare Parts should be used as replacements.



**DATSUN MODEL (L) 411 - U**

# CONTENTS

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	Page
<b>MAJOR SPECIFICATIONS</b>	
<b>ENGINE</b> .....	1
Cooling System .....	3
Lubrication .....	8
<b>SERVICE OPERATIONS</b> .....	11
Rocker Mechanism .....	12
<b>REMOVING &amp; REFITTING</b> .....	25
Operation with the Engine Removed .....	26
<b>IGNITION TIMING</b> .....	31
Distributor .....	31
Adjusting the Ignition Timing .....	31
<b>FUEL SYSTEM</b> .....	34
Carburetor .....	34
The Gasoline Tank .....	37
Fuel Strainer .....	40
Adjustment and Inspection of Engine .....	43
<b>CLUTCH</b> .....	48
<b>TRANSMISSION</b> .....	57
Cover of Transmission Case .....	58
Transmission Case .....	59
Extension of Transmission Case .....	65
Disassembly the Transmission Case (For 4 Stage Floor Shift) .....	72
<b>CHASSIS</b> .....	85
<b>FRONT AXLE</b> .....	85
Disassembling the Front Hub .....	86
Independent Front Suspension .....	88
<b>REAR AXLE</b> .....	98
<b>STEERING</b> .....	112
<b>BRAKE</b> .....	119
Front Brake .....	120
Rear Brake .....	123
Hand Brake .....	126
<b>ELECTRICAL SYSTEM</b> .....	129
Alternator .....	130
Generator .....	132
Regulator .....	139
14 Items on Handling .....	142
Trouble Shooting List .....	143
Starter Motor .....	144

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## MAJOR SPECIFICATION OF MODEL 411 SERIES

MODEL		P(L)411-U P(L)411-UT	WP(L)411-U WP(L)411-UT	
ITEM				
DIMENSIONS	Overall Length	3,995 mm (157.3 in.)	3,995 mm (157.3 in.)	
	Overall Width	1,490 mm ( 58.7 in.)	1,490 mm ( 58.7 in.)	
	Overall Height	1,440 mm ( 56.7 in.)	1,430 mm ( 56.3 in.)	
	Wheel Base	2,380 mm ( 93.7 in.)	2,380 mm ( 93.7 in.)	
	Room Space	Inner Length	1,710 mm ( 67.3 in.)	1,704 mm ( 67.1 in.)
		Inner Width	1,240 mm ( 48.8 in.)	1,240 mm ( 48.8 in.)
		Inner Height	1,130 mm ( 44.5 in.)	1,130 mm ( 44.5 in.)
	Tread	Front	1,206 mm ( 47.5 in.)	1,206 mm ( 47.5 in.)
		Rear	1,198 mm ( 47.2 in.)	1,198 mm ( 47.2 in.)
	Min. Road Clearance		175 mm ( 6.9 in.)	175 mm ( 6.9 in.)
	Overhang to the Front End without bumper		605 mm ( 23.8 in.)	605 mm ( 23.8 in.)
	Overhang to the Rear End without bumper		950 mm ( 37.4 in.)	947 mm ( 37.3 in.)
WEIGHT	Vehicle Weight	885 kg (1951 lb.)	960 kg (2116 lb.)	
	Distribution	Front	505 kg (1113 lb.)	500 kg (1102 lb.)
		Rear	380 kg ( 838 lb.)	460 kg (1014 lb.)
	Vehicle Gross Weight	1,160 kg (2557 lb.)	1,235 kg (2723 lb.)	
	Distribution	Front	600 kg (1323 lb.)	595 kg (1312 lb.)
		Rear	560 kg (1234 lb.)	640 kg (1411 lb.)
	Height of Gravity Center		580 mm ( 22.8 in.)	580 mm ( 22.8 in.)
	Proportion of Front Tire with load		51.7 %	48.2 %
Max. Inclination	Right	46	46	
Angle	Left	46	46	

# DATSUN

ITEM	MODEL	P(L)411-U	WP(L)411-U
		P(L)411-UT	WP(L)411-UT
PERFORMANCE	Max. Speed	140 km/H (87 MPH)	140 km/H (87 MPH)
	Fuel Consumption	18.5 km/ℓ	18.5 km/ℓ
	Grade Ability sinθ	0.375, 0.417 (-UT)	0.334, 0.391 (-UT)
	Min. Turning Radius	5.0 m (16.4 ft.)	5.0 m (16.4 ft.)
	Brake Stopping Distance (50 km/h)	13.5 m (44.3 ft.)	13.5 m (44.3 ft.)
ENGINE	Model	J	
	Make	NISSAN MOTOR CO., LTD.	
	Classification	GASOLINE ENGINE	
	Cooling System	WATER FORCED CIRCULATION	
	No. of Cylinder & Arrang.	4 IN LINE	
	Cycle	4	
	Combustion Chamber	BATHTUB TYPE	
	Valve Arrangement	OVER HEAD VALVE	
	Bore x Stroke	73 x 77.6 mm (2.874 x 3.055 in.)	
	Displacement	1299 c.c. (79.27 cu.in.)	
	Compression Ratio	8.2	
	Compression Pressure	11.5/350 kg/cm <sup>2</sup> (r.p.m.)	
	Max. Exploding Pressure	48/3600 kg/cm <sup>2</sup> (r.p.m.)	
	Max. Mean Effective Press	9.7/28000 kg/cm <sup>2</sup> (r.p.m.)	
	Max. B.H.P. (SAE)	67/5200 HP/r.p.m.	
	Max. Torque (SAE)	76.7/2800 ft-lb/r.p.m. (10.6/2800 kg-m/r.p.m.)	
	Length x Width x Height	597 x 575 x 690 mm (23.1 x 22.6 x 26.5 in.)	
	Weight	139 kg (306 lb.)	
Piston Type	SPLIT SKIRT TYPE		
Piston Material	LO-EX		

## MAJOR SPECIFICATION

ITEM		MODEL	P(L)411-U P(L)411-UT	WP(L)411-U WP(L)411-UT
<b>ENGINE</b>	No. of Piston Ring	Pressure Oil	2 1	
	Valve Timing	Inlet Open	14° B.T.D.C.	
		Inlet Close	50° A.B.D.C.	
		Exh. Open	52° B.B.D.C.	
		Exh. Close	12° A.T.D.C.	
	Valve Clearance	Intake	0.35 mm (0.014 in.)	
Exhaust		0.35 mm (0.014 in.)		
<b>BATTERY</b>	Starting Method		MAGNETIC STARTING SYSTEM	
	Type		N41 (14MZ), N50 (2SMB) 1 each	
	Voltage		12V	
	Capacity		40, 50 A.H.	
	Ground Polarity		NEGATIVE	
<b>GENERATOR</b>	Type		AC300/12WR	
	Make		MITSUBISHI	
	Generating Method		ALTERNATOR	
	Voltage		12V	
	Capacity		300 W	
	Voltage Regulator		RL-2B1	
<b>STARTER</b>	Type		S114-92	
	Make		HITACHI	
	Voltage & Power		12-1.4V-HP	
<b>IGNITION SYSTEM (GASOLINE)</b>	Ignition Method		BATTERY-COIL TYPE	
	Ignition Timing		8° /600 B.T.D.C./r.p.m.	
	Firing Order		1-3-4-2	

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ITEM	MODEL		P(L)411-U P(L)411-UT	WP(L)411-U WP(L)411-UT
	IGNITION SYSTEM (GASOLINE)	Ignition Coil	Type	C1Z-18
Make			HITACHI	
Distributor		Type	D411-53	
		Make	HITACHI	
Distributor		Ign. Timing Advance System	VACUUM AND GOVERNOR	
Spark Plug		Type	B-6E	
		Make	NGK	
		Thread	14 mm (0.551 in.)	
		Gap	0.7 ~ 0.8 mm (0.0275 ~ 0.0315 in.)	
Carburetor		Type	D2630A-5A	
		Make	NIHONKIKAKI	
		Throttle Valve Bore	P. 26 mm	S. 30 mm
		Venturi Size	20 mm	27 mm
		Main Jet	#92	#140
		Slow Jet	#48	# 48
		Pump Jet	#45	
		Power Jet	#40	
		Air Draught	DOWN	
Air Cleaner		Type & No.	PAPER TYPE 1 each	
		Make	TSUCHIYA	
Fuel Pump	Type	DIAPHRAGM		
	Make	SHOWA, KYOSAN		
Capacity of Fuel Tank			41 ℓ r (10.8 U.S.gal.)	
LUB- RICA- TION	Lubrication Method		FORCED PRESSURE TYPE	



## MAJOR SPECIFICATION

	MODEL	P(L)411-U P(L)411-UT	WP(L)411-U WP(L)411-UT	
LUBRICATION	Oil Pump Type	TROCHOID TYPE		
	Oil Filter	FULL FLOW TYPE (CARTRIDGE TYPE)		
	Oil Pan Capacity	2.9 ℓ r (0.76 U.S.gal.)		
COOLING SYSTEM	Type	WATER COOLING CLOSED TYPE		
	Radiator	CORRUGATED FIN AND TUBE TYPE		
	Cooling Water Capacity	5.4 ℓ r (1.43 U.S.gal.)		
	Water Pump Type	CENTRIFUGAL TYPE		
	Thermostat	PELLET TYPE		
CLUTCH	Type	SINGLE DRY DISC HYDRAULIC OPERATION		
	No. of Plate	1 (FACING 2)		
	Out. dia x In. dia x Thickness	200 x 130 x 3.5 mm (7.87 x 5.12 x 0.138 in.)		
	Total Friction Area	181 x 2 cm <sup>2</sup> (28.06 x 2 sq.in.)		
	In. dia. of Operating Cylinder	19.05 mm (3/4 in.)		
	In. dia. of Master Cylinder	15.87 mm (5/8 in.)		
TRANSMISSION	Type	3 FORWARD, 1 REVERSE ALL SYNCHROMESHED ON FORWARD GEARS	4 FOREARD, 1 REVERSE SYNCHROMESHED ON 2ND, 3RD, 4TH	
	Gear Shift Method	REMOTE CONTROL	FLOOR SHIFT	
	Oil Capacity	1.7 ℓ (0.45 U.S.gal.)	2.2 ℓ (0.58 U.S.gal.)	
	Gear Ratio	1st	3.197	3.945
		2nd	1.725	2.402
		3rd	1.000	1.490
		4th		1.000
Reverse		4.125	5.159	
PROPELLER SHAFT	1st Length x Out. dia x In. dia.	1222 x 71 x 67.8 mm		
	Type of Universal Joint	SPICER TYPE		
FINAL GEAR	Gear Type	HYPOID		

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ITEM		MODEL		
		P(L)411-U P(L)411-UT	WP(L)411-U WP(L)411-UT	
FINAL GEAR	Gear Ratio	4.375 P(L)411-U WP(L)411-U	4.111 (OP.3889) P(L)411-UT WP(L)411-UT	
	Housing Type	BANJO		
	Type & No. of Gear	STRAIGHT BEVEL PINION 2 each		
DIFF. GEAR	Oil Capacity	1 ℓ (0.26 U.S.gal.)		
	Type	RECIRCULATING BALL TYPE		
	Gear Ratio	15.0		
STEERING SYSTEM	Steering Angle	In	36°	
		Out	28° 36'	
	Steering Wheel Dia.	405 mm (15.95 in.)		
	Oil Capacity	0.33 ℓ (0.087 U.S.gal.)		
	Wheel Arrangement	2 FRONT, 2 REAR		
RUNNING DEVICE	Front Axle Type	WISHBONE BALL JOINT TYPE		
	Toe-in	3 mm		
	Camber	1° 45'		
	Caster	0		
	Inclination Angle of King Pin	6° 15'		
	Rear Axle Type	SEMI-FLOATING TYPE		
	BRAKE SYSTEM	SERVICE BRAKE	Type	FRONT: 2 LEADING; REAR: LEADING AND TRAILING
Lining Dimension (Width x Thickness x Length)			F.	40 x 4.5 x 215 mm (1.575 x 0.177 x 8.465 in.)
			R.	40 x 4.5 x 215 mm (1.575 x 0.177 x 8.465 in.)
Total Braking Area			F.	351 cm <sup>2</sup> (54.4 in <sup>2</sup> )
			R.	351 cm <sup>2</sup> (54.4 in <sup>2</sup> )
In.dia. of Brake Drum			F.	228.6 mm (9.0 in.)
	R.	228.6 mm (9.0 in.)		

## MAJOR SPECIFICATION

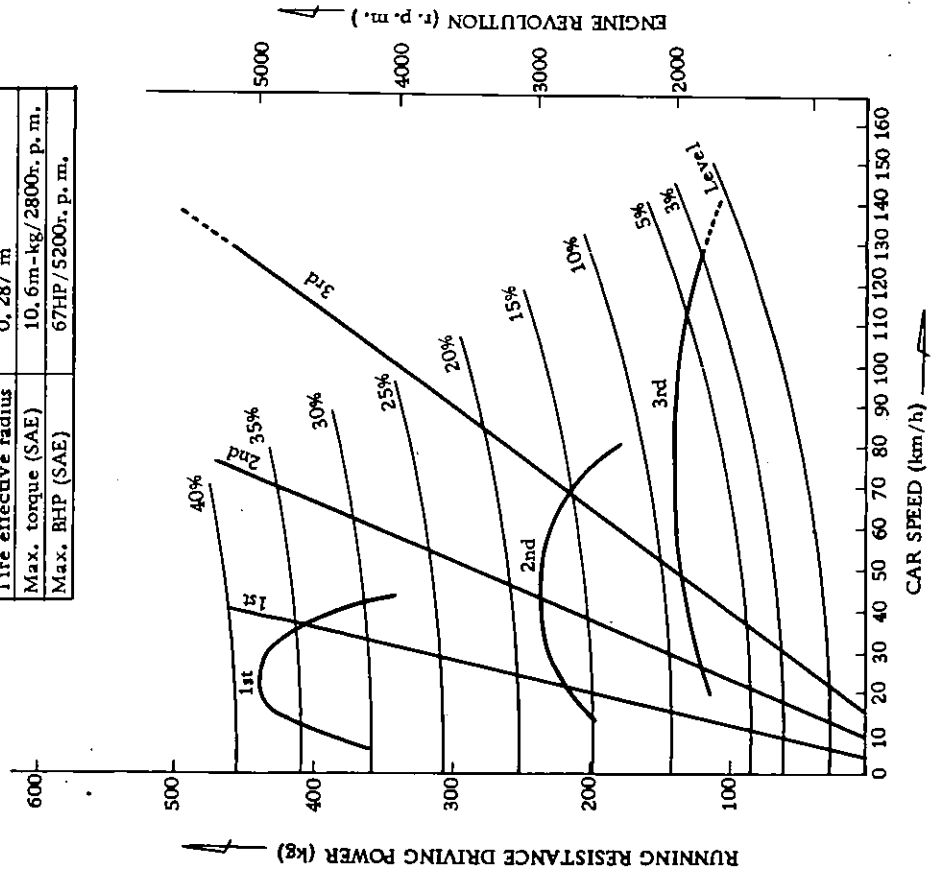
ITEM		MODEL	P(L)411-U P(L)411-UT	WP(L)411-U WP(L)411-UT	
<b>BRAKE SYSTEM</b>	<b>SERVICE BRAKE</b>	<b>OIL BRAKE</b>	In.dia. of Master Cylinder	22.22 mm (0.8748 in.)	
			In.dia. of Wheel Cylinder	25.40 mm (1.000 in.)	
			F.		
			R.	23.81 mm (0.9374 in.)	
		Max. Oil Pressure	115 kg/cm <sup>2</sup> (1636 lb/in <sup>2</sup> )		
	<b>PARKING BRAKE</b>	Type		MECHANICAL FOR REAR WHEEL	
		Lining Dimension		40 x 4.5 x 215 mm (1.575 x 0.177 x 8.465 in.)	
		Total Braking Area		351 cm <sup>2</sup> (54.4 sq.in.)	
In. dia. of Drum		228.6 mm (9.0 in.)			
<b>SUSPENSION</b>	Front Suspension Type		INDEPENDENT SUSPENTION WITH COIL SPRING		
	Coil (Wire dia. x Coil dia. x Free Length - No. of Coils)		R.H. CAR 14.2 x 94 x <sup>336(R)</sup> / <sub>325(L)</sub> -8.5,	L.H. CAR 14.2 x 94 x 325-8.5	
	Rear Suspension Type		LONGITUDINAL SEMI-ELLIPTING SPRING		
	Spring Size (Length x Width x Thickness - No.)		1200 x 60 x <sup>6-2</sup> / <sub>5-2</sub>	1200 x 60 x <sup>6-3</sup> / <sub>5-2</sub>	
	Shock Absorber	F.	TELESCOPIC DOUBLE ACTION		
	Shock Absorber	R.	TELESCOPIC DOUBLE ACTION		
	Stabilizer	F.	TORSION BAR TYPE		
<b>WHEEL &amp; TIRES</b>	Tire Size	F.	5.60 - 13 - 4P		
		R.	5.60 - 13 - 4P		
<b>LAMPS</b>	Head Lamp (Sealed beam)		12V-37.5/50W x 2		
	Width Indicators		12V- 8W x 2		
	Tail Lamps		12V- 8W x 2		
	License Plate Lamps		12V- 8W x 2		
	Stop Lamps		12V-25W x 2		
	Reverse Lamps		12V-25W x 1		
	Room Lamps		12V- 5W x 1		

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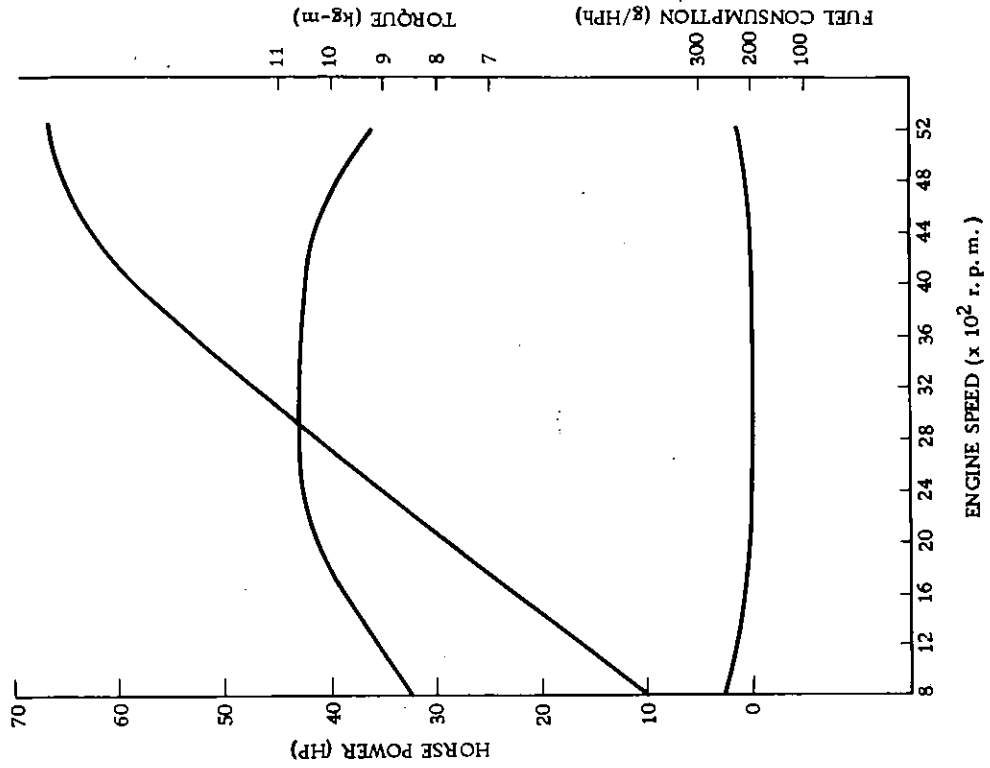
ITEM \ MODEL		P(L)411-U P(L)411-UT	WP(L)411-U WP(L)411-UT
		LAMPS	Fog Lamps
Inspection Lamps	12V- 8W x 1		
Parking Lamps	12V- 8W x 4		
Turn Signal Lamps	12V-25W x 4		
Dash Lamps	12V- 3W x 4		
Reflection	32.5 $\phi$ x 2		
Warning Lamps			
Turn Signal	12V-15W x 2		
Main Beam	12V-1.5W x 1		
Ignition	12V-1.5W x 1		
Oil Pressure	12V-1.5W x 1		

### MODEL P(L) 411-U RUNNING PERFORMANCE CURVE

Final gear ratio	4.375 (35/8)
1st speed ratio	3.197
2nd speed ratio	1.725
3rd speed ratio	1.000
4th speed ratio	
Gross vehicle weight	1,160 kg
Max. grade ability	$\tan \theta = 0.382$ ( $\sin \theta = 0.357$ )
Tire effective radius	0.287 m
Max. torque (SAE)	10.6m-k <sub>g</sub> /2800r. p. m.
Max. BHP (SAE)	67HP/5200r. p. m.

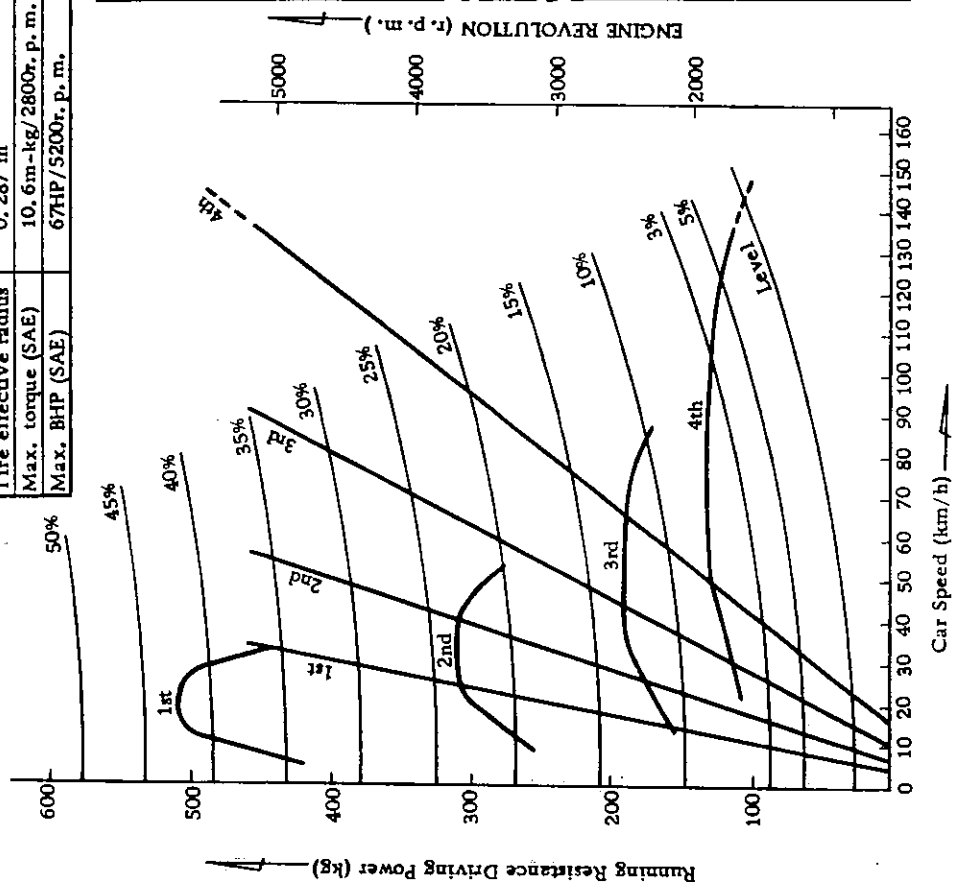


### MODEL J ENGINE PERFORMANCE CURVE



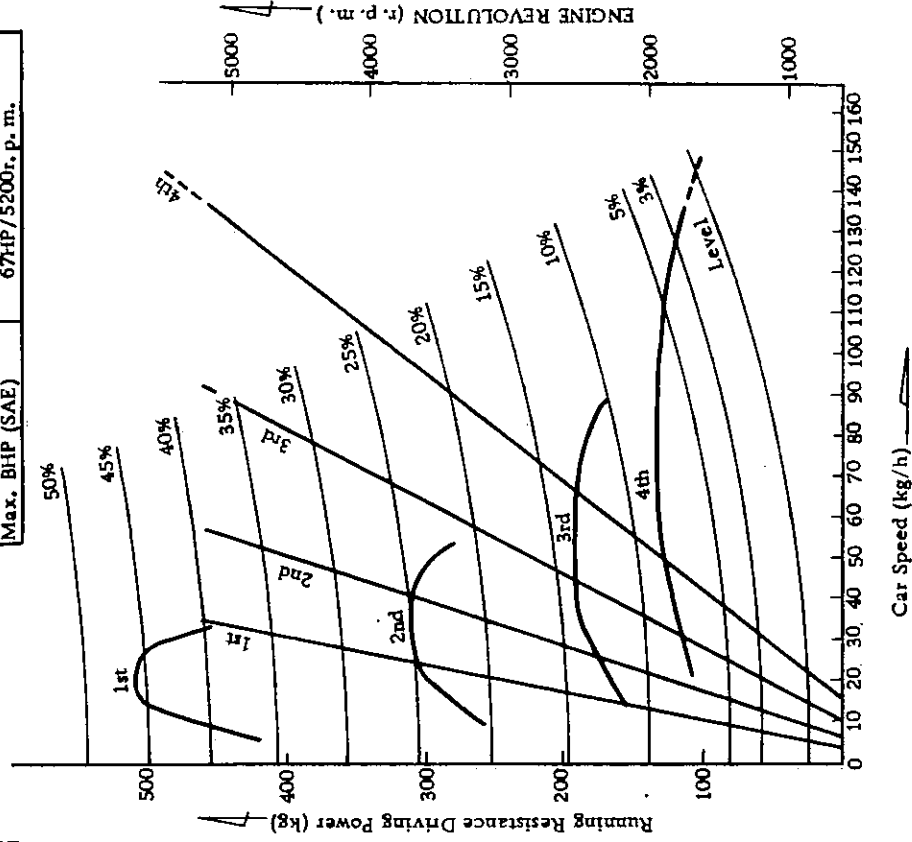
MODEL WP(L) 411-UT  
RUNNING PERFORMANCE CURVE

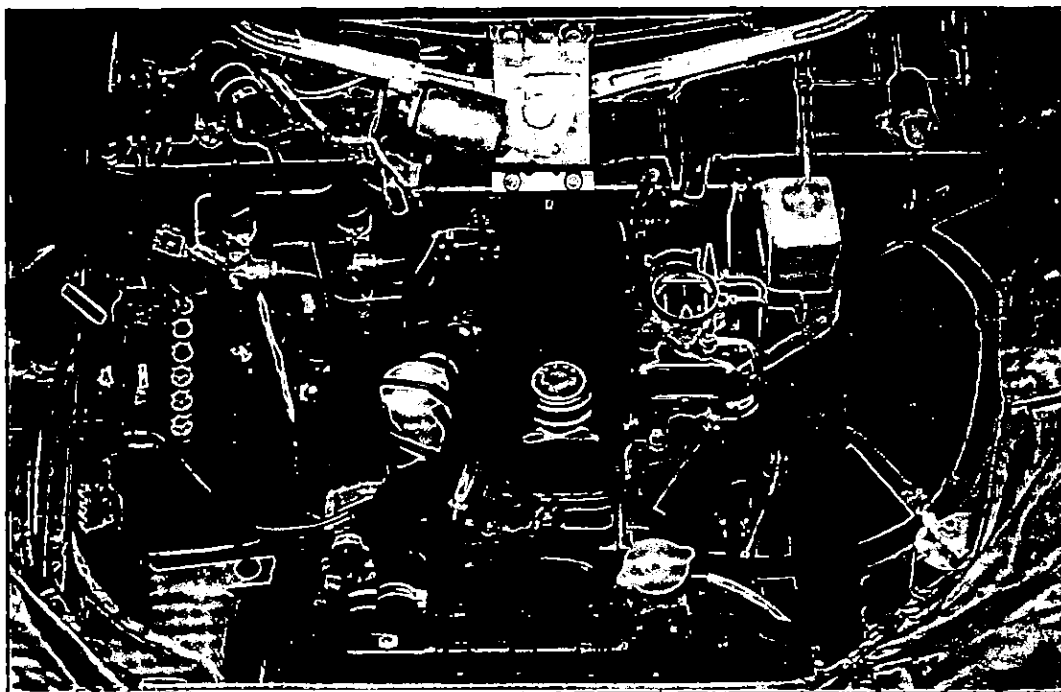
Final gear ratio	4.111
1st speed ratio	3.945
2nd speed ratio	2.403
3rd speed ratio	1.490
4th speed ratio	1.000
Gross vehicle weight	1,235 kg
Max. grade ability	$\tan \theta = 0.425 (\sin \theta = 0.391)$
Tire effective radius	0.287 m
Max. torque (SAE)	10.6 m-kg/2800r. p. m.
Max. BHP (SAE)	67HP/5200r. p. m.



MODEL P(L) 411-UT  
RUNNING PERFORMANCE CURVE

Final gear ratio	4.111
1st speed ratio	3.945
2nd speed ratio	2.403
3rd speed ratio	1.490
4th speed ratio	1.000
Gross vehicle weight	1,160 kg
Max. grade ability	$\tan \theta = 0.459 (\sin \theta = 0.417)$
Tire effective radius	0.287 m
Max. torque (SAE)	10.6 m-kg/2800r. p. m.
Max. BHP (SAE)	67HP/5200r. p. m.



**ENGINE****ENGINE**

The engine is of monobloc construction, and the valve are set in line in the cylinder head and are operated by rockers and push rods from the camshaft in the left hand side of the engine.

The camshaft, running in three steel backed whitmetal bearings, is chain-driven and has a rubber chain tenssioner.

The distributor and oil pump are driven from the camshaft.

The pistons are the split skirt type of

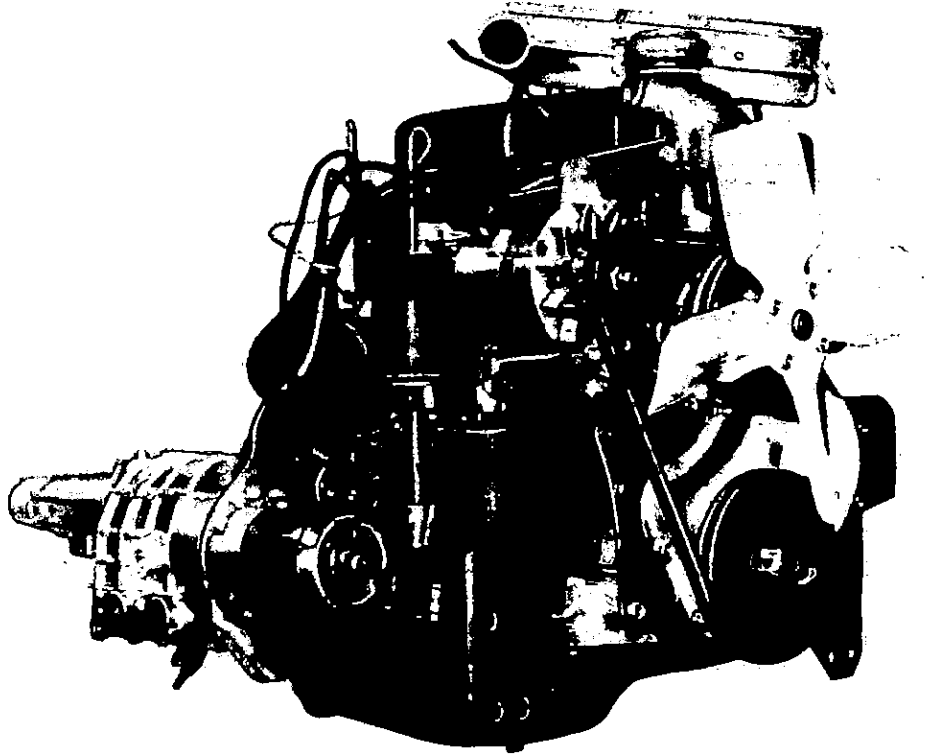
aluminum alloy, and carry two compression rings and a slotted oil control ring.

The piston pins are bolted in connecting rods, which have steel backed lead and copper alloy, changeable big end bearings.

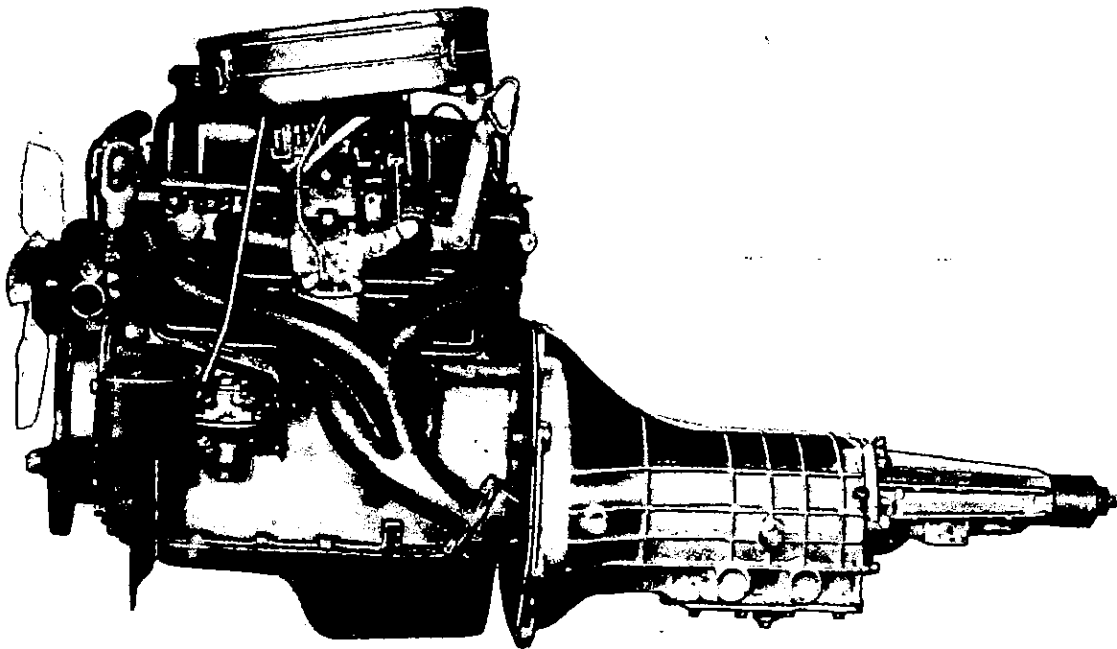
A counter balanced crankshaft is fitted. The end thrust on this component is taken by special washers at the center main bearing. The centrifugal water pump and cooling fan are driven by the generator belt.

**GENERAL SPECIFICATIONS**

Engine type .....	J type
No. of Cylinder .....	4
Bore (mm) .....	73 mm
Stroke .....	77.6 mm
Volume .....	1.299
Max. brake horse power .....	67 HP. at 5200 r.p.m.
Torque .....	10.6 kg-m at 2800 r.p.m.
Firing order .....	1-3-4-2
Valve arrangement .....	Overhead valve, push rod type
Compression pressure .....	163 lbs. per sq. in. (11.5 kg/cm <sup>2</sup> ) at 350 r.p.m.
Compression ratio .....	8.2 : 1



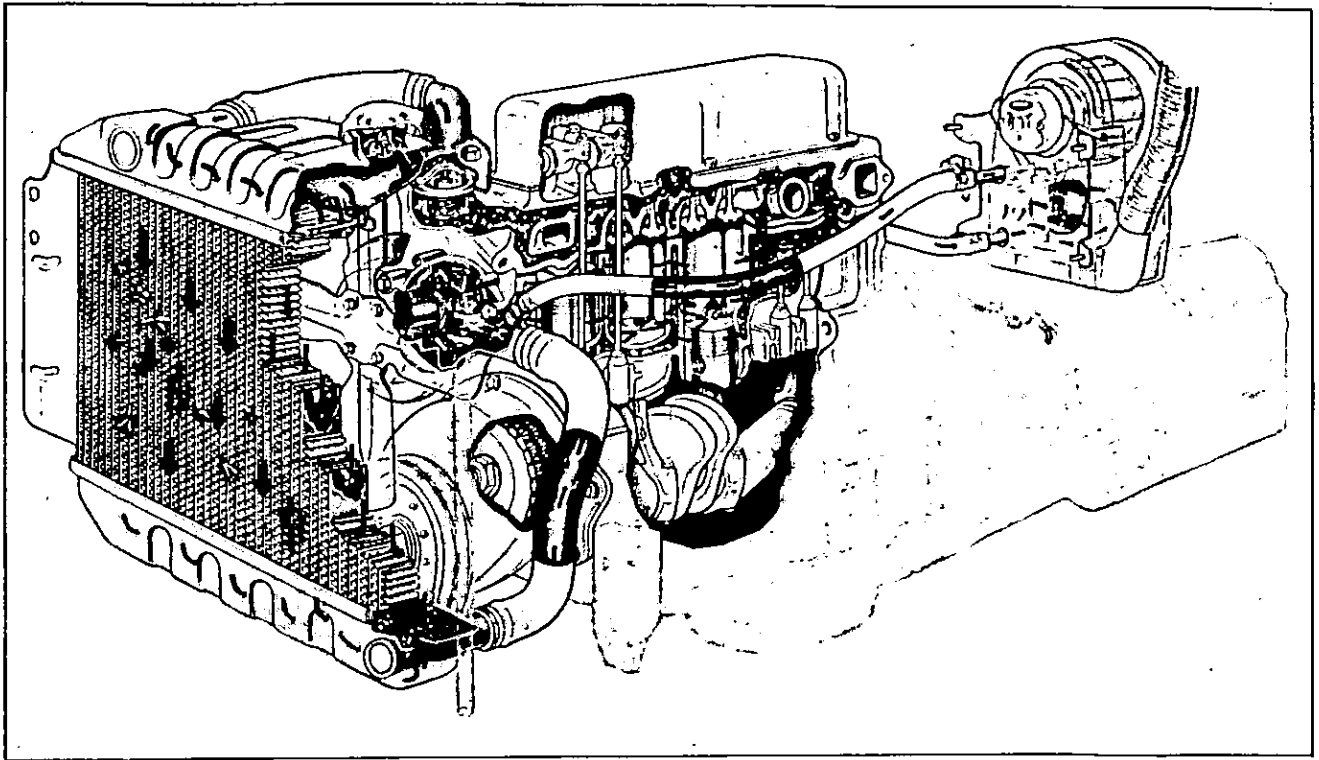
*ENGINE-RIGHT SIDE*



*ENGINE-LEFT SIDE*



## COOLING SYSTEM

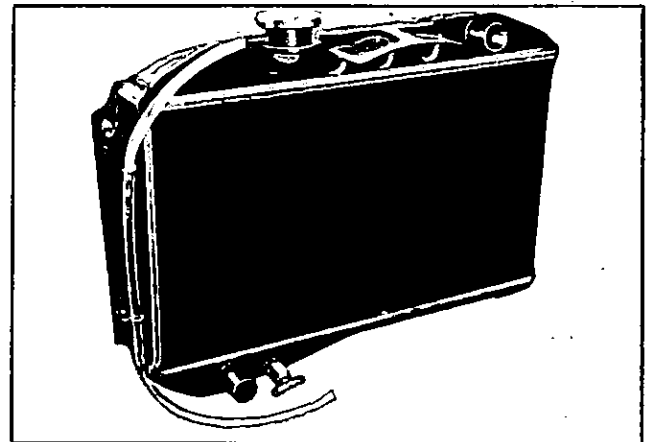


An efficient cooling system is of major importance to ensure the satisfactory running of the engine and it is therefore necessary to pay particular attention to its maintenance.

**Description**

The cooling system is maintained by water pump circulation, combined with an efficient fan cooled radiator and thermostat.

The system is pressurised and the relief valve, incorporated in the radiator filler cap, controls the pressure at approximately 0.4 kg per sq. cm. Do not remove the filler cap if the temperature of the coolant is above boiling point or if the engine is running. Topping-up should only be required occasionally to replace water lost through the overflow pipe. Top-up when the engine is cold, and if possible use clean soft water.



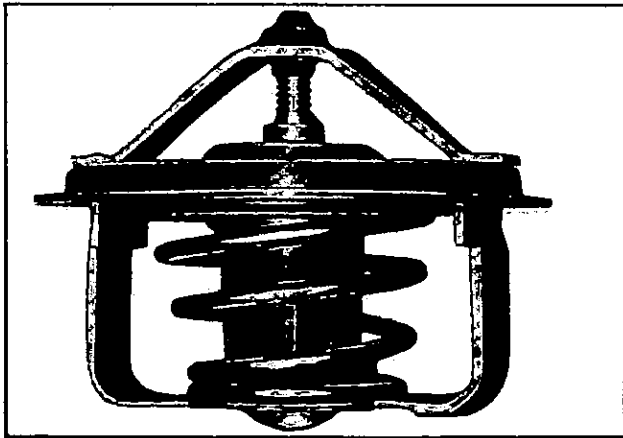
*Fig. 1 Radiator*

Fill to within 1/2" of the bottom of the filler plug well. Overfilling when the engine is cold may cause water to flow through the overflow pipe. The capacity of the system is approximately 5.2 litres.

## Thermostat

In order to ensure maximum efficiency, it is essential to keep the engine operating temperatures within certain limit. To assist this a pellet type thermostat is fitted, being located in the water outlet at front of the cylinder head.

Pellet type thermostat works by the principle of rapid variation of solution of wax.



*Fig. 2 Pellet Type Thermostat*

The device consists of metallic pellet, filled with the wax, which controls a mash-room valve by solution of wax.

When the engine is cold this valve is closed and on starting the engine the flow of water to the radiator is temporarily restricted.

Due this, the temperature of the water in the cylinder head and cylinder jackets will quickly rise, thus ensuring rapid warming up.

The heat so generated will gradually press up the piston by shrinkage of synthetic rubber sleeve so opening the valve, and ultimately permitting a full flow of water to the radiator. The thermostat itself is detachable; therefore, should be occasion arise, it can be removed

from its housing and the hose reconnected to avoid laying up the car.

The thermostat opening is set by the manufacturer and can not be altered.

During decarbonising it is policy to test this opening by immersing the thermostat in water raised to requisite temperature. The valve should open under these conditions, but if it fails to open a new unit should be fitted.

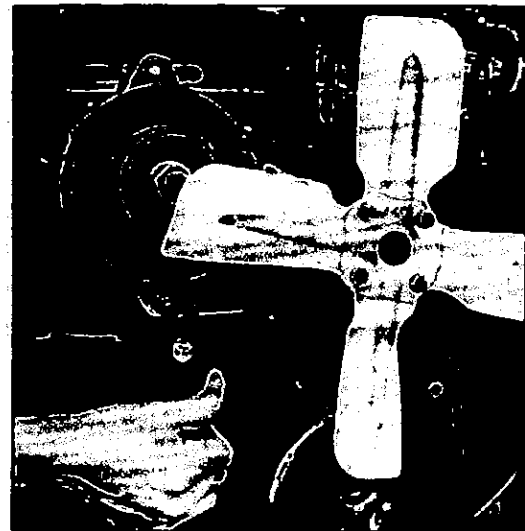
## Overheating

Overheating may be caused by a slack fan belt, excessive carbon deposit in the cylinders, running with the ignition too far retarded, incorrect carburetor adjustment, failure of the water to circulate or loss of water.

## Fan Belt Adjustment

The fan is driven from the crankshaft by a "V" belt, this also driving the alternator.

A new belt can be fitted by first loosening the clamp bolts (Fig. 3), which hold the dynamo in position, and moving the dynamo towards the engine. Slide the belt over the fan and onto the fan pulley.



*Fig. 3 Fan Belt Adjustment*

	Part No.	Rated Temperature
Standard	21200 61001	Open at $76.5^{\circ}\text{C} \pm 1.5^{\circ}\text{C}$ Open fully at $90 \pm 1.5^{\circ}\text{C}$
Optional for cold district	21200 61001	Open at $82^{\circ}\text{C} \pm 1.5^{\circ}\text{C}$ Open fully at $95 \pm 1.5^{\circ}\text{C}$

Adjustment is then made by bringing the alternator away from the engine. The belt should be sufficiently tight to prevent slip, yet the belt should have 10 to 15 mm slack between the generator and crankshaft pulley when the midspan is pushed firmly.

After the correct tension has been obtained, securely lock it in position again.

### Frost Precautions

Freezing may occur first at the bottom of the radiator or in the lower hose connections.

Ice in the hose will stop water circulation and may cause boiling. A muff can be used to advantage, but care must be taken not to run with the muff fully closed, or boiling will result. When frost is expected or when the car is to be used in a very low temperature, make sure that the strength of the solution is, in fact, up to the strength advised by the manufacturers. The strength of the solution must be maintained by topping-up with anti-freeze solution as necessary. Excessive topping-up with water reduces the degree of protection afforded. Solution must be made up in accordance with instructions supplied with the container.

Top-up when the system is cold.

If the cooling system has to be drained, run the mixture into a clear container and use again.

### Protection by Draining

On cars where anti-freeze is not used the following precautions must be taken during frosty weather to obviate any damage due to freezing of the cooling system.

When heavy frost is imminent, the cooling system must be completely drained. It is not sufficient merely to cover the radiator and engine with rugs and masks. There are two drain cocks one on the left-hand side of the cylinder block and the other at the base of the radiator block. Both taps must be opened to drain the system and the car must be on level ground while draining.

The drain taps should be tested at frequent intervals by inserting a piece of wire to ensure that they are clear. This should be done immediately the taps are opened, so that any obstruction freed by the wire may be flushed out by the water. The draining should be carried out when the engine is hot.

When completely drained the engine should be run for a timed minute to ensure that all water has been cleaned from the system.

A suitable notice should be then affixed to the radiator, indicating that the water has been drained.

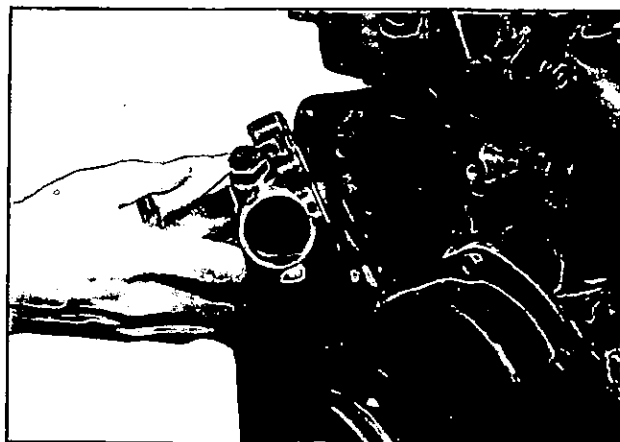
### Flushing the Radiator

To ensure efficient circulation of the coolant and to reduce the formation of scale and sediment in the radiator, the system should be periodically flushed with clear running water, preferably before putting in anti-freeze in the winter and again when taking it out in the spring. The water should be allowed to run through until it comes out clear from the drain taps. At intervals a stiff piece of wire should be inserted into the taps during draining to ensure that they are not becoming clogged with sediment.

This method of radiator flushing may serve well, but in cases where the "urging" up is excessive the operator will find it more efficient practice to remove the radiator completely and flush in the reverse way to the flow, turn the radiator upside down and let the water flow in through the bottom hose connection and out of the top connection.

### Water Pump

After draining the water from the radiator, remove the pump unit from the cylinder block by taking off the fan belt and releasing the setbolts with spring washers and hinge bolts to dynamo.



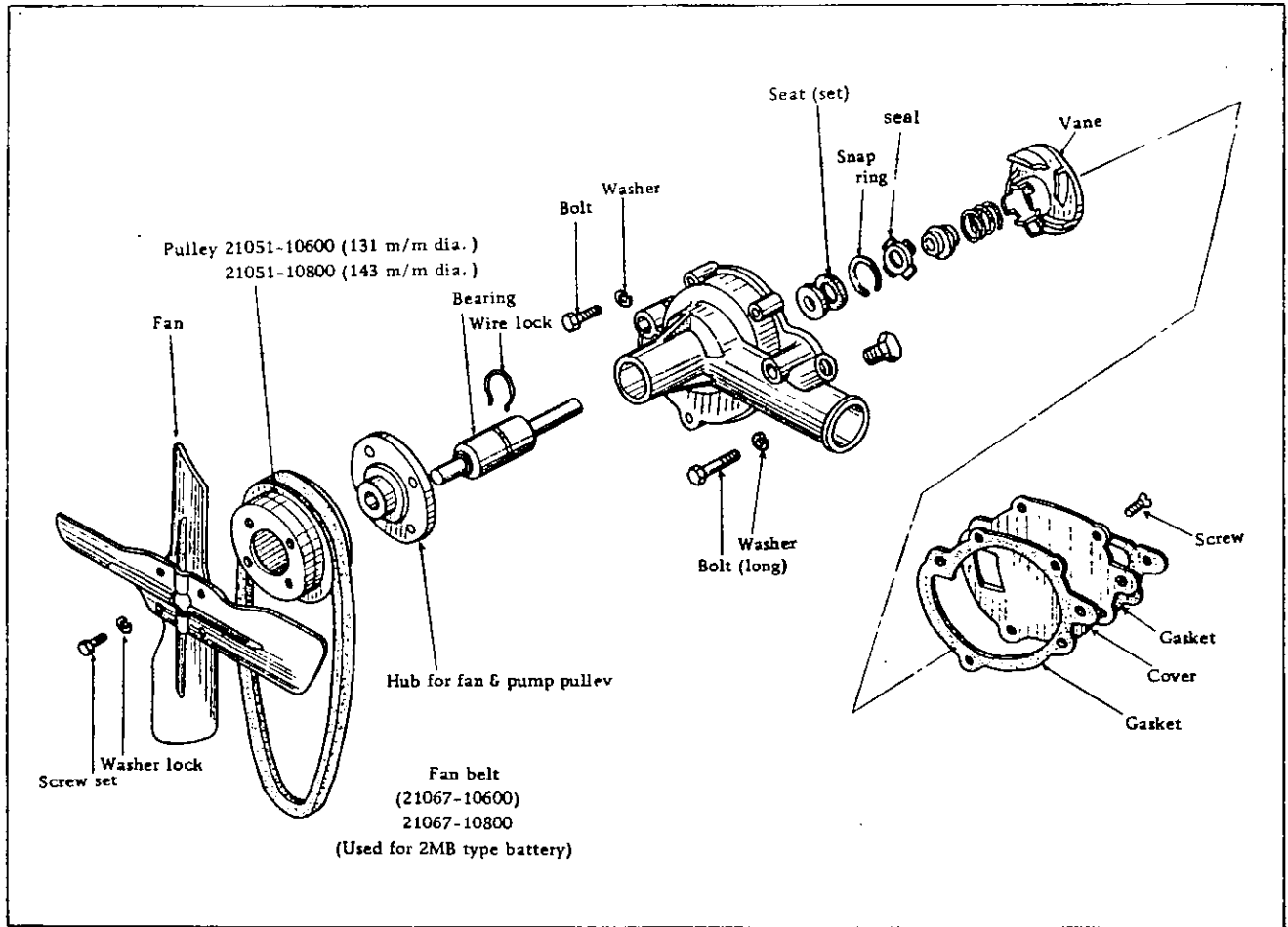


Fig. 4 Water Pump

**Removing the Pump Shaft Assembly**

Disconnect the fan blades, pulley and cover. The shaft and ball bearings is combined with one unit.

Put the pulley hub on the bench.

First, press or knock the shaft end with a drift (hard bar) and draw out the pulley hub on the U type bench.

Take out the set pin from the slit which locked the shaft assembly to the pump body. (See Fig. 6)

Next, turn the body upside down and press out the shaft assembly from the vane side on the U type bench.

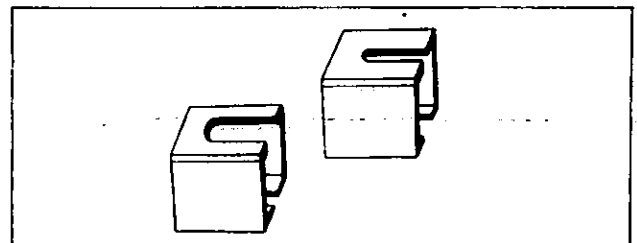
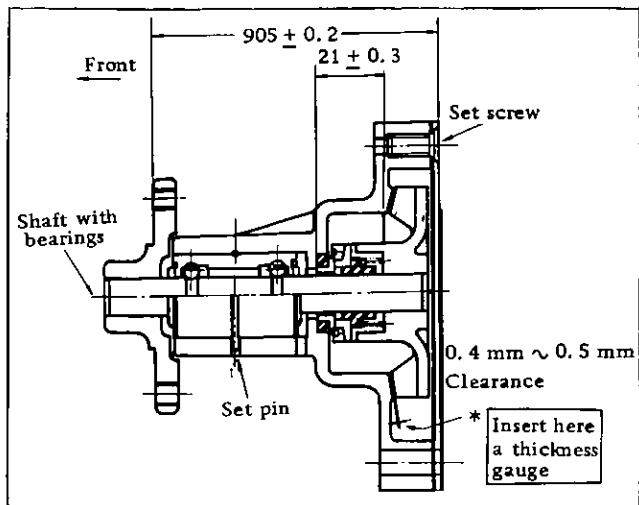


Fig. 5 Example of the Bench for Pump Body

The shaft and ball bearing assembly can be drew out from the body.

Thus take out the vane, floating seal and seal which remained the pump body.

**Reassembly**



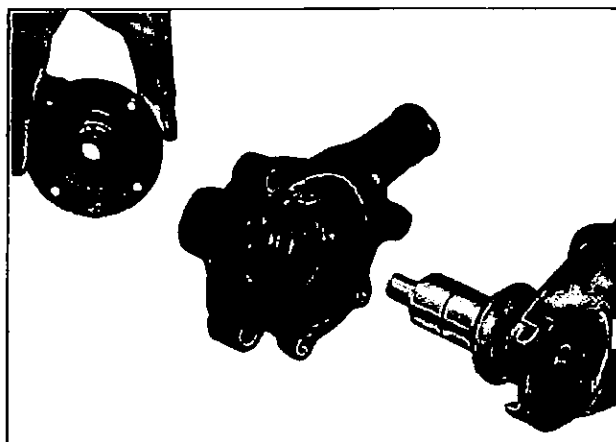
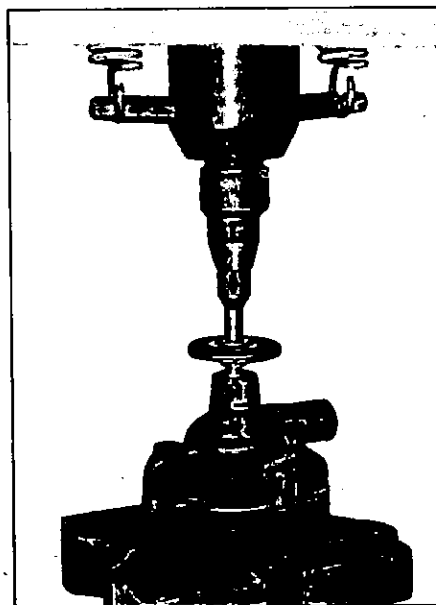
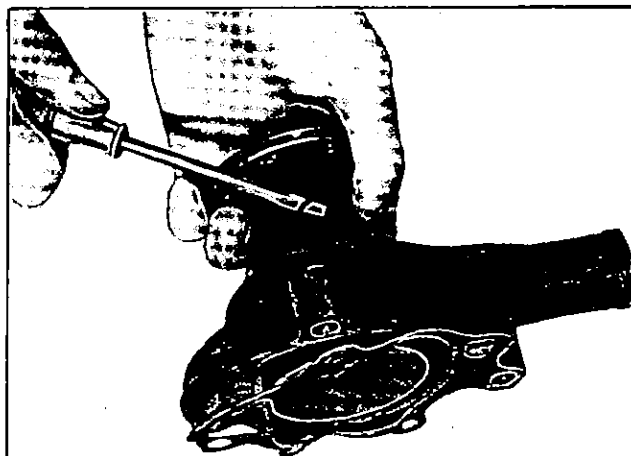
*Fig. 6*

The reassembling of the pump is a reversal of the disassembly procedure, but a care should be taken to ensure that the shaft assembly is fitted correctly for a slit (a hole of set ring) with a groove of shaft so as to insert and set the said ring correctly.

**Adjusting Clearance the Van End and Body**

First, press down the shaft fitting with a groove line to insert the set pin.

Inserting thickness gauge (Thickness 0.4-0.5 mm) between the vane end on the U block bench. Take out the thickness gauge and find out good condition. Screw up with the cover and cork washer.



## LUBRICATION

### Circulation

Pressure lubrication is used throughout the unit and is provided by an eccentric non-draining oil pump. The oil pump is bolted into the left-hand side of the crankcase, and is driven from the camshaft gear by a short vertical shaft.

The oil is drawn into the pump via the filter and is delivered through internal oilways to the relief valve which is situated at the cover of oil pump.

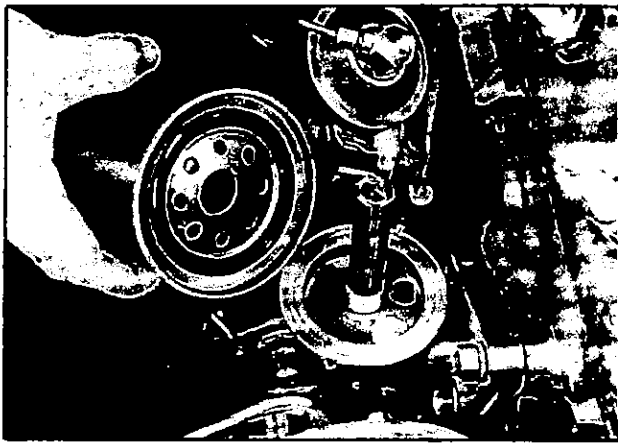


Fig. 1

From the relief valve the oil passes into the main oil gallery on the right-hand side of the engine. The flow then passes via connecting oilways to the main, big end and camshaft bearings through drillings in the crankshaft. The connecting ends are drilling in the cylinder block and the rear rocker shaft bracket, to lubricate the rockers, and then drains back into the oil pan via the push rod apertures. The oil from the center camshaft bearing enters a gallery on the left-hand side of the engine and lubricates the tappets through individual drillings. As the camshaft rotates, two grooves in the front journal register with a small hole in the camshaft thrust plate thus allowing a small amount of oil to pass into the timing case twice during case revolution of the camshaft to provide lubrication for the timing chain and gears. From the timing case the oil returns via a drain hole back to the oil pan. The filter therefore forms part of the main oil gallery and as such is filled with oil under pressure.

The full of the oil enters the element through holes in the cartridge, and passes through the element into the annular space round the center pipe.

This space is sealed top and bottom so that the oil can only escape through a small hole into the hollow center pipe and from this point back into the oil pan.

### Draining the Oil

The oil on new and reconditioned engines must be drained and then filled with new oil after first 2000 miles (3000 km) and at intervals of every 3000 miles (5000 km). The drain plug is at the oil pan. The oil should be drained when the engine is hot as the oil will flow more readily.

Before filling the oil pan with new oil disconnect and change the oil cartridge.

### Oil Pressure

The oil pressure should not drop below 30 lb./sq.in. (2.1 kg/cm<sup>2</sup>) on the gauge at normal road speeds, whilst approximately 10 lb./sq.in. (0.7 kg/cm<sup>2</sup>) should be shown when the engine is idling. New engines with new oil will give considerably higher readings at low speeds should there be a noticeable drop in pressure, the following points should be checked:

- a) That there is a good supply of the correct grade of oil in the oil pan.
- b) That the strainer in the oil pan is clean and not choked with sludge.
- c) That the bearings, to which oil is fed under pressure, have the correct working clearances excessive the oil will escape more readily from the sides of the bearings, particularly when the oil is warm and becomes more fluid.

This will cause a drop in pressure on the gauge as compared with that shown when the bearings are in good order. The relief valve in the lubrication system deals with any excessive oil pressure when starting from cold. When hot the pressure drops as the oil becomes more fluid.

### Check for Low Oil Pressure

Check the level of oil in the engine sump by means of the dip-stick and top up if necessary. If the warning light is still on after refilling the sump, switch off and ascertain that the gauge strainer in the sump is clean and not choked with sludge, sale that no air leakage exists at the strainer union on the suction side of the oil pump being defective, remove the unit and rectify the fault.

### Removing the Filter

A new filter cartridge should be changed after first 2000 miles (3000 km) and then every 10,000 km after this.

The forms part of the main oil gallery of the engine. The element of oil filter is sealed in the container as a unit, it can easily removed by hand. Take care not to lose the rubber sealing ring.

The filtered oil in the element of filter cartridge is sent to the oil passage in the cylinder block, delivered to all the lubrication system, crankshaft journal, crank pin, cylinder bore, locker arm, camshaft journal and chain tensioner, and finally returned to the oil pan.

The oil filter is provided with a relief valve. If the temperature of lubricant oil is low at starting, oil viscosity is high, or if the filtration

resistance of the oil filter element is large caused by its choke up, the relief valve will be opened with pressure difference to bypass oil.

### Removing the Oil Pan

The sump capacity is 3.1 litres. Drain the oil and replace the drain plug.

Remove the set screw bolts which are inserted from the underside of the securing flange, and the lower bolts from the bottom edge of the bell housing. Lower the oil pan from the engine, taking care not to damage the joint washers in the process.

### Removing the Strainer

With the sump lowered it is, possible to remove the oil strainer through which oil is drawn into the oil pump. To remove the strainer unto the union connecting the oil pick-up to the pump and unscrew the securing bolts.

The strainer may be dismantled for cleaning purpose by removing the delivery pipe flange bolts.

Notice that there are the dowel pins to the cover which must be positioned correctly when refitting.

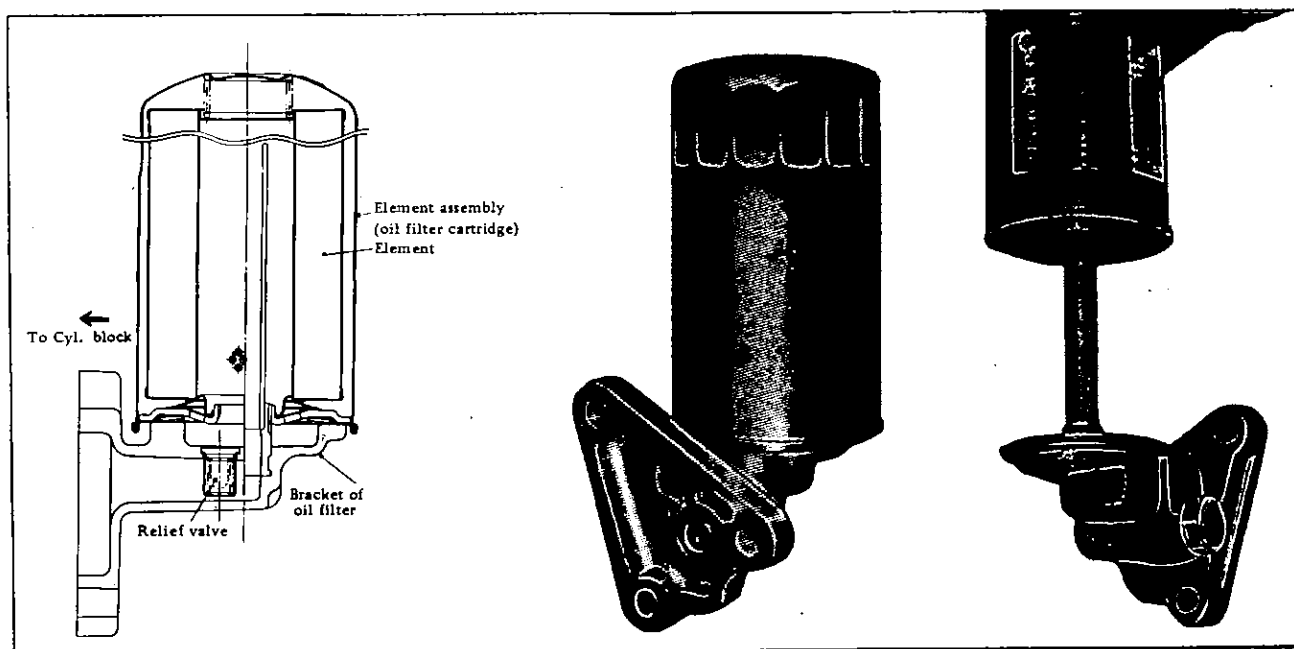


Fig. 2 Oil Filter

## Removing the Oil Pump

Remove the oil pan and pick-up strainer. Three of the five bolts securing the oil pump bottom cover are long enough to secure the pump to the crankcase. Fig. 3 illustrates the pump in exploded form. Unscrew the long bolts and remove the pump with its drive shaft.

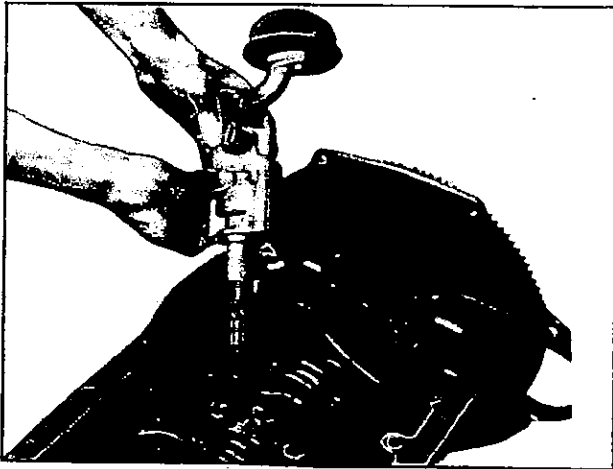


Fig. 3

## Dismantling the Oil Pump

Remove the setscrews and spring washers which secure the cover to the body and take off

the cover. On tilting the body upside down the inner rotor with its drive shaft, and the outer rotor with slide out.

## Refitting the Pump

Clean out the sump by washing it in paraffin, the care to remove any traces of the paraffin before refitting the oil pan to the engine. Pay particular attention to the oil pan and crankcase joint faces, and remove any traces of oil jointing material. Examine the joint washer and renew it if necessary. The oil joint washer can be used again if it is sound, but it is advisable to fit a new one. Smear the faces of the joint with grease and fit the joint washer. Lift the oil pan into position and insert the setscrews into the flange tightening them up evenly.

## Reassembling the Oil Pump

The outer rotor has a chamfered edge. It is of great important that this chamber be towards the base of the body, failure to assemble in this way will result in the cover is tightened down. Insert the slotted end of the drive shaft into the body and bring the rotors into mesh.

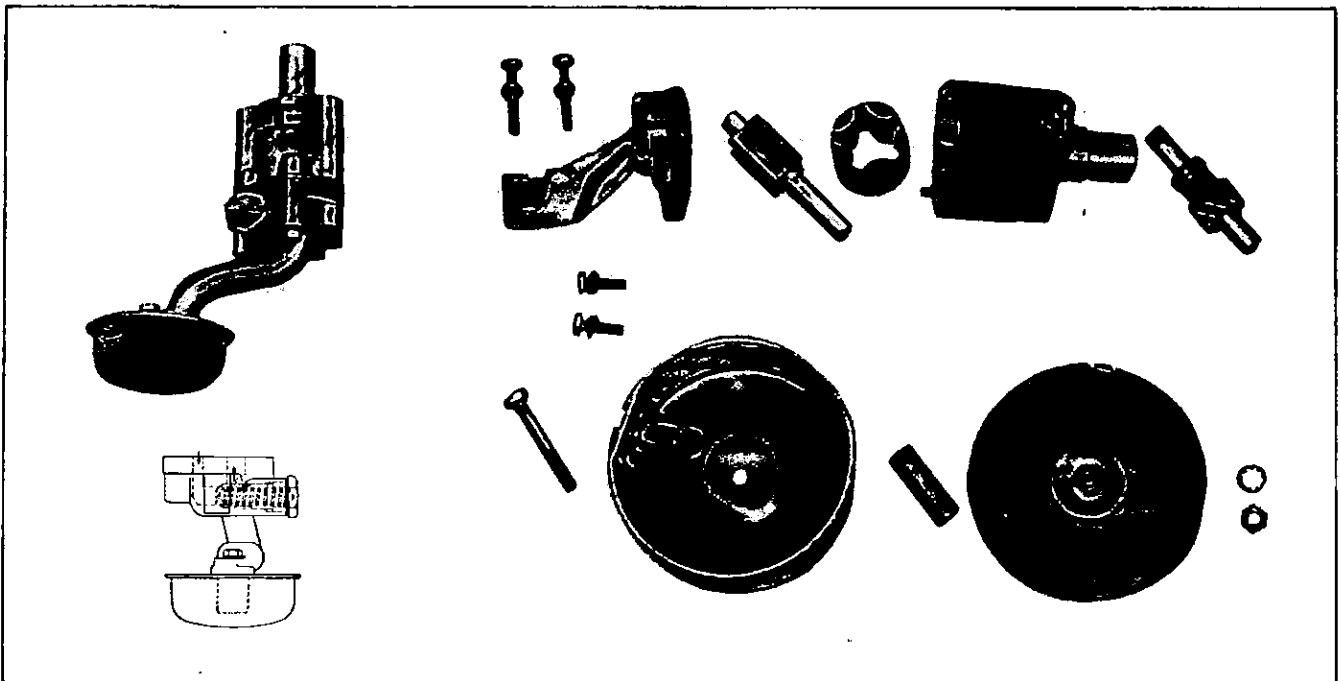


Fig. 4 Oil Pump



## SERVICE OPERATION WITH ENGINE IN POSITION

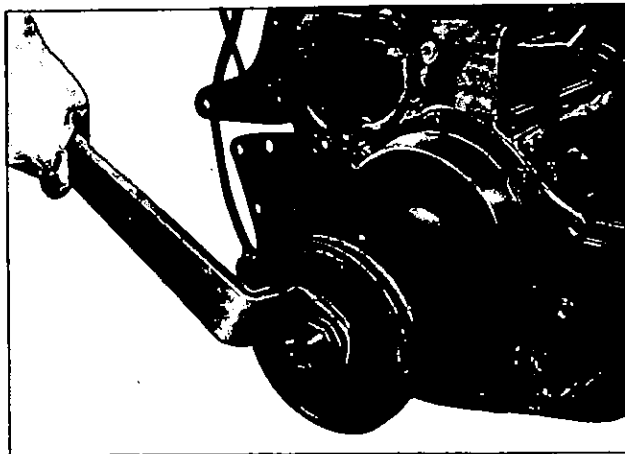
### Removing Starting Nut and Pulley

Remove the radiator. Slacken the dynamo attachment bolts and remove the fan belt.

Bend back the tab on the starting dog nut locking washer. Unscrew the starting dog nut by using Heavy duty "Shock type" spanner.

A few sharp blows in an anti-clockwise direction will slacken the nut.

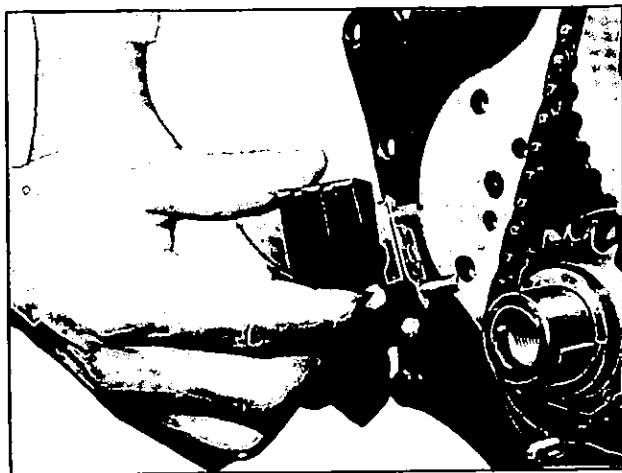
Pull off the crankshaft pulley.



*Fig. 1*

### Removing the Timing Cover

The timing cover is secured by set-screw bolts, each having a shakeproof washer and a special plain-washer. Note that the special washer is of elongated shape and is fitted next to the timing cover flange.

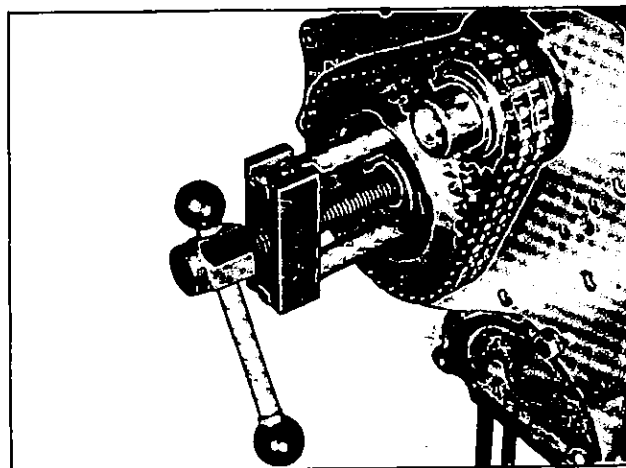


*Fig. 2*

The spring washers are immediately below the bolt heads.

Take out the set-screw bolts, remove the cover and its joint washer. Care should be taken not to damage the washer when breaking the joint. If damage does occur fit a new washer, cleaning of the faces of the joint surfaces beforehand.

### Removing the Timing Gear



*Fig. 3*

The timing chain is endless, and it is necessary to remove both the crankshaft and camshaft gears together. Before doing this, notice the timing marks on both gears and their relationship to each other.

Draw off both the gears a little at a time, first removing the crankshaft gear retaining nut.

As the gears are withdrawn care must be taken not to lose the packing washers from behind the crankshaft gear. Between the camshaft gear teeth, is a rubber ring which acts as a tensioner, and ensures silent operation of the chain drive. Examine the felt washer and renew it if oil has been lost by seepage.

### Refitting the Timing Gear

Replacing the components of the timing gear is largely a reversal of the dismantling process, but special attention should be paid to the following points.

# DATSUN

Fit the crankshaft and camshaft gears into their respective shafts. Ensure the timing marks are opposite and in line.

Turn the engine crankshaft until the keyway is at T.D.C. and the camshaft with its keyway in approximately the one o'clock position.

Place the gears into position, ensuring that the keys are present in keyways on the shafts. Ensure that the timing marks on the gears are opposite to each other and in line. Drive the gears home.

The same number of packing washers taken from behind the crankshaft gear must be replaced unless a new crank or camshaft has been fitted. In this case the alignment of the gear faces and measuring the alignment with a feeler gauge. To adjust the alignment it will be necessary to vary the number of packing wash

Fit the oil thrower behind the crankshaft gear so that its concave face it towards the front of the car, and check that the felt washer is in position.

## ROCKER MECHANISM

### Valve Rocker Cover Removal

Remove the air cleaner. Unscrew the cap nuts securing the engine lifting brackets. Remove the rocker cover and the cork joint washer.

### Removing the Rocker Assembly

Drain the cooling system. If anti-freeze is in use, use a clean container for the fluid.

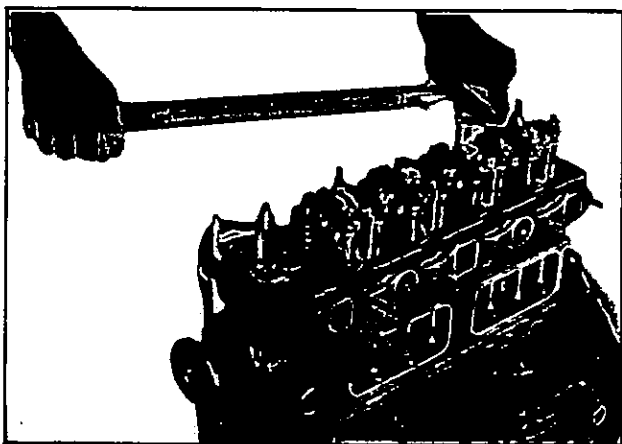


Fig. 4

It is necessary to drain the system and slacken the cylinder head nuts, because four of the rocker shaft fixing nuts also secure the cylinder head.

If the cylinder head nuts are not slackened distortion may result and allow water to find its way from the cooling system into the cylinders and pump.

Notice that under the right-hand rear rocker stud nut is a special locking plate. Completely unscrew the rocker-shaft bracket nuts and remove the rocker assembly. Complete with brackets and rockers.

### Dismantling the Rocker Shaft Assembly

To dismantle the rocker shaft assembly first remove the grub screw and locking plate from the rear rocker bracket.

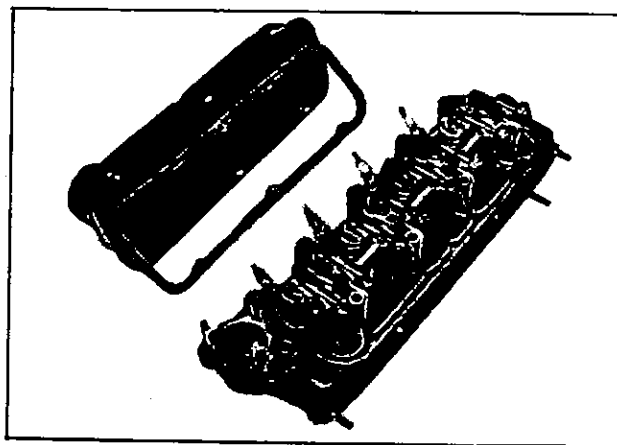


Fig. 5 Cylinder Head

Remove the split pins, flat washers and spring washers from each end of the shaft. Slide the rockers, brackets and springs from the shaft. Unscrew the plug from the end of the shaft and clean out the oil way.

The two end rockers may be dismantled without the whole rocker assembly being drawn out. This may be achieved by turning the engine by hand until No. 1 push rod reaches its lowest position.

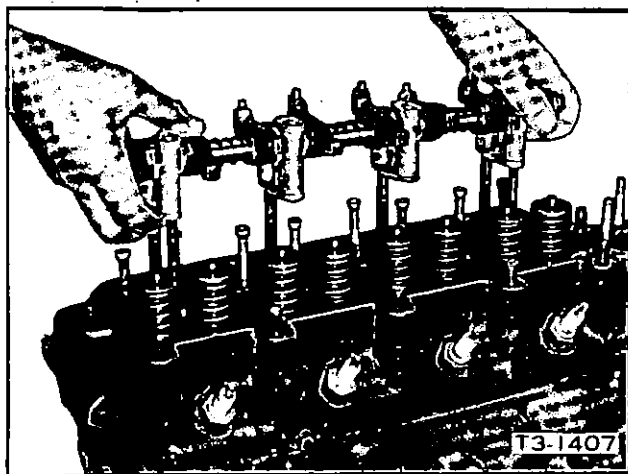
Unlock the tappet adjusting screw and screw it back as far as it will go.

Withdraw the split pin, flat and spring washer and slide the rocker off the shaft.

Sometimes the valve spring will have to be slightly compressed by levering a screwdriver under No.2 rocker, thus allowing the end rocker

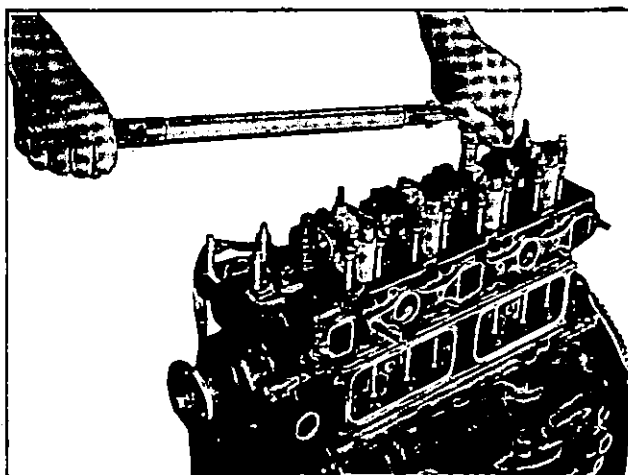
to slide off the shaft easily. Repeat the procedure for No. 8 rocker.

**Reassembling the Rocker**



*Fig. 6*

On reassembly tighten the pedestal bracket securing nuts a little at a time working diagonally from nut to nut, left nut of No. 1 pedestal bracket, right nut of No. 2, left of No. 3 and so on returning from the left nut of No. 4 bracket and repeating the process until they are all tight. If the rocker assembly has been completely stripped down and rebushed, the oil holes will have to be redrilled and the bushes reamed down to size before assembly on the shaft.

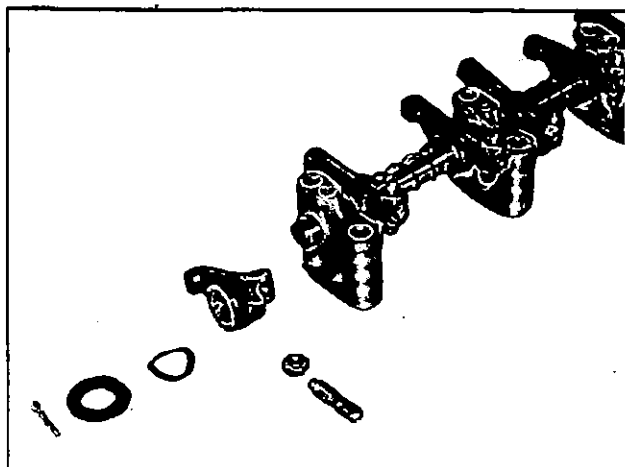


*Fig. 7*

The rockers and spring must be replaced in their original position on the ends of the shaft. Remember to replace the rocker shaft locating

screw and lock plate.

Replace the spring and flat washers with the split pins on the ends of the shaft. Replace the rocker cover and gasket.



*Fig. 8 Reassembling the Cylinder Head*

The vent pipe should be at the front of the engine. Secure the cover by means of the two cap nuts, ensuring that the rubber bushed and engine lifting plates are in position. If the rocker cover gasket or the rubber bushes are found to be faulty, they must be renewed otherwise oil leaks will result.

**Push Rod Removal**

If the valve rocker assembly has already been removed all that remains is for the push rods to be lifted out. They may on the other hand be taken out without detaching the rocker assembly.

Remove the air cleaner and rocker cover.

Slacken all the tappet adjusting screws to their full extent; then using a screwdriver, with the rocker shaft as a fulcrum, depress the valve spring, slide the rocker side ways and lift out the push rod.

All but the end push rods can be withdrawn in this way. These will have to be withdrawn after the removal of the two end rockers from the shaft. When replacing push rods ensure that the ball ends register in the tappet cups. From here onwards, reassembly is a straight forward reversal of the dismantling process.

## Adjusting Valve Rocker Clearances

Remove the air cleaner and rocker cover.

There should be a clearance of 0.014 in. (0.35 mm) between the face of the rocker and the base of the valve stem. Whilst checking the clearances it is important to maintain pressure with a screw-driver on the tappet adjusting screw to disperse the film of oil from the push rod cup. Failure to follow this procedure will result in a wrong reading being taken.

Turn the engine over by hand (starting handle) until the push rod stops falling, the valve is fully closed.

To adjust (Fig. 9) insert a screw driver in the adjusting screw slot and slaken the lock nut. Then insert 0.014 in. feeler gauge between the face of the rocker and the valve stem. Raise or lower the adjusting screw until the correct clearance is obtained.

Tighten the lock nut and recheck the clearance.

It is important to note that while the clearance is being set, the tappet of the valve being adjusted must be on the back of the cam, opposite to its peak.

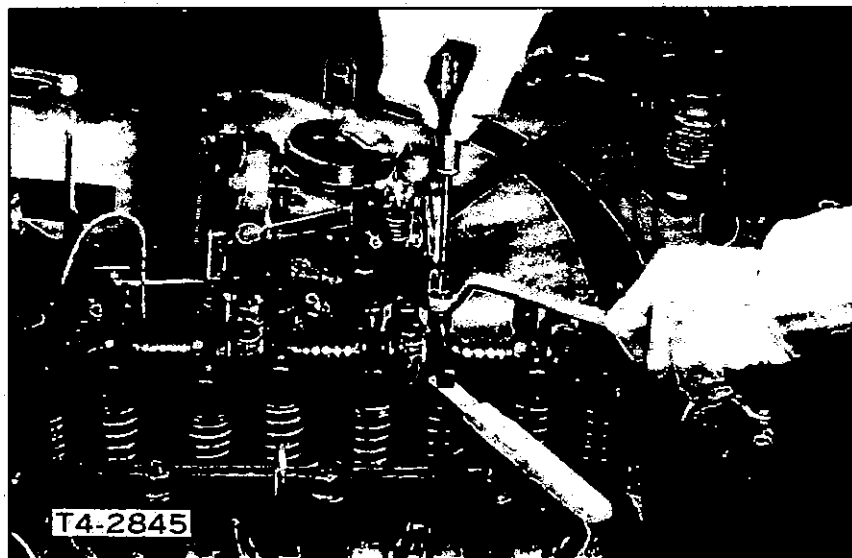


Fig. 9 Adjusting the Rocker Clearance

## CYLINDER HEAD

### Removing the Cylinder Head

Drain water from the cooling system by opening the radiator and cylinder block drain cocks.

One is situated inlet tube at the backside of the radiator and other at the rear right-hand side of the engine. If anti-freeze mixture is in use it should be drained into a suitable container and retained for future use.

Disconnect the negative cable from the battery by extracting the terminal screw and removing the lug from the battery terminal post.

Slacken both the retaining clips on the hose connecting the radiator to the thermostat housing and remove the hose.

Rocker shaft	
-Length	356.4
-Outer diameter	15.85~15.88 mm
Rocker arm bush	
-Outer diameter (before mounting)	19.01~19.04 mm $\phi$
-Inner diameter (Reamer-finished dimension after mounting)	15.89~15.90 mm $\phi$
-Clearance	0.01-0.05 mm
Rocker arm	
-Bore	19.012~19.037 mm
-Lever ratio	1.43

Extract the thermostat housing securing nuts and remove the housing and thermostat.

Remove the aircleaner, carburetor, rocker cover and the inlet and exhaust manifolds.

Detach the high tension cables and remove the sparking plugs, also disconnect the water temperature gauge connection from the thermostat housing.

Take off the rocker assembly not forgetting to slacken the external cylinder head nuts at the same time.

Withdraw the push rods keeping them in the order of removal.

The cylinder head can now be lifted off the cylinder block. To facilitate breaching the cylinder head joint, tap each side of the head with a hammer using a piece of wood interposed to take the blow. Do not use excessive force. When lifting the head a direct pull should be given so that the head is pulled evenly up the studs. Remove the cylinder head gasket.

## Decarbonising

Remove the cylinder head. With the valves still in position remove the carbon from the combustion chambers and the valve faces. Leaving the valves in position for this operation ensures that damage cannot be caused to the seats by the wire brush which should be used for the removal of carbon.

If the exhaust valve heads are coated with a very hard deposit this may be removed by using a chisel shaped piece of hardwood.

Remove the valves, and using the wire brush clean out the carbon from the inlet and exhaust ports.

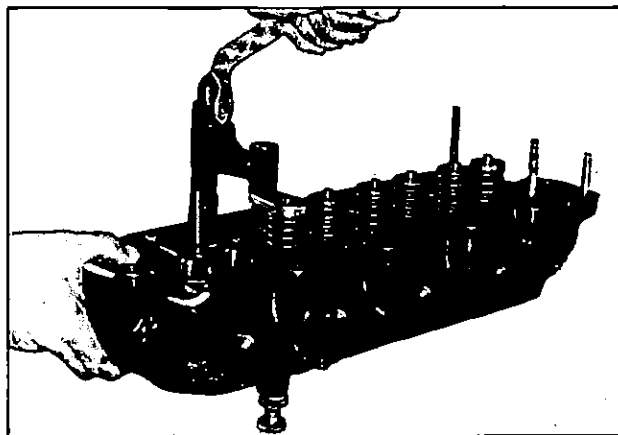
Blow out all traces of carbon dust with compressed air or type pump, and finally clean the ports with gasoline and dry them out. The carbon should now be removed from the piston crowns. Rotate the engine until the piston to be worked on is at T.D.C. Protect the other cylinder bore from the entry of carbon particles by pushing a non-fluffy rag into them.

Using a chisel shaped piece of hardwood. Carefully remove the carbon from the piston crowns. A ring of carbon should be left round the periphery of each piston, and the deposit round the top of the cylinder bore should not be touched. An indication as to when decarbonisation is required is generally given by an all round loss of power. Cars used mainly on short runs

will require this attention more often than those used for long runs.

## Removal and Replacement of the Valves

Whilst the cylinder head is removed the valves can be taken out. To do this compress the valve spring with the special valve spring compressor as shown in Fig. 1.



*Fig. 1 Valve Spring Compressor*

## Removal

Remove the two cap retaining collets. Release the valve spring, the valve spring cap, valve oil seal (Inlet valve only) and its retainer. Withdraw the valve from the guide.

Keep the valves in their relative positions when removed from the engine, to ensure replacement in their original valve guides.

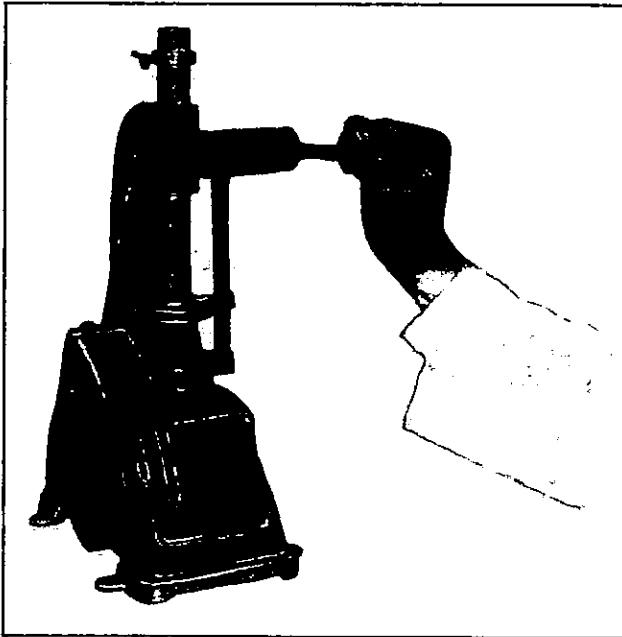
## Replacement

Note that the diameter of the exhaust valve heads are smaller than the inlet valve. To replace the valves, insert each valve into its guide and replace the spring, oil seal and retainer. Fit oil seal chamfered side down wards. The oil seals are more easily fitted if they have been soaked in engine oil for a short period before use. The oil seal is used for the intake valve only.

Replace the valve spring and compress the valve spring.

Refit the cap retainers and secure them by means of the valve cotters. Remove the compressor.

	Inner Sp.	Outer Sp.
Free length mm	50 mm	52 mm
Length in use and loaded mm-kg	36.9-13.1 ± 0.7	38.9-29 ± 1.5
Turning Nos. of coil	8.5	6.5
Effective turn of coil	6.5	4.5
Dia. of coil wire	2.8 mm $\phi$	4 mm $\phi$
Diameter of coil	24 mm $\phi$	25.2 mm $\phi$



*Fig. 2 Checking Spring Tension*

## Valve Grinding

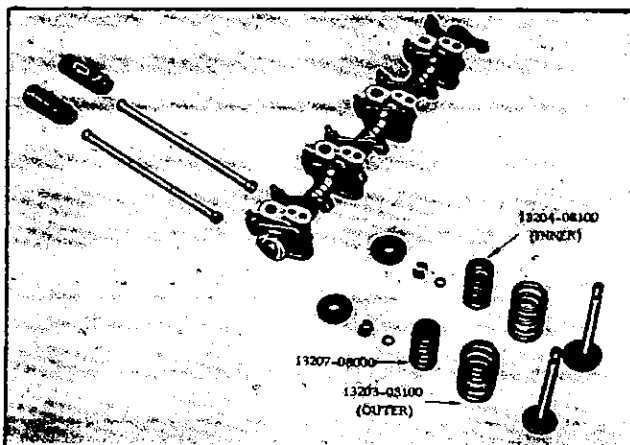
Before replacement of the cylinder head the valves and their seats should be examined for signs of pitting or burnt patches and distortion.

If these conditions are present, the valve seats must be recut before attempting to grind in the valves, whilst distorted valve heads should be trued or the valve renewed. Only the minimum amount of metal should be removed in the turning process.

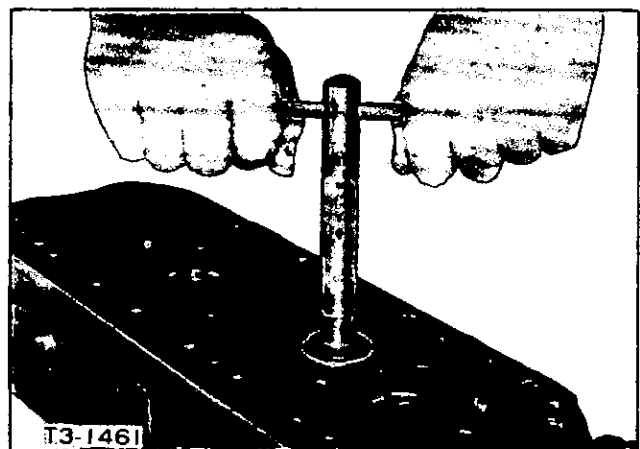
When grinding a valve onto its seating, the valve face should be smeared lightly with grinding paste and then lapped in with a suction type grinding tool. The valve must be ground to its seat with a semi rotary motion. A light coil spring interposed between the valve head and the port will assist considerably when lifting the valve in order to rotate the face to a different position. This should be done frequently to spread the grinding compound evenly.

It is necessary to continue the grinding process until an even matt surface is produced on the seating and the valve face.

On completion, the valve seats and ports should be thoroughly cleaned with gasoline soaked rag; and dried, and the subjected to a compressed air blast. The valves should be washed in gasoline and all traces of grinding compound removed.



*Fig. 3 Valve Spring & Valve Ass'y*



*Fig. 4 Turning the Valve Seating*

VALVES

Valve head diameter	
Intake valve	34.9 mm
Exhaust valve	30 mm
Valve seat width	1.63 ± 0.015 mm
Valve stem outer diameter (both intake and ex.)	8.7 mm $\phi$ (-0.01, -0.02)
Overall length	
Intake valve	109.54 mm
Ex. valve	108.74 mm

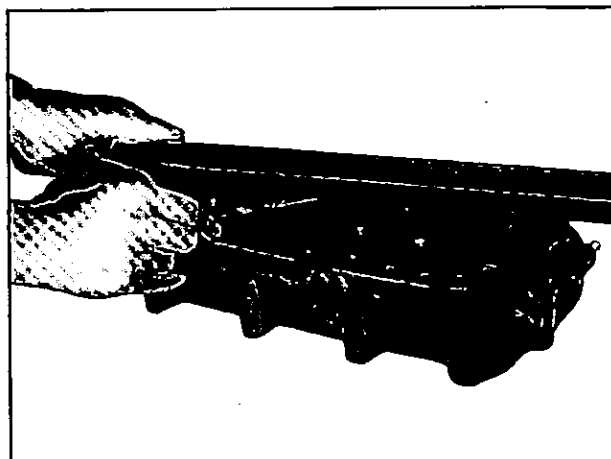
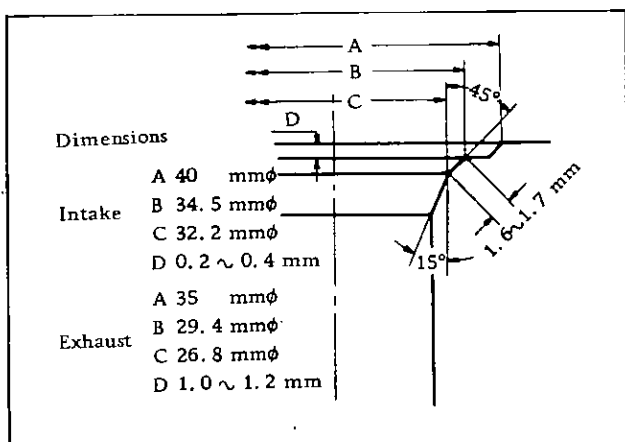


Fig. 5 Cylinder Head Distortion Measurement

Place the gasket into position and lower the cylinder head into place. Fit the cylinder head securing nuts finger tight.

Insert the push rods, replacing them in the positions from which they were taken.

Screw back all the tappet adjusting screws. Replace the rocker assembly and screw down the securing nuts finger tight. Evenly tighten the eleven cylinder head nuts a little at a time in the order given in Fig. 6, finally pulling them down with a torque wrench set to 45 lbs./ft.

VALVE GUIDE

Length Intake valve	47.6 mm
Exhaust valve	56 mm
Outer diameter (both intake and exhaust)	14.31-14.33 mm
Inner diameter (both intake and exhaust)	8.74-8.76 mm
Inner diameter at guide inlet to insert (both intake and exhaust)	14.3 mm
Clearance of valve stem and guide (both intake and exhaust)	0.04 ~ 0.07 mm
Height of valve guide (from face of the spring seat)	15.5 ~ 15.9 mm

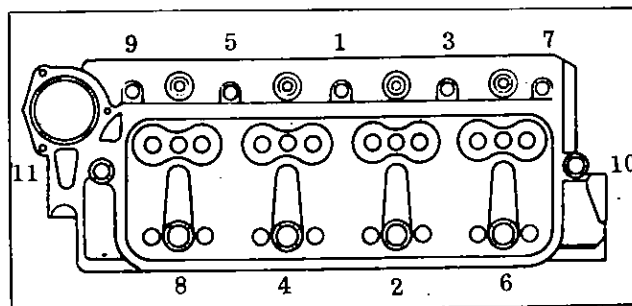


Fig. 6 The Order of Tightening the Cylinder Head Nuts

Reset the valve clearances, and finally check them when the engine is not hot or cold. The cylinder head nuts may pull down slightly more after the engine has attained its normal working temperature, in which case the valve clearances will have to be checked again and reset if necessary.

Refit the inlet and exhaust manifolds.

Fit the carburetor and reconnect the control linkage. Refit the ignition advance suction pipe

Refitting the Cylinder Head

Ensure that the cylinder head and cylinder block joint faces are clean.

The cylinder head gasket is marked "Top" so that it will be placed head in correctly.

to the connection on the carburettor, but do not at this stage refit the air cleaner or it will have to be removed later to check the valve clearances. Replace the rocker cover taking care to fit the cork gasket correctly.

Place the thermostat and its housing in position and secure with the three nuts.

Reconnect the water temperature gauge wire and fit the radiator hose to the thermostat housing. Connect the cables to the battery. Ensure that the radiator and cylinder block drain tapes are closed, and refill the radiator.

Clean and adjust the sparking plugs and refit them, clipping on the hightension leads. The firing order of the engine is 1-3-4-2. Replace the clip which secures part of the electrical wiring harness to the side of the head.

The ignition can now be switched on and the engine started. When the normal operating temperature has been reached switch off and remove the rocker cover so that the valve clearances may be rechecked. Replace the rocker cover and fit the air cleaner when the final check has been made.

Whilst the engine is running check that the water hose connections and fuel line unions do not leak. Tighten them if necessary.

## Removing and Refitting Valve Guides

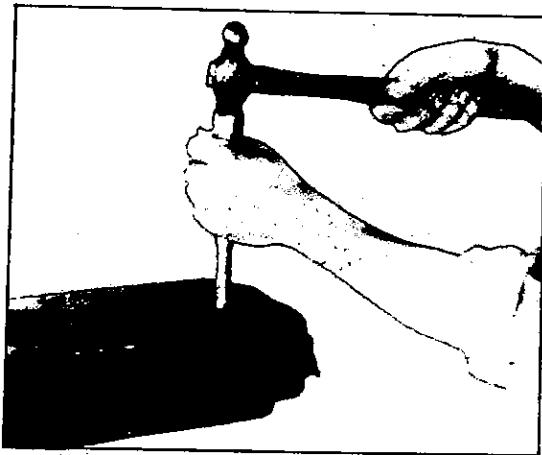


Fig. 7 Fitting Position of a Valve Guide

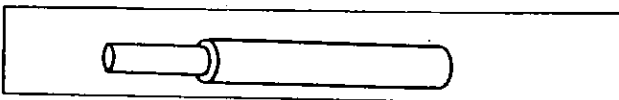


Fig. 8 Hardened Steel Punch

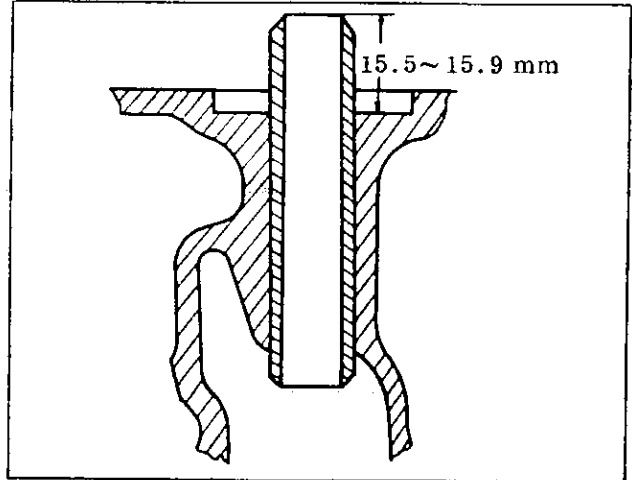


Fig. 9 Location of Valve Guide to be Fixed

Remove the cylinder head.

Remove the appropriate valve and spring. Rest the cylinder head with its machined face downwards on a clean surface and drive the guide downward into the combustion space with a drift.

This should take the form of hardened steel punch. (See Fig. 8)

When fitting new valve guides, these should be driven in from the top of the cylinder head.

## Removing a Valve Spring in Position

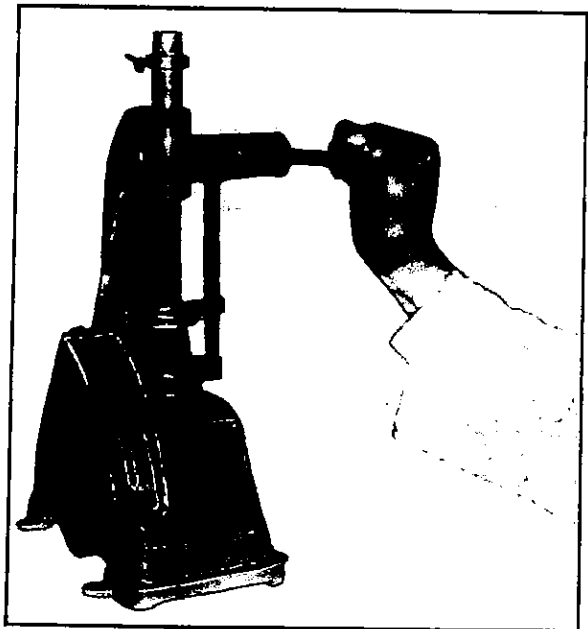


Fig. 10 Checking Spring Tension

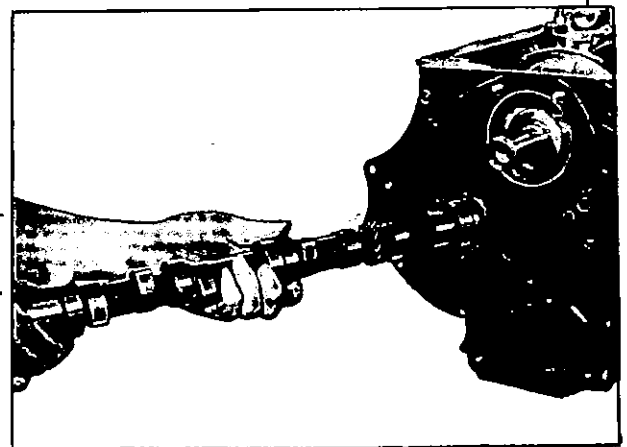
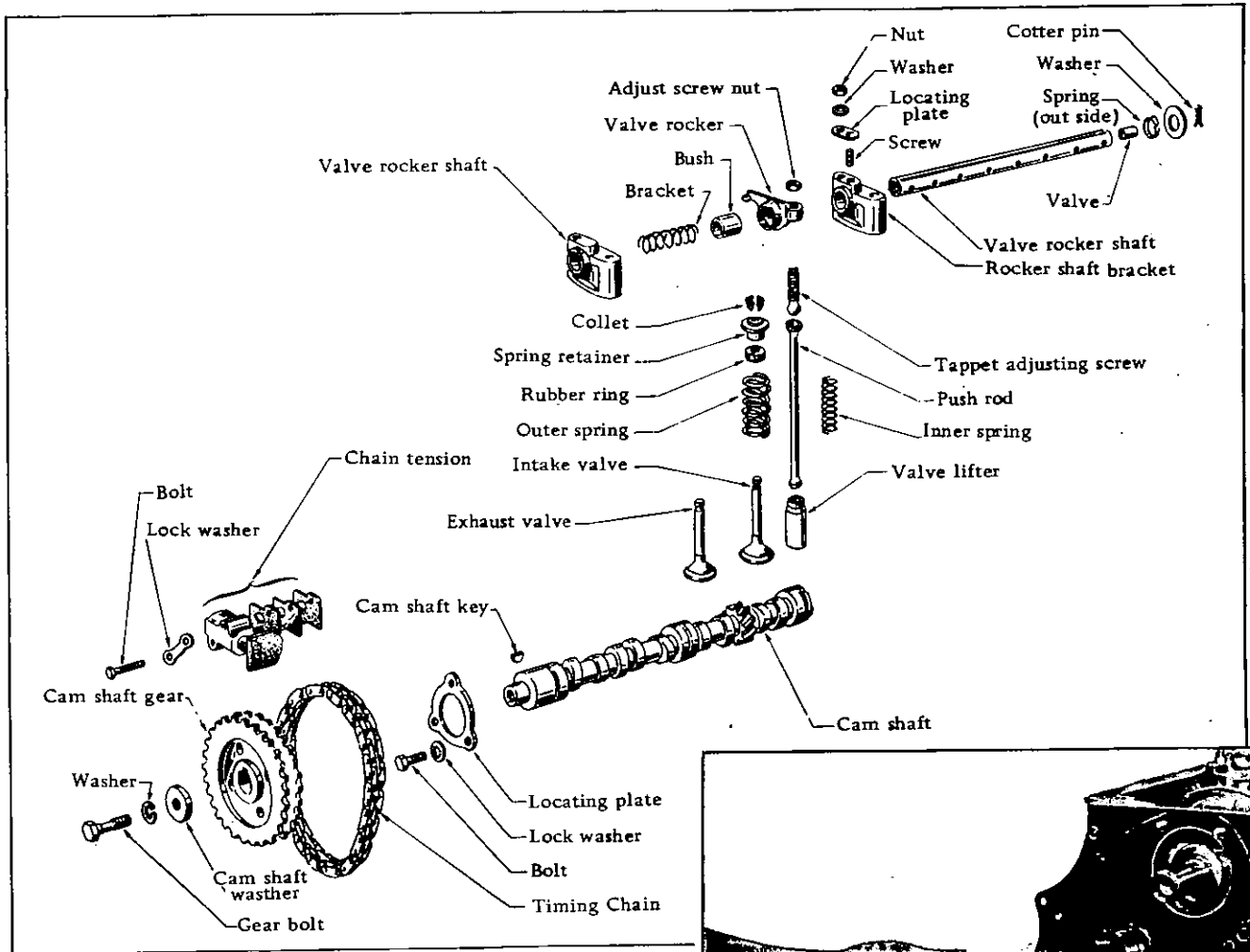


In an emergency a new valve spring can be fitted without removing the cylinder head. When doing this, the applicable piston must be brought to its T.D.C. position to eliminate any possibility of the valve falling into the cylinder.

Remove the spark plug from the cylinder concerned. Hold the valve onto its sealing with the aid of a suitable tool such as a bent screw-

driver which will pass through the sparking plug orifice, and locate on the valve head. By using the rocker shaft, as a fulcrum point, the spring can be compressed with two screwdrivers or a fork ended bar.

Withdraw the valve cotters and renew the valve spring.



*Fig. 11 Camshaft & Valve Gear*

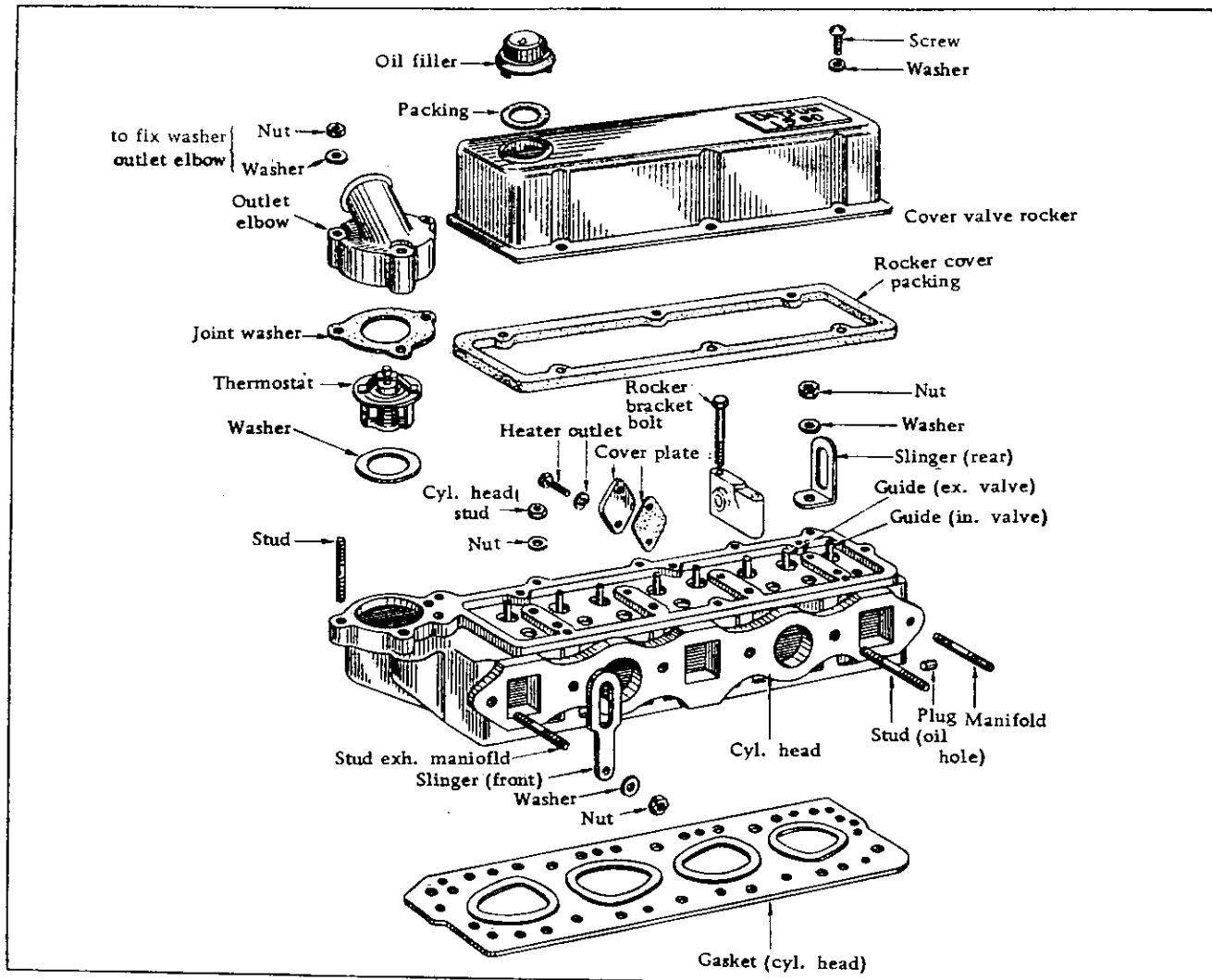


Fig. 12 Cylinder Head

### Removing and Replacing the Tappets

Remove the carburetor and the rocker cover, then take off the manifolds.

Disconnect the high-tension leads from the sparking plugs, remove the rocker assembly and withdraw the push rods, keeping them in their respective positions so that they will be replaced onto the same tappets.

Remove the tappet covers and lift out the tappets, also keeping them in same locations (Fig. 13).

New tappet should be fitted by selective assembly so that they fall into the guides under their own weight when lubricated.

Assembly is a reversal of the above procedure, but care should be taken to see that tappet cover, joints are oil tight, and that the

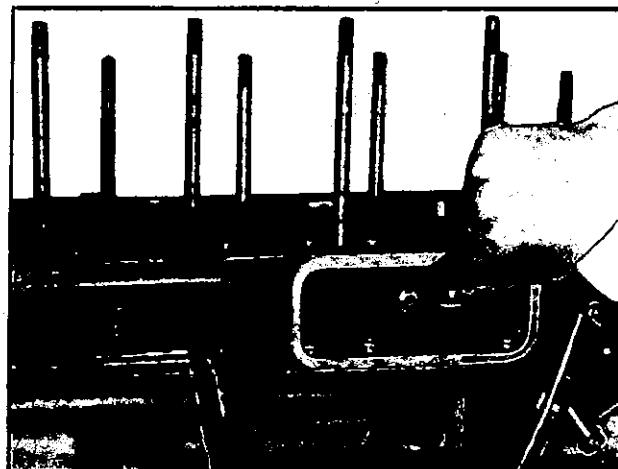


Fig. 13 Removing a Tappet

rockers are adjusted to give the correct valve clearance.

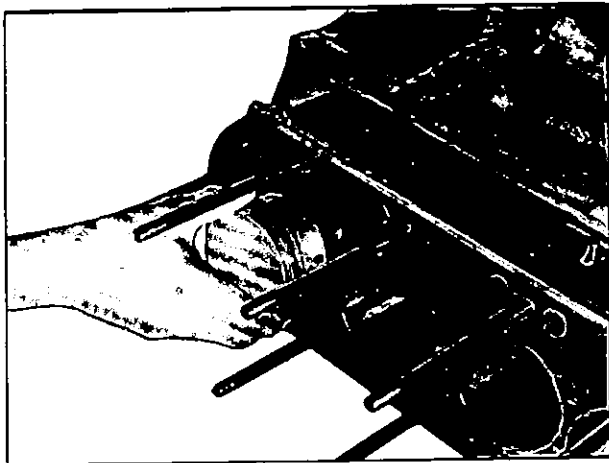
Dia. of tappet 22.48~22.49 mm $\phi$

Dia. of cyl. side hole 22.50~22.52 mm $\phi$

Clearance of the hole 0.01~0.04 mm

**Piston and Connecting Rod Removal**

Drain the cooling water from the engine and radiator. Drain and remove the sump from the engine, then disconnect and remove the oil strainer. Take out the setscrews and rock washers from the big-ends and withdraw the caps. It will be noted that the caps are off-set; When used parts are replaced after dismantling it is essential they are fitted into their original positions. To ensure correct refitting mark the caps and connecting rods on the sides to identify them together. The piston and connecting rods must be withdrawn upwards through the cylinder bores.



*Fig. 14 Removing Connecting Rod with Piston*

Release the connecting rod from the crankshaft and slowly push the piston and rod upwards through the cylinder bore.

**NOTE:**

It may be necessary to remove the ring of carbon or lip from the top of the cylinder bore with a hand scraper to avoid risk of piston ring breakage.

Remove the assembly from the top of the cylinder block.

Check the crankpins for oval with a pair of micro meter calipers, and examine the bearing surface for scoring, either defect will necessitate the removal of the crankshaft for regrinding.

**CONNECTING ROD**

Distance between center of large end and small end	150 ± 0.03 mm
Large end bearing	
Type	Clevite (F500)
Overall width	22 ± 0.1 mm
Thickness	1.87~2.34 mm
Outer diameter	51.35 mm
Width of large end	31 mm
End play of large end	0.20-0.31 mm
Finishing dimension of inner diameter of small end bush Standard	17.450-17.462 mm

**CRANKSHAFT**

Clearance of bearing periphery to cylinder block hole	-0.013-0.050 mm
Material	White metal (Block side) Clevit metal (Cap side)
Clearance of bearing inner diameter and crank journal	0.0127-0.0508 mm
Diameter of main journal	50.813-50.825 mm
End play of crankshaft	0.051-0.076 mm
Crank pin diameter	
Standard	47.640-47.652 mm
Difference of crank pin diameter	Less than 0.012 mm
End play, flywheel is installed	Less than 0.05 mm

The shell bearing are removable by hand. The bearings are require no "bedding in" it is being only necessary to ensure that the housings are scrupulously clean and dry, and to place the bearings into position with the tangs located in their corresponding slots. Always renew bearings if they are scored or damaged in any way, or following the regrinding of the crankshaft bearing surfaces. In the latter case undersize bearings will be required and the kinds of sizes available are -8, -12, -25, -50, -75 and -100 (with punched mark).

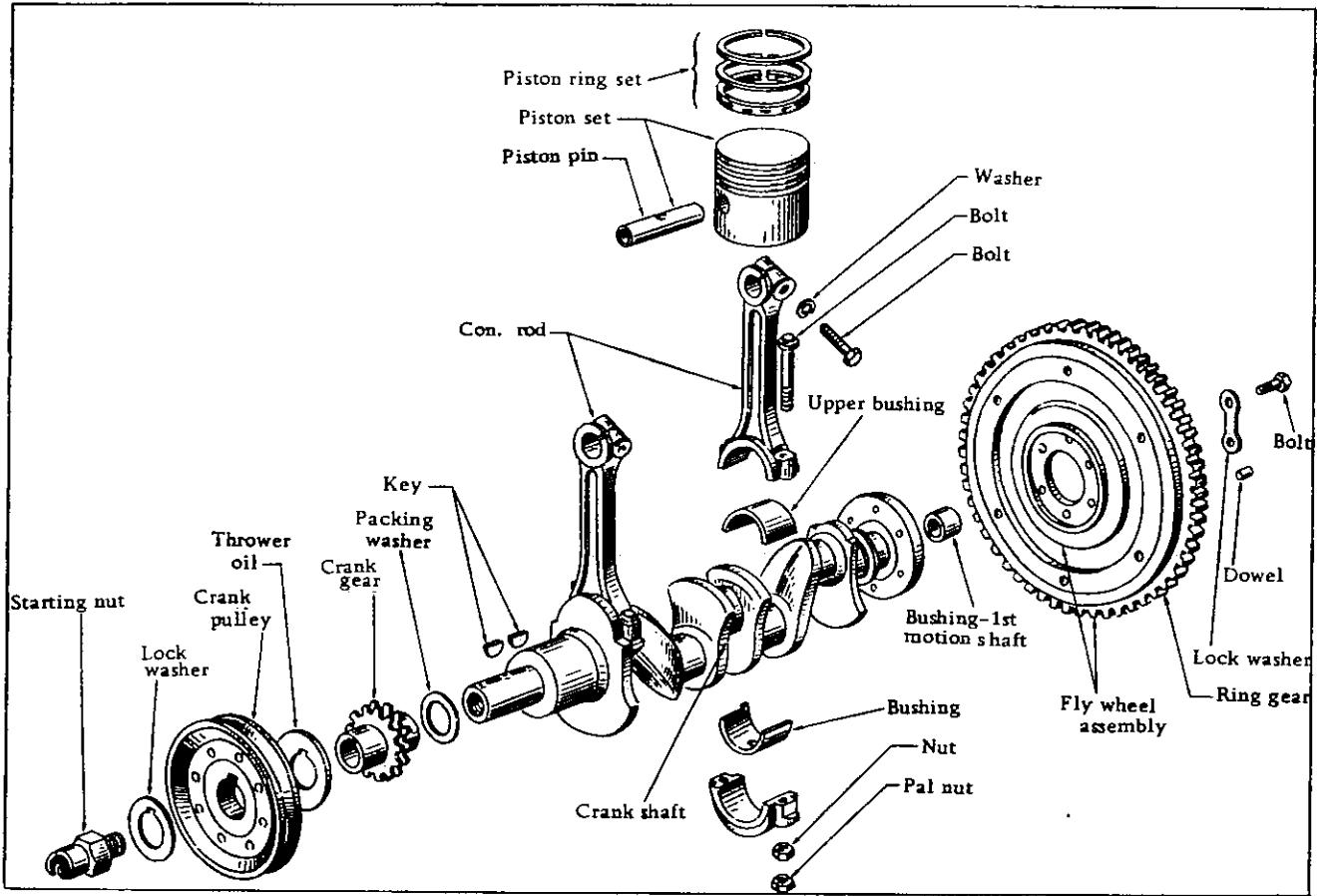


Fig. 15 Piston & Crankshaft



Fig. 16 Crankshaft

**PISTON**

**Replacing Pistons and Connecting Rods**

Insert each piston and connecting rod assembly into the cylinder from which it was taken; it is essential that the split in the skirt of the piston is positioned towards the camshaft.

Compress the piston rings with inserting piston using tool (Fig. 18), and gently tap the crown of the piston with the wooden end of a hammer handle, until the piston is clear of the piston ring clamp.

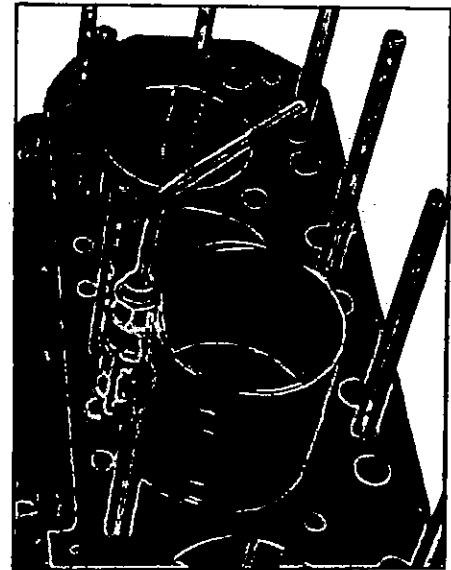


Fig. 17 Inserting the Piston

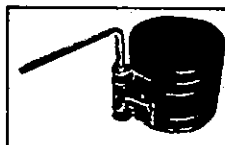


Fig. 18 Piston Adapter

Now push the piston down the cylinder block until the big end of the connecting rod just protrudes through the bottom of the cylinder bore, then position upper half bearing shells.

**NOTE:**

Each upper & lower bearing has two oil holes, there by ensuring sufficient and it is of the greatest importance that the corresponding oil hole in the bearing shell registers with the oilway to provide an unobstructed passage.

Pull the connecting rod onto the crankpin taking care not to injure the bearing surface. Insert the shell into the connecting rod cap; position the cap and the locking washers. Insert the setscrews and tighten with a torque wrench to 21.7-24.6 lbs./ft.



*Fig. 19 Measuring Thrust Clearance of Connecting Rod*

Finally knock back the lock washers.

Check the connecting rod big end for side clearance (7/1000 in.) and see that the shell bearings are not binding on the crankpin when rotating the crankshaft. If it is difficult to turn, undo the big end and examine the shell and seat for dirt or grit.

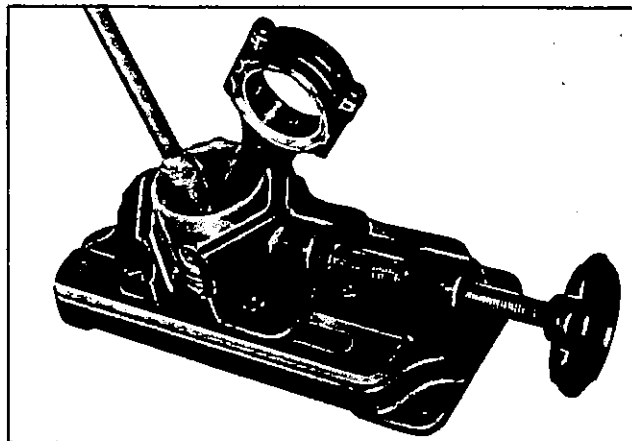
Before reassembling always apply a little clean oil to the piston surfaces and into the cylinder bore. Never file the connecting rod caps or their mating surfaces as this creates oval in the bearing.

**Removing a Piston**

Remove the clamping bolt from the small end of the connecting rod and push out the

gudgeon pin. The gudgeon pin is a push fit in piston at 70° F. (21.1° C.)

When reassembling, ensure the gudgeon pin is positioned in the connecting rod so that its groove is in line with the clamp screw hole. Check that the spring washer fitted under the head of the pitch bolt is not damaged.



*Fig. 20 Re-assembling Pistons and Connecting Rods*

**PISTON PIN**

Diameter		17.41 mm $\phi$
Over size	1	0.125
	2	0.250
	3	0.375
Length		65.3 mm
Clearance of pin and pin hole		Degree to be able to push it by finger at 20° C.
Clearance of pin and connecting rod bush hole		0.01 mm

**Piston and Bores**

Insert "Feeler gauge", 0.04 mm thick, between cylinder bore and piston, and measure at the lower portion of the cylinder bore at right angle to the piston pin.

There should be a clearance of 0.015~0.030 mm.

Pull out with feeler gauge by the spring scale and then inspect if the reading is within regulations (0.5-1.5 kg) or not.

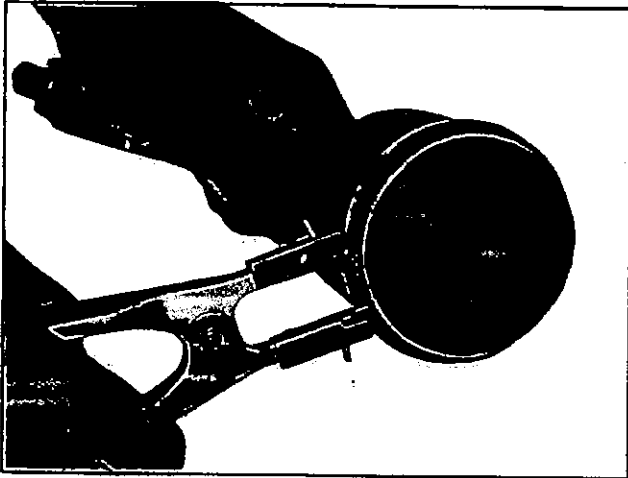


Fig. 21 Removing Piston Ring

### Piston Rings

The piston ring gap should be 0.008-0.013 in. (0.203-0.330 mm) when checked in the cylinder bore. The clearance of the compression rings in their grooves should amount to 0.0015-0.0035 in. (0.038-0.089 mm) and the oil control ring 0.0016-0.0036 in. (0.041-0.092 mm).

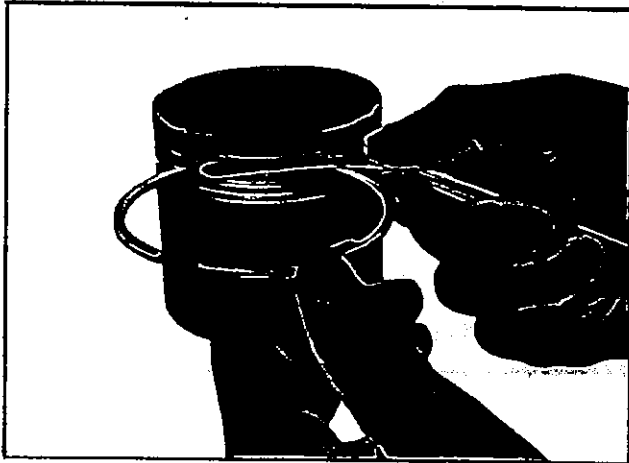


Fig. 22 Clearance Between Ring and Groove

Because the piston rings do not travel to the end of the cylinder bores a "lip" is eventually formed due to wear.

This may be checked with a dial gauge and must be removed. If this is not done there will be a tendency to noisy operation or a fractured ring, caused by the top piston ring striking the lip.

Piston and rings are available in. 0.010 in. (0.254 mm) 0.020 in. (0.508 mm) 0.030 in. (0.762 mm), and 0.040 in. (1.016 mm) over-sizes. The piston rings should always be fitted from the crown of the piston and never pushed upwards over the skirt. Before fitting the rings, remove any carbon deposit from the grooves in the piston. When fitting, note that the second compression is tapered type and oil control ring is slat type processed by chromium plating.



Fig. 23 Measuring Clearance of Ring Joint

**TROUBLES & REMEDIES****Excessive Oil Consumption**Burning oil

- (1) Rings not correctly seated to cylinder wall  
Give sufficient time for rings to seat  
Replace if necessary
- (2) Piston rings worn excessively or stuck in ring grooves  
Replace ring
- (3) Excessive clearance between piston and cylinder wall due to wear or improper fitting  
Fit new pistons
- (4) Cylinder walls, scored, tapered or out of round  
Recondition cylinders and fit new pistons
- (5) Piston ring oil return holes clogged with carbon  
Replace rings
- (6) Piston rings broken  
Replace rings
- (7) Valve stem oil seals missing or leaking  
Replace seals, check for sealing

Leaking oil

- (1) Rocker arm cover gasket or tightening tappet cover damaged or loose  
Tighten covers or replace gasket
- (2) Oil pan drain plug loose  
Tighten drain plug
- (3) Oil pan retainer bolts loose  
Tighten oil pan bolts
- (4) Oil pan gasket damaged  
Replace gasket
- (5) Timing gear cover loose or gasket damaged  
Tighten cover bolts or replace gasket
- (6) Fuel pump loose or gasket damaged  
Tighten fuel pump bolts or replace gasket
- (7) Rear main bearing leaking oil into clutch housing or flywheel housing  
Adjust or replace main bearing or main bearing oil seal

**Lack of Engine Power**Ignition system improperly adjusted

- (1) Spark plug faulty  
Replace or clean, adjust and seat spark plugs
- (2) Distributor points not set correctly  
Set distributor points and timing engine
- (3) Ignition not properly timed  
Set ignition by the instruction under correct specification of engine

Lack of fuel

- (1) Gas line partly plugged  
Clean gas lines
- (2) Dirt or water in carburetor  
Clean carburetor and fuel pump
- (3) Dirt in gasoline tank  
Clean the tank
- (4) Air leaks in gasoline line  
Check gasoline lines and tighten
- (5) Fuel pump not functioning properly  
Replace or repair fuel pump

Carburetor air inlet restricted

- (1) Air cleaner dirty  
Clean air cleaner
- (2) Carburetor choke partly closed  
Adjust or replace choke mechanism

Over heat

- (1) Lack of water  
Refill system
- (2) Fan belt loose  
Adjust or replace
- (3) Fan belt worn or oil soaked  
Replace belt
- (4) Water pump inoperative  
Replace water pump
- (5) Thermostat sticking closed  
Replace thermostat

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- (6) Cooling system clogged  
Clean and reverse flush
- (7) Incorrect ignition or valve timing  
Retime engine
- (8) Improper grade and viscosity oil being used  
Change to correct oil
- (9) Fuel mixture too lean  
Overhaul or adjust carburetor
- (10) Valve improperly adjusted  
Adjust valves
- (11) Exhaust system partly restricted  
Clean or replace

## Over cooling

- Thermostat holding open  
Replace thermostat

## Hard Starting

### Slow cranking

- (1) Heavy engine oil  
Change to lighter oil
- (2) Partially discharged battery  
Change battery
- (3) Faulty or undercapacity battery  
Replace battery
- (4) Poor battery connections  
Clean and tighten or replace connections
- (5) Faulty starter switch  
Replace switch
- (6) Faulty starting motor or starting switch

### Ignition troubles

- (1) Distributor points burned or corroded  
Clean or replace points
- (2) Points improperly adjusted  
Readjust points correctly
- (3) Spark plugs improperly gapped  
Set plug gap correctly  
0.7 ~ 0.8 mm (0.0275 ~ 0.0315 in.)

- (4) Spark plug codes loose and corroded in distributor cap  
Clean code and cap terminals
- (5) Loose connections in primary circuit  
Tighten all connections in primary circuit
- (6) Series resistance in condenser circuit  
Clean all connections in condenser circuit
- (7) Low capacity condenser  
Install proper condenser

### Engine condition

- (1) Valves burned  
Grind valves or change
- (2) Valves holding open  
Adjust valves
- (3) Leaking manifold gasket  
Tighten manifold bolts or replace gasket
- (4) Loose carburetor mounting  
Tighten carburetor mounting bolts
- (5) Faulty pistons, rings or cylinders  
See "Lack of power"

### Carburetion

- (1) Choke not working properly  
Adjust or repair choke mechanism
- (2) Throttle not set properly  
Set throttle
- (3) Carburetor dirty and passages restricted  
Overhaul carburetor

## Spitting and Detonation

### Ignition trouble

- (1) Loose wiring connections  
Tighten all code connections
- (2) Faulty wiring  
Replace faulty wiring
- (3) Faulty spark plugs  
Clean or replace and adjust plug gap



## REMOVING & REFITTING

Experience has shown that it is much easier to remove the engine and transmission as a single unit than to detach the engine by itself.

To remove the engine and transmission upwards, proceed as follows;

Completely drain the cooling system and the transmission, disconnect and remove the battery and its supporting tray.

Remove the upper and lower radiator hoses by undoing the retaining clips.

Disconnect the capacitor lead at the distributor, also the high tension and switch wires at the coil.

Take off the dynamo lead and disconnect the starter motor cable at the motor end.

Remove the oil gauge and water, temperature gauge leads from their terminals on the engine.

The throttle and choke controls must be disconnected from the carburetor. Disconnect the fuel pipe from the fuel pump.

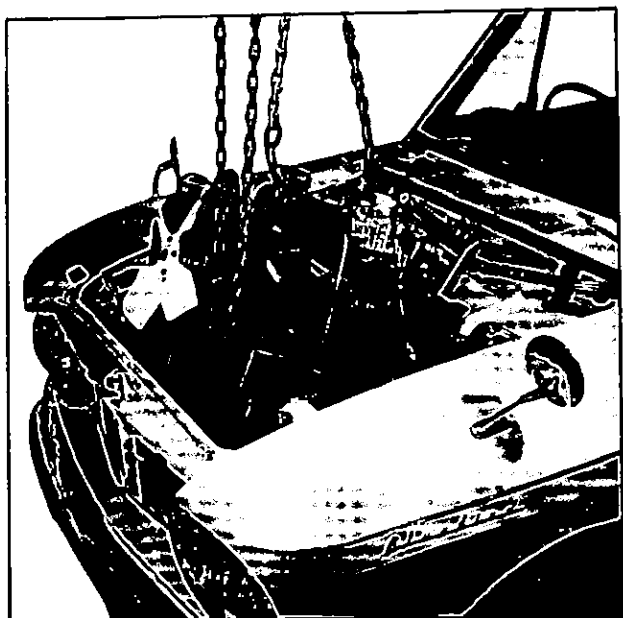
Next, remove the exhaust pipe from the manifold.

From below the vehicle, remove the gear change selector rod from the lever on the transmission casing.

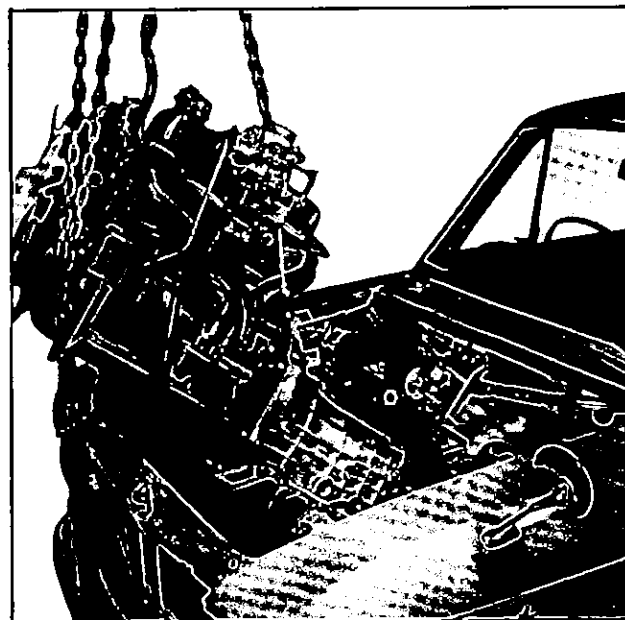
Disconnect the earth strap from the starter motor. Remove the hand brake control rod supporting from transmission.

Disconnect the speed-meter cable from the transmission. Uncouple the propeller shaft pinion franges at rear axle and draw the shaft out of the transmission.

To allow the engine and transmission to be drawn forward, the radiator must be removed by undoing the four securing bolts.



*Fig. 1*



*Fig. 2*

OPERATION WITH THE ENGINE REMOVED

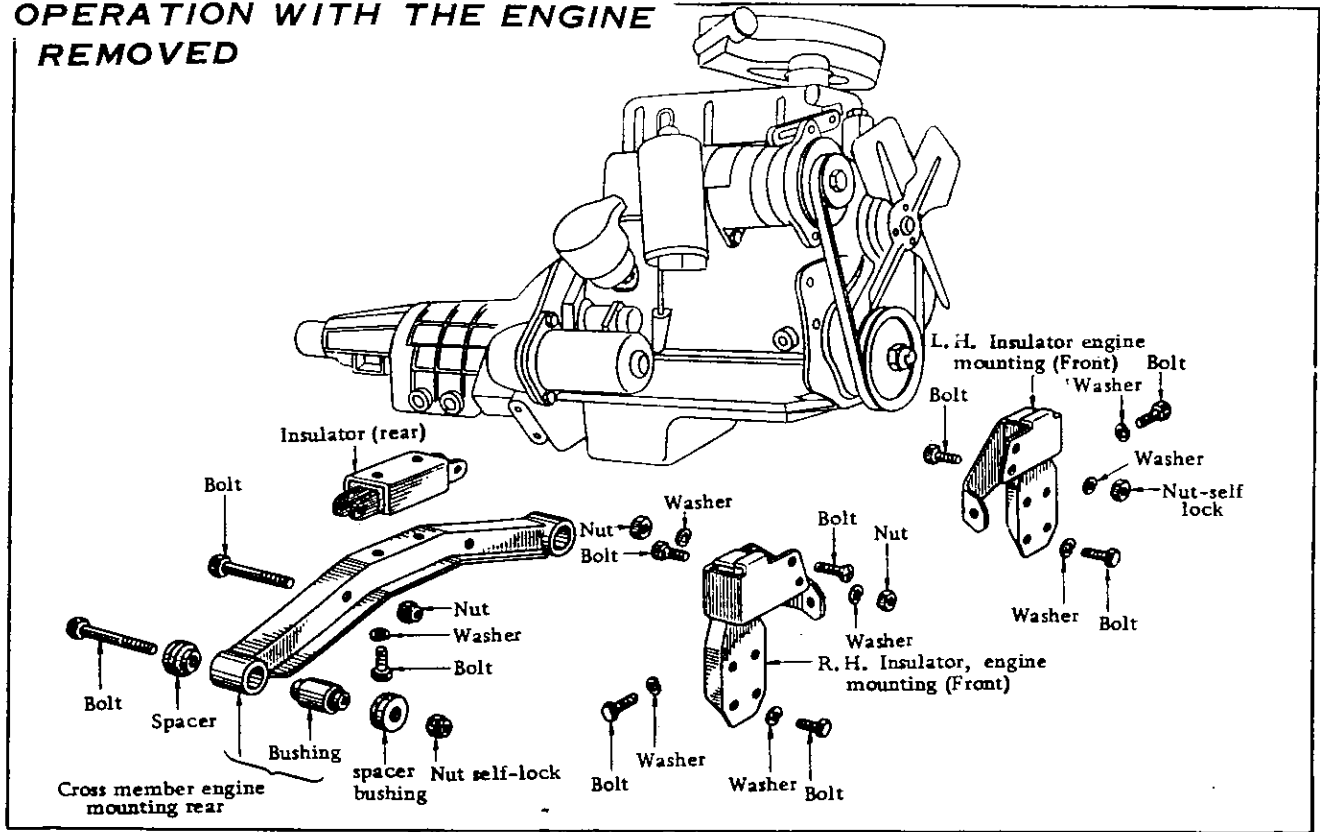


Fig. 3 Engine Mounting

The following operations are best performed with the engine removed from the car. Although it may be found possible to carry

out certain attentions with the engine in position, it is more convenient to do the work on the bench.

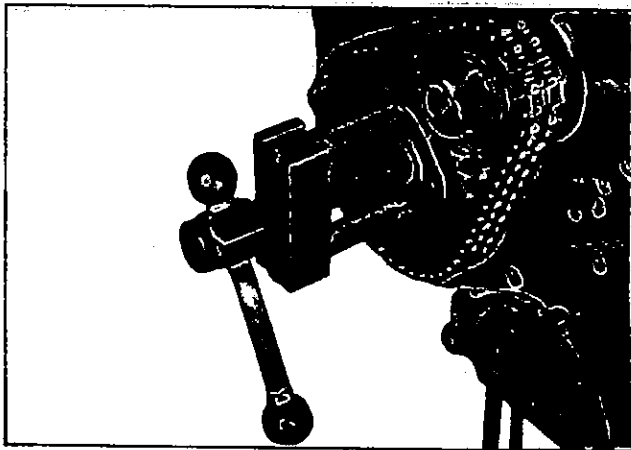


Fig. 4 Removing Crank Gear, Cam Gear and Chain

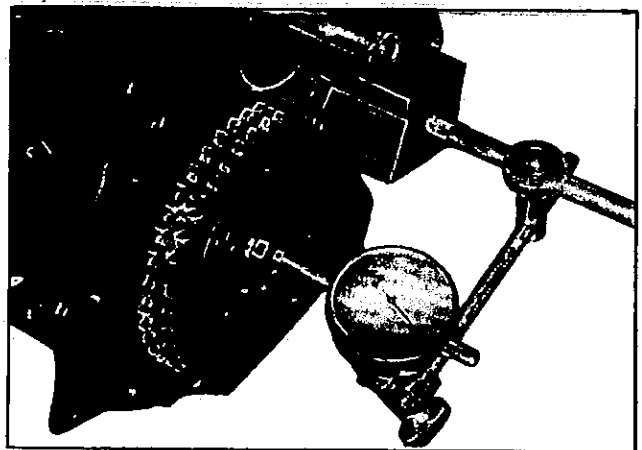


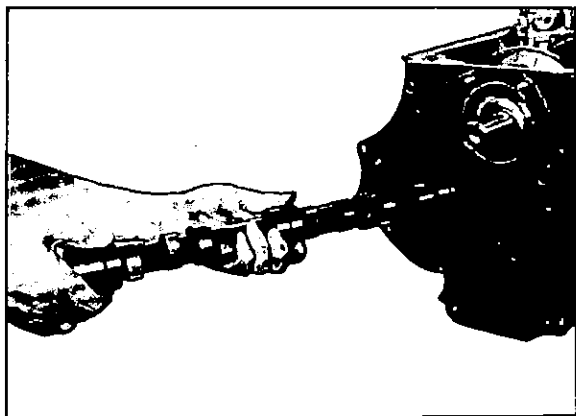
Fig. 5 Checking Thrust Clearance

### Withdrawing Camshaft

The camshaft is positioned by a locating plate held by three screws and shakeproof washers. Note the position of the small lubricating oil hole in the locating plate when replacing should be to the right of the engine.

End play of 0.003-0.007 in. (0.076-0.178 mm) is controlled by the thickness of the locating plate, and can be checked with a dial indicator set against the camshaft gear.

Before withdrawing the camshaft the distributor and its driving spindle push rods, and tappet, will have to be removed. Remove the oil pump and its drive shaft, and take off the timing cover and gears. The engine front



*Fig. 6 Pulling out Camshaft*

mounting plate is now accessible and may be removed by withdrawing the setscrew and locking plates. The dynamo swinging link must be removed.

Take out the setscrews securing the camshaft locating plate, when the camshaft can be withdrawn from the cylinder block.

### Camshaft Bearings

White metal bearings, with steel lining are used for the camshaft. They can be taken out renewed when necessary, it being usual to do this when the cylinder block is being reconditioned.

The bearings can be removed by drifting them out of their housings.

When fitting new bearings care must be taken to line up the oil holes with the corresponding holes in the cylinder block.

Tap the new bearings into position and ream them to give a running clearance of 0.001-0.002 in. (0.025-0.015 mm).

### Refitting the Camshaft

This is a reversal of the introductions for removal. Care should be taken however, to align and engage the drive pin in the rear end of the camshaft with the slot in the oil pump drive shaft.



## Main Bearing Caps

Remove the flywheel and clutch.

Take off the timing chain, the sump and strainer, and the engine rear mounting plate. Unlock and remove the bolts securing the main bearing caps to the cylinder block, also the two bolts securing the front cap to the engine front bearer plate.

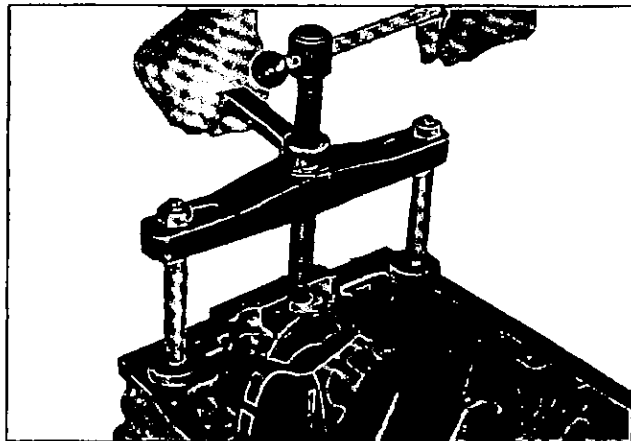
Note that a thrust washer is fitted on each side of the centre main bearing to take the crankshaft end thrust. These thrust washers each consist of two semicircular valves, one half having a lug, which is located in a recess in the detachable half of the bearing, the other being plain.

When fitting new bearings no scraping is required as they are machined to give the correct running clearance of 0.0005-0.002 in. (0.0127-0.0508 mm).

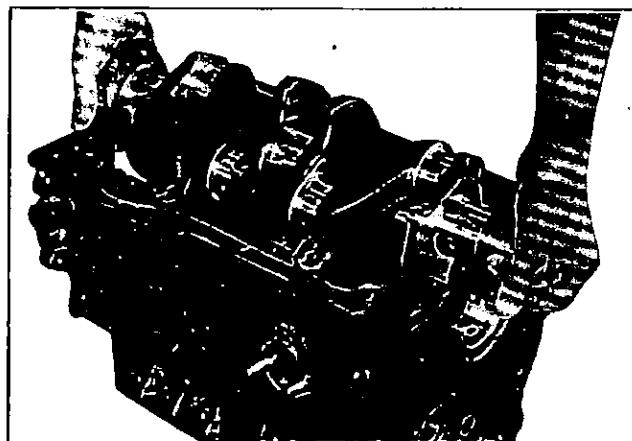
Ensure that the locating tangs are properly engaged in their recesses.

Handle the new bearings carefully so as not to damage the fine surface finish.

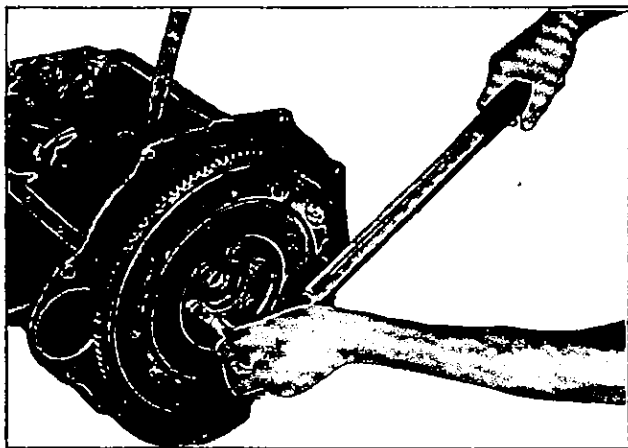
Remove all traces of dirt and oil from the housings and thoroughly dry them with a non-fluffy rag. Make sure that the oilways are clear. When fitting the bearing caps ensure that they are replaced the right-way round. Each cap is punch marked, and the marks should race the camshaft side of the engine.



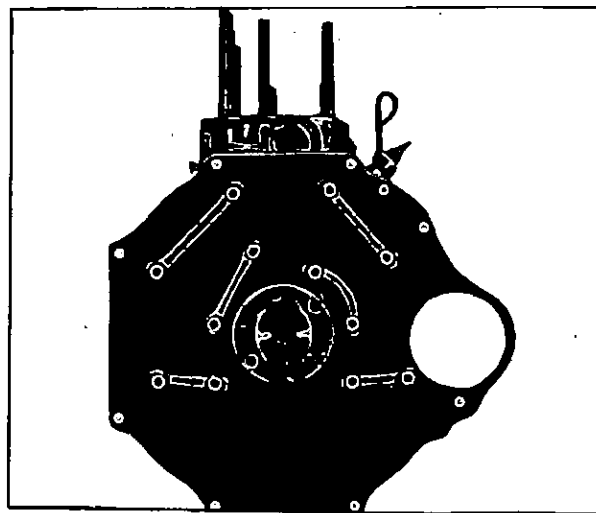
*Fig. 10 Removing Main Bearing Cap*



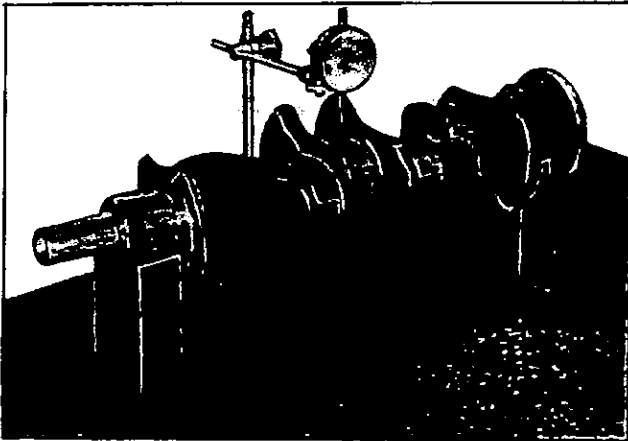
*Fig. 11 Removing Crankshaft*



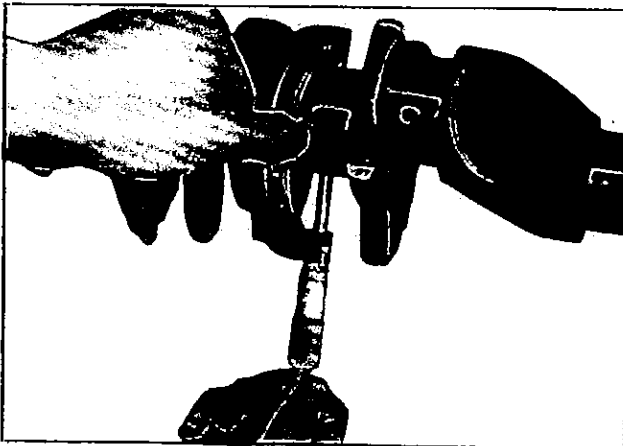
*Fig. 9 Removing Fly Wheel*



*Fig. 12 Engine (Rear Side)*



*Fig. 13 Measuring Bend of Crankshaft*



*Fig. 14 Measuring Crankshaft Pin and Journal*

### *Caution*

Never file the bearing caps to take up excessive play as this will cause ovality.

Always cover the bearing surfaces with engine oil when they are replaced.

The main bearing caps are held in position by setscrews and lock washers. Pull the setscrews up tight with a torque wrench set to a loading of 75-80 lb./ft. (10.36-11.05 kgm).

When refitting the main bearing caps tighten the center one first, after each cap is tightened rotate the crankshaft to ascertain that it revolves freely.

If it is tight remove the last cap tightened, and examine the bearing and its seating for foreign matter.

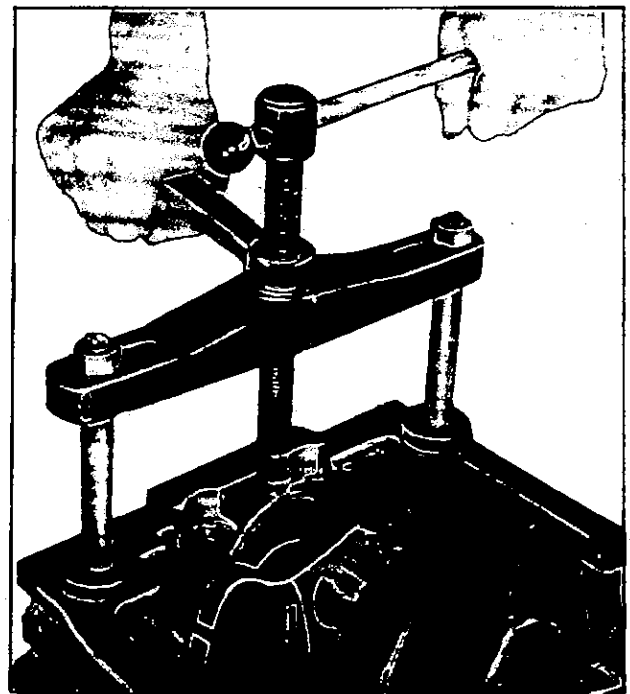
Check the crankshaft end play by means of a dial gauge. This should be 0.002 in. (0.051 mm).

If a bearing has "run", it is essential to clean out all oilways in the crankshaft and block. Wash out the engine sump and the strainer.

The oil pump should be dismantled and cleaned. Ensure that no particles of bearing, metal are left within the engine lubrication system.



*Fig. 15 Measuring End Play of Crankshaft*



*Fig. 16 Removing Crankshaft*

## IGNITION TIMING

### DISTRIBUTOR

Type	Hitachi D411-53
Ignition timing standard	8° before top dead center at 600 r.p.m.
Apparatus of automatic advance	Governor type
Advance starting vacuum pressure	100~120 mm-Hg
Advance angle by vacuum	12°~18° (Crankshaft)
pressure of 340 mm-Hg	6°~9° (Distributor)
Number of revolution at the start of advance angle	450 r.p.m.
Max. advance angle at crankshaft	11°~15° at 2400 r.p.m.
Rotating direction of cam	Counterclockwise
Firing order	1-3-4-2
Point gap	0.45-0.55 mm (0.018-0.022 in.)
Dowel angle	50°-55°
Contact arm spring pressure	0.5-0.65 kg
Condenser capacity	0.20-0.24 mfd.

Inside the distributor is a braker point as shown in Fig. 1. This braker makes and brakes contact several thousand times in one minute. Each time this braker brakes contact, a spark is generated in one of the spark plugs. Therefore, the maintenance of this braker must not be treated lightly. Also, because the time during which the ignition coil current flows varies with the gap between these braker points, see that this gap is maintained at the standard value, which is 0.45 mm. (0.018 to 0.022 in.)

The braker points must be kept free of grease and oil. If the points should become burnt or blackened, they are cleaned with a fine honing stone or croucus cloth after which they should be wiped clean with a piece of cloth which has been dampened with gasoline.

If the points are badly burnt, they must be replaced. Braker points must always be replaced as sets.

### Adjusting the Braker Points

To adjust the braker points, turn the engine crankshaft with the crank handle until the braker is fully open. Then loosen the braker point fixing screw. Next, by turning the adjusting screw, move the plate until a feeler gauge of 0.45 to 0.55 mm (0.018 to 0.022 ins.) thickness slides easily between the braker points. Then tighten the Fixing screw securely.

Finally, check the gap once more; then reinstall the rotor. The interior and exterior of the cap is wiped clean with a soft, dry piece of cloth, extra attention being paid to the areas between the terminals. Clean the center electrode on the inside of the cap also.

Whether or not the vacuum type timing advancer is functioning properly, can be determined by the inspection pointer located at the diaphragm if, as the engine is being run, this pointer moves when the engine speed is suddenly changed, the advancer is satisfactory.

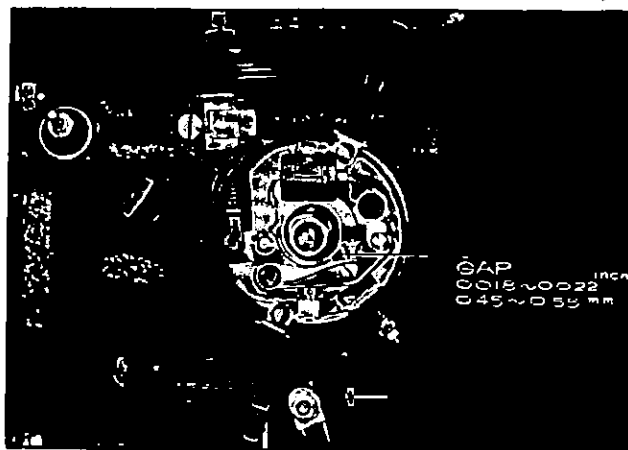


Fig. 1 Adjusting the Point Gap

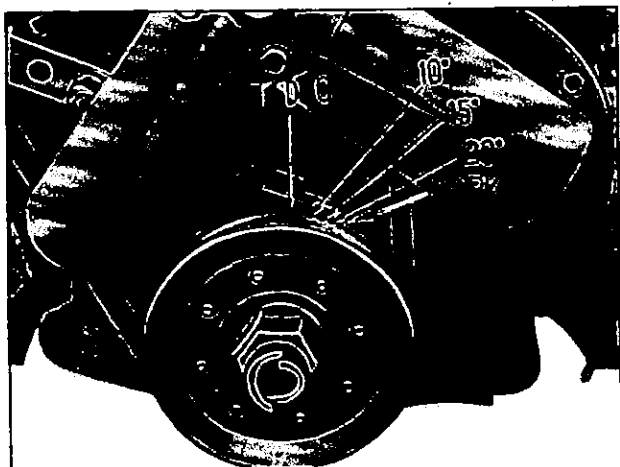
### ADJUSTING THE IGNITION TIMING

The ignition timing is adjusted to 10 degrees before top dead center with the engine stopped as shown in Fig. 2. With this adjustment, the automatic timing advancer of the distributor advances the ignition timing even further at the time the engine starts to rotate, and the timing is maintained constantly at valves suitable for the rotational speed.

With the engine stopped, adjust so that the distributor breaker point just breaks when the piston of the No. 1 cylinder is in its 10 degrees before top dead center position for compression. If a timing lamp is used, the standard ignition timing is 15 degrees before top dead center at idling (600 rpm.) speed.

In the case of marks which are not evenly spaced, pointers indicate 10 deg., 15 deg. and 20 deg., positions before top dead center. Adjustment is made by the following procedure.

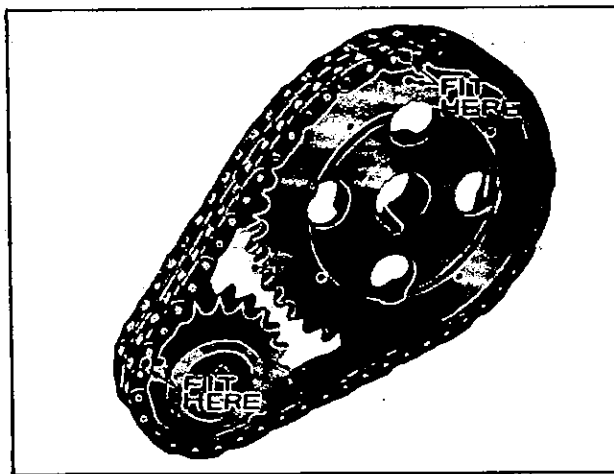
1. First adjust the distributor to the correct gap as described previously.
2. Turn the crankshaft gradually until the top dead center mark (Fig. 2) on the pulley periphery coincides with the mark for 10 deg. before top dead center on the timing gear cover as the crankshaft approaches its positions somewhat before that corresponding to the end of the compression stroke of the No. 1 piston. Stop the crankshaft in this position. The compression stroke of the No. 1 piston can be determined if the spark plug of the No. 1 cylinder is removed, the hole plugged with a finger, and the crankshaft turned. With the crankshaft in the previously-mentioned position, the No. 1 piston is in its position of 10 deg. before top dead center of compression.



*Fig. 2 Checking the Ignition Timing*

3. Next, inserting the driving shaft of the distributor at an angle to the engine, engage the gear on its lower and with the gear on the camshaft. During this assembly place the

slot of the distributor drive of the upper end of the shaft somewhat to the left as shown in Fig. 4. At this time, the smaller of the semicircle is placed toward the front.



*Fig. 3 Setting of Timing Gear Mark*

4. Adjusting the direction of the rotor so that it engages the drive shaft slot, mount the distributor to the engine. During this assembly the directions of the distributor and rotor must be as shown in Fig. 4. At the same time, the breaker must be in its position when it is just beginning to open. If these conditions do not coincide, they are made to do so by slightly turning the distributor body only.

To determine the position when the breaker point is just beginning to open, turn on the ignition key; hold the end of the No. 1 spark cord about 1/4 inch away from the cylinder head; and turn the body until spark jumps across the gap.

The off-set slot position of the drive shaft when the No. 1 piston is in its compression top dead center position is shown here.

5. Next put the distributor cap on and clamp it securely with the clip.
6. To the No. 1 spark plug connect the cord from the terminal to which the arm of the rotor is pointing. Thereafter connect the terminal cords to their spark plugs in the counter-clockwise order so as to obtain a 1-3-4-2 firing order.

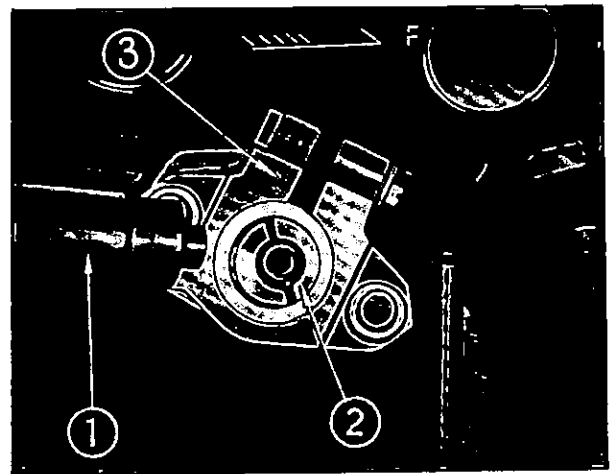


7. Upon completion of the wiring, cover the distributor with a rubber cap. The engine should now start properly.

Ordinarily, the pointer of the octane selector is set at its zero reading during the ignition timing adjustment. If the octane number of the fuel being used is low and the engine knocks, the pointer is adjusted to the right (R) to the optimum advance angle.

Conversely, if the octane number is high the pointer is adjusted to the left (A). One unit of calibration of the selector corresponds to 2 deg. of the distributor angle and to 4 deg. of the crankshaft angle.

When a timing lamp is used, the standard setting is 15 dge. before top dead center with the engine idling (600-620). In any case, the optimum adjustment is that in which a slight knocking is heard when, with the car running at low speed in "HIGH" (TOP) gear, acceleration is applied suddenly.



*Fig. 4 Assembly Angle of Drive Shaft*

- ① Distributor shaft
- ② Distributor drive shaft
- ③ Distributor fixing plate

# FUEL SYSTEM

## CARBURETOR

### SPECIFICATIONS

D2630A-5A	Primary	Secondary
Bore diameter	26 mm	30 mm
Venturi diameter:		
large	20 mm	27 mm
small	8	8
Main jet	#92	#140
Main air bleed	#60	#60
Slow jet	#48	#48
Slow air bleed (first)	#100	#120
Slow air bleed (second)	#240	
Emulsion hole	#60 x 12	#60 x 20
Slow economizer	#145	
Power jet	#40	
Power valve	Begins to open when the primary throttle valve is at 48° opening.	
Float level	21.5 mm below the upper surface of the float chamber body.	

The carburetor has the function of automizing the fuel, mixing it in suitable ratio to air and supplying the mixture to the engine.

It is therefore an important part which can influence the performance of the engine.

The carburetor is a highly efficient one of two barrel two step and down draft type having the following special features.

### Construction and Operation

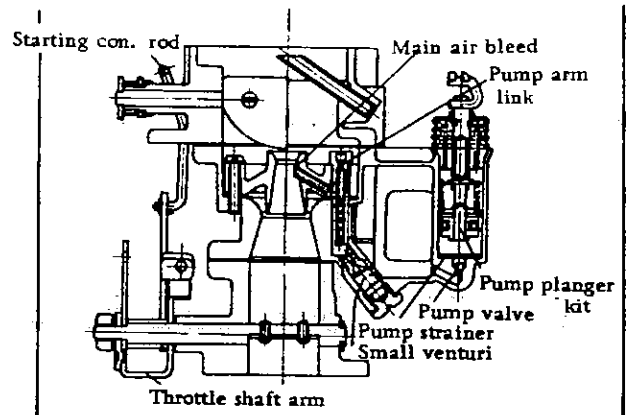
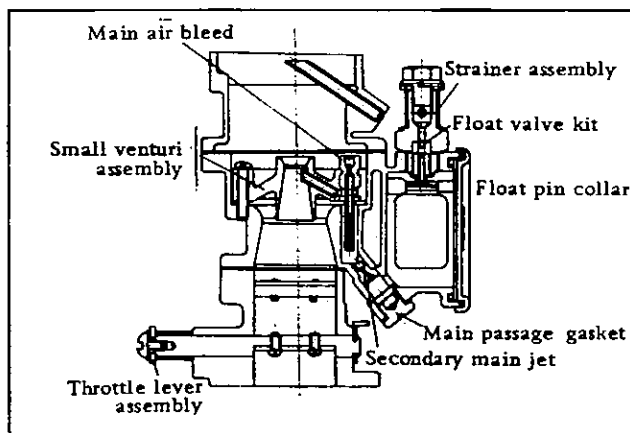


Fig. 1

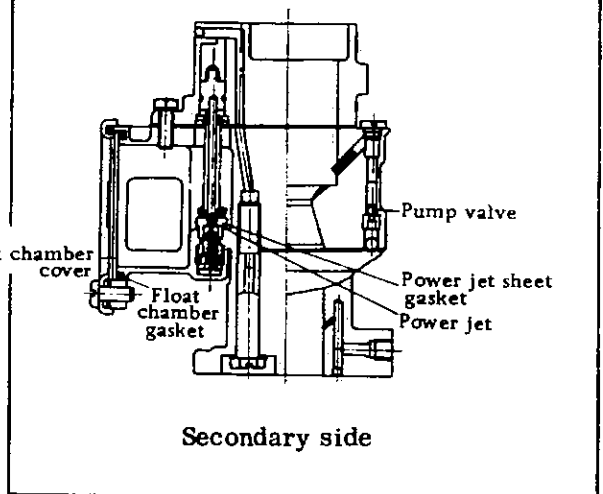
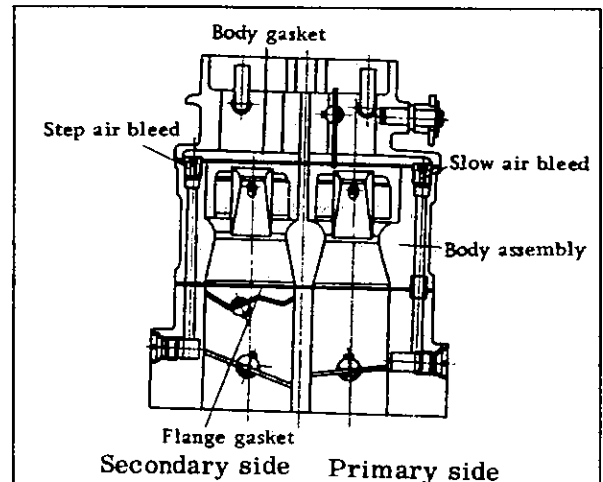
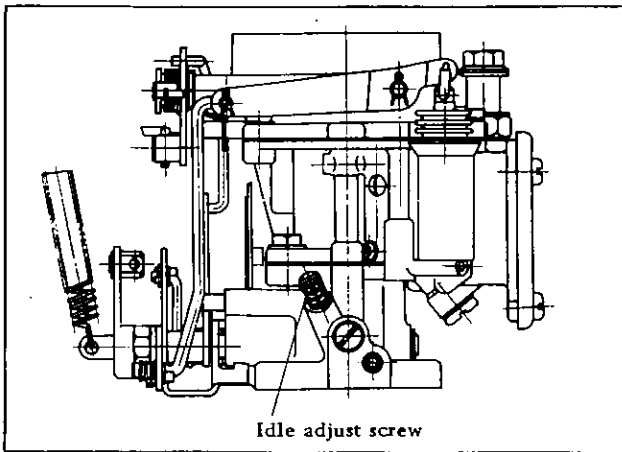


Fig. 2



*Fig. 3*

**Main Carbureting System**

The fuel flowing out of the passage at the bottom of the float chamber passes through the primary main jet and then mixed with the air coming from the main air bleed to be minute drops and inject into the venturi through the main nozzle.

When the throttle valve is widely open and the engine requires dense mixture gas, the accelerating pump opens its power valve, from where the fuel also flows into the main system.

The power valve begins to operate when the throttle valve opens 48° from full closed position.

**Slow Speed System**

Passing through the main jet, the fuel passage separate from main line and flows through the slow jet, slow air bleed first, slow economizer, slow air bleed second and inject from the by-pass holes and idle holes.

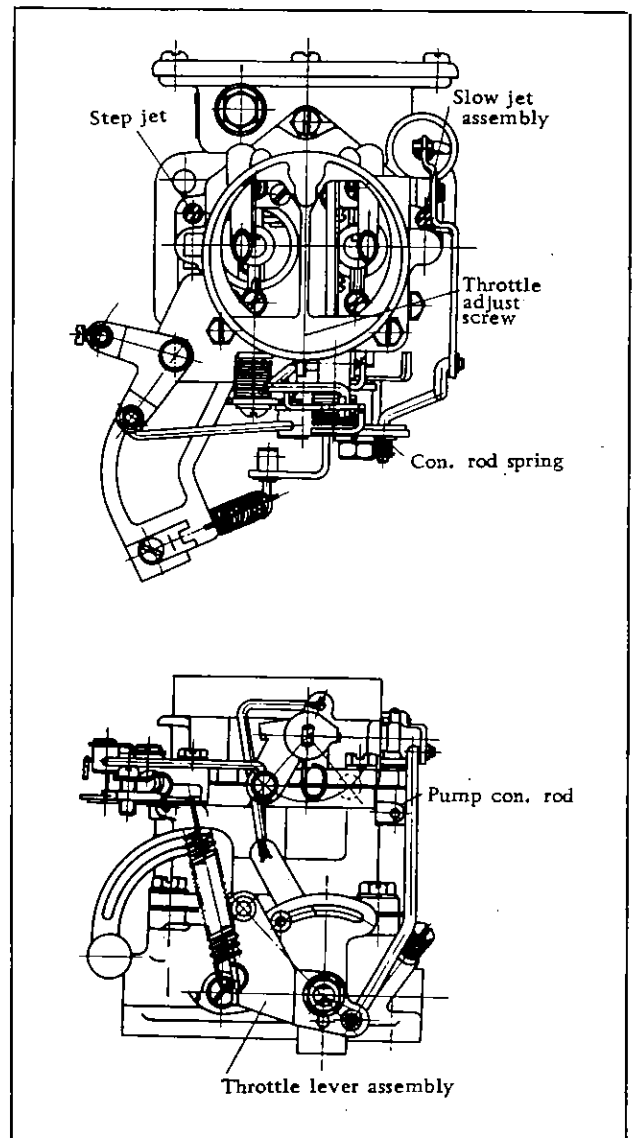
**Accelerating System**

Mechanical accelerating pump synchronized with the throttle valve is adapted. When throttle valve is open, the piston rod is pushed up with the linkage, which pushed up the piston through the dumper spring. When the piston is coming down, the inlet check valve closes the out-let check valve opens and the fuel within the pump is blown out from the pump jet by the compressed dumper spring and hits against the side wall of the small venturi to be minute drops, compensating transient sparseness of the fuel. A jetting

amount of the fuel can be varied with the two holes provided on the pump arm, that is, the inserting positions of the Connecting rod.

**Starting System**

The choke valve is provided with the spring and installed eccentrically on the normal carbureting device and synchronized with the throttle valve. When the choke is fully closed, the throttle valve opens about 14° from a full close. This is the best condition to start operation. The synchronization of the choke valve and the throttle valve can be exactly maintained often the engine has started firing.



*Fig. 4*

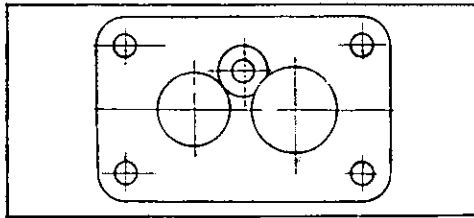


Fig. 5

### Main Carburetting System

Same as the normal carburetting function the fuel flowing out of the passage at the bottom of the float chamber passes through the secondary main jet and become minute drops mixing with the air coming from the main air bleed and is blown into the venturi through the main nozzle.

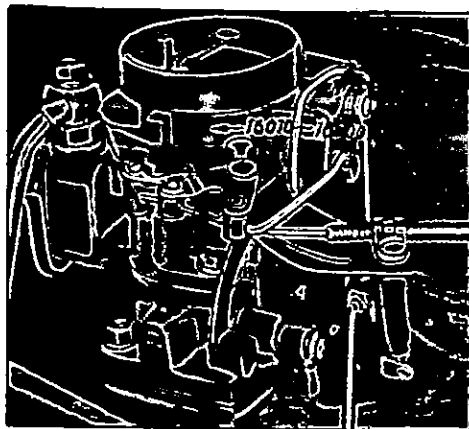


Fig. 6 Nikki Carburetor

When the throttle valve of the normal carburetor is widely opened and the engine produces high power, the throttle valve of the power carburetor begins to open by the synchronized linkage.

However, at the top of the power carburetor throttle valve is an auxiliary valve which is not open at a slow speed with a heavy load due to the load of the counter weight connected to the valve shaft even when the throttle valve is open. When the engine change to still higher revolutions, the auxiliary valve open against the loat of the counter weight and the power carburetor starts operation for high power. When the normal carburetor throttle valve is in a full open, the power carburetor throttle valve is also to be in a full open.

### Float Chamber

Adjustment of the float level can be done from outside by adding or subtracting the needle valve carrier gasket after removing the float needle valve installed at the inlet connector.

As ventilation within the float chamber is of a air vent method and pressure within the venturi and the float chamber is always constant no matter how suctional registance of the air cleaner varies, fuel consumption can be always econmically maintained.

### Adjusting Fuel Level

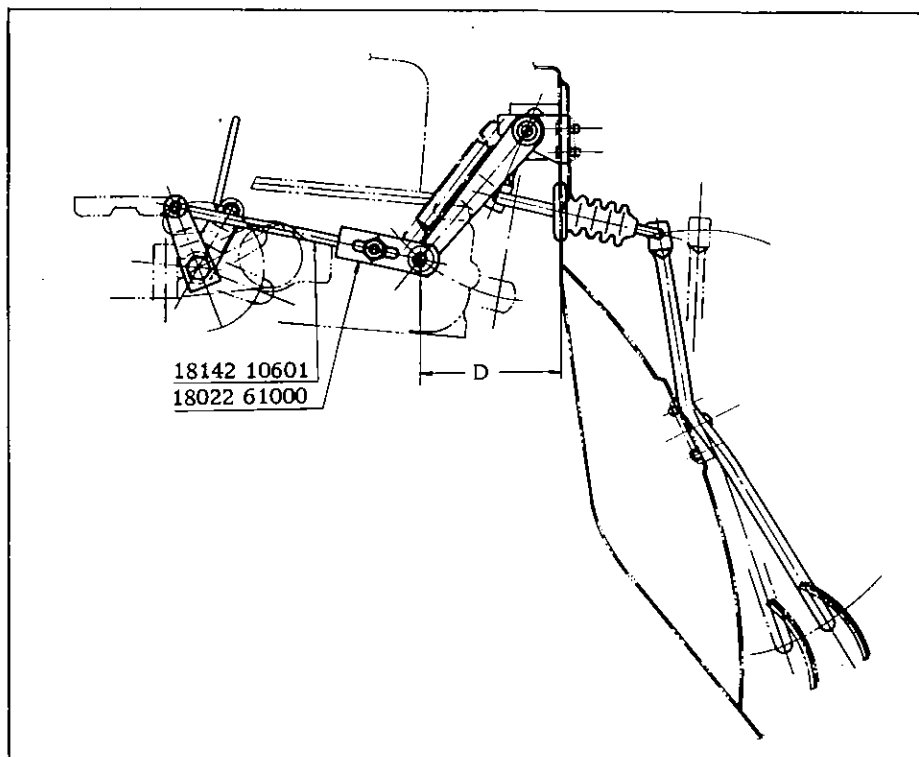
1. Take off the cover of float chamber.
2. Raise the float slowly until its hanger lip contact with the valve retainer.
3. At this stage, the float upper surface must be level and parallel with the chamber top.
4. Adjusting the float level is done by adding or subtracting the gasket of float valve seat (needle valve carrier).
5. Addition or subtraction of 2 numbers gasket make the float level up or down about 1 mm. (one gasket is thickness (0.5 mm))

### Adjustment of accelerator

The accelerator must be so adjusted by the adjusting plate at the carburetor side that the throttle valve may be full open with full pedal on and of slight gap with pedal off. After adjusting this, tighten up surely the nuts of the adjusting plate.



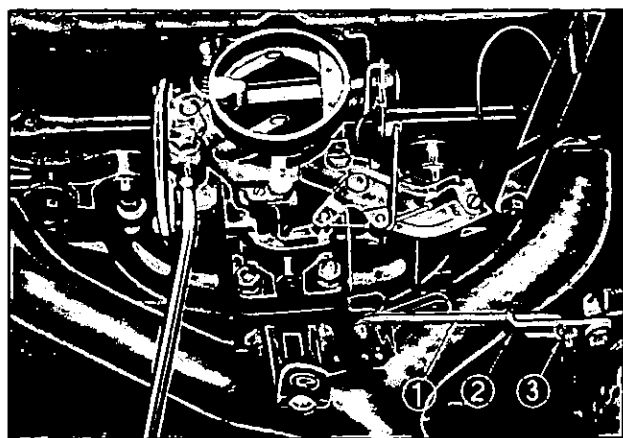
Fig. 7



*Fig. 8*

Dimensions of (D) is adjusted to 86.5 mm by rod and adjusting plate.

The nut must tighten surly after fixing the dimension of (D).



*Fig. 9*

- ① Rod
- ② Adjusting plate
- ③ Nut

## **THE GASOLINE TANK**

The fuel tank has a capacity of 41.0 litres and is situated at the rear of the luggage compartment.

The fuel pump, operated off the camshaft draws fuel from the tank and forces it into the carburetor float chamber. A large and efficient air cleaner filters the air supply to the carburetor.

### **Draining the Fuel**

The fuel tank is drained by turning the wrench operated drain cock.

### **Fuel Tank Gauge Unit**

Situated on the top face of the tank is the gauge unit. To remove, withdraw the set screws which secure the unit to the tank not forgetting to disconnect the electrical lead beforehand. Care must be taken not to strain or bend the float lever as this may seriously effect subsequent gauge readings. Remember this also applies when refitting the unit.

Examine the joint washer to ensure that it is in position and undamaged. This is essential as the joint between the tank and gauge unit must be fuel tight.

Fig. 1 Fuel Tank Securing

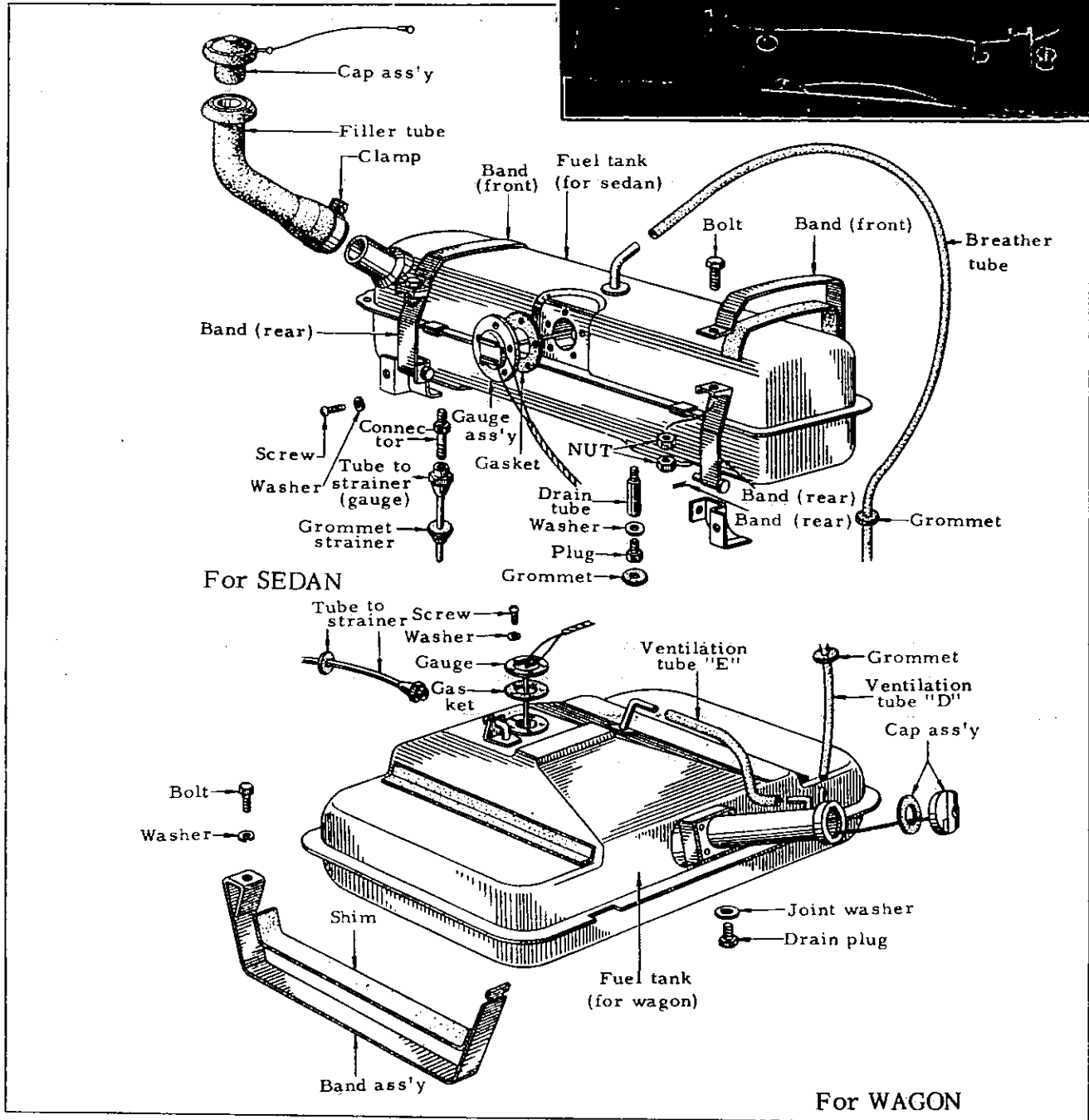
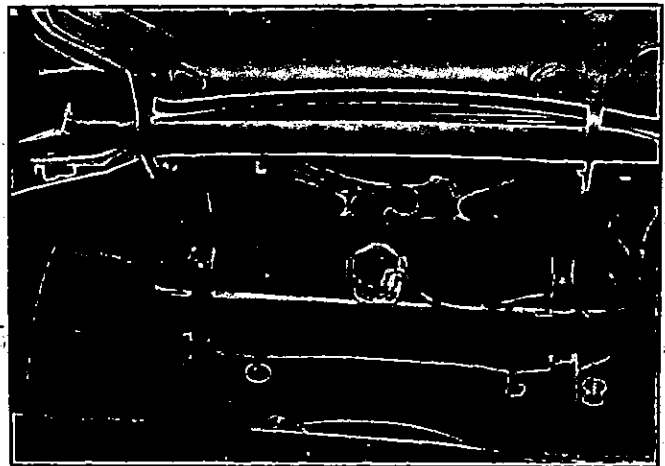


Fig. 2 Fuel Tank Mounting

**ENGINE**

Lined area for notes, consisting of multiple horizontal lines.

# **DATSUN**



FUEL PUMP

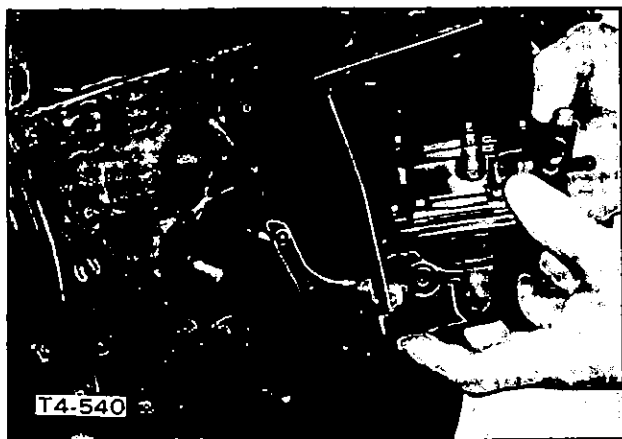


Fig. 5

FUEL PUMP

Type	Diaphragm pump
Method driven	Driven by camshaft
Diaphragm spring	
Free length	36.5 ~ 0.1 mm
Length in use and tension	18 mm - 1.6 ~ 0.1 kg
Rocker arm spring	
Free length	30 mm
Valve spring	
Free length	9.5 mm
Thickness of valve	1.6 mm
Performance	
Max. quantity discharged	1300 cu. cm per minute at 1000 r.p.m. of cam, 500 mm in suction height
Max. pressure discharged	110-130 mm in mercury column
Max. degree of suction vacuum	More than 400 mm in mercury column
Hand primer quantity discharged	80 cu. cm (at 20 strokes)

The fuel pump, which is of the diaphragm type, is mechanically driven by the eccentric part of the camshaft of the engine.

It draws gasoline from the tank and delivers it under pressure to the carburetor.

Even when the engine is not running, fuel can be delivered under pressure by moving the hand primer up and down.

By the rotation of camshaft, rocker arm is pushed and pull rod of diaphragm is pulled down.

At the same time, diaphragm goes down against diaphragm spring and then is pushed up again by its spring.

By the movements of the diaphragm and functioning of the valves at the inlet and outlet of the pump chamber, gasoline is drawn up from the tank to the carburetor.

If the float chamber of the carburetor contains enough gasoline and the needle valve is closed, gasoline is not allowed into the carburetor.

Thus gasoline is stored in the pump chamber and due to its pressure, the diaphragm is kept down and cannot return.

Under this condition, the rocker arm works in vain, as the rod remains low.

The rocker arm spring serves to prevent noise, keeping the rocker arm pushed against the eccentric of the camshaft.

Disassembling & Inspection

*Checking with fuel pump installed on engine:*

Switch off and stop the engine. Disconnect the fuel pipe at the inlet union of the carburetor, and then turn the engine with the crank handle.

Now the gasoline should be ejected vigorously from the tip of the pipe once very two rotations of the crankshaft.

To test the function of the pump alone, operation of the hand primer and checking the fuel ejection is enough.

*Removal from engine:*

Fuel pump can be easily removed by disconnecting the inlet and outlet unions and loosening the 2 attachment nuts.

*Inspection prior to disassembling:*

Prior to disassembling of the removed pump, measure the distance between the rocker arm and flange of the lower body by means of a scale and see if the rocker arm, rocker link and pins are worn.

## Method of disassembling:

First wipe dirt off the outer surface of the pump and put marks on both the upper and lower bodies, to make their reassembling easy.

It is easily separated into two when the five screws around the upper body are loosened.

Take great care not to damage the diaphragm during this disassembly.

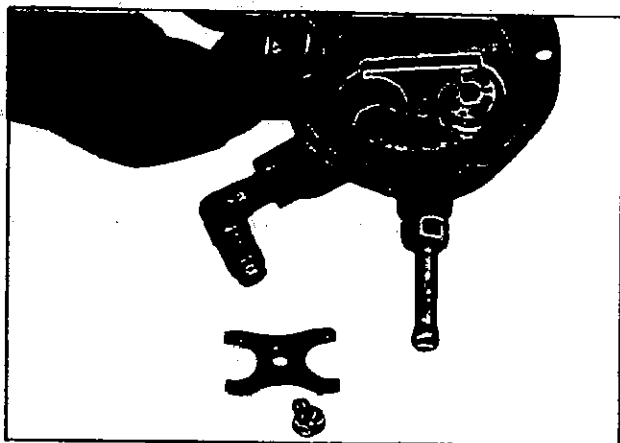


Fig. 6

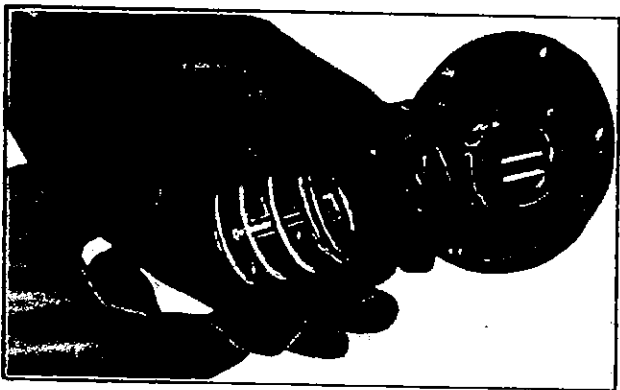


Fig. 7

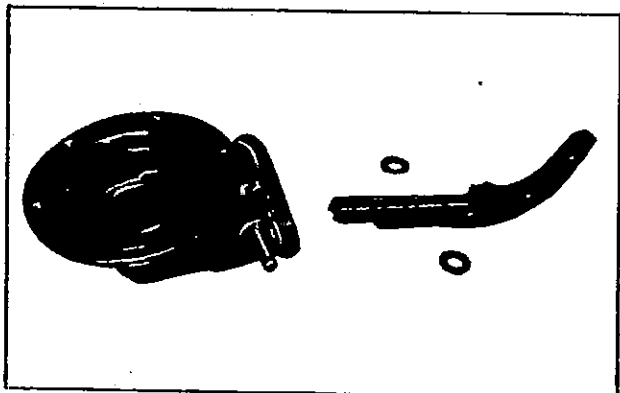


Fig. 8

## Checking & Repaires of Parts

Wash the disassembled parts well in gasoline then inspect them.

Replace the diaphragm if any damage, impregnation by gasoline.

Replace a valve assembly if any wear or faulty operation is detected.

Even if repairs are unavoidably required, the limit for repairs of warp or wear of the valve is 0.001 in.

When the surface of the valve seat or valve is found irregular, remove the valve seat of the outlet and dress the surface with a fine oilstone.

In case of irregularity of the seat surface of the inlet valve, which cannot be taken off from the body, recondition it with a cutter and grinding tool.

When the surface of the valve is faulty, place some very fine grinding compound on the surface of a flat piece of glass plate and grind it lightly with the tip of a finger. The standard thickness of the valve is 1.6 mm.

The hole of the joint parts of diaphragm shaft and link may be worn to some extent. This is not serious, but when serious eccentric wear, crack, or breakage is found, the part must be replaced.

As a remedial measure, such wear can be compensated for at the time of dismantling and reassembling of the body, by inserting a packing made of thick paper between the lower body and diaphragm to raise the relative position of diaphragm shaft with respect to the lower body.

The rocker arm should be replace when its contact face with the cam and that with the link and its pin hole are seriously worn.

When its re-employment by reconditioning is unavoidable, add material to the rocker arm and link by welding and finish them with a file, but this cannot last long and is no more than a temporary measure.

Renew the arm pin when it is found worn excessively.

The diaphragm spring, arm spring seldom become faulty, but when weakened, replace them always with standard ones.

If the diaphragm spring is to strong, it results in overflow of the float chamber of the carburetor.

The tension of the spring must not be strengthened or weakened arbitrarily by hand.

Check to see if there is any warp on the joint surfaces of the cap and body, and, after disassembling is over, renew the gasket to keep its air-tightness.

## Reassembling & Installing

Employ standard springs for the various uses as stated before.

Install valves precisely for close contact with their respective seats.

In screwing in of upper and lower bodies and diaphragm, fit them together according to the marks which were put before the disassembling and align one screwing hole to its mate, and then screw in at the position where the diaphragm is fully pulled down with the rocker arm pushed towards the side of the body by and pressure.

Do not screw in tight one by one since it causes warping. Instead, clamp all the screws round loosely and uniformly.

Then tighten them diagonally and lastly re-tighten all of them in order to make sure.

As a general rule, gaskets should be replaced by new ones.

Installation on the engine is done in the reverse order to that for disassembly.

Be sure to set the rocker arm so that it is contacting the eccentric of camshaft properly, not the rear side or to one side. Replace the gasket between the cylinder block and pump with a new, standard one.

## Checking Function

When repairs of the pump is over, or before it is installed on the engine, make a check to see:

When a vacuum gauge is connected to the pump inlet port and the pump is mounted on a tester, the rocker arm is activated by the eccentric of the camshaft revolving at 1000 rpm. Then the gauge pressure should rise to higher than 400 mm of mercury column, and, even if operation is discontinued, this condition should remain for more than 3 seconds.

When a gauge or tester is not available, test in the following way:

Close the inlet port and outlet port with finger tips. Then, after operating the rocker arm several times, suddenly release the fingers.

The pump is in good conditions if, 3 to 5 seconds thence, there can be heard strong inlet and outlet noise respectively.

The pump is mechanically fit for use when, by connecting a hose to the inlet port, it is able to draw up gasoline from a height of more than 0.5 m. After installing the pump, test its functions during operation.

- (A) Connect the gasoline pipe on the inlet post side only. Leave that on the outlet port side as it is, and turn the engine 6 to 7 rotations by means of the crank handle and make sure that there is sure outflow of gasoline from the outlet port.
- (B) Connect the gasoline pipe to the outlet port side and tighten all the piping joints. Then turn the engine again several times to see if there is any leakage of air or gasoline from each connection.

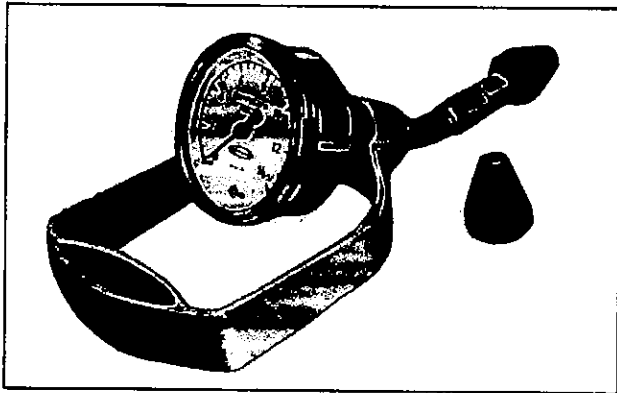
## ADJUSTMENT AND INSPECTION OF ENGINE

The engine must always be operated in the best possible condition, and for this purpose, periodic inspection and adjustment must be maintained in a certain order while in use as well as after overhaul.

### Order of Inspection and Adjustment of Engine

- (1) Check the cooling water: water level and extent of fillthiness.
- (2) Inspect the battery: all connections, level of electrolyte, specific gravity of electrolyte and voltage.
- (3) Inspect the oil: amount, filthiness, classification and viscosity.
- (4) Cleaning of spark plugs and adjustment of their gaps.
- (5) Measurement of compression pressure of cylinder. The standard compression pressure of the engine is approx. 163 lbs. per sq.in. at 350 r.p.m. Measurement of pressure is made in the following manner: (see Fig. 1) First, warm up the engine (temperature of cooling water, 70-80°C) then remove all spark plugs and pull out the throttle knob all the way (that is in the carburetor, the throttle valve and choke valve are fully opened); press a compression gauge against each spark plug hole, and, running

the starter motor with a fully charged battery, read the maximum pressure obtained within 5-8 rotations of the motor. This measurement must be made as quickly as possible. If the compression pressure of any one cylinder differs by 10 lb./sq.in. or more from that of another, the cause must be



*Fig. 1 Compression Gauge*

(6) Check and adjust the distributor:

If the breaker contact points have defective contact surfaces, dress them and adjust the gap to 0.45-0.55 mm.

Also turn the cam of the distributor clockwise and check to see if the governor can carry out advancing function.

(7) Adjust ignition timing correctly.

By utilizing a power timing light, the function of the governor can be checked together with the ignition timing (illumination of crank pulley will enable to inspect the conditions of running and advancing of the timing.) (B.T. D.C. 20°)

(8) Inspection of fuel pump and gasoline strainer.

(9) Adjust the slow setting of carburetor.

(10) Checking operation of generator.

Check the generating condition and functioning of the cut-out relay by means of indications of the ammeter.

(11) Adjustment of slack in fan belt.

(12) Adjustment of valve tappet clearance.

(13) Road test.

While driving in 3rd. speed at about 25 km/hr., suddenly step on the accelerator. If only a slight knocking results, the ignition timing is correct. Slow speed adjustment is made so that the speed is about 15 km/hr., when driving in 3rd speed.

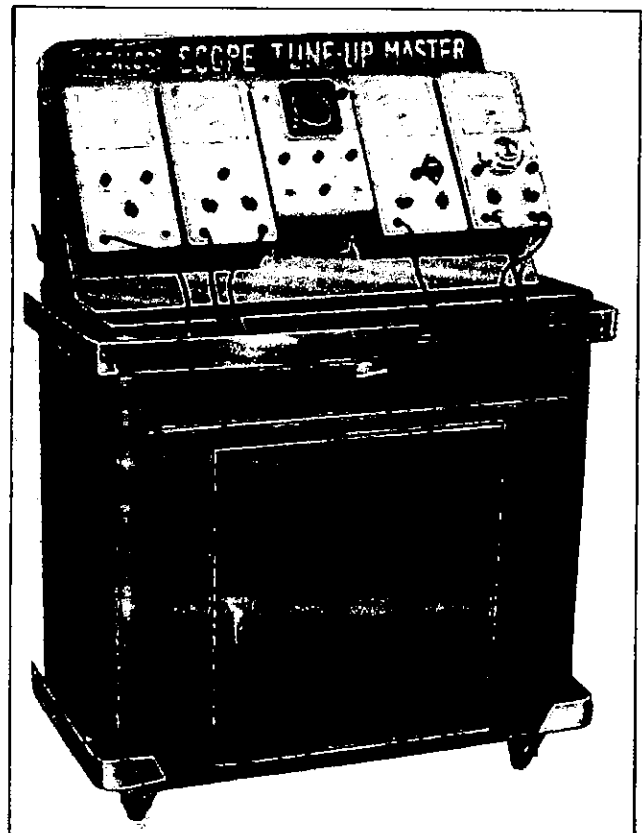
## Diagnosing of Engine by means of Vacuum Gauge and Combustion Tester

In diagnosing the engine, the condition of each cylinder can be assumed by measuring its compression.

For employment of a vacuum gauge, connect it to the engine intake manifold and refer to Fig. 2.

The use of a master motor tester as shown in Fig. 2 is convenient.

When a combustion tester is used, install a special intake (pick-up) in the exhaust tube, and after the engine has been started, analyze by means of a special gauge, the combustion gas which flows through the connecting hose into the tester, and judge the combustion condition according to the mixture ratio of fuel and air. When measurement is to be made in rainy or cold weather, use an auxiliary condenser between the pick up and the meter, otherwise, the excessive moisture in the exhaust gas will damage the functioning of the meter if permitted to enter it.



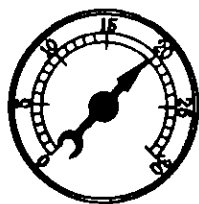
*Fig. 2 Motor Master Tester Available for 4, 6 and 8 Cylinder Engine*

When a tester is to be used, make adjustments according to the following table.

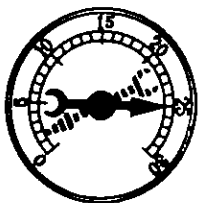
Conditions (Without load)	Suitable Weight Ratio of Mixture
Low Speed Running (600 r.p.m.)	$70 \pm 2\%$
High Speed Running (2,000 r.p.m.)	$85 \pm \frac{5}{2}\%$

## Engine Trouble Shooting

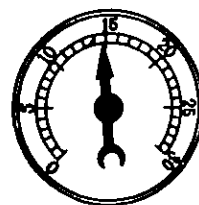
Fig. 3 is intended to be of assistance in the systematic analysis and isolation of symptoms of engine troubles so that the defective points may be accurately traced and economically repaired.



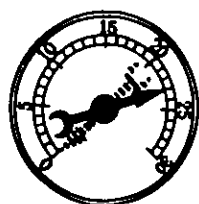
- (1) Normal Condition  
Settles between 18 ~ 20 in.



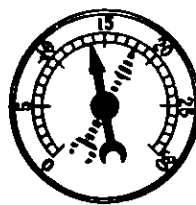
- (2) Normal condition  
When indicator fluctuates between a range of 0~25 in. as engine is raced, rings and valves are in good conditions.



- (3) Even if indicator settles, if reading is low rings or oil are in faulty condition.



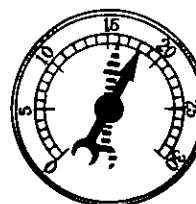
- (4) When above (3) condition exists, indicator will swing to 0 in. if engine is raced.



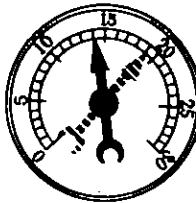
- (5) When indicator sometimes drops by 4 in., or so, valve sticking exists.



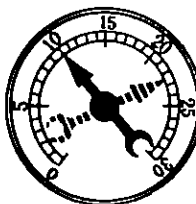
- (6) When indicator drops by several inches at certain time, valve are burnt.



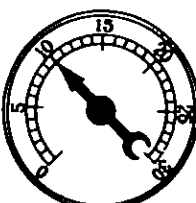
- (7) When indicator drops by about 2 in., valve leak. (Faulty seating of valves.)



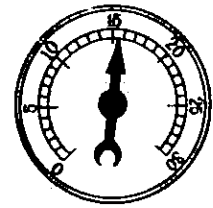
- (8) When indicator oscillates actively between 14 and 18 in., valve stem guide is worn out.



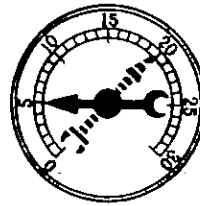
- (9) When, with a slight speeding up, indicator moves between 10~22 in., and with increase of speed, the range becomes larger, valve springs are weak.



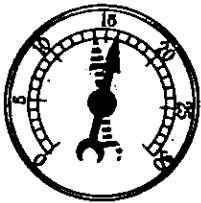
- (10) When indicator remains still between 8 ~ 15 in., it is because either valve timing is retarded or valve clearances are not correct.



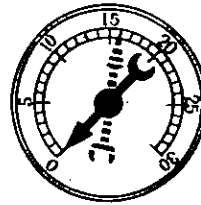
(11) When indicator settles between 14 ~ 17 in., ignition timing is retarded.



(14) When indicator oscillates regularly between 5 ~ 19 in., there is leakage at cylinder head gasket. (Faulty clamping of gasket.)



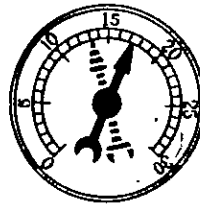
(12) When indicator moves slowly between 14~16 in., it is because either electrode gaps of plugs are too narrow, or breaker point is defective.



(15) When indicator first rises high, drops down to zero, and then returns to 16 in., muffler is clogged.

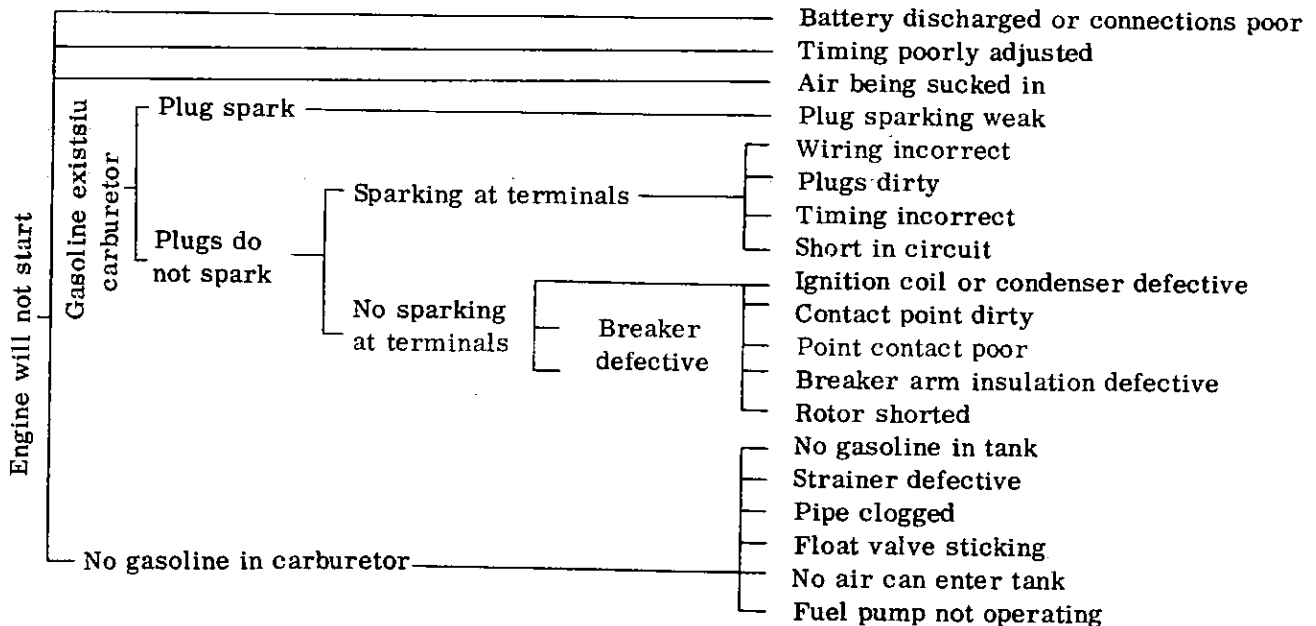


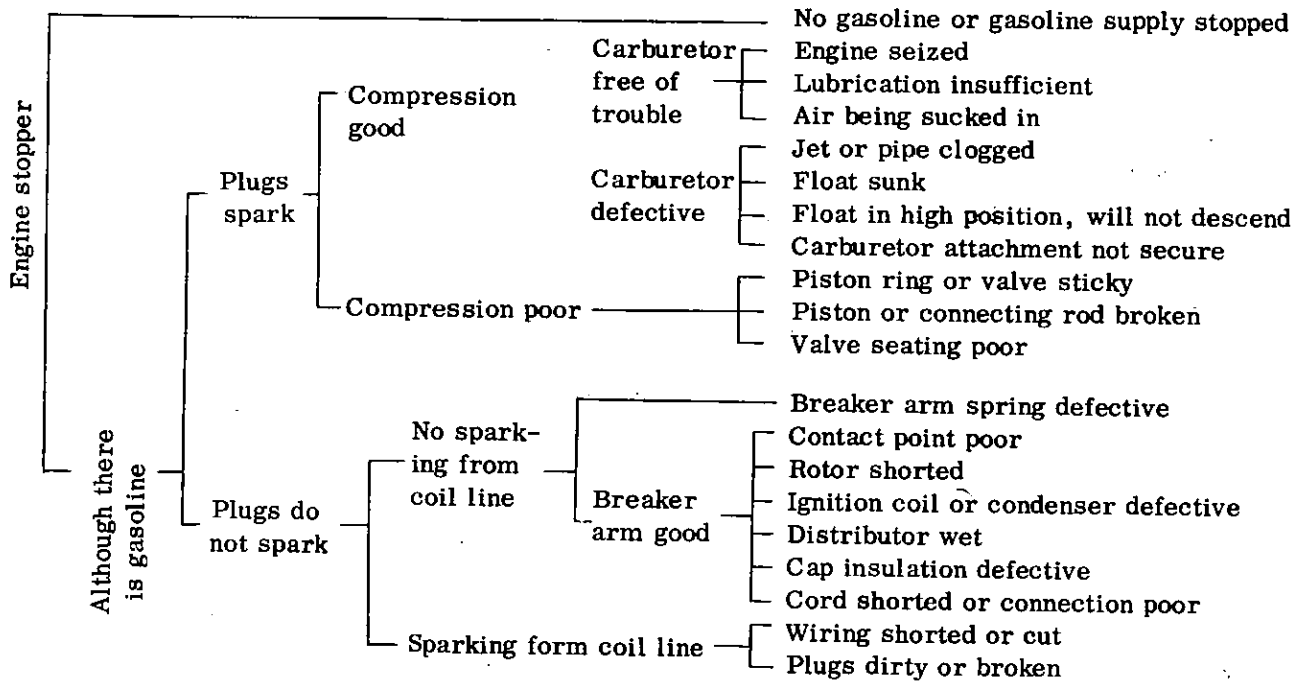
(13) When indicator points to 5 in. or below, there is leakage at intake-manifold or gasket of carburetor. (Faulty clamping of gasket.)



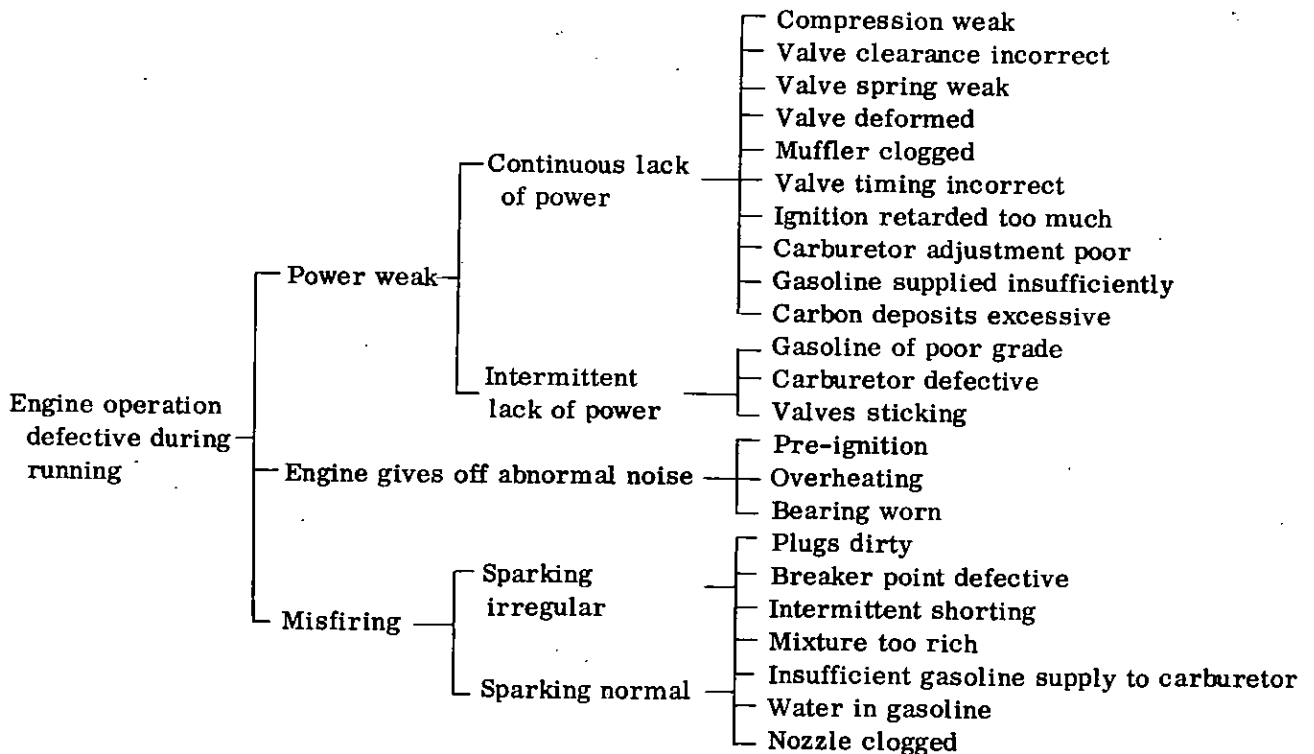
(16) When indicator moves slowly between 13 ~ 17 in., carburetor is poorly adjusted.

Fig. 3 Diagnosing Engine by Means of a Vacuum Gauge





(A) *Trouble Shooting Chart*



(B) *Trouble Shooting Chart*

# CLUTCH

## GENERAL DATA

Type	Single dry disc plate
Construction of disc	With coil spring
Outer dia. of facing	200 mm
Inner dia. of facing	130 mm
Thickness of facing	3.5 mm
Gross friction area	363 cm <sup>2</sup>
Thickness of disc ass'y	8.6~9.1 mm when releasing 7.3~8.1 mm when depressing
Disc run-out	Less than 0.5 mm
Backlash at splines part	0.05~0.15 mm (0.002~0.006 in.)
*Operating method	Oil pressure
*Inner dia. of master cylinder	15.85 mm (5/8 in.)
*Inner dia. of operating cylinder	19.05 mm (3/4 in.)
*Operating liquid	Genuine super brake oil
Return spring, with- drawal wire dia.	1.6 mm
Free length	87 mm
Length in used & tension	136 mm/5 kg

## PRESSURE SPRING

Free length	49 mm ± 1.5
Compressed length	Less than 25 mm
Turn numbers	7.8
Power of comp, in full	About 300 kg
Wire diameter	3.3 mm
Length in used and load	29.2-37.5 ± 2 kg

## RELEASE BEARING

Construction	Ball bearing type
Height of release plate	*From flywheel face to rear end of plate 50.5 ± 0.2 mm
Release plate run-out	Less than 0.03 (0.0012 in.)

\*If use master disc (7.8 mm ± 0.5 mm height), height of release lever is 50.5 ± 0.2 mm.

## DISASSEMBLY OF CLUTCH SHIFT LEVER

### Clutch Housing

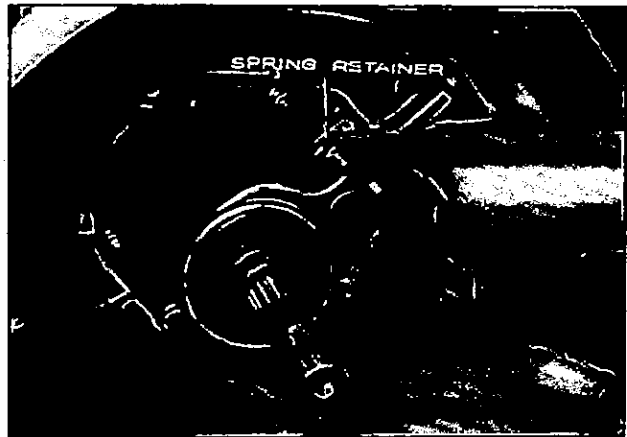


Fig. 1

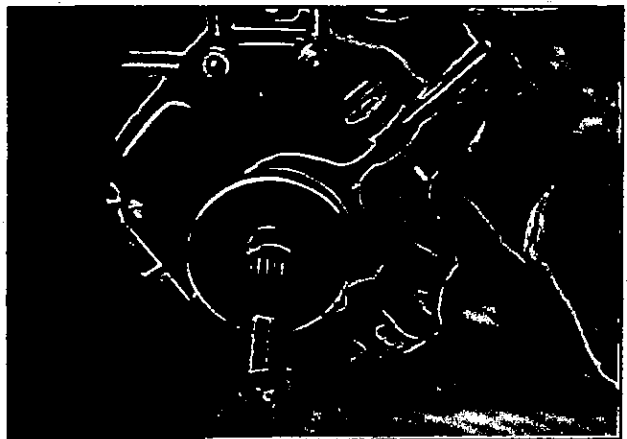


Fig. 2



Fig. 3



### Driver Plate Assembly

This is the flexible type in which the splined hub is indirectly attached to a disc, which transmits the power and the over-run through a number of coil springs held in position by retaining wires.

Two friction linings are riveted to the disc.

### Cover Assembly

The cover assembly consists of pressed steel cover, and a cast iron pressure plate located by six pressure springs.

Mounted on the pressure plate are three release levers.

Adjusting nuts are screwed on the bolts of pressure plate. Retainers of pressure spring insert to the clutch cover holes and anti-rattle springs load release levers.

### Release Bearing

The release bearing consists of a carbon bearing shrunk into a bearing cup, the cup bearing located by the operating fork and the release bearing retainer spring.

### Running Adjustment

Owing to the hydraulic design of the clutch controls no adjustment is necessary to the clutch pedal.

### Removing the Clutch

To gain access to the clutch it is first necessary to remove the transmission complete from the engine.

Once the transmission unit is free, a turn at a time by diagonal selection until the spring pressing is relieved.

Then remove the screws completely and lift the clutch assembly away from the flywheel. Finally, remove the driven plate assembly.

The release levers are correctly set on assembly. Interference with this setting, unless new parts have to be fitted, will throw the pressure plate out causing judder.

### Dismantling, Assembling & Gauging

By using service tool the clutch can be quickly dismantled, reassembled and adjusted to a high degree of accuracy.

The tool comprises the following parts; base plate centre pillar, spacing washers, distance pieces, hight finger actuating mechanism, set-screws, speed brace and metal box. As this tool is universal, a chart indicating the particular parts to be used for particular types of clutch will be found on the inside of the lid of the box.

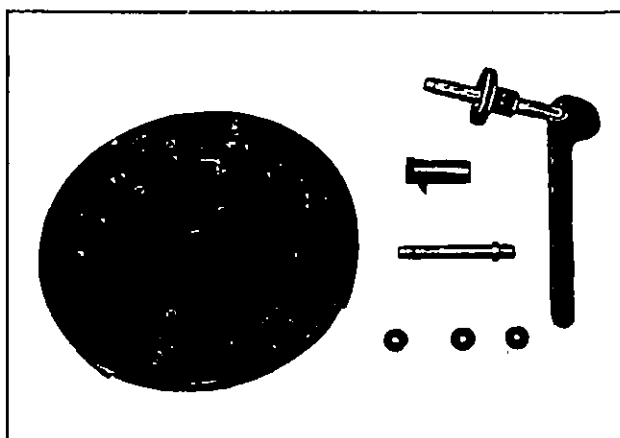


Fig. 4

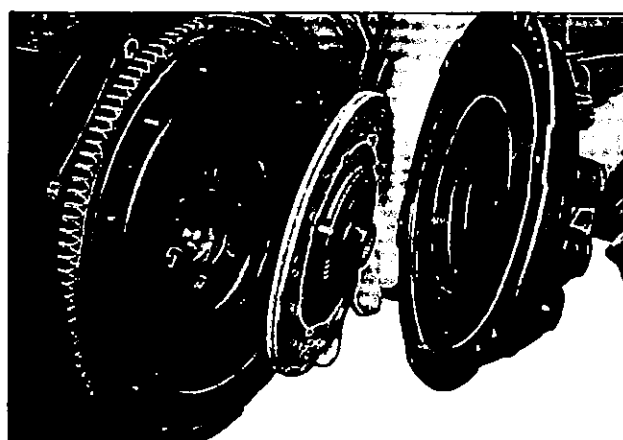


Fig. 5

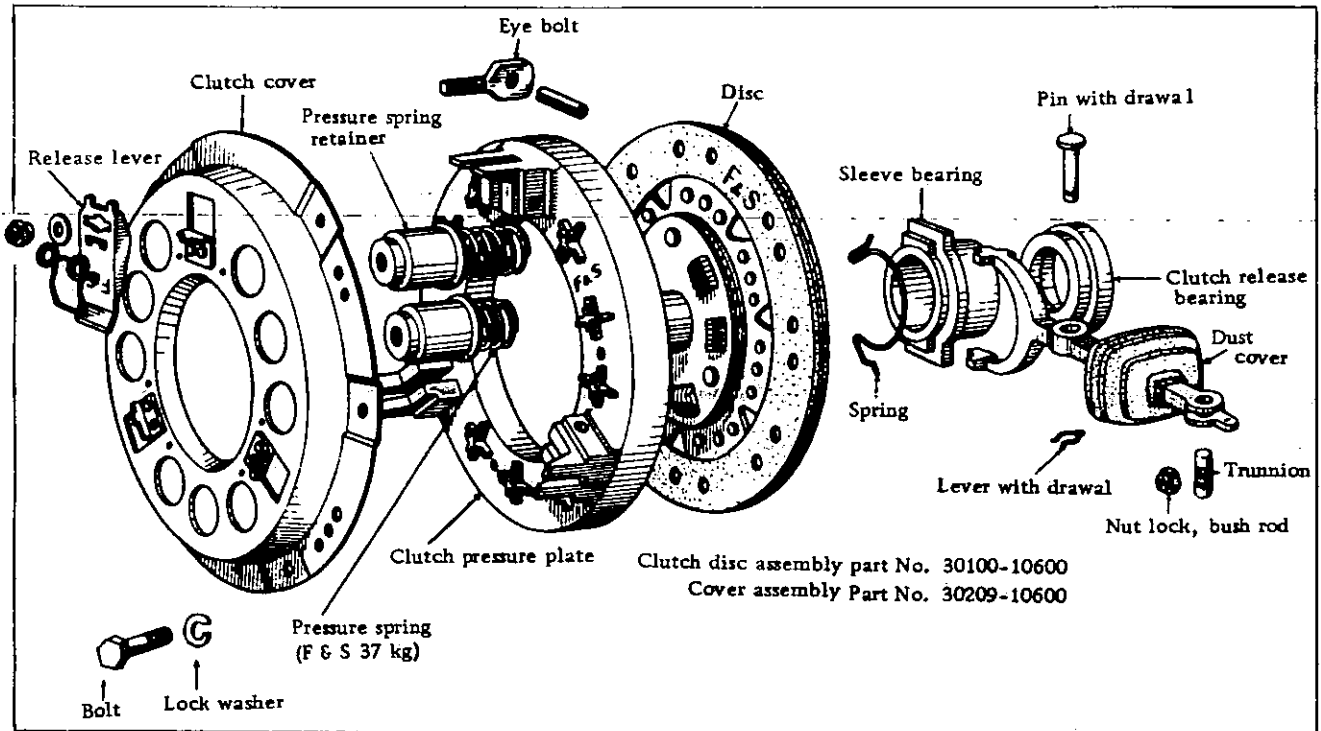


Fig. 6 Clutch

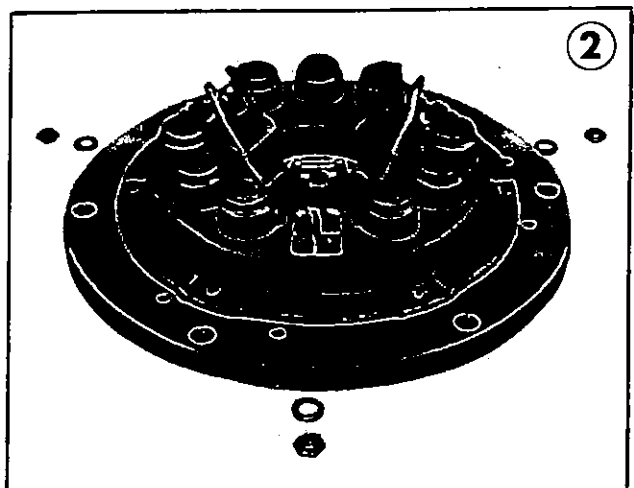
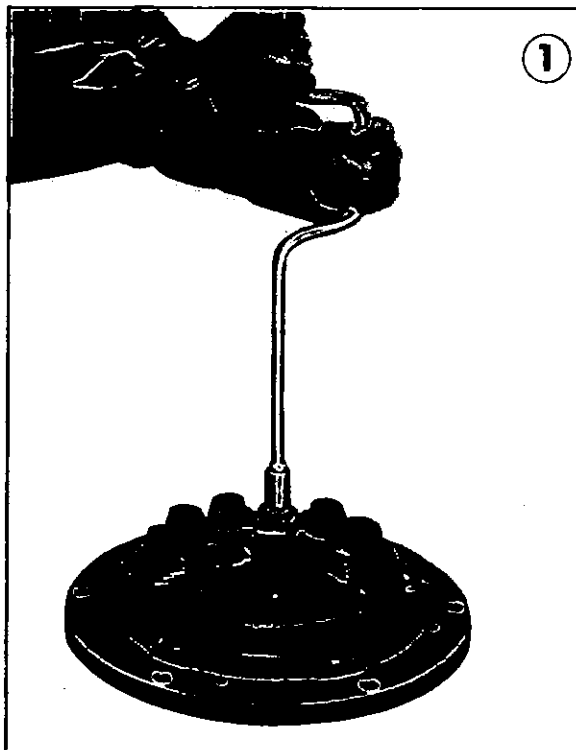
**Dismantling**

Place the clutch cover assembly on the three spring so that the holes in the cover coincide with the tapped holes in the plate, insert the set-screws provided and tighten them, a little at a

time, by diagonal selection until the cover is firmly attached to the base plate at all possible points. This is most important if the best results are to be achieved.

Mark the cover, pressure plate lugs and release levers with a centre punch so that the parts can be reassembled in their relative position in order to maintain the balance of the clutch.

Detach the release lever plate from the eye-bolts and remove the three lock nuts and adjusting nuts.



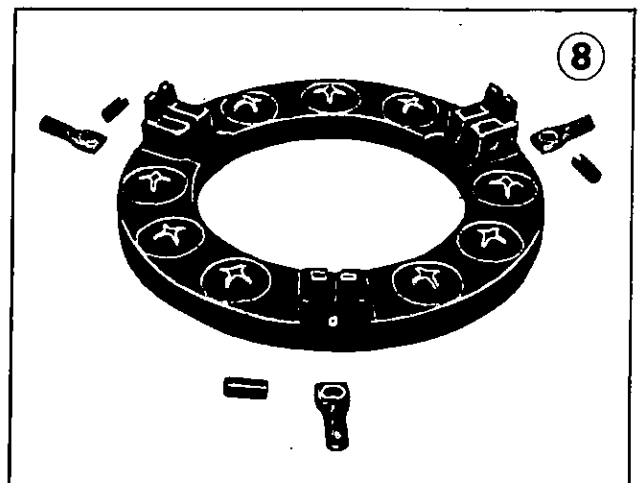
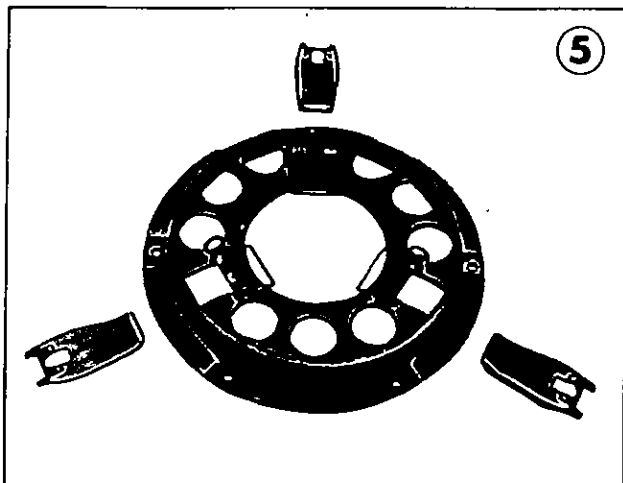
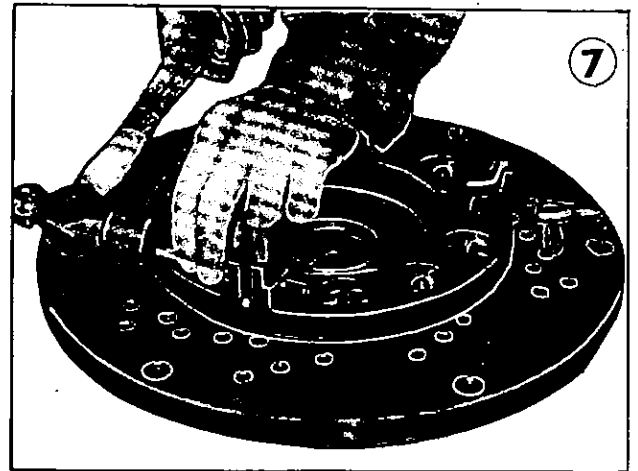
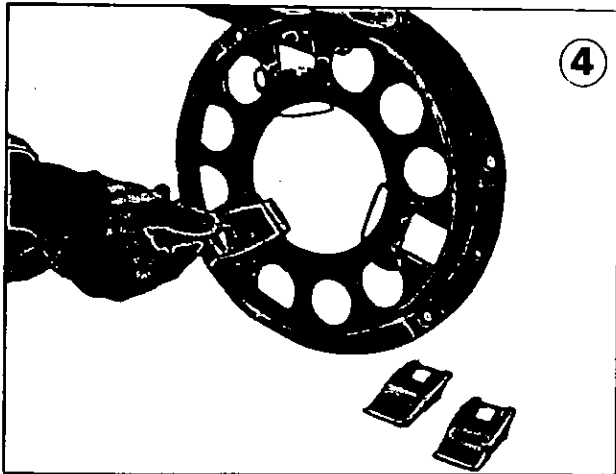
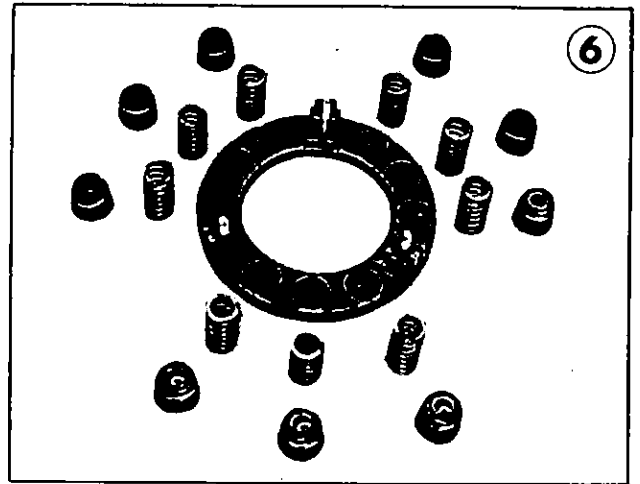
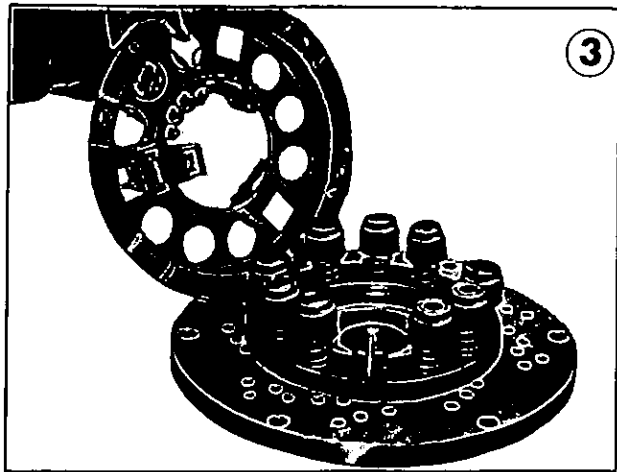


Fig. 7 Disassembling

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Slowly release the pressure on the springs, unscrewing by diagonal selection, the set-screws securing the cover to the base plate. The clutch can then be lifted to expose all components for inspection.

The release levers, and springs should be examined for wear and diatorstion. Renew these parts if necessary, bearing in mind that the pressure springs must only be renewed in sets. Clean all parts and lubricate the bearing surfaces of the levers, sparingly with grease.

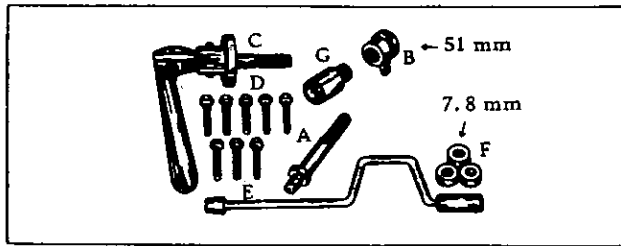


Fig. 8

## Assembling

Press the pin into the eye-bolt hole through the lug on the pressure plate as shown.

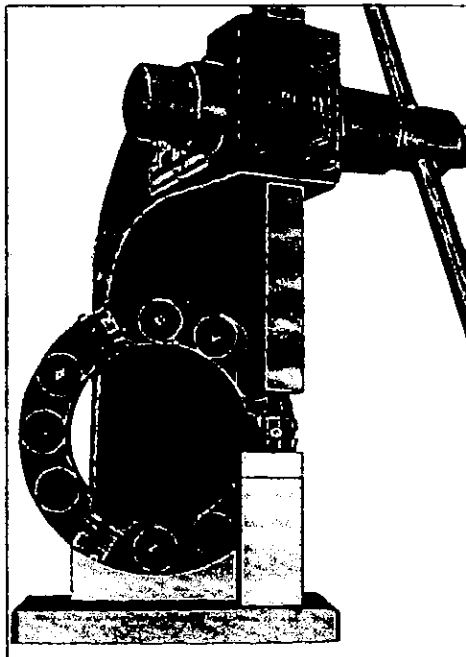
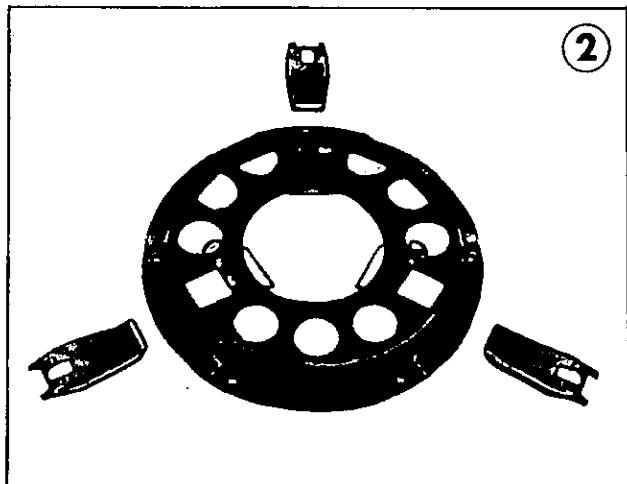
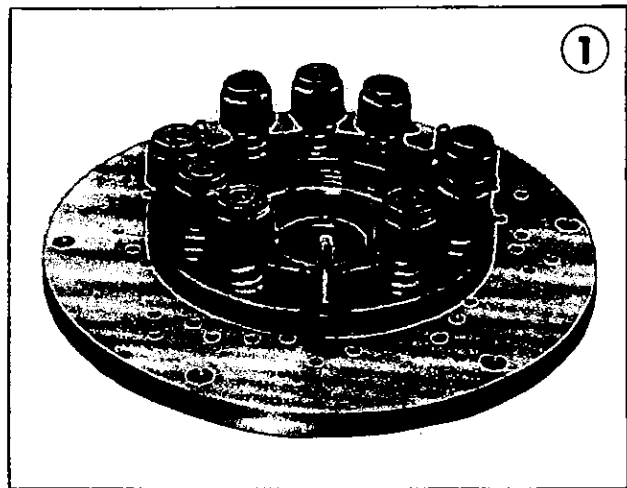


Fig. 9

Place the pressure plate on the base plate with the pressure springs in position on the pressure plate and put the pressure spring retainers on it. Cover and set the clutch cover assembly on the base plate.

Compress the pressure springs by screwing down the cover to the base plate by using the special set screw placed through each hole in the cover.

Tighten the screw, a little at a time, by diagonal selection to prevent distortion to the cover. Set the release lever on the eye-bolt with lock nuts inserting for lug at the edge of pressure plate.



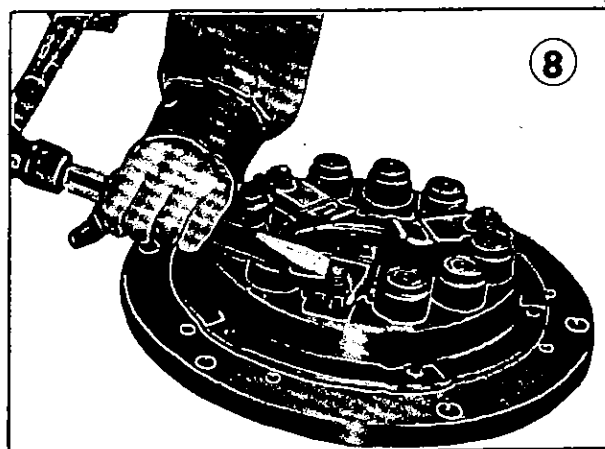
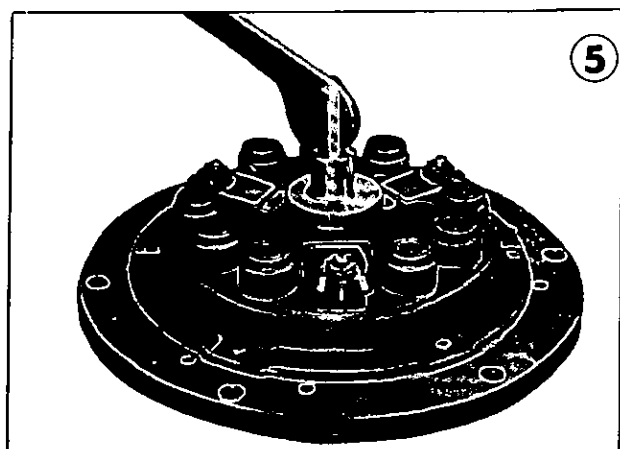
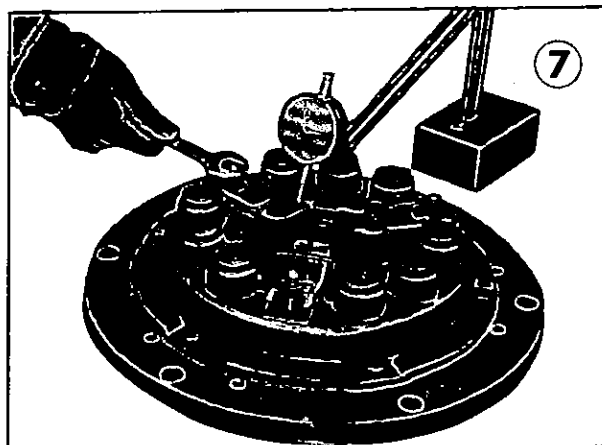
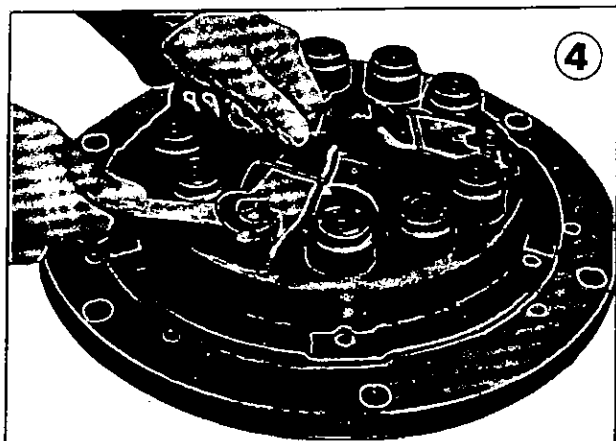
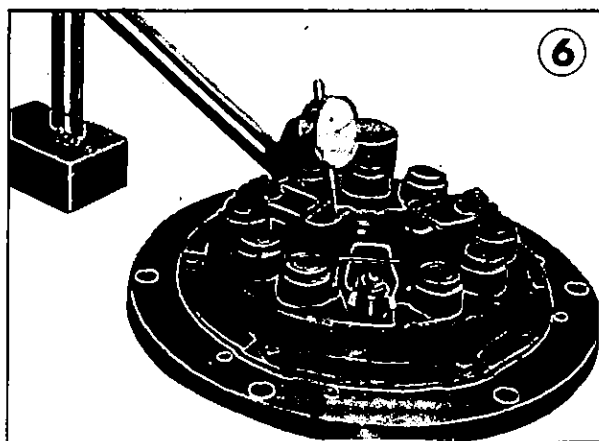
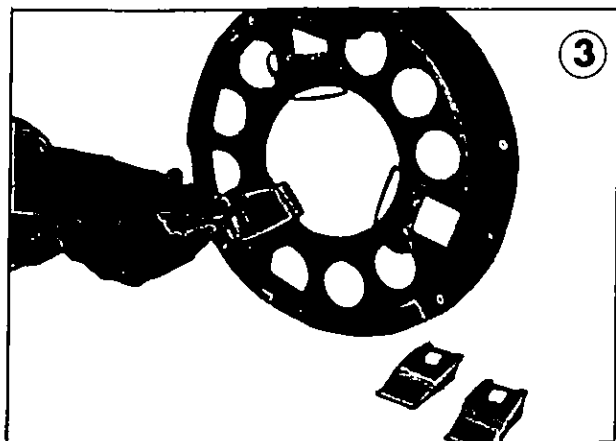


Fig. 10

## Gauging

Screw the nuts into the bolts and proceed as follows; Screw the centre pillar into the base plate and slip the distance piece over the pillar followed by the camshaped height finger. Adjust the height of the release levers by screwing or unscrewing the bolt nuts until the height finger, when rotated, just contact the highest point on the tip of the release levers.

Replace the height finger and pillar by the clutch actuating mechanism (See insert Fig. 5) and actuate the clutch several times by operating the handle.

This will enable the parts to settle down on their knife edges.

Replace the height finger and distance piece and readjust the height of the release levers checked for "run out" as near the edge as possible as; if the error is more than 0.02 in. press over the high spots until it is true within this figure. It is important to keep friction facings free from oil or grease.

Finally repeat the procedure to make quite sure the release levers are seating properly and gauge again. Secure the lock nuts and fix the release lever.

Release the setscrews, and remove the clutch assembly from the base plate.

## Refacing the Driven Plate

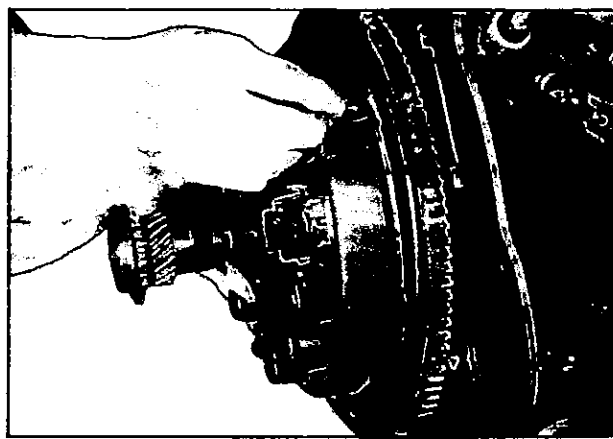
If a new complete clutch driven plate is not available new linings may be fitted to the old driven plate in the following manner;

Each rivet should be removed by using drill. The rivets should not be punched out. Rivet one new facing in position, then if the correct tool is not available, use a blunted center punch to roll the rivet shanks securely against the plate. The second facing should then be riveted on the opposite side of the plate with the clear-holes over the heads already formed in fitting the first facing. The plate should then be mounted on a mandrel between centers and checked for "run out" as near the edge as possible; if the wabbing is more than 0.02 in. press over high spots until it is true within this figure. It is important to keep friction facings free from oil or grease.

## Refitting the Clutch

Place the driven plate on the flywheel with the longer chamfered splined end of the driven plate hub towards the transmission.

The driven plate should be centralised by a dummy drive shaft which fits the splined bore of the driven plate hub and the pilot bearing of the flywheel.



*Fig. 11*

The clutch cover assembly can now be secured to the flywheel by means of the holding screws, tightening them a turn at a time by diagonal selection.

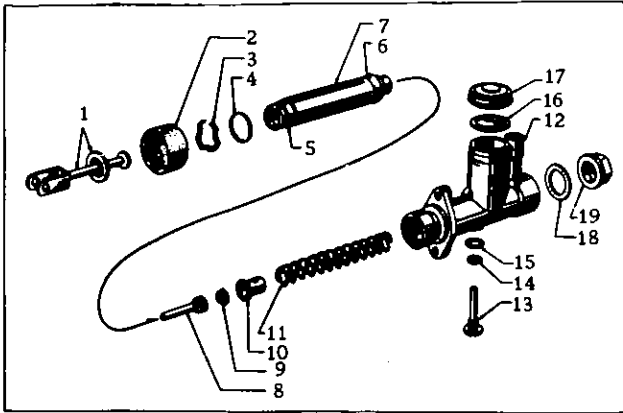
There are two dowels in the flywheel to locate in the clutch cover. Remove a dummy shaft after these screws are fully tightened. (35 lbs/ft = 4.84 kg-m.)

Refit the release bearing and transmission case. The weight avoid strain on the drive shaft and distortion of the driven plate assembly.

## Description of Clutch Control

The clutch is operated from a master cylinder by means of a suspended pedal.

A cylinder mounted on the clutch bell housing is coupled to the clutch operating shaft.



**Fig. 12 Components of the Master Cylinder**

- |                                |                                     |
|--------------------------------|-------------------------------------|
| ① Push rod assembly            | ⑨ Let-in valve spring               |
| ② Master cylinder rubber boots | ⑩ Return spring seat                |
| ③ Stopper ring                 | ⑪ Piston return spring              |
| ④ Piston secondary cup ring    | ⑫ Clutch master cylinder body ass'y |
| ⑤ Secondary cup                | ⑬ Let-in valve release pin          |
| ⑥ Primary cup                  | ⑭ Ring                              |
| ⑦ Master cylinder piston       | ⑮ Gasket                            |
| ⑧ Let-in valve assembly        | ⑯ Filler cap gasket                 |
|                                | ⑰ Cap                               |
|                                | ⑱ End plug gasket                   |
|                                | ⑲ End plug                          |

When pressure to the clutch pedal is applied the piston of the master cylinder displaces the fluid in the cylinder and via a pipe line, in turn, moves the piston of the cylinder, pushing against the lever of the clutch shaft.

### The Master Cylinder

The master cylinder consists of an alloy body with a polished finish bore, and reservoir with cap. The inner assembly is made up of the push rod, ring, stopper ring, piston, cups, spring seat, spring, valve and valve spring.

The end of cylinder is protected by a rubber boot.

### Dismantling the Clutch Master Cylinder

Disconnect the pressure pipe union from the cylinder and remove the securing bolts, then the master cylinder and may be withdrawn complete from the car.

Remove the filler cap and drain out the fluid.

Pull back the rubber boot and remove the stopper ring with a pair of long nosed pliers. The push rod and ring can then be removed, and unscrew the release pin.

When the push rod has been removed the piston with caps attached will be exposed; remove the piston assembly complete.

The assembly can be separated by lifting the spring seat edge over the shouldered end of the piston. Depress the piston return spring allowing the valve assembly to slide through the elongated hole of the spring seat thus releasing the tension, on the spring.

Examine all parts, especially the gasket, cylinder bore and piston cups, for wear or distortion and replace the new parts where necessary.

### Assembling

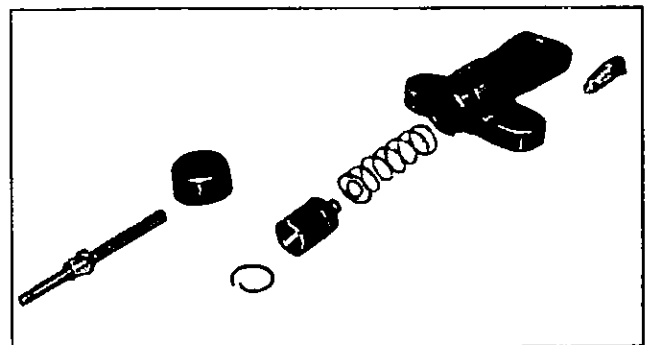
Smear the assembly well with the recommended brake fluid, and insert the assembly into the bore of the cylinder, end first, easing the piston cups lips in the bore.

Replace the push rod, with the secondary cup ring, into the cylinder followed by the stopper ring which engages into the groove machined in the cylinder body.

Replace the rubber boot and secure the unit by means of the two bolts on the flange and refit the pressure pipe union into the cylinder.

### The Operating Cylinder

This cylinder is of simple construction, consisting of the body, piston, piston with cup, spring and bleed screw, the open end of the cylinder being protected by a rubber dust cover. The cylinder is mounted under side of the starting motor.



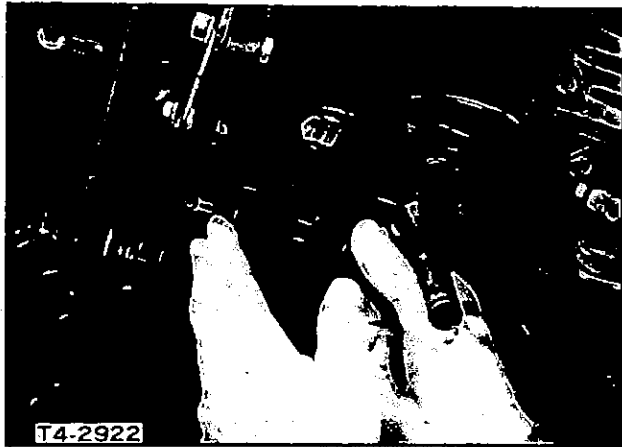
**Fig. 13**

## Dismantling

Remove the rubber dust cap from the bleed screw attach a bleed tube, open the bleed screw three-quarters of a turn and pump the clutch pedal until all the fluid has been drained into a clean container.

Unscrew the flexible pipe union and adjustable push rod. The operating cylinder can now be removed. Removed the rubber cover and if compressed air line is available, blow out the piston from the side union.

Examine all parts, especially the seal, and replace if worn or damaged.



*Fig. 14*

stem, smear well with the recommended fluid and insert into the cylinder. Replace the dust cover and mount the cylinder in position, making sure the push rod enters the hole in the rubber boot. Secure the cylinder with the bolt, and screw in the pipe union. Adjust the push rod by the screw driver at top of withdrawal level with the adjustable rod of operating cylinder to give the end play 2.5~3.0 mm.

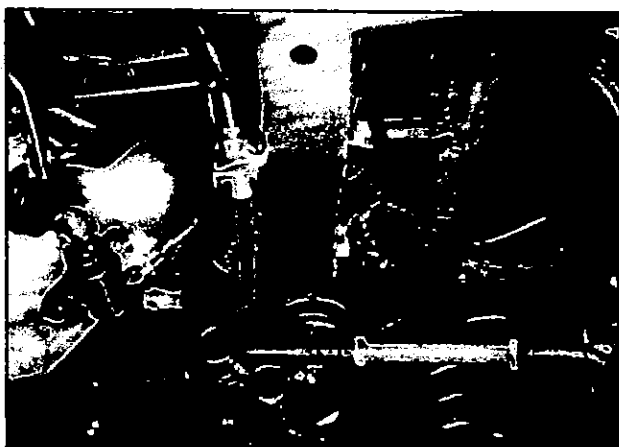
## Bleeding the Clutch System



*Fig. 16*

## Assembling

Place the seal into the stem of the piston, with the back of the seal against the piston, replace the springs with the small end on the

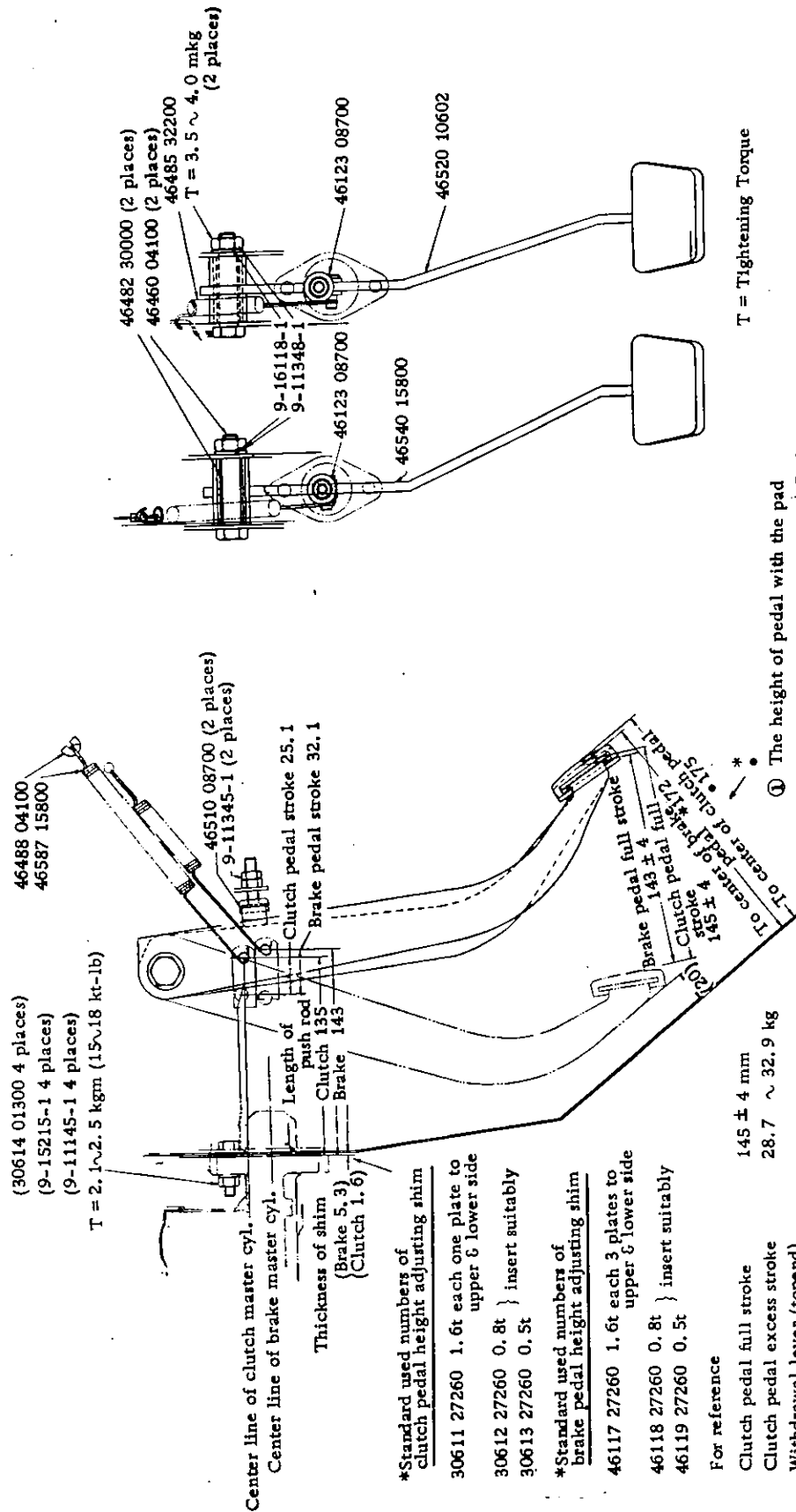


*Fig. 15*

Remove the bleed screw dust cap at the operating cylinder, open the bleed screw approximately three-quarters of a turn and attach a tube immersing the open end into a clean receptacle containing a small amount of brake fluid. Fill the master cylinder reservoir with the recommended fluid and by using slow, full strokes, pump the clutch pedal until the fluid entering the container is free from air bubbles. On a down stroke of the pedal, screw up the bleed screw, remove the bleed tube and replace the dust cap.

When the clutch pedal is depressed, the force is transmitted to the ball bearing, and the surface pushed the release plate. Effectual stroke of the pedal is 128 mm leaving 30 mm surplus in stroke (95 mm until the clutch disengages). When there is undue surplus or shoriness instroke, readjust the pedal position with the adjust shim.





- ① The height of pedal with the pad  
\* Brake  
Adjust the dimension (mark . Clutch )  
without stopper
- ② Stopper locking  
After the said adjustment, lock up  
the nut at contacted point of the stopper  
end and the pedal arm

**DATSUN**

TRANSMISSION

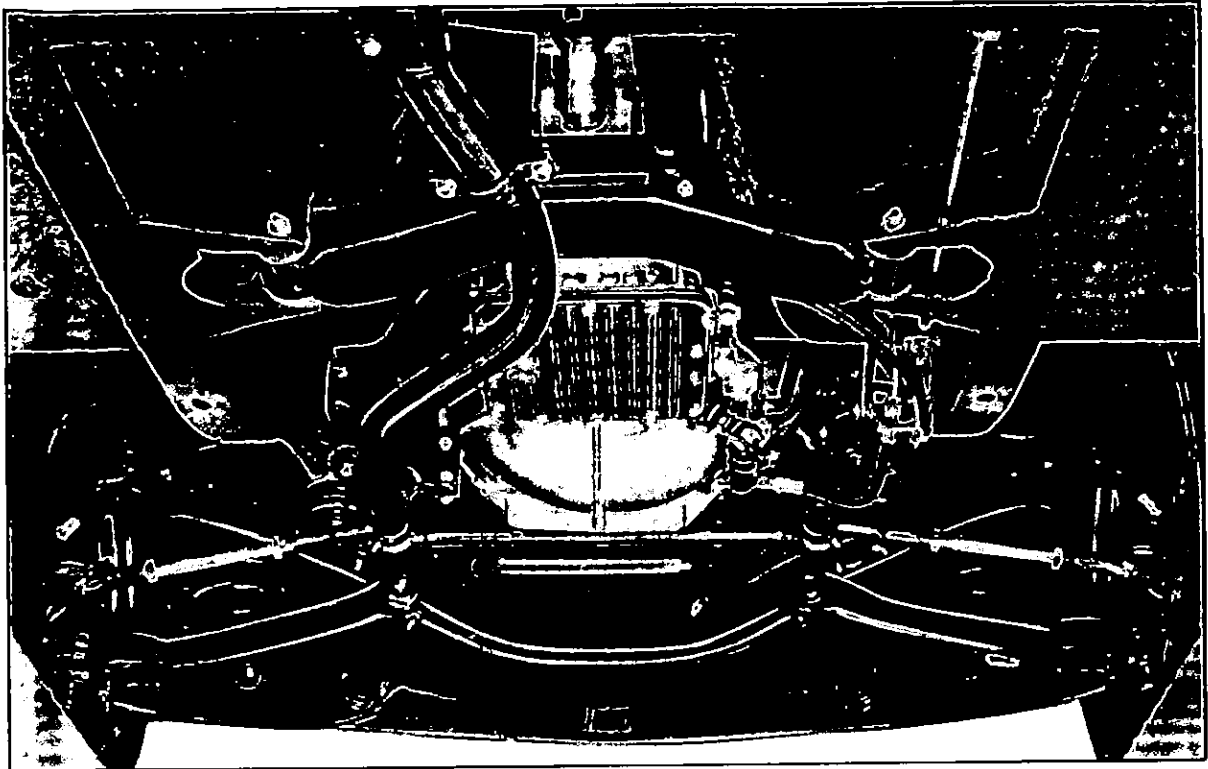


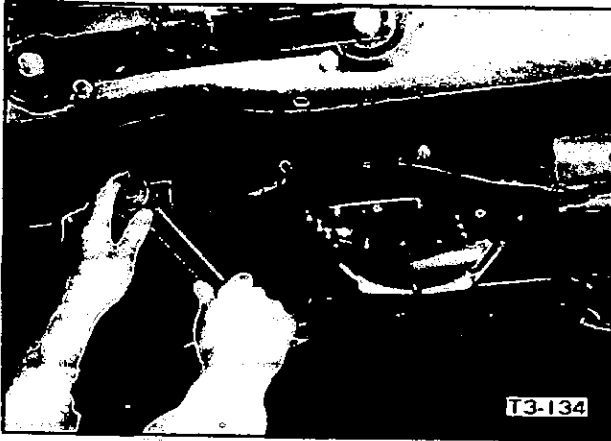
Fig. 1

Model	3 stage for forward, 1 stage for reverse Remote control Full-synchromesh on forward gears.	4 stage for forward, synchromesh on for speed
Type of gear	Synchromeshed helical gear type	#2nd, 3rd & 4th gear
Ratio #1	3.197	3.94
Ratio #2	1.725	2.40
Ratio #3	1.000	1.49
Ratio #4		1.00
Reverse	4.125	5.159

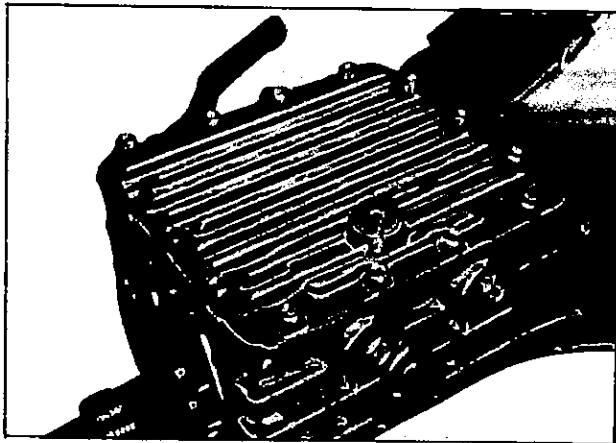
# DATSUN

## COVER OF TRANSMISSION CASE

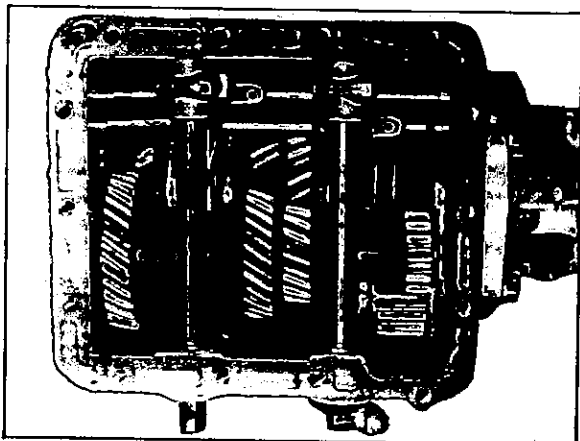
Drain out the gear oil from the case. Holding the cover in position are 14 set-nuts, all of which must be removed when cover can be taken off.



*Fig. 1*



*Fig. 2 Bottom Cover*

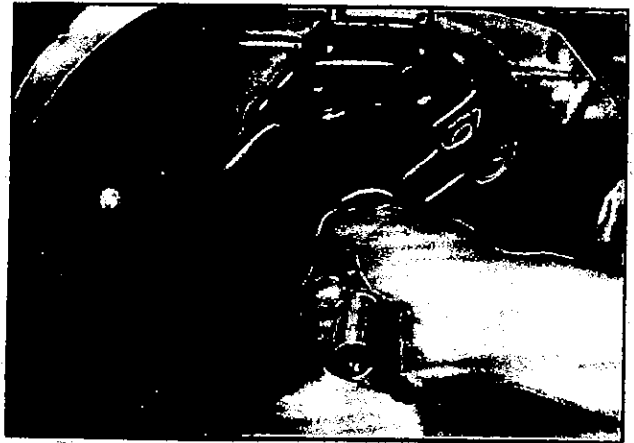


*Fig. 3 View of Inside of Transmission*

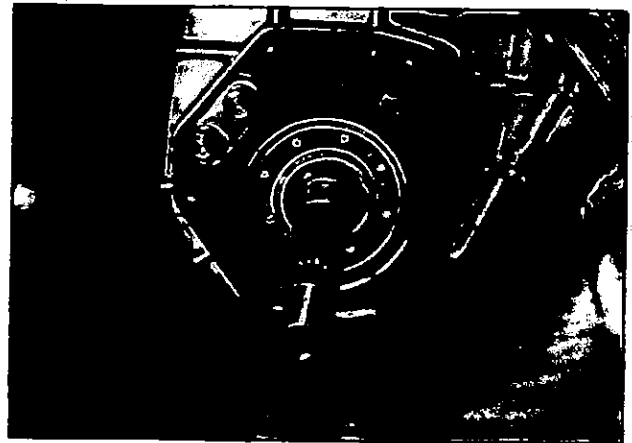
## DISASSEMBLY COURSE

### Front Bearing Retainer

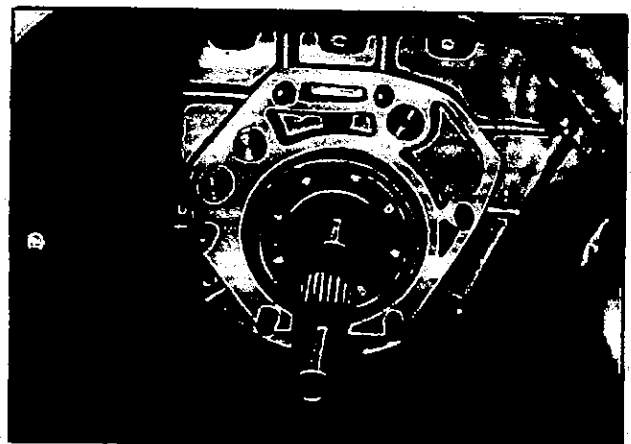
Release the front bearing retainer situated within the clutch housing by removing the nuts.



*Fig. 1*



*Fig. 2*



*Fig. 3*

TRANSMISSION CASE

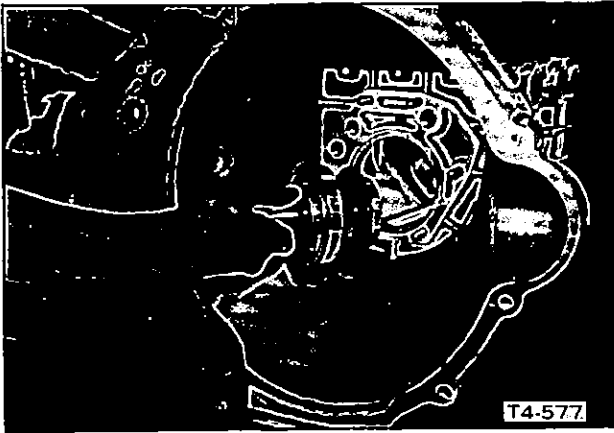


Fig. 4

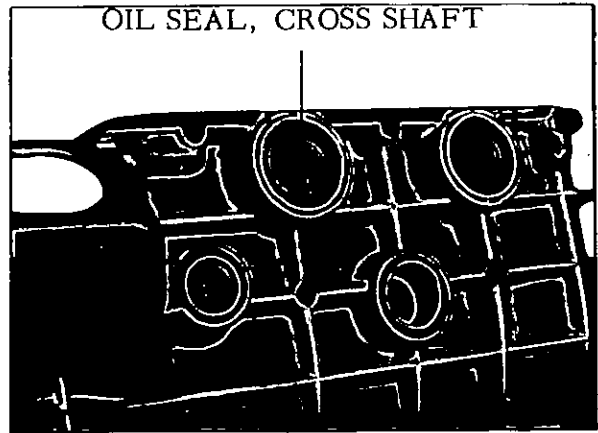


Fig. 1

Plug Cross Shaft

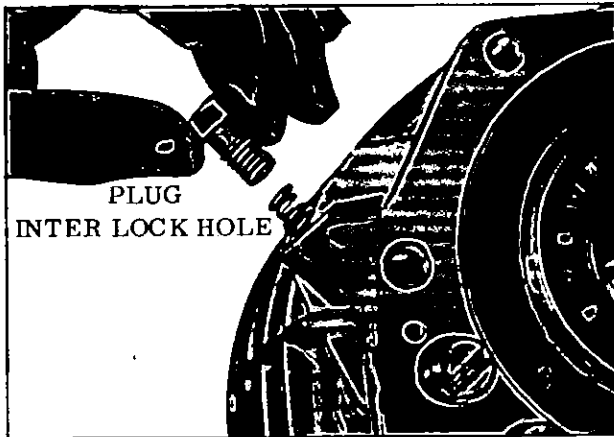


Fig. 5

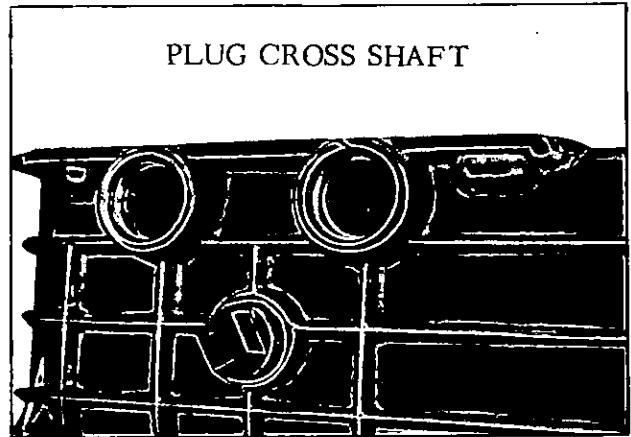


Fig. 2

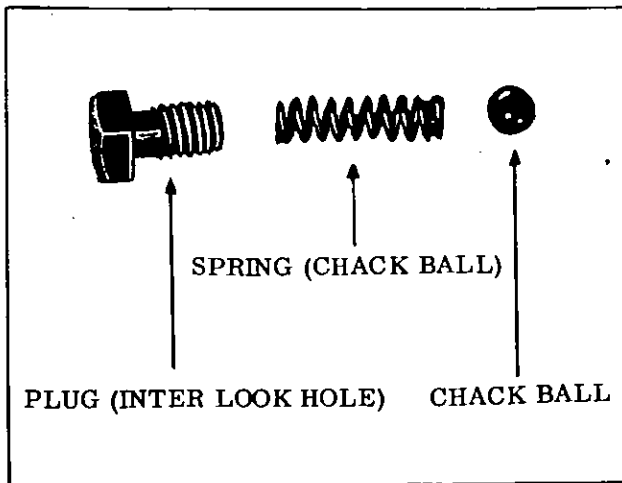


Fig. 6

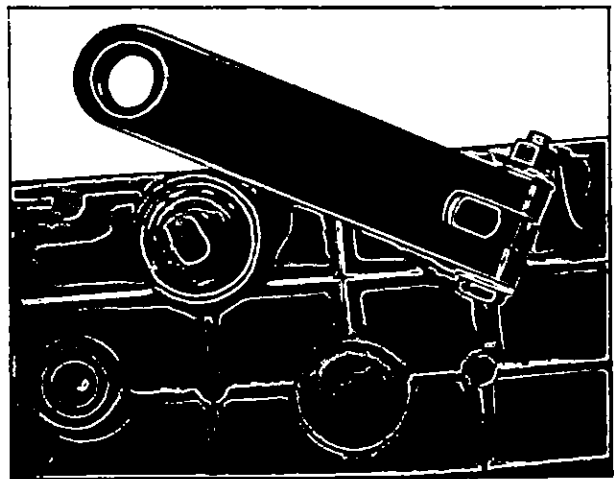
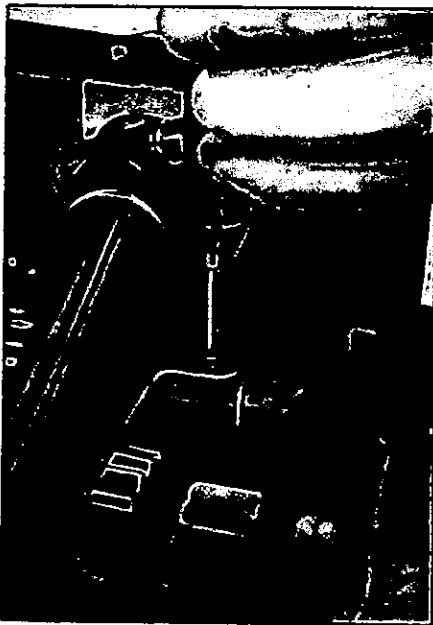
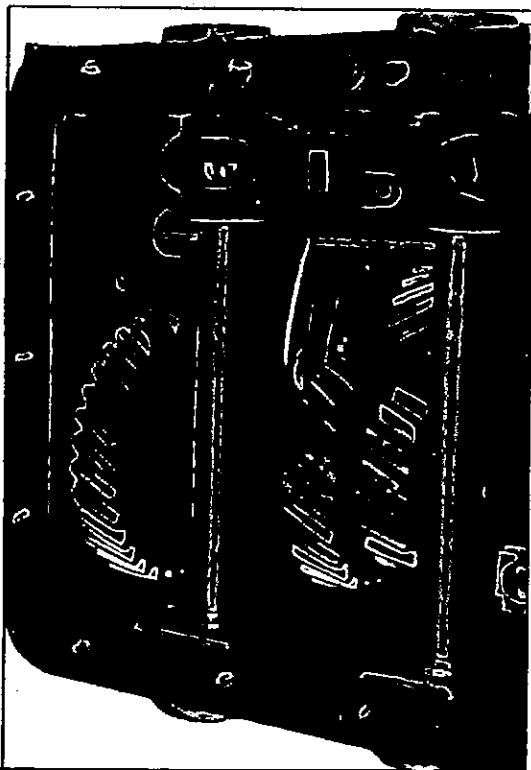


Fig. 3

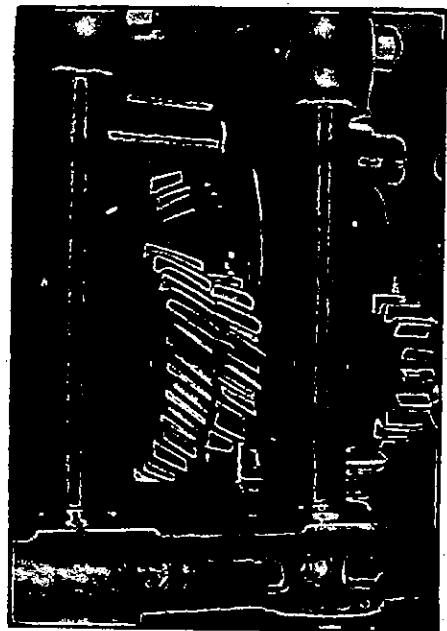


*Fig. 4 Press out the pin from fork shaft (Disassembly) Insert the pin and tap into the shaft and hole fork setting hole.*

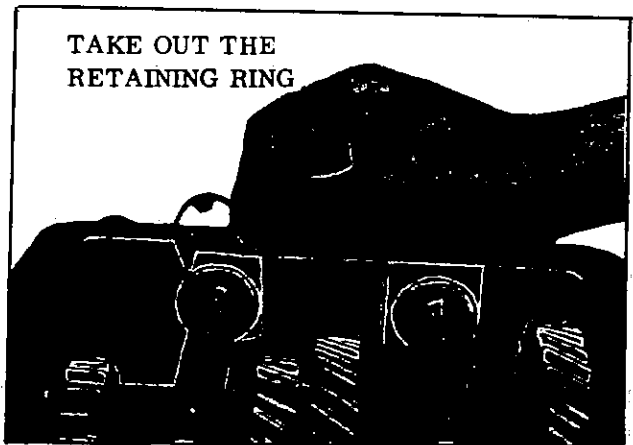
Take out the cross shaft from the case.



*Fig. 5*



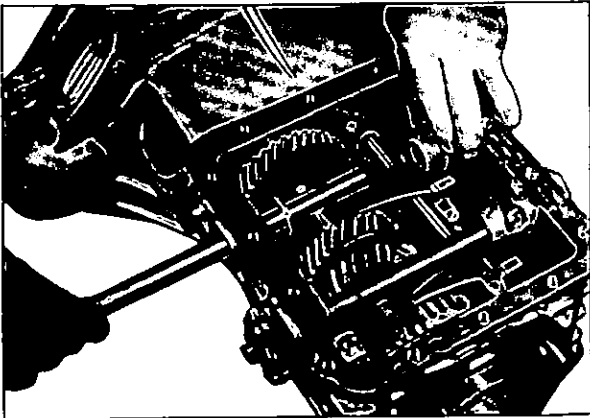
*Fig. 6*



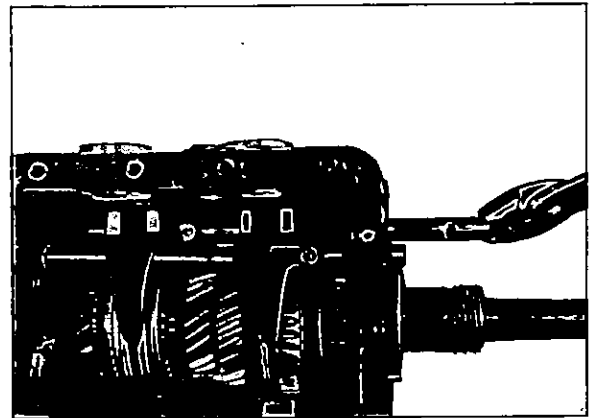
*Fig. 7*



*Fig. 8 Take off the Pin & Nut of Cross Shaft*

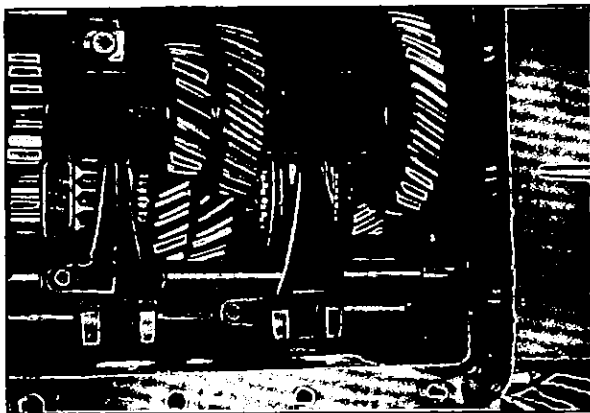


*Fig. 9 Pull out the Cross Shaft*



*Fig. 12*

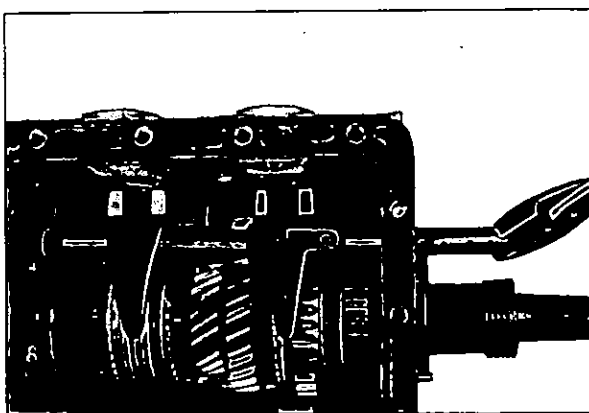
Fork Shaft



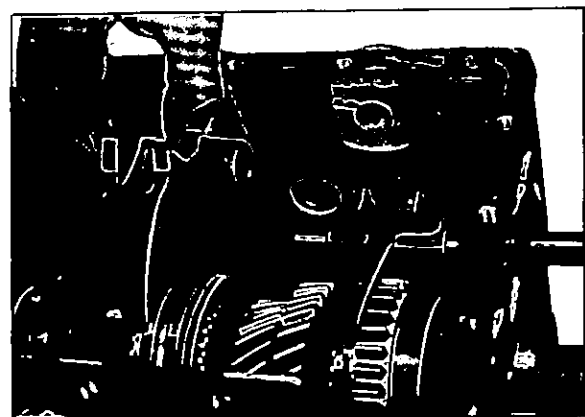
*Fig. 10*



*Fig. 13 Detach the Fork from the Gear*



*Fig. 11*



*Fig. 14 Take out the Fork Shaft*

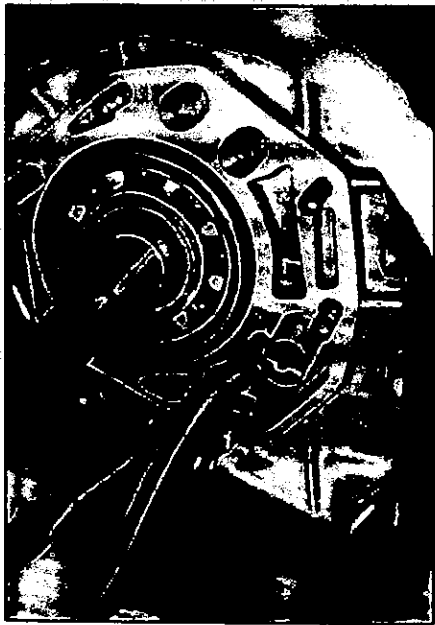


Fig. 15 Pull out the Shaft

### Counter Shaft & Gear

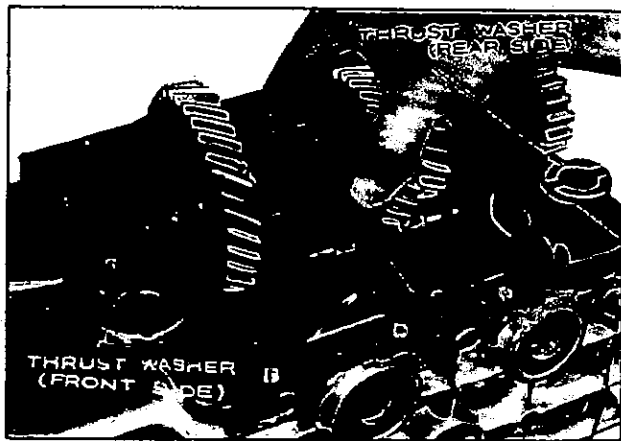


Fig. 16

### Disassembly

Using a soft and long metal drift, pushing out the counter shaft forward. When the counter gear cluster and two thrust washer will drop in the case.

### Assembling

First locate the two washers to the counter gears, ensuring that the larger washer is at the

front, and small one at the rear then place the cluster gears in the case.

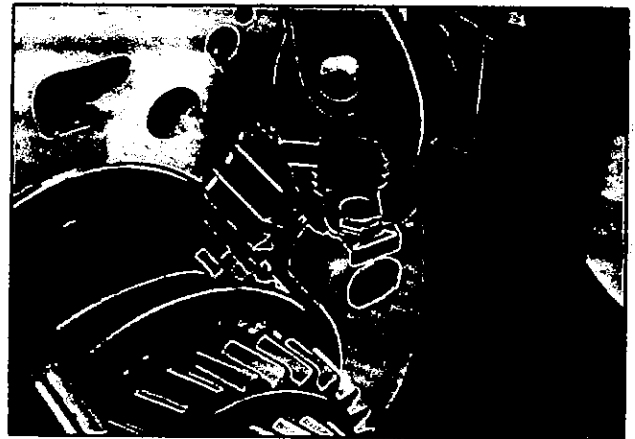


Fig. 17 Assembly Course

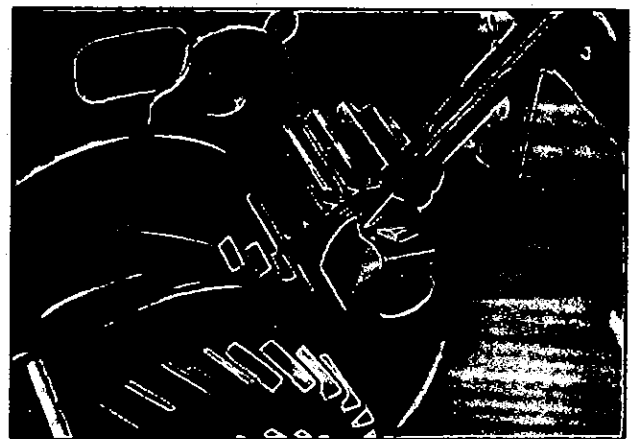


Fig. 18 Disassembly Course

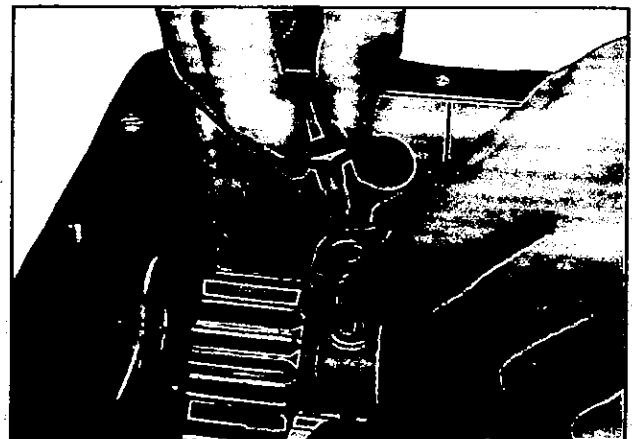
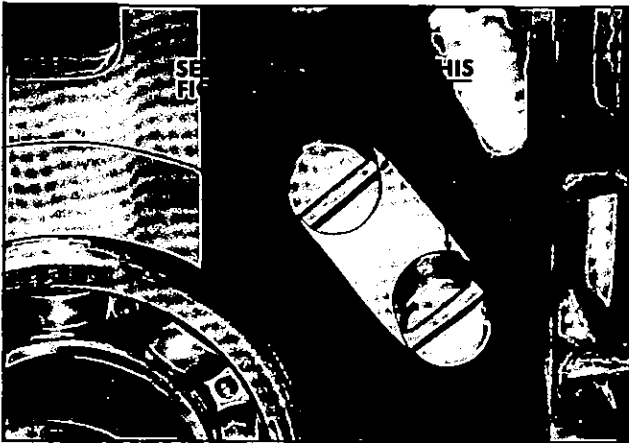
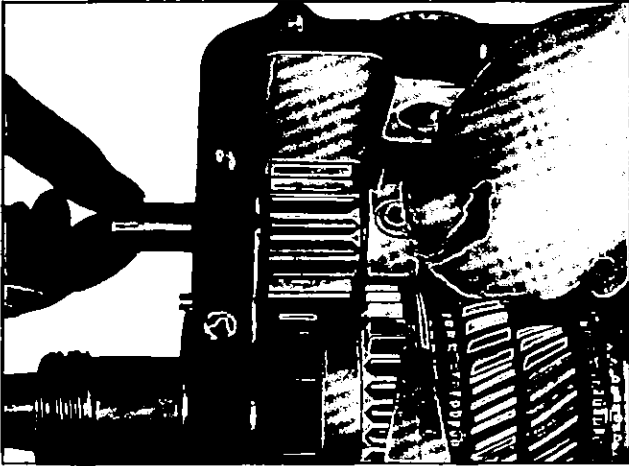


Fig. 19



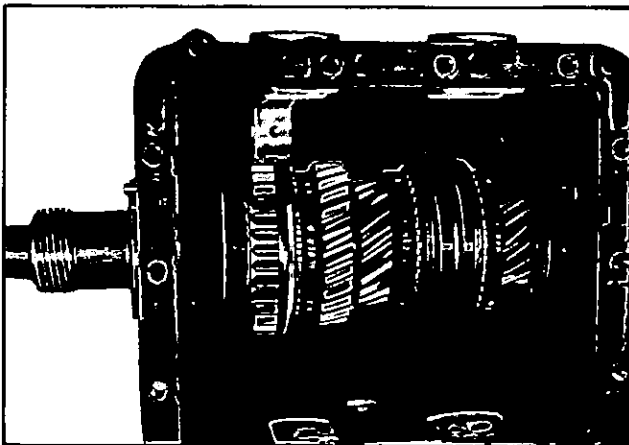


*Fig. 20*



*Fig. 21 Pull Out the Reverse Gear Shaft*

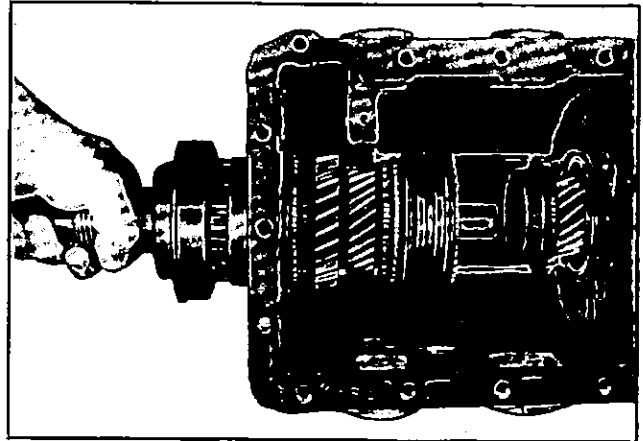
## Main Drive Shaft



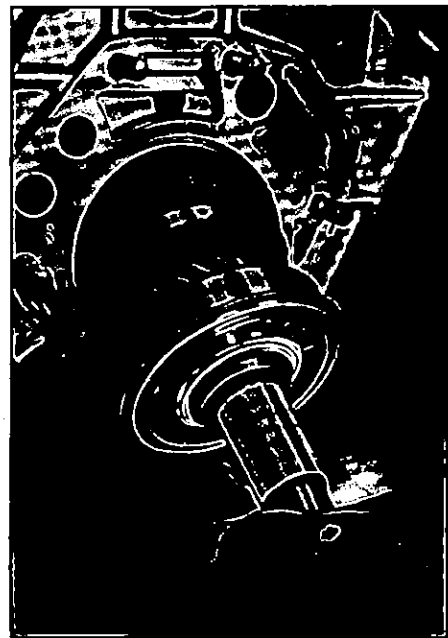
*Fig. 22*

## Main Shaft

Pull out the rear bearing and the speed gear sleeve by the bearing puller from the main shaft rear side.



*Fig. 23 Removal of Main Shaft Assembly*



*Fig. 24 Take out the Main Drive Gear*

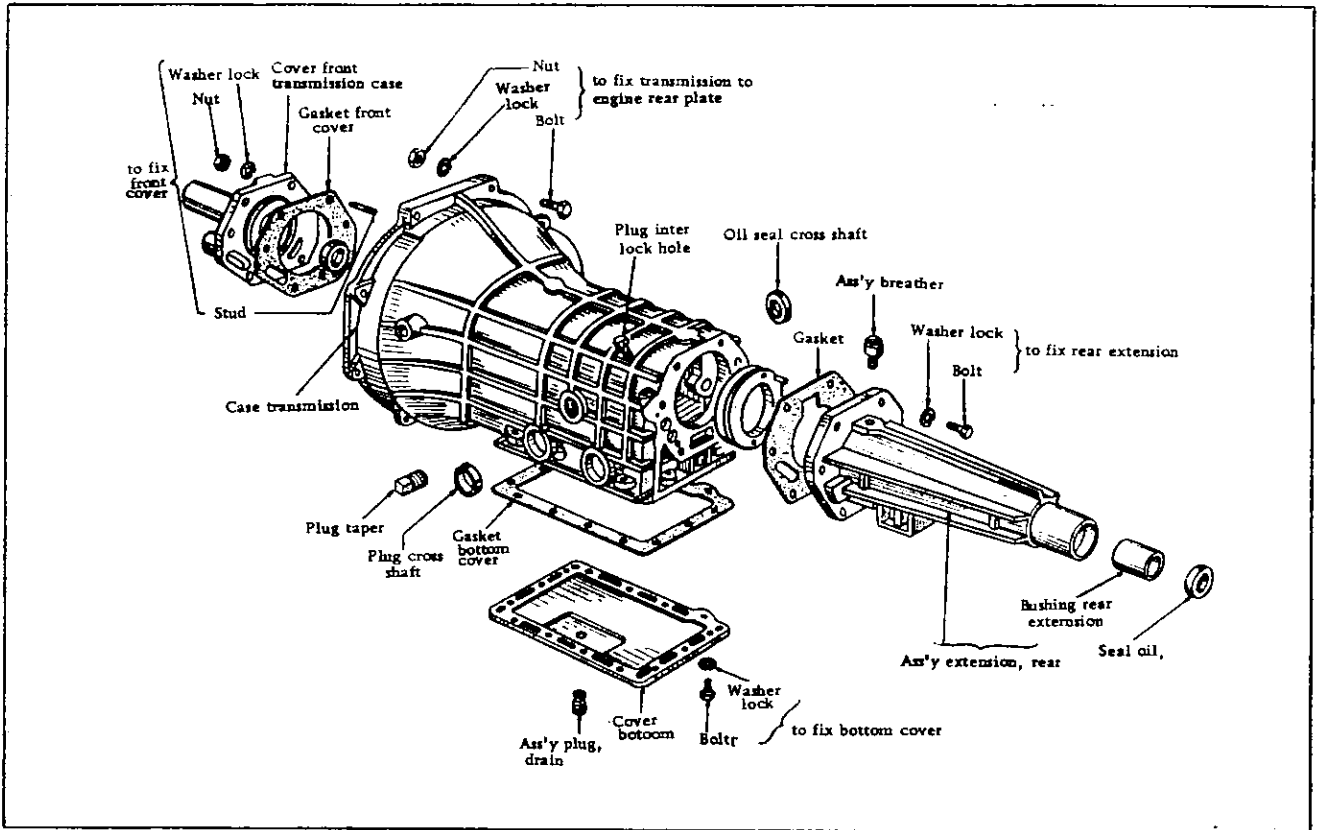


Fig. 25 Transmission Case & Rear Extension

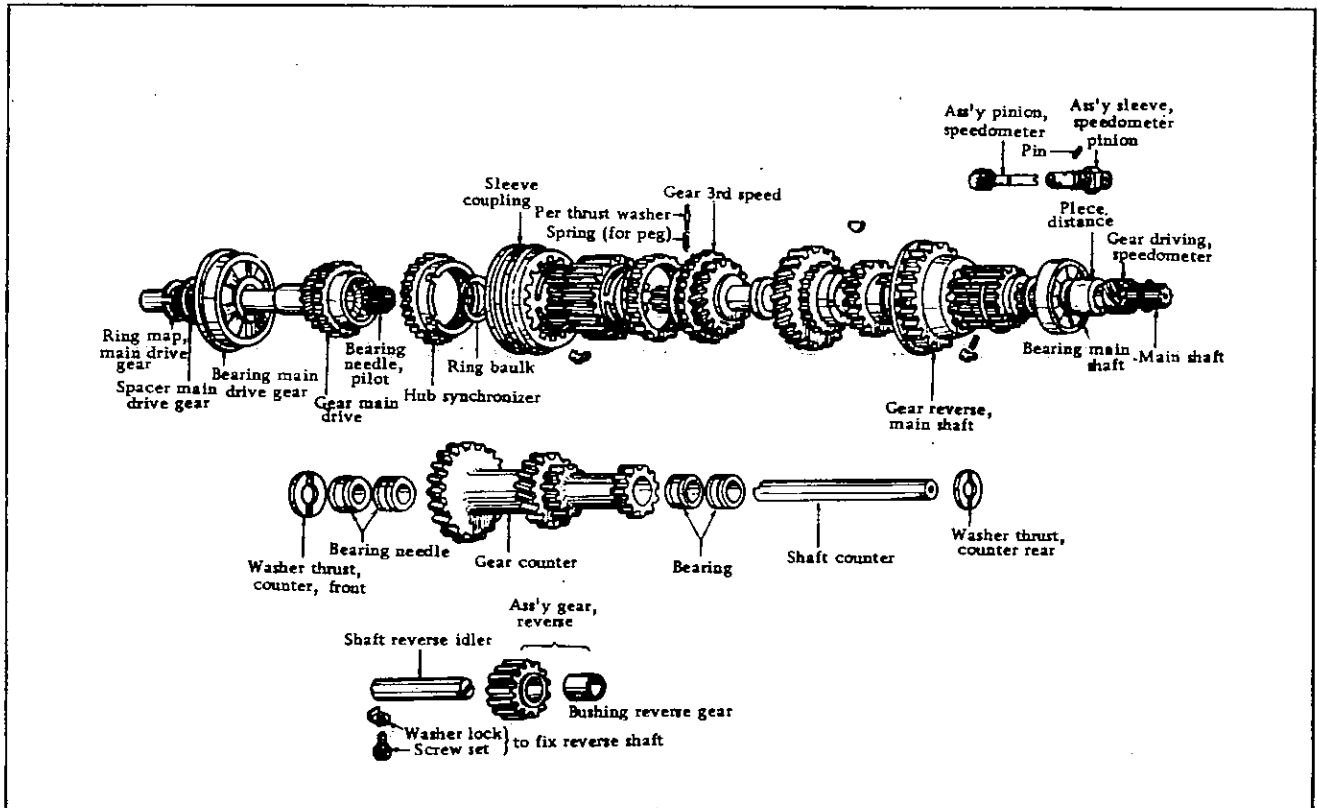


Fig. 26 Components of Transmission Gear

## Reverse Gear

A lug, which is an integral part of the main casting locates the forward end of the reverse gear shaft. To secure the shaft in position, a set pin is screwed through the lug locating in the shaft. The set key is locked out side of the case.

Release the set pin, then tap forward and remove the reverse gear shaft. Lift out the reverse gear.

## Rear Oil Seal

This oil seal is situated in the end of the rear bearing retainer and should not be dismantled unless suspected of leaking. It is almost impossible to take off the seal without damage it; consequently a new oil seal should be fitted if the old one has been removed.

This can removed by using a punch and hammer.

## Main Shaft

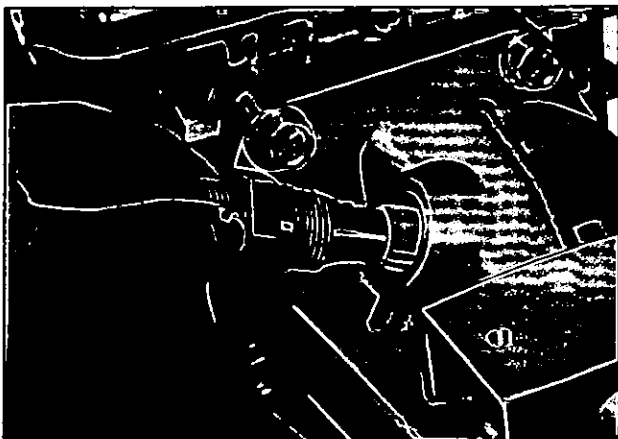
Counter cluster gear in the case. Insert the first gear to the main shaft together with second and third gear assembly from rear hole and fit the first and reverse fork shifter over the first gear.

Fit the shift fork of the second and third gears assembly on the hub of synchronizer.

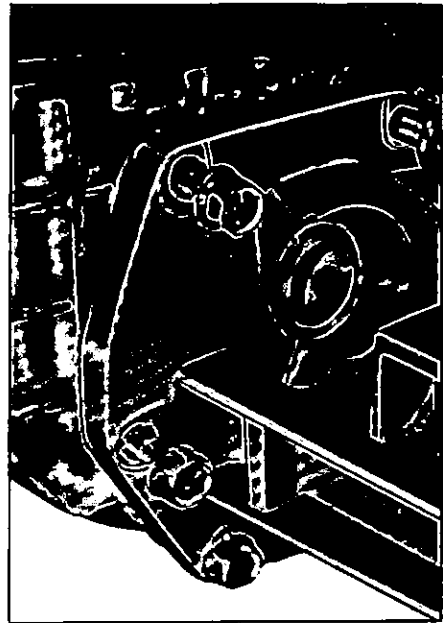
Depress the main shaft bearing to the end of the case.

Change the dummy shaft to counter gear with the said shaft.

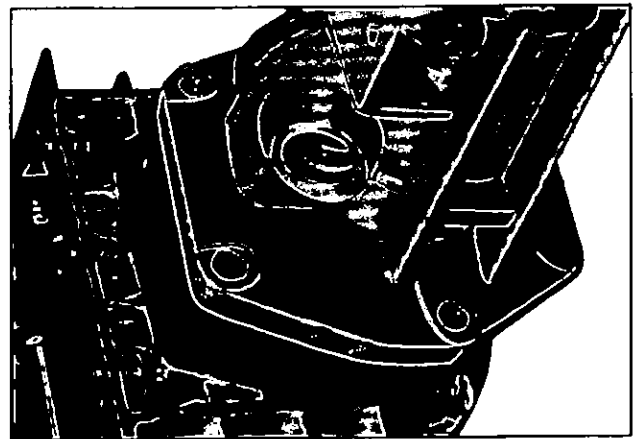
## EXTENSION OF TRANSMISSION CASE



*Fig. 1 Speedometer Pinion Gear*



*Fig. 2 Detachment of Rear Extension*



*Fig. 3*

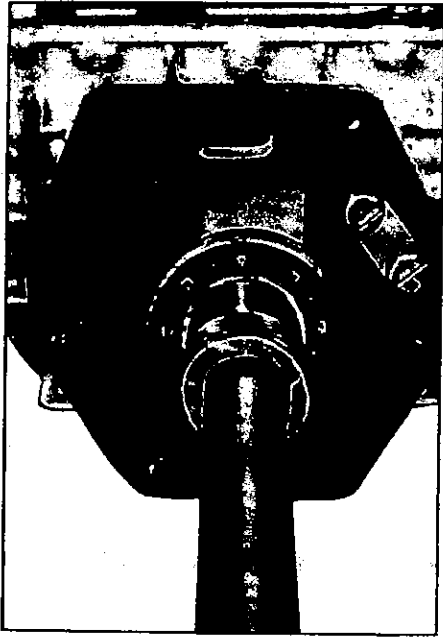


Fig. 4

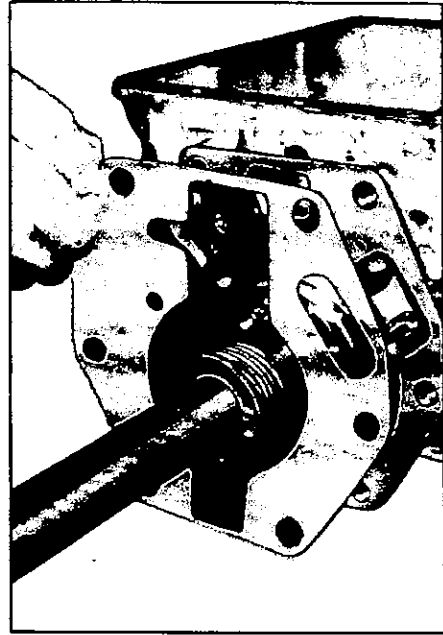


Fig. 5

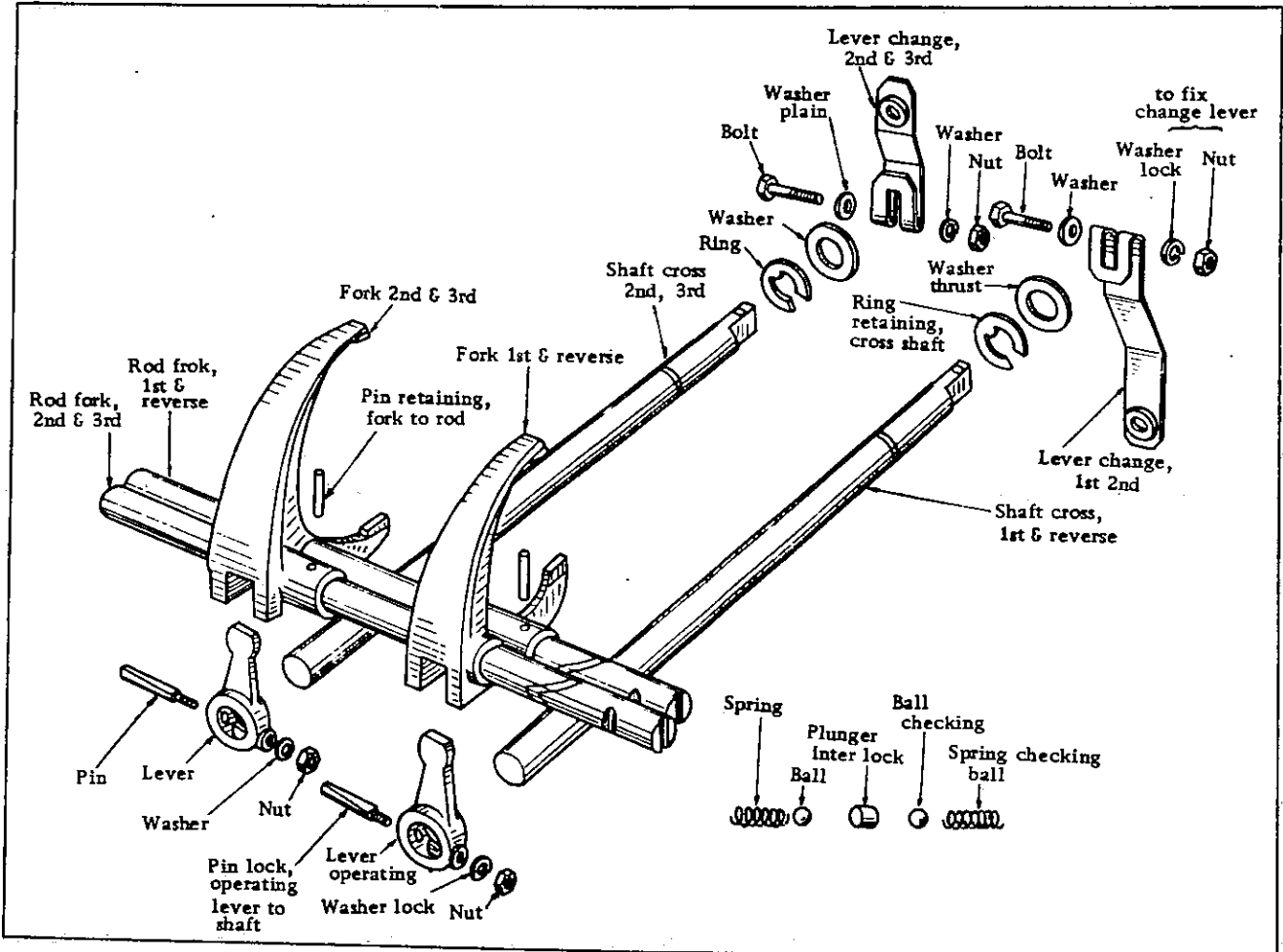


Fig. 6 Transmission Fork & Rod

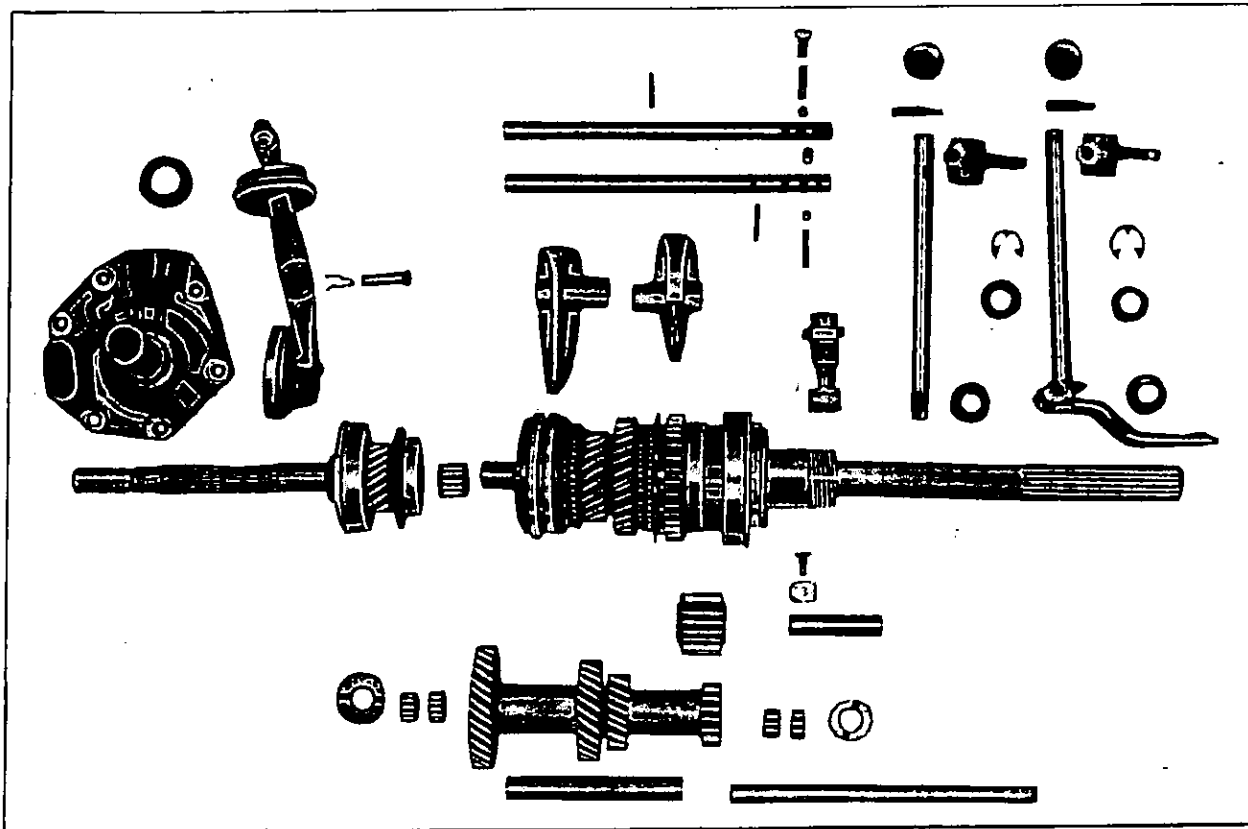


Fig. 7 Components of Transmission

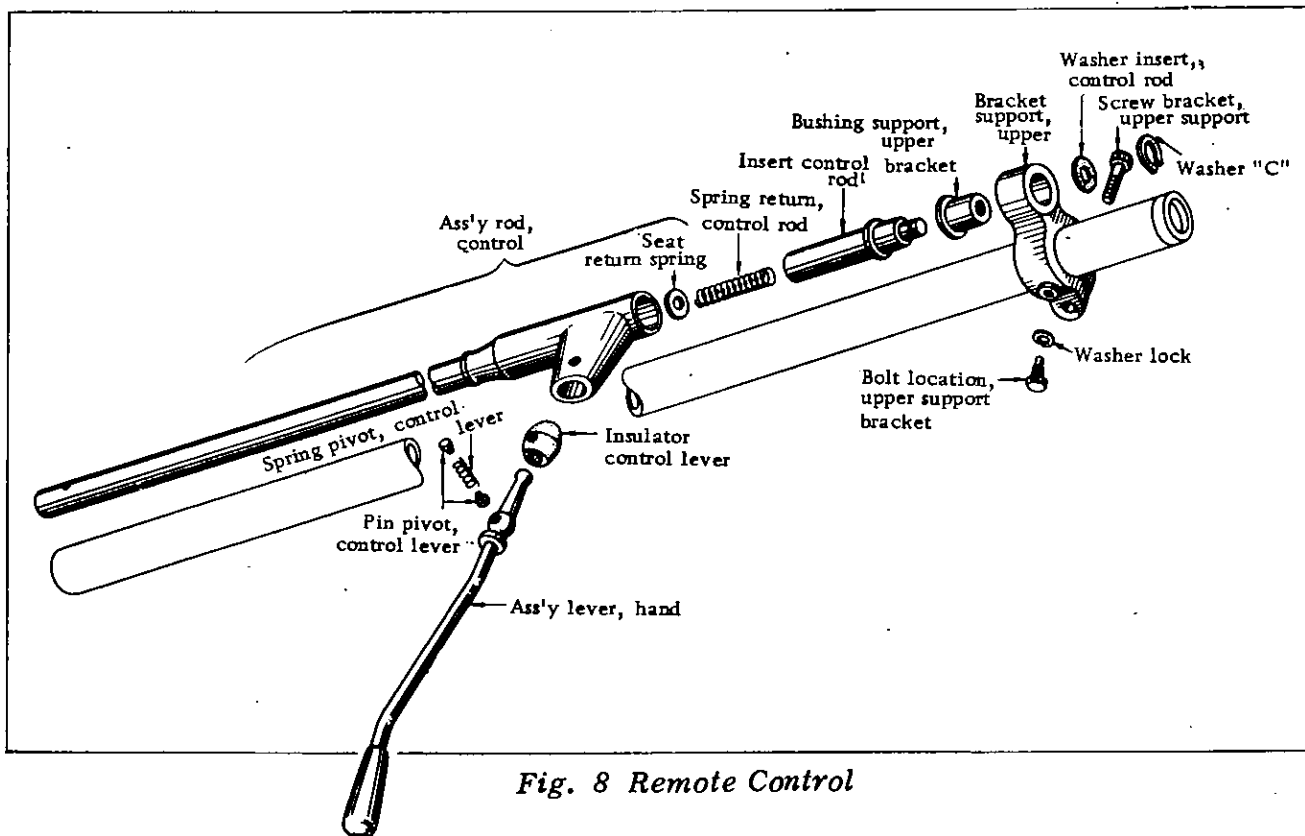


Fig. 8 Remote Control

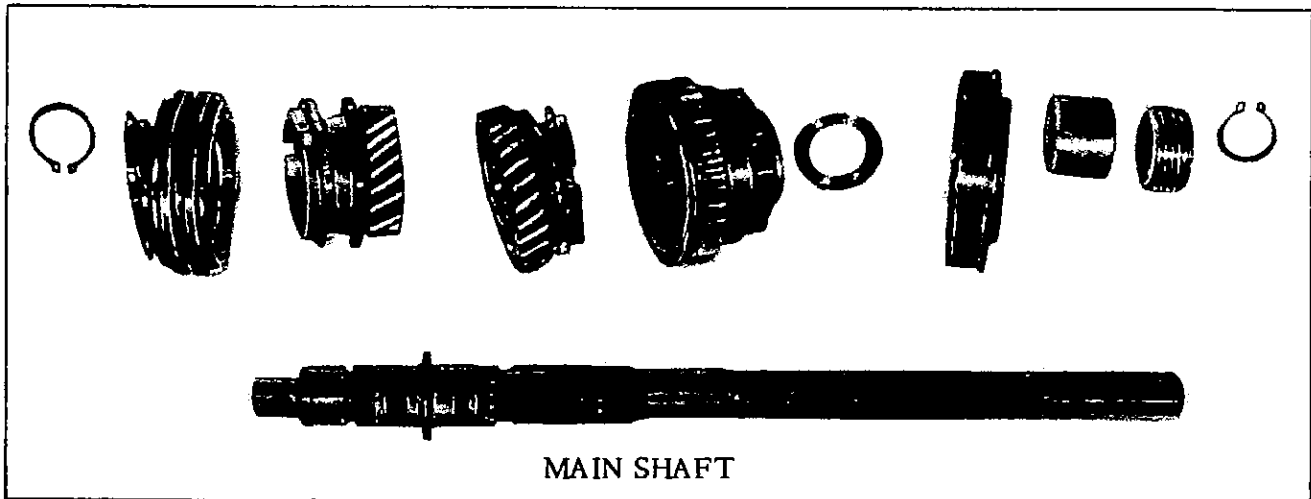


Fig. 9 Assembling order through the Main Shaft

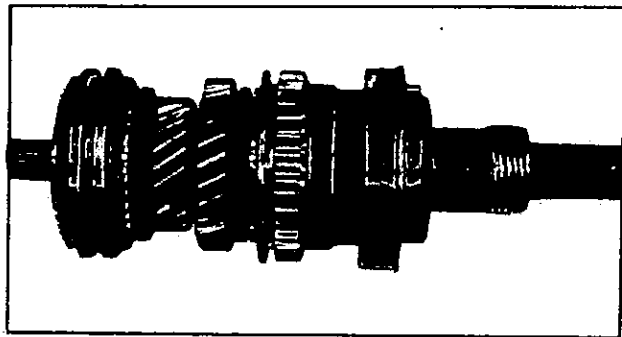


Fig. 10 Main Shaft Complete Assembly

Disassembling Course

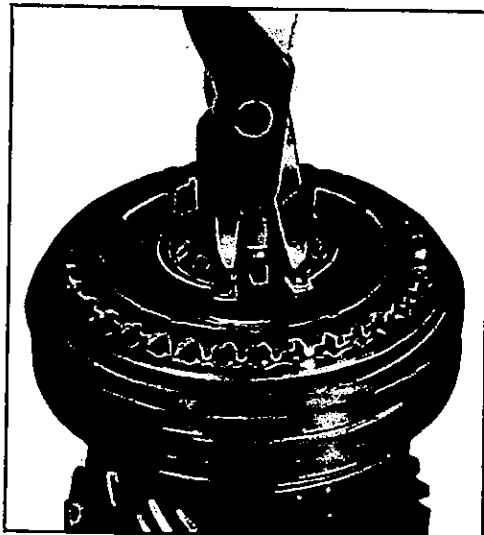


Fig. 11 Taking out by the Snap Ring Plier

Disassembly of Main Shaft (Front Side)

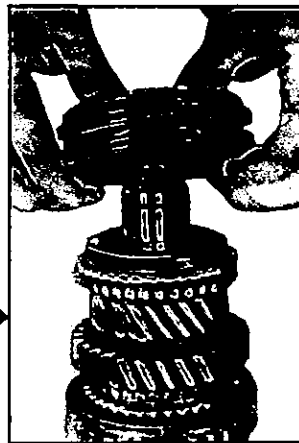


Fig. 12

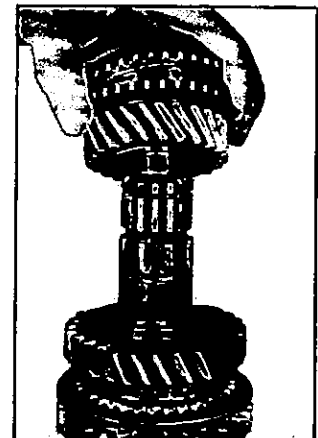


Fig. 13

Disassembly of Main Shaft

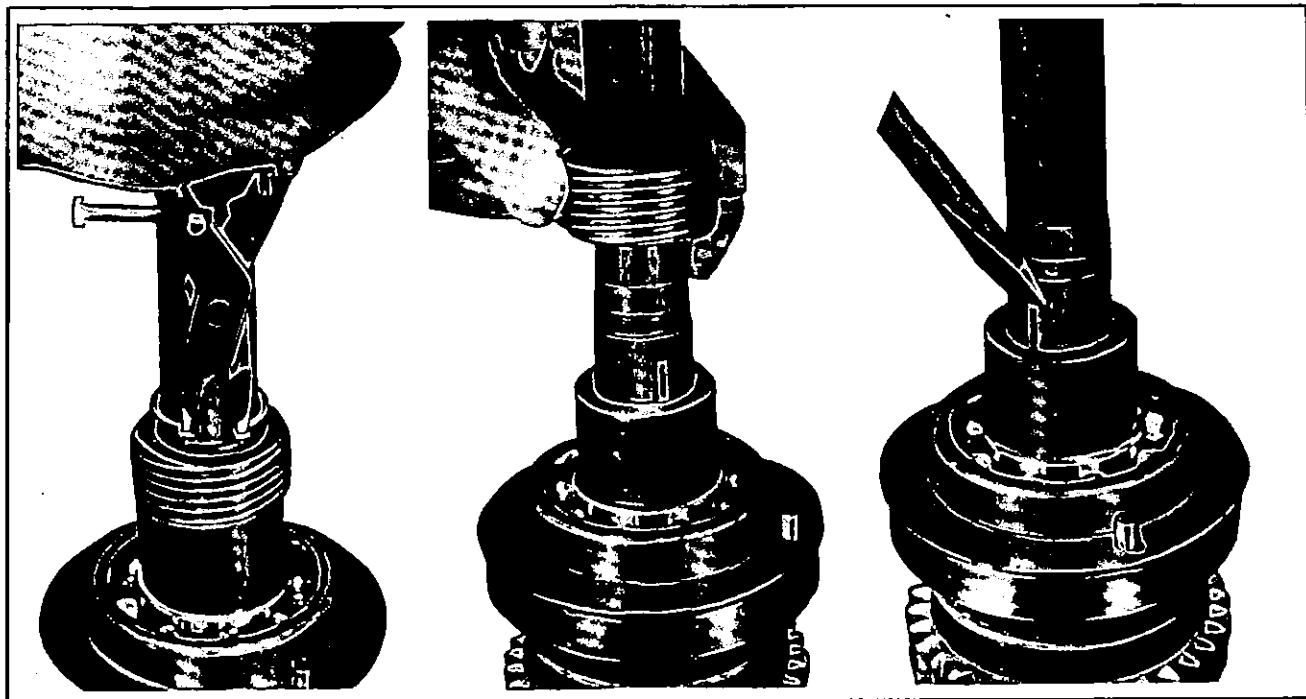


Fig. 14

Fig. 15

Fig. 16 Take out the Spacer

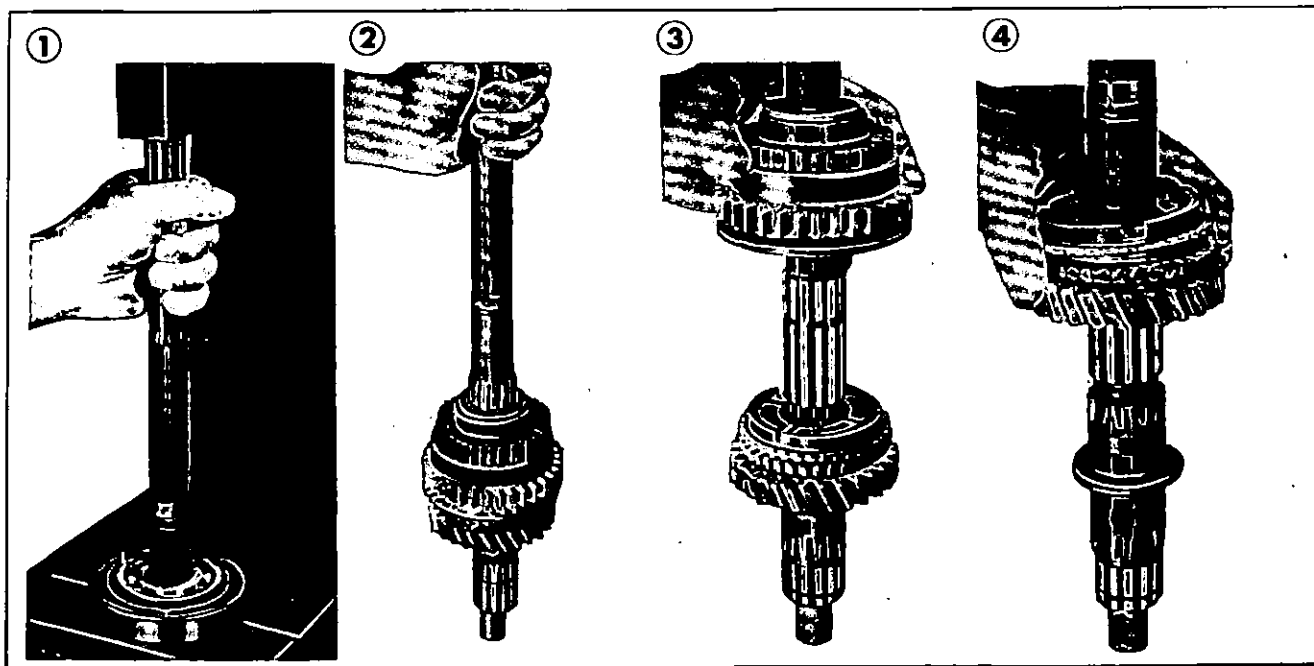


Fig. 17 Press out the Main Shaft Bearing Retainer

Fig. 18 Tapping out

Fig. 19

Fig. 20

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## Assembling the Baulk Ring

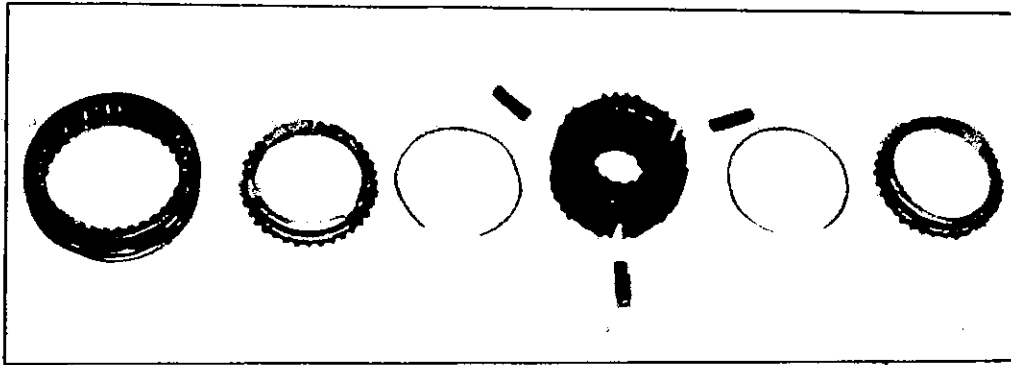


Fig. 21

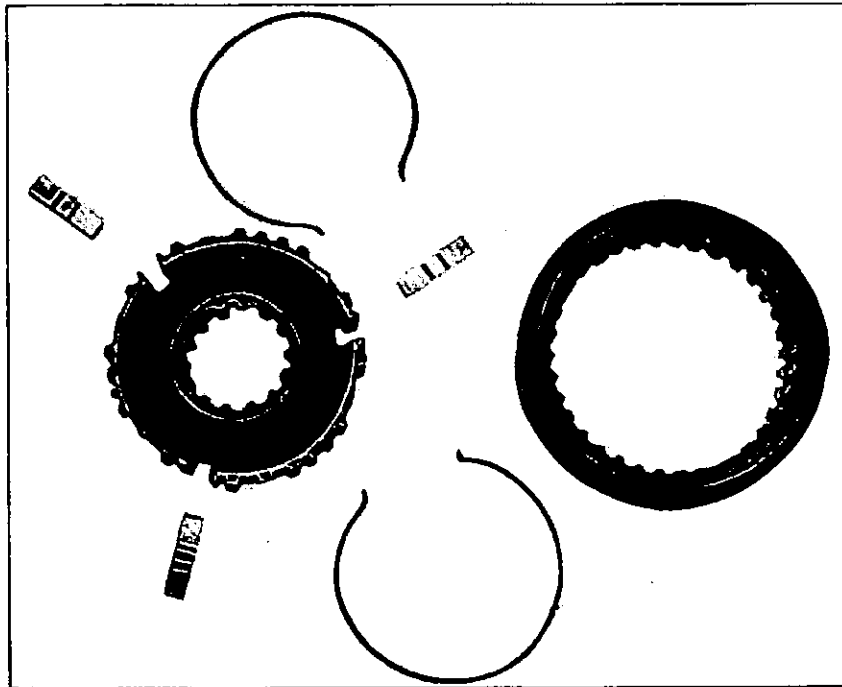


Fig. 22

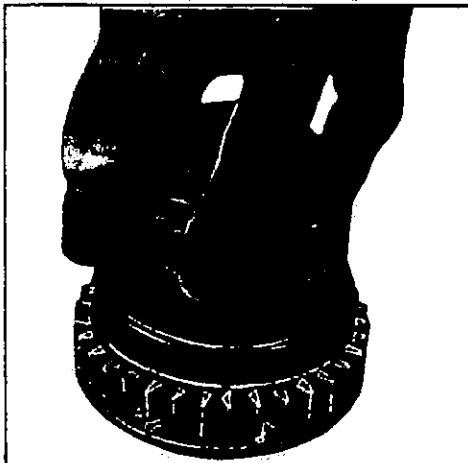
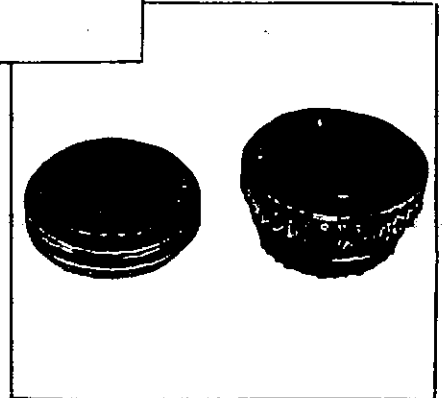


Fig. 23

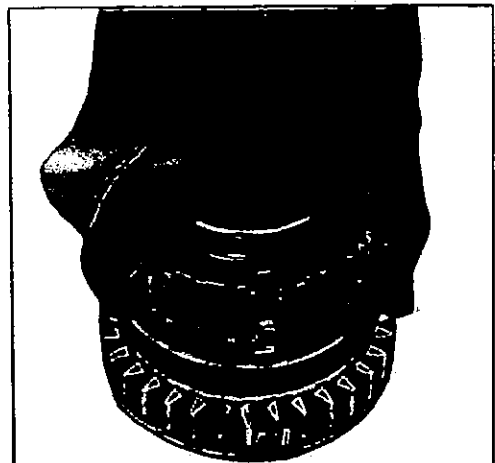


Fig. 24



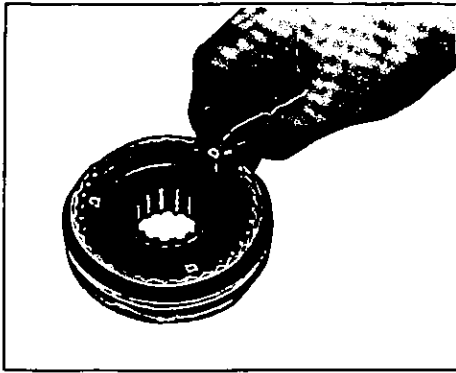


Fig. 25

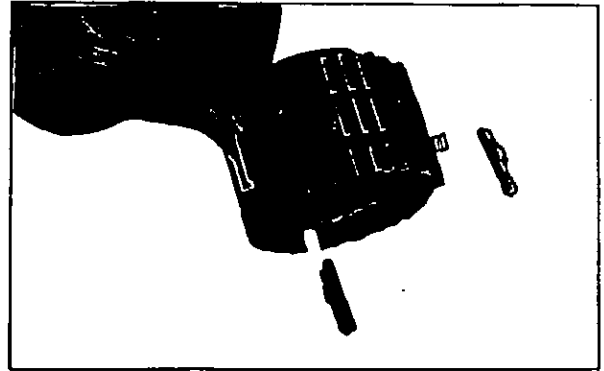


Fig. 29

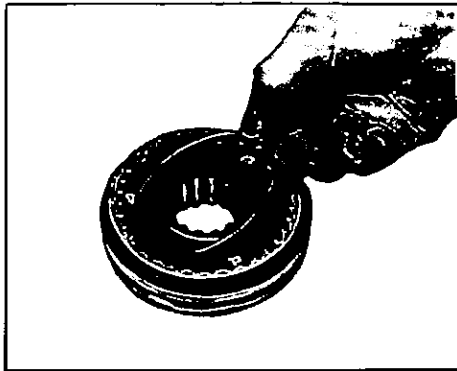


Fig. 26

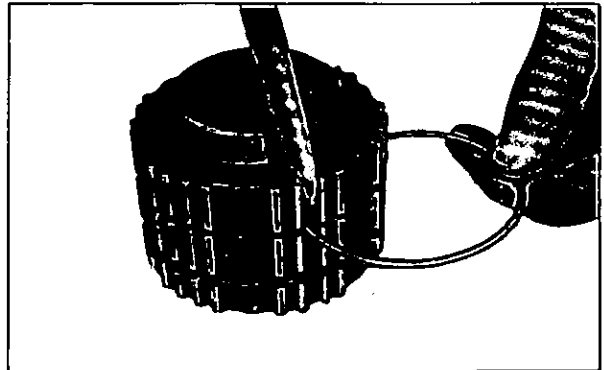


Fig. 30

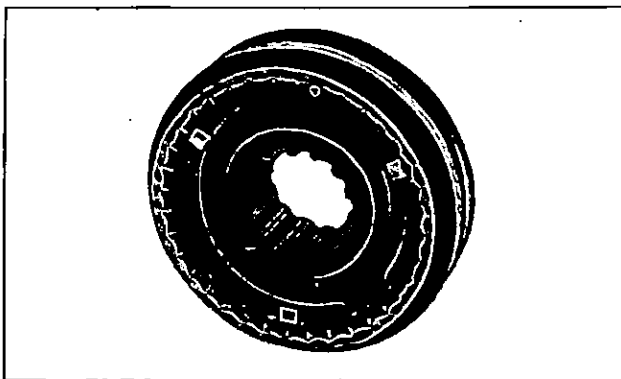


Fig. 27

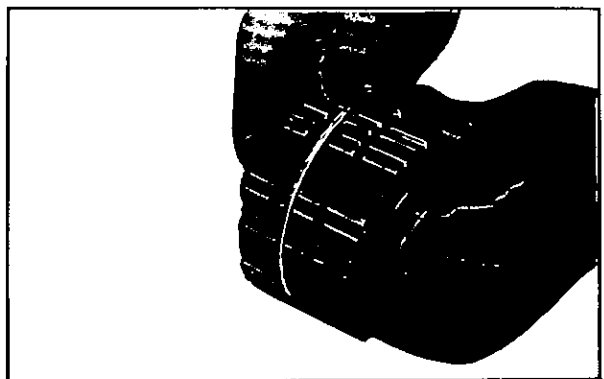


Fig. 31

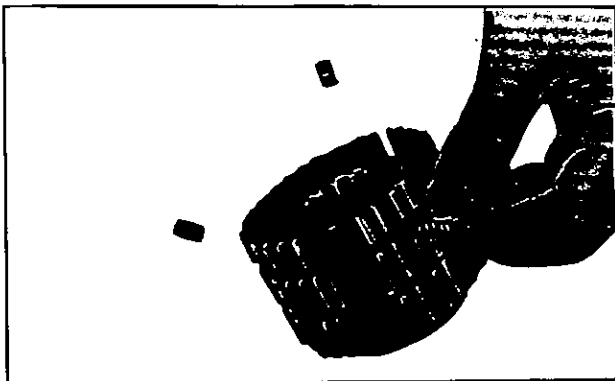


Fig. 28

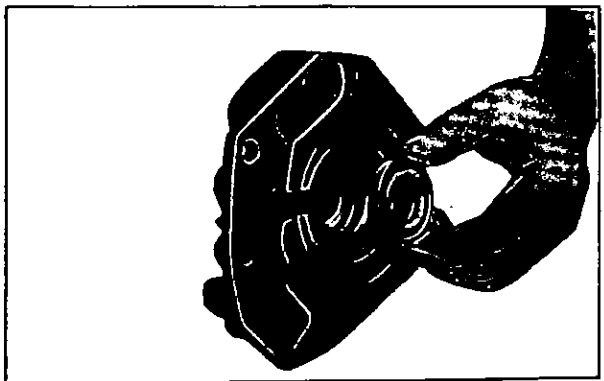


Fig. 32 Oil Seal Front Cover

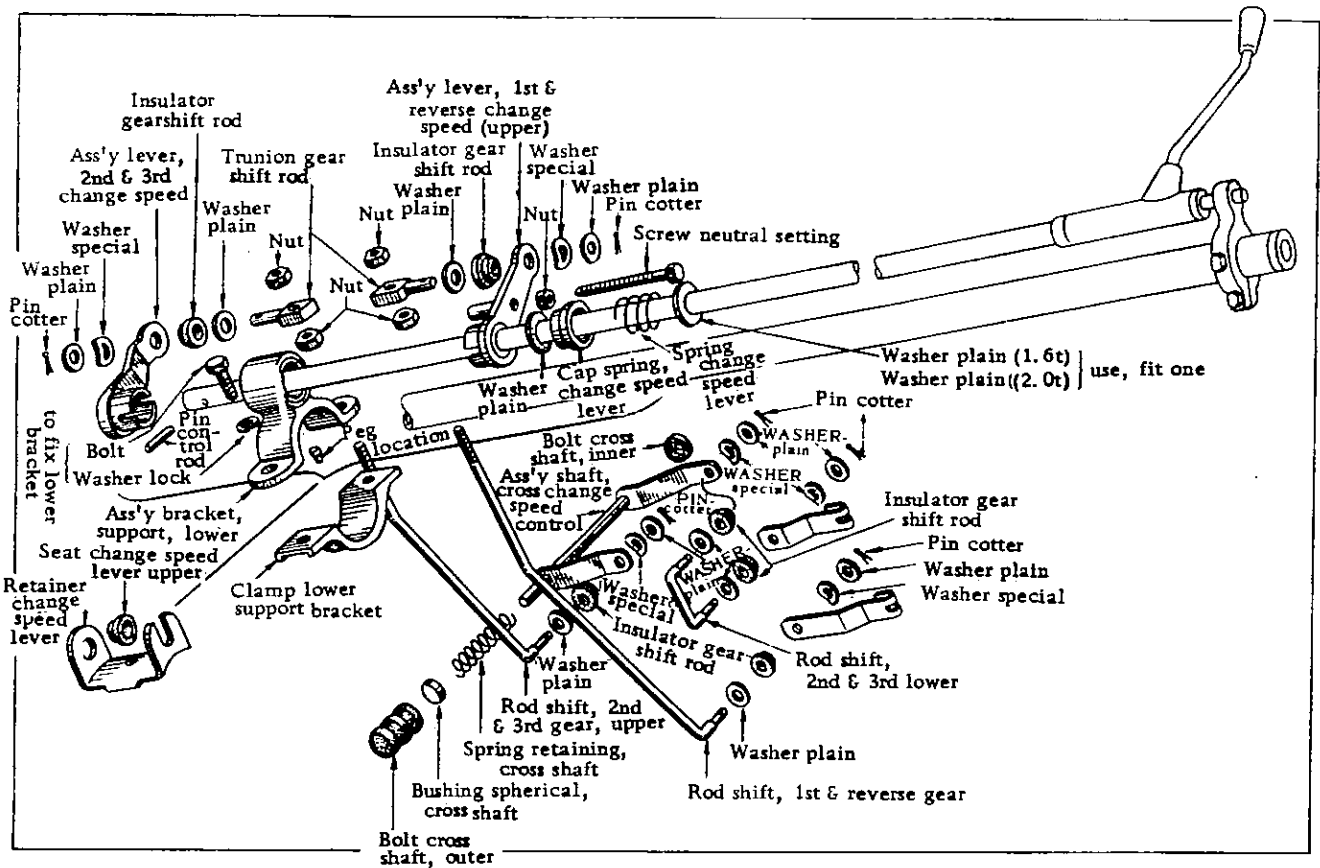


Fig. 33 Remote Control Linkage (For Left Handle)

**DISASSEMBLE THE TRANSMISSION CASE (For 4 Stage Floor Shift)**

**Removal of Control Lever**

Twist the cap on the lower portion of the control lever counterclockwise with a slight downward pressure.

**Removal of Shift Rod & Shift Fork**

Remove the cover from the transmission by detaching six bolts.

**Reverse Gear**

A lug, which is an integral part of the main casing locates the forward end of the reverse gear shaft. To secure the shaft in position, a setting screw is locked by a tab washer. Straighten the tab washer, release the setting screw, then tap forward and remove the reverse gear shaft. Set out the reverse gear.

**Counter Shaft & Gear**

Using soft metal drift, drive out the counter shaft forward and out of case, when the counter gear cluster and two thrust washers will drop to the bottom of the case.

These gears can only be lifted from the casing when the main and drive shafts together with their respective gears, have been removed.

To remove the needle roller bearing within the counter gear cluster it is necessary to break the retaining circlips before driving out the bearing with a suitable piece of metal tubing.

**Main Shaft**

The main shaft can now be withdrawn from the transmission casing. To remove the gears from the main shaft first slide off the third and fourth speed synchronizer assembly, then with a piece of wire inserted through the hole in the gear cone, depress the small spring loaded plunger which locates the splined washer at the

forward end of the main shaft, turning the washer into line with the splines. The third and second speed constant mesh gears, together with their common phosphor bronze sleeve, can now be pulled over the steel plunger and so clear of the main shaft. As the phosphor bronze sleeves and their common driving washer are tight fit on the shaft, the shaft should be immersed in warm oil in order to expand the sleeves so that they will slide off the shaft when the second speed gear can be removed.

Take out the steel plunger and spring.

Next remove the splined washer separating the second speed constant mesh gear assembly from the first gear unit and then slide the first gear assembly free of the main shaft.

To release the speedometer wheel from the main shaft straighten the tab washer and unscrew its securing nut, then slide the speedometer wheel off the shaft.

Do not lose the key. Take off the distance piece and the main shaft bearing, can be separated from its housing after the nut has been prised from the shaft.

If it is desired to dismantle the fourth and third speed coupling sleeve, or the first speed gear these can be pressed clear of their splined synchronizers, but care must be taken to retrieve the three balls and springs in each assembly. Take out the main shaft front needle roller bearings from the end of the drive gear shaft.

## Rear Oil Seal

This oil seal is situated in the end of the rear cover and should not be dismantled unless suspected of leaking. It is almost impossible to take off the seal without damaging it; consequently a new oil seal should be fitted if the old one has been moved. It will be seen that the oil seal housing is pinched into position. This can be removed by using a punch and hammer.

## Assembling the Transmission

The 2nd speed gear, the 3rd and 4th speed coupling sleeves are each paired with their respective synchronizers. Only mated pairs of these parts should therefore fitted.

## Reverse Gear

Refit the reverse gear into the gear case with the large gear to the rear.

Oil the reverse gear shaft before inserting and secure the shift with locating screw and lock washer.

## Counter Shaft Gears

First put the two thrust washers to the counter gears, ensuring that the larger washer is at the front, and then place the gear cluster in the gear case.

Check that there is end play for the cluster gears between 0.04 mm and 0.12 mm (0.0015~0.0046), and remedy if necessary by fitting a thicker or thinner rear washer.

Thickness of front thrust washer;

Part No.	Thickness
32224-26760	3.91 3.96T

Thickness of rear thrust washer;

Part No.	Thickness
32226 26760	3.9T
32227 26760	4.0T
32228 26760	4.1T
32229 26760	4.2T

Replace the counter shaft with a thin temporary rod which will permit the gear cluster to remain out of mesh with the main and drive shaft gears.

## Drive Gear Shaft

The ball journal bearing should now be drifted on to the shaft, with its spring ring away from the geared end. Position the geared end of the drive shaft in a dummy 3rd and 4th speed coupling sleeve put the washer over the bearing, tighten the nut and lock it in position.

Smear grease in the end of the shaft, where the main shaft locates, then load the needle rollers so that they adhere in position by means of the grease. Turn the gear casing to ensure that the counter teeth are below the drive shaft bearing housing.

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Failure to do this will result in damage to both the counter gear and drive shaft geared ends.

The drive shaft can now be drifted into position from the clutch housing end.

Ensure that the spring ring resisters properly in the rece on the gear case.

## Main Shaft

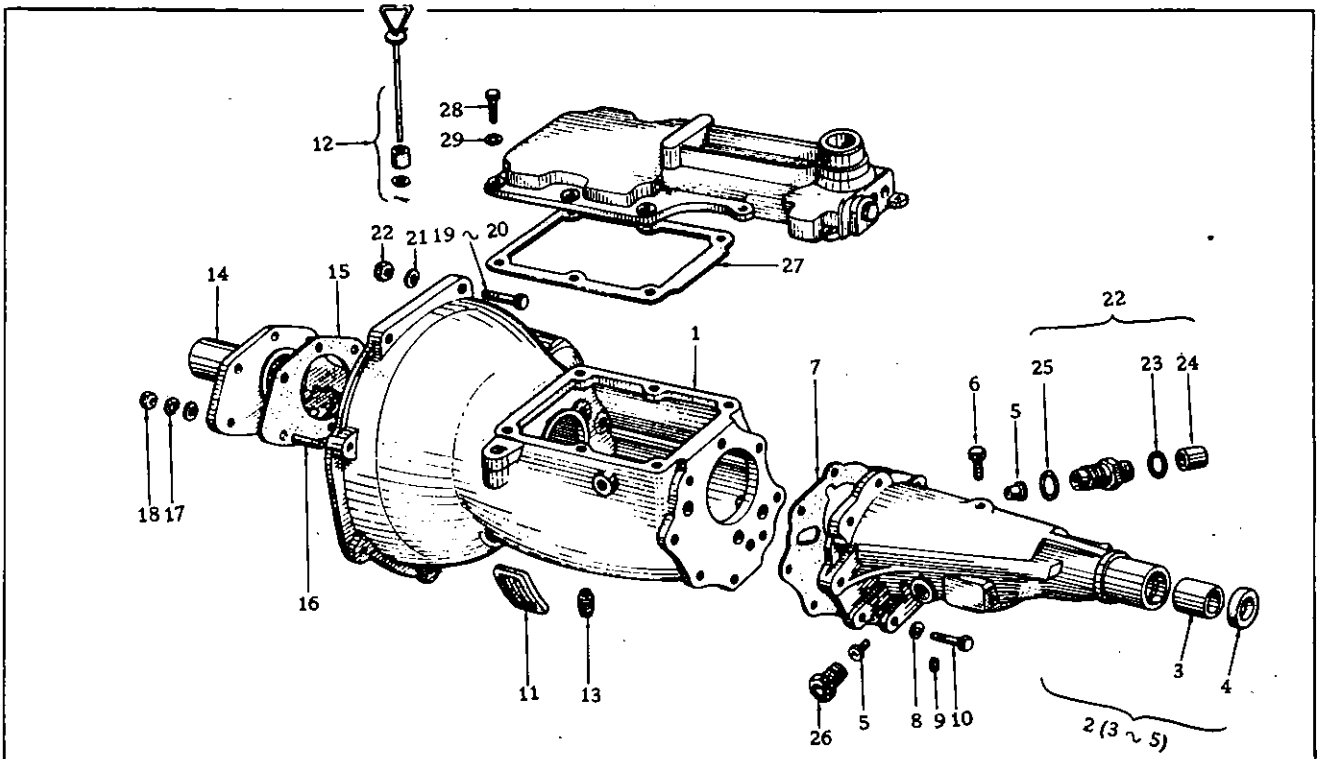
Press the main shaft center bearing complete with housing on to the shaft from the rear.

The bearing must be pressed firmly against the shoulder of the center splined portion of the shaft. Lightly smear oil the shaft forward of the bearing and refit the first speed wheel assembly with the synchronizer pointing forward.

Refit the thrust washer on to the shaft followed by the baulking ring. The phosphor bronze sleeve which carries the second speed is a tight fit on the shaft; there it must be first immersed in warm oil and then slid into position on the shaft. Fit second speed wheel over the sleeve, then the driving washer and the second bronze sleeve which carries the third speed wheel. The two sleeves are locked together by the driving washer. Now position the third gear over its sleeve.

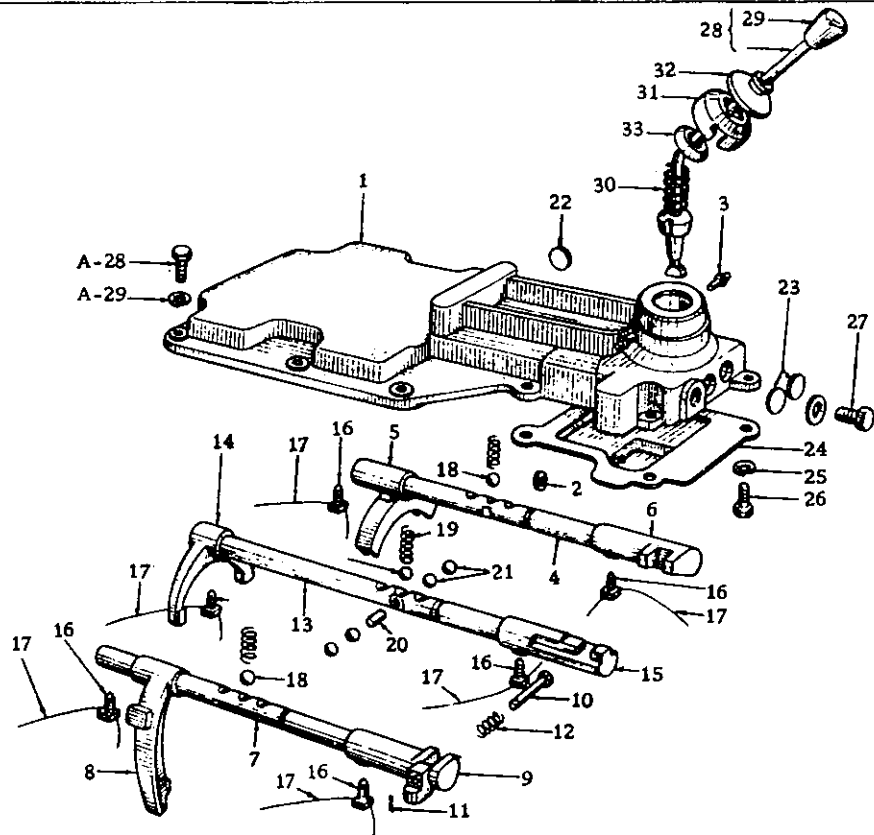
Place the spring and plunger into the hole in the main shaft and slide the splined washer. Depress the plunger with a piece of wire through the hole in the third speed, and the slide splined washer over the plunger. Then turn the washer for the plunger to engage with a groove in the washer.

The gear are now assembled on the main shaft.



- |  |  |
|--|--|
| <ul style="list-style-type: none"> <li>① Case-transmission</li> <li>② Ass'y-extension, rear</li> <li>③ Bushing-rear extension</li> <li>④ Seal-oil, rear extension</li> <li>⑤ Bushing-speedometer pinion</li> <li>⑥ Ass'y-breather</li> <li>⑦ Gasket-rear extension</li> <li>⑧ Washer-lock</li> <li>⑨ Washer-plain</li> <li>⑩ Bolt</li> <li>⑪ Bolt-rubber</li> <li>Bracket-spring return</li> <li>Spring-return</li> <li>⑫ Ass'y-stick, oil level dip</li> <li>⑬ Ass'y-plug, drain</li> <li>⑭ Cover-front, transmission case</li> <li>⑮ Gasket-front cover</li> </ul> | <ul style="list-style-type: none"> <li>⑯ Stud</li> <li>⑰ Washer-lock</li> <li>⑱ Nut</li> <li>⑲ Bolt</li> <li>⑳ Bolt</li> <li>㉑ Washer-lock</li> <li>㉒ Nut</li> <li>Ass'y-pinion, speedometer (18T)</li> <li>Ass'y-pinion, speedometer (15T)</li> <li>㉓ Ass'y-sleeve, speedometer pinion</li> <li>㉔ Ring-"O", speedometer pinion</li> <li>㉕ Retainer-"O", ring</li> <li>㉖ Ring-"O", pinion sleeve</li> <li>㉗ Plug-speedometer pinion</li> <li>Screw-set</li> <li>Washer-lock</li> <li>㉘ Gasket-cover, transmission case</li> <li>㉙ Bolt</li> <li>㉚ Washer-lock</li> </ul> |
|--|--|
- } to fix front cover
- } to fix transmission case
- } to fix rear extension
- } to fix reverse shaft

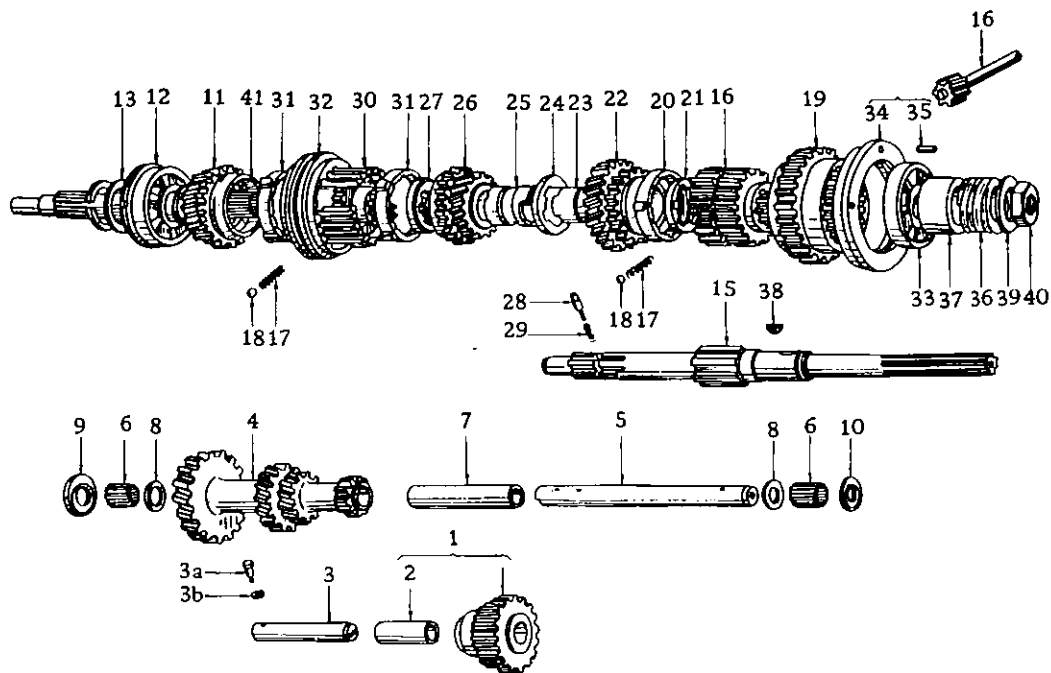
Transmission Case (4-Speed)



- |                                |    |                              |
|--------------------------------|----|------------------------------|
| Ass'y-cover, transmission      | 17 | Wire-lock                    |
| Ass'y-cover, transmission      | 18 | Ball-checking                |
| ① Cover-transmission           | 19 | Spring-poppet, shift rod     |
| ② Ring-"O" shift rod           | 20 | Pin-interlock                |
| ③ Pin-control lever, pivot     | 21 | Ball-interlock               |
| ④ Rod-fork, 1st & 2nd speed    | 22 | Plug-weld.                   |
| ⑤ Fork-1st & 2nd speed         | 23 | Plug-weld.                   |
| ⑥ Bracket-rod, 1st & 2nd       | 24 | Plate-dust                   |
| ⑦ Rod-fork, reverse            | 25 | Washer-lock                  |
| ⑧ Fork-reverse                 | 26 | Bolt                         |
| ⑨ Bracket-rod, reverse         | 27 | Plug                         |
| ⑩ Pin-fork, reverse            | 28 | Ass'y-lever, control         |
| ⑪ Pin-cotter                   |    | Boot-control lever           |
| ⑫ Spring-pin, reverse fork     | 29 | Knob-control lever           |
| ⑬ Rod-fork, 3rd & 4th speed    | 30 | Spring-lever, control        |
| ⑭ Fork-3rd & 4th speed         | 31 | Cap-cover, transmission case |
| ⑮ Bracket-rod, 3rd & 4th speed | 32 | Boot-rubber                  |
| Ball checking                  | 33 | Seat-lever spring            |
| Spring-poppet pin              |    | Screw-stop, reverse fork     |
| ⑯ Screw-set                    |    | Nut-plain                    |

Transmission Fork & Rod (4-Speed)

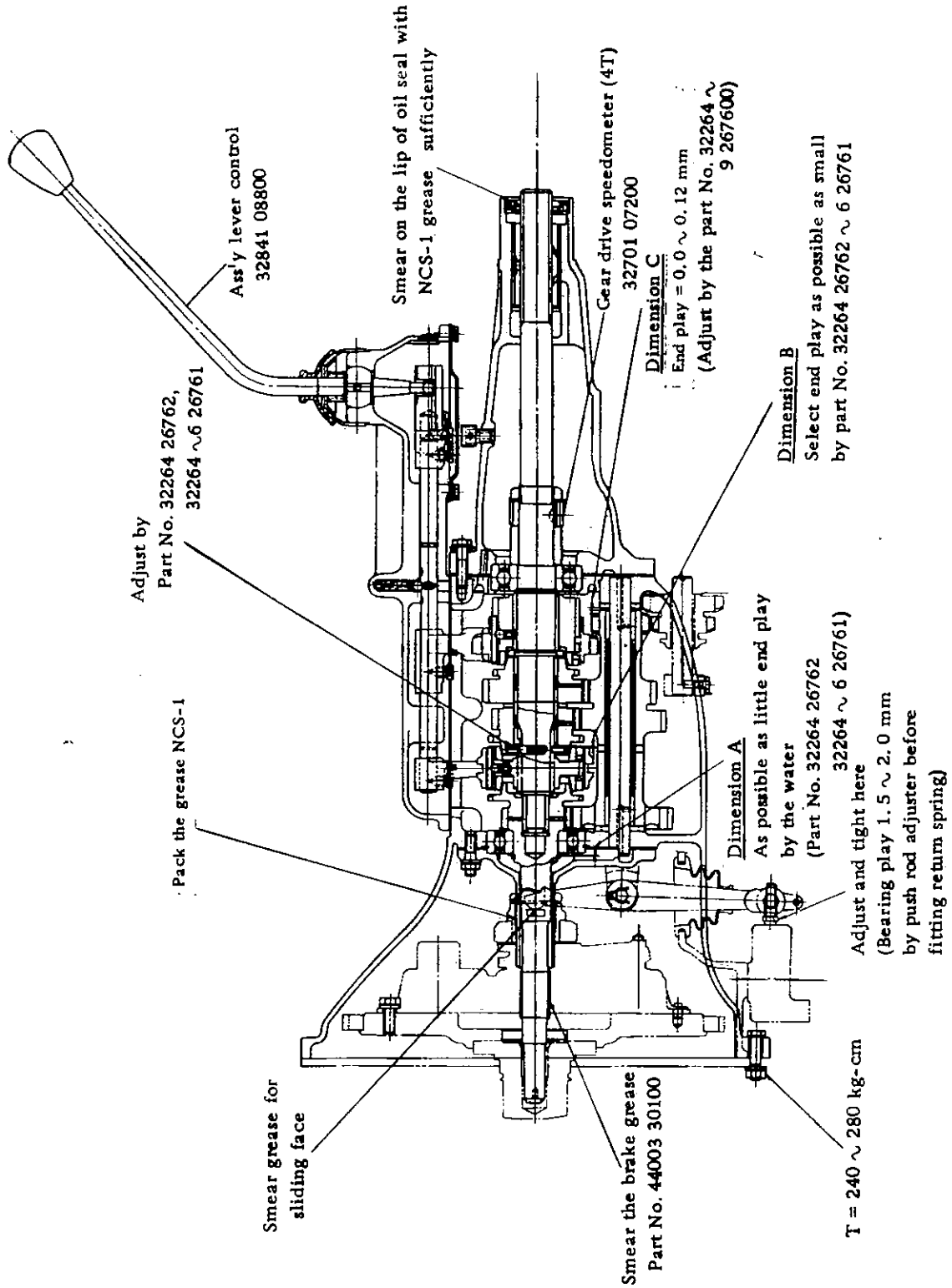
# TRANSMISSION



- |   |  |
|---|--|
| <ul style="list-style-type: none"> <li>① Ass'y-gear, reverse</li> <li>② Bushing, reverse gear</li> <li>③ Shaft-reverse gear<br/>Screw-set reverse gear<br/>Washer lock</li> <li>④ Gear-counter</li> <li>⑥ Shaft-counter</li> <li>⑥ Roller-needle</li> <li>⑦ Counter shaft spacer</li> <li>⑧ Ring-retainer, needle roller</li> <li>⑨ Washer-thrust, counter front</li> <li>⑩ Washer-thrust, counter rear (3.9T)<br/>Washer-thrust, counter, rear (4.0T)<br/>Washer-thrust, counter, rear (4.1T)<br/>Washer-thrust, counter, rear (4.2T)</li> <li>⑪ Gear-main drive</li> <li>⑫ Bearing-main drive gear</li> <li>⑬ Spacer-bearing (1.6T)</li> <li>⑭ Ring-snap, main drive gear (1.6T)<br/>Ring-snap, main drive gear (1.65T)<br/>Ring-snap, main drive gear (1.74T)<br/>Ring-snap, main drive gear (1.77T)</li> <li>⑮ Shaft, main</li> <li>⑮ Hub-synchronizer</li> <li>⑰ Spring-synchronizer hub</li> <li>⑰ Ball-synchronizer hub</li> </ul> | <ul style="list-style-type: none"> <li>⑰ Gear-main shaft</li> <li>⑳ Ring-baulk, 2nd speed</li> <li>㉑ Washer-thrust, main shaft rear</li> <li>㉒ Gear-2nd speed</li> <li>㉓ Bushing-2nd speed gear</li> <li>㉔ Washer-thrust, main shaft</li> <li>㉕ Bushing-3rd speed gear</li> <li>㉖ Gear-3rd speed</li> <li>㉗ Washer-thrust, main shaft, front (3.9T)<br/>Washer-thrust, main shaft, front (4.0T)<br/>Washer-thrust, main shaft, front (4.1T)</li> <li>㉘ Peg-locking</li> <li>㉙ Spring-locking, peg</li> <li>㉚ Hub-synchro., 3rd &amp; 4th speed</li> <li>㉛ Ring-baulk, 3rd &amp; 4th speed</li> <li>㉜ Sleeve-synchro., 3rd &amp; 4th speed</li> <li>㉝ Bearing-main shaft</li> <li>㉞ Ass'y-retainer, main shaft bearing</li> <li>㉞ Peg-locking</li> <li>㉟ Gear-drive, speedometer (5T)</li> <li>㊱ Gear-drive, speedometer (4T)</li> <li>㊱ Piece-distance, main shaft</li> <li>㊲ Key-woodruff</li> <li>㊳ Washer-lock</li> <li>㊴ Nut-main shaft</li> <li>㊴ Bearing-main shaft pilot</li> </ul> |
|---|--|

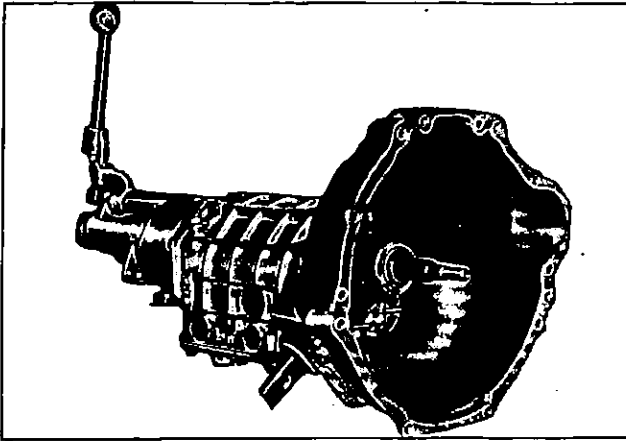
*Transmission Gear (4-Speed for 1200 cc Engine)*

Transmission (for 1200 cc Engine)

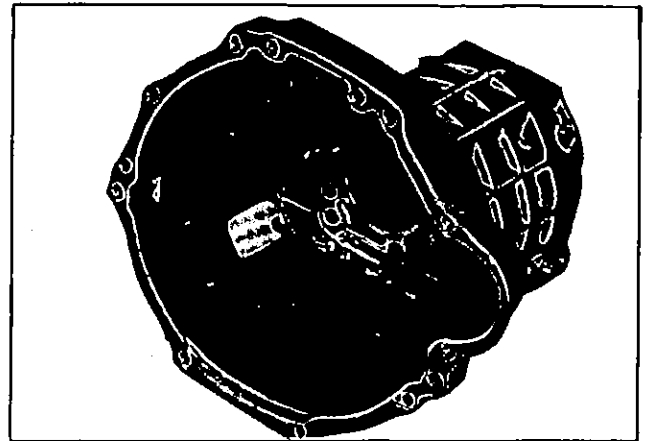




**Transmission (4 forward type)**



*Fig. 1*



*Fig. 3*

*(2) Rear extension*

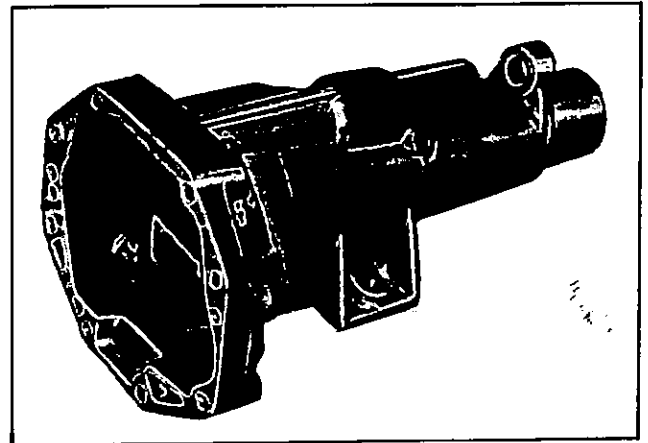
Floor shift rod setting through the rear extension is set in rear extension.

**Gear ratio**

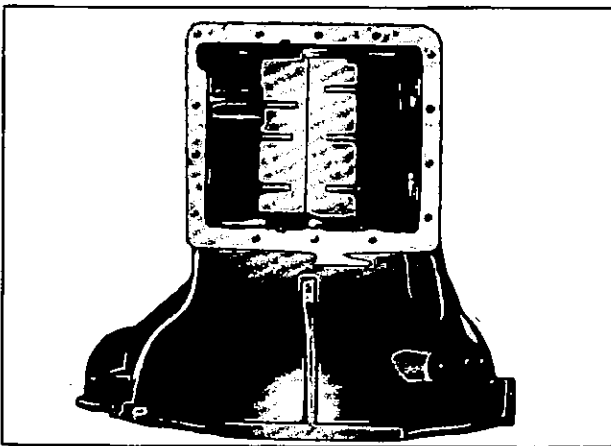
	New	Former
1	3.657	3.945
2	2.177	2.402
3	1.419	1.490
4	1.000	1.000
Rev.	3.638	5.159

*(1) Transmission case*

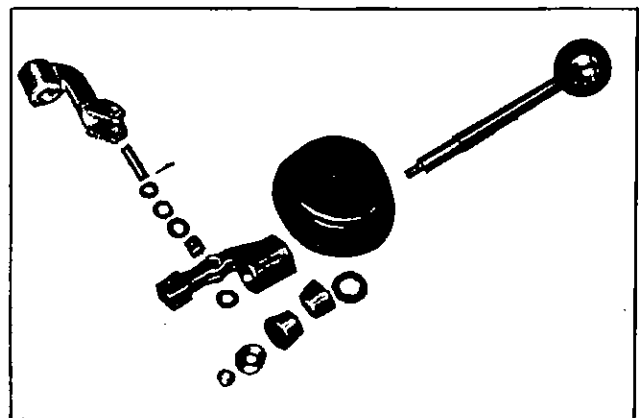
The cover of transmission is attached to the bottom of case.



*Fig. 4*



*Fig. 2*



*Fig. 5*

# DATSUN

## (3) Reverse lamp switch

It is placed at the side of rear extension and directly operated reverse shift fork.

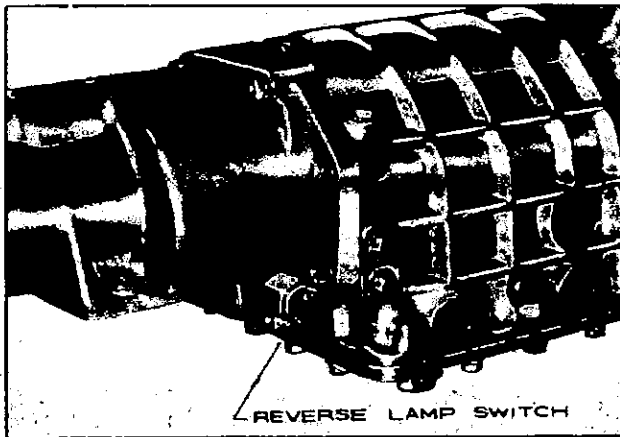


Fig. 6

## (4) Speedometer pinion sleeve

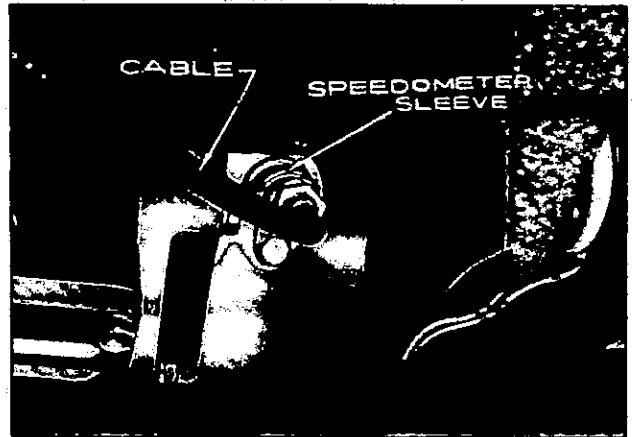
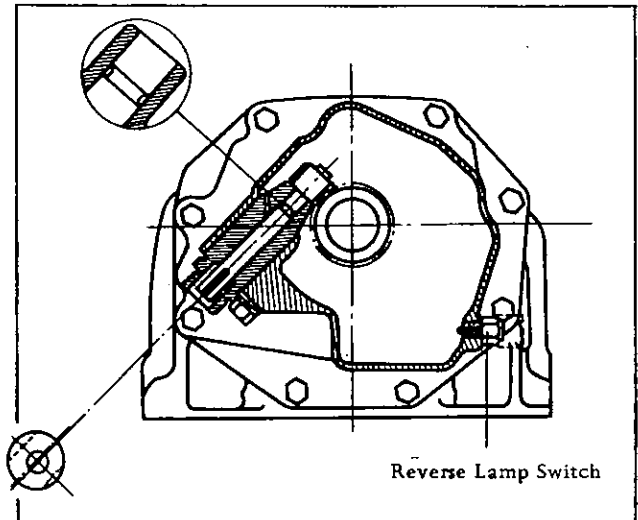
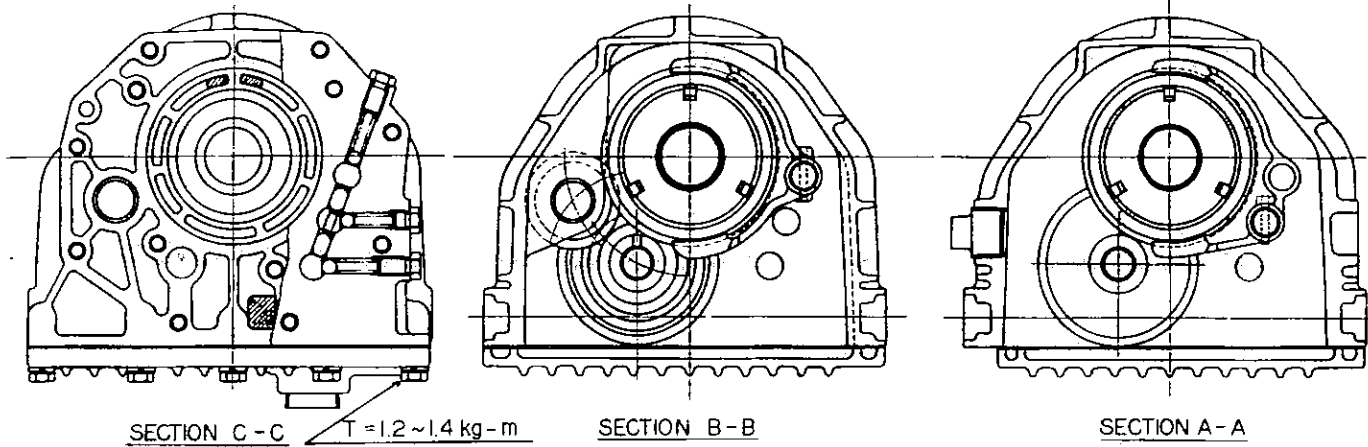


Fig. 7





# SECTIONAL VIEWS OF TRANSMISSION

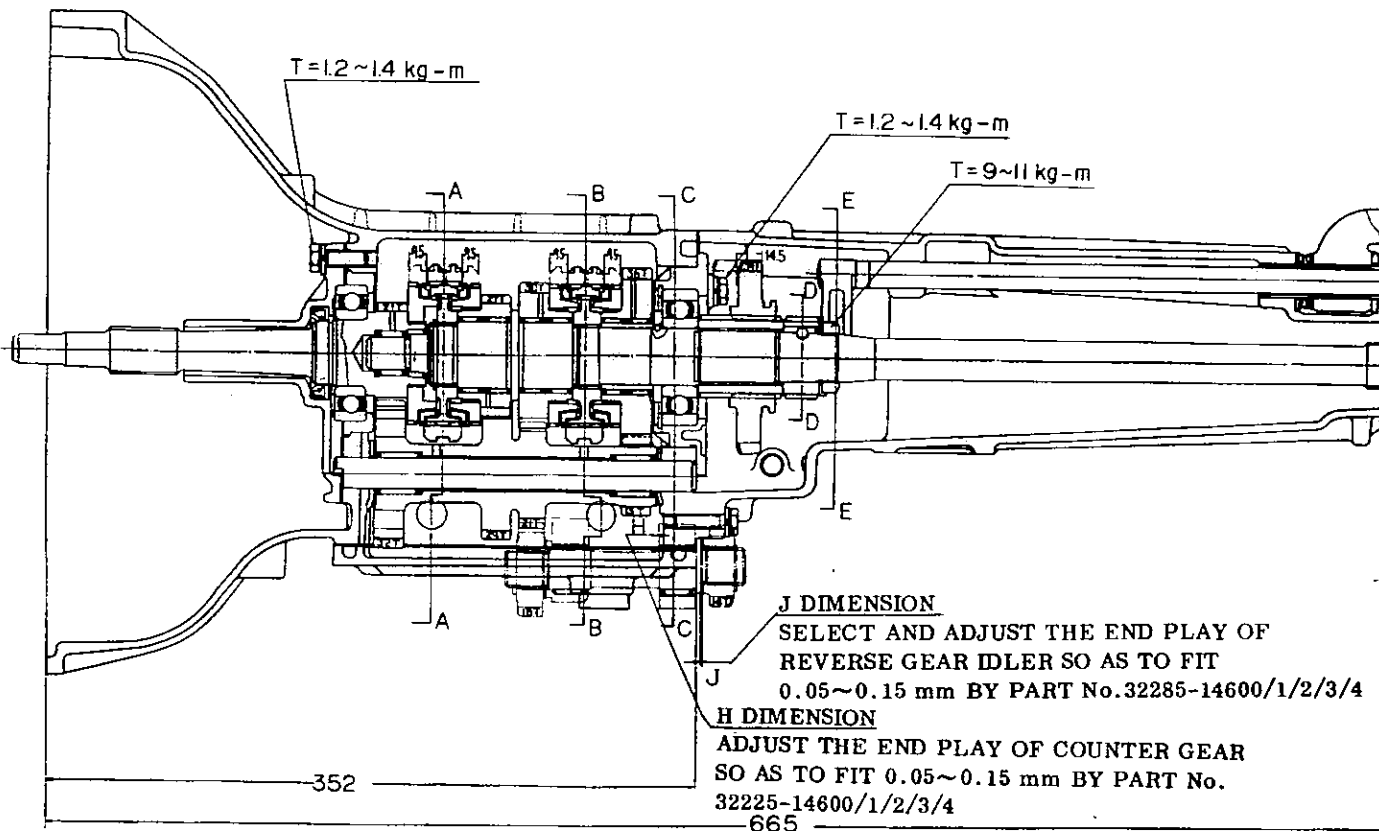


SECTION C-C

T = 1.2 ~ 1.4 kg-m

SECTION B-B

SECTION A-A



T = 1.2 ~ 1.4 kg-m

T = 1.2 ~ 1.4 kg-m

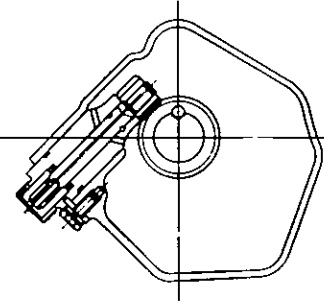
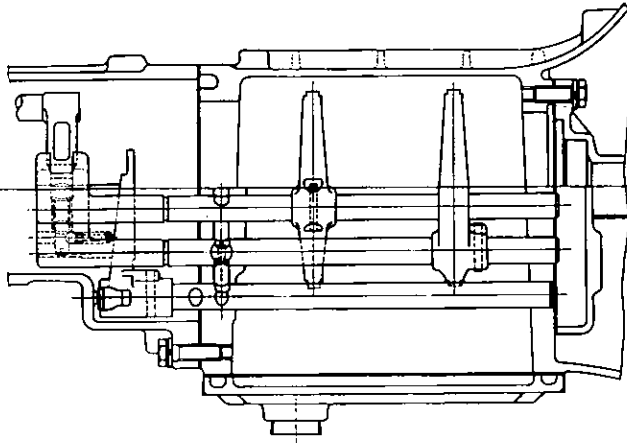
T = 9 ~ 11 kg-m

352

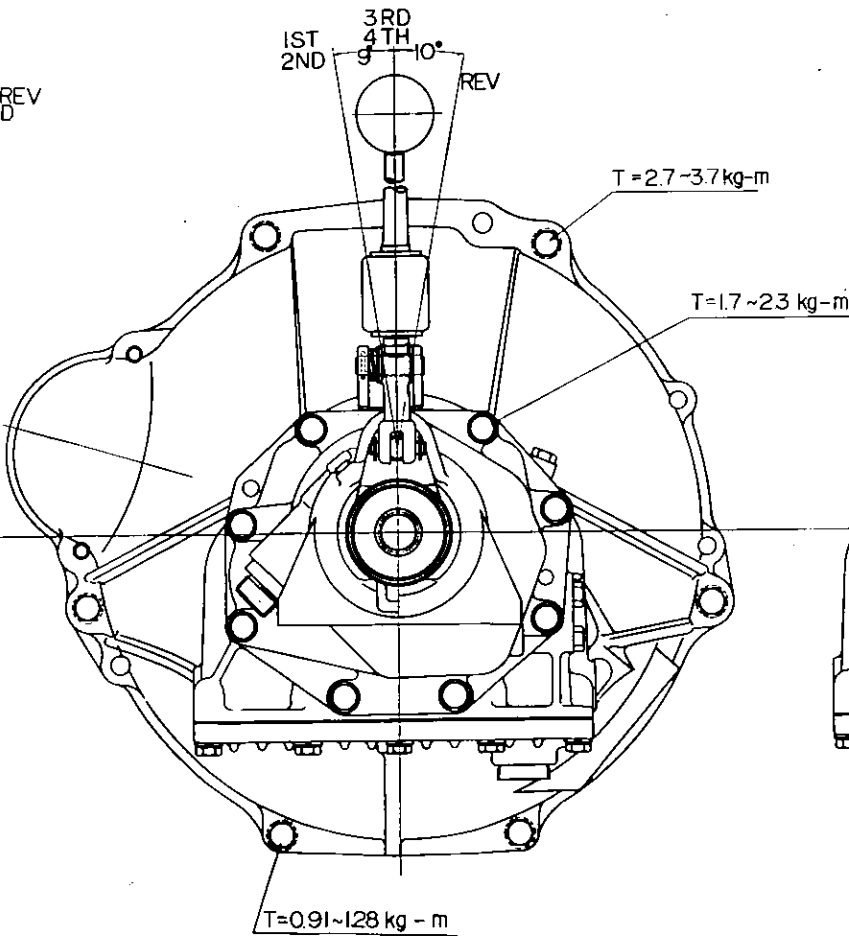
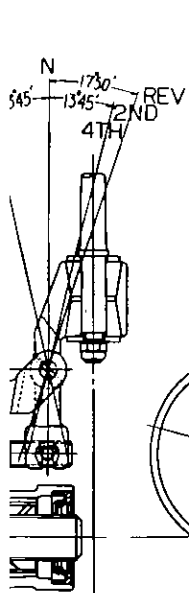
**J DIMENSION**  
 SELECT AND ADJUST THE END PLAY OF  
 REVERSE GEAR IDLER SO AS TO FIT  
 0.05 ~ 0.15 mm BY PART No. 32285-14600/1/2/3/4

**H DIMENSION**  
 ADJUST THE END PLAY OF COUNTER GEAR  
 SO AS TO FIT 0.05 ~ 0.15 mm BY PART No.  
 32225-14600/1/2/3/4  
 665

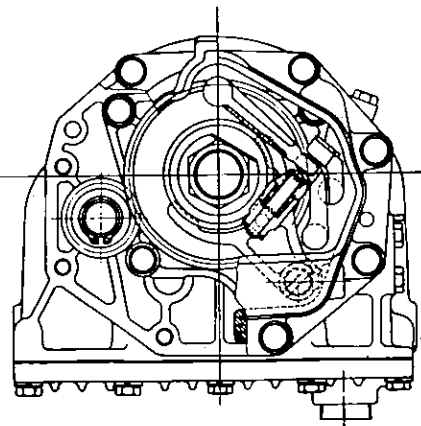
# TRANSMISSION



SECTION D - D



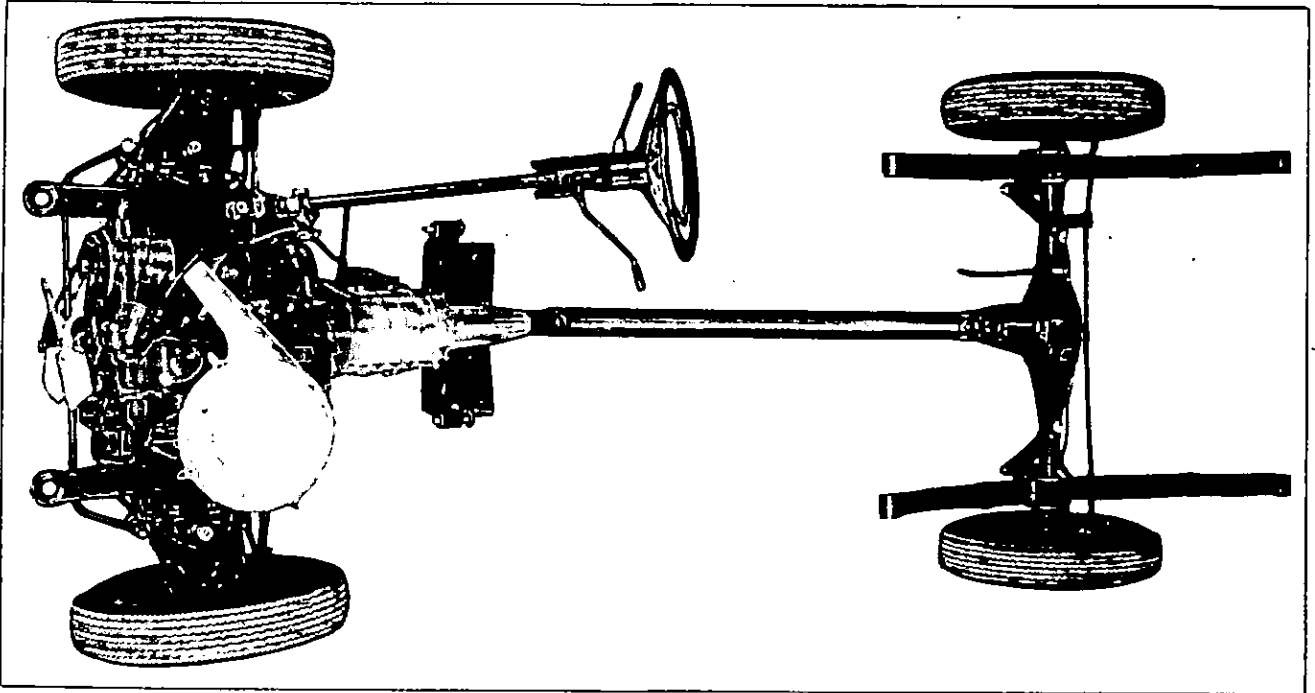
GEAR RATIO	
1ST	3.657
2ND	2.177
3RD	1.419
4TH	1.000
REVERSE	3.638



SECTION E - E



CHASSIS



FRONT AXLE

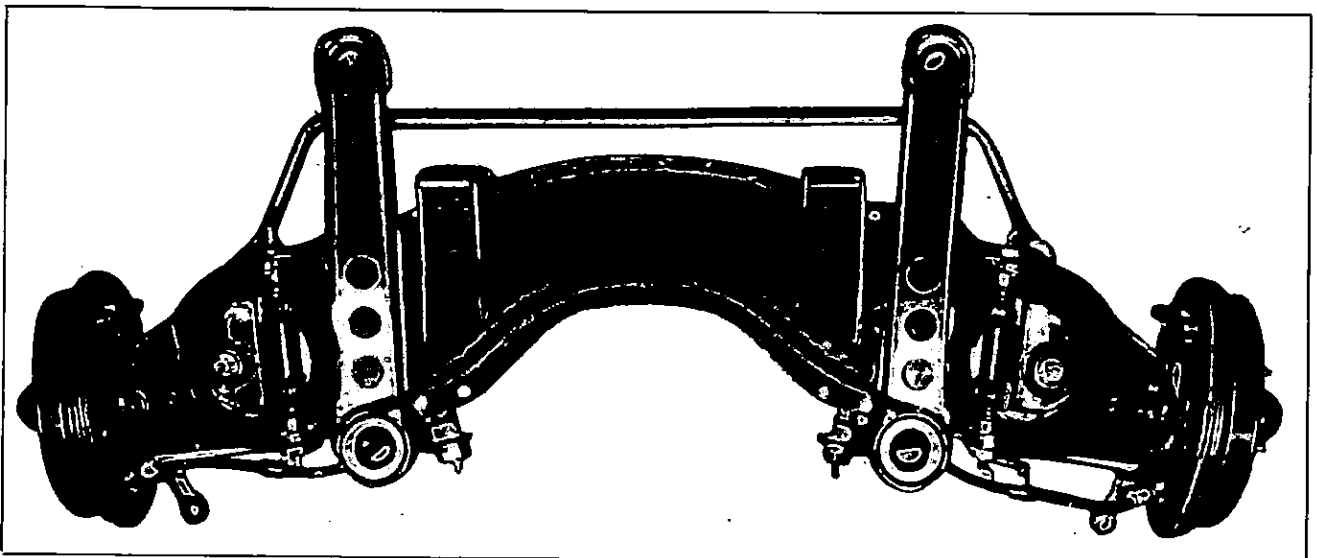


Fig. 1

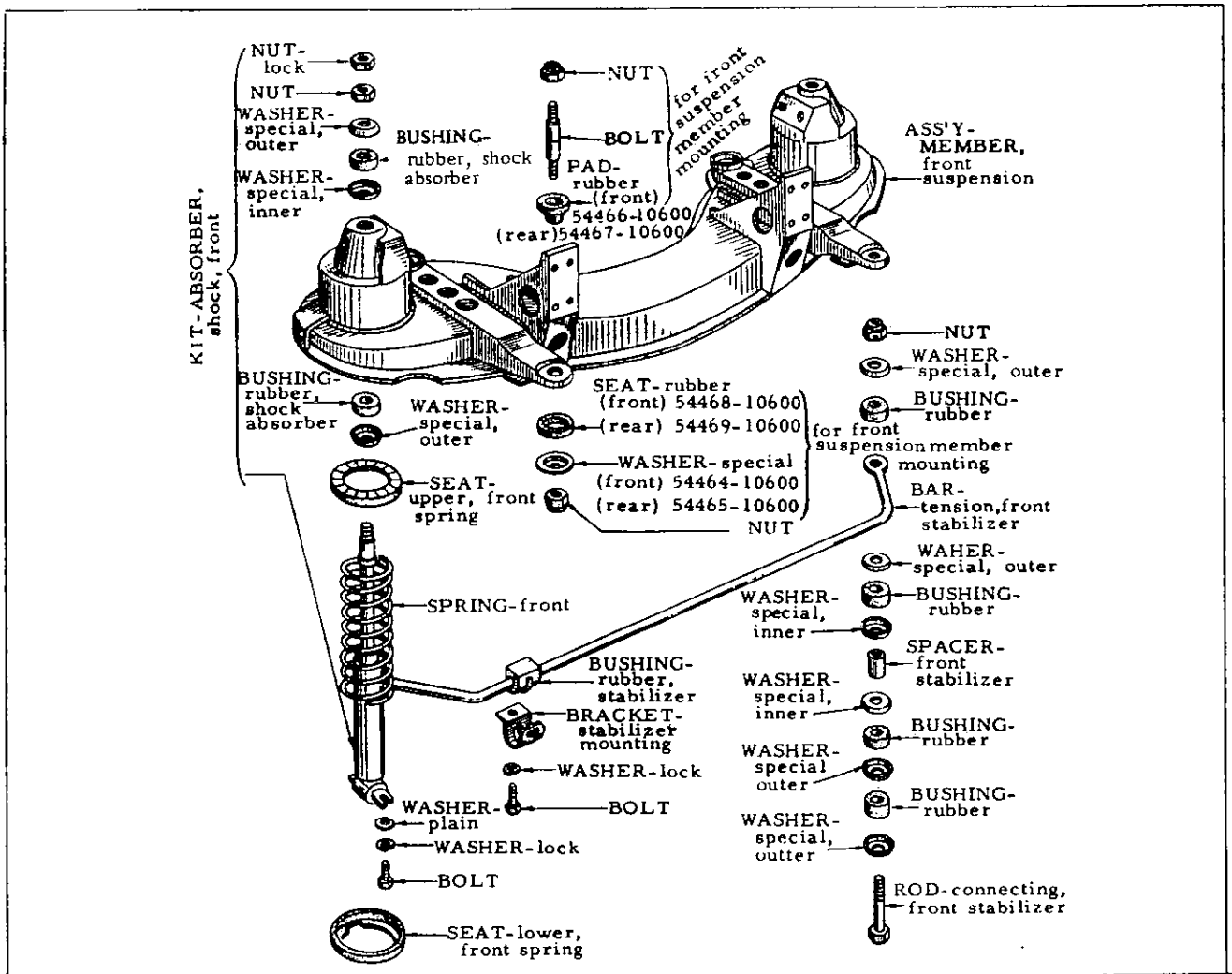


Fig. 2 Front Suspension Member & Shock Absorber

**DISASSEMBLING THE FRONT HUB**

Dismantling of the front hub, first jack the car until the wheel is clear of the ground and then place blocks under independent suspension spring plate. Lower the car on to the blocks. Remove the wheel and the screw. If the drum appears to bind on the brake shoes. The shoe adjusters should be slackened.

Lever off the hub cap, and then extract the split pin from the spindle nut.

Using a box spanner remove the spindle nut and ease flat washer under the nut, clear of the axle thread by carefully using a narrow rod into small holes, in turn, in each side of the spindle and tapping the race lightly. With the hub removed, outer bearing can be dismantled, and by inserting a drift through the inner bearing

and tapping the out bearing clear of the hub.

The inner bearing and oil seal can then be removed by inserting the drift from the opposite side of the hub.

When assembling the hub the inner bearing race should first be inserted into the hub. Pack the hub with recommended grease. Replace the hub oil seal over the inner bearing. Renew the seal if it is damaged any way.

The hub can now be replaced on the spindle. Gently tap the hub into position until the inner race bear against the shoulder on the spindle.

Place the spindle flat washer into position and screw the nut down finger tight. Spin the wheel and examine the resistance. Tighten the nut.



A slightly increased resistance to the spinning of the wheel will then be noticed. The bearings are now preloaded and the split pin should be inserted to lock the nut. Tap the hub cap to the hub after packing the cap with grease.

Replace the brake drum and secure with machine screws. It is important that the drum

is fully home before this screws is tightened and if necessary, the drum should be pressed in position by tightening two wheel nut. Refit the wheel and nuts are best finally tightened when the car is off the backing blocks, but readjust the brake shoes if necessary before the car is lowered to the ground.

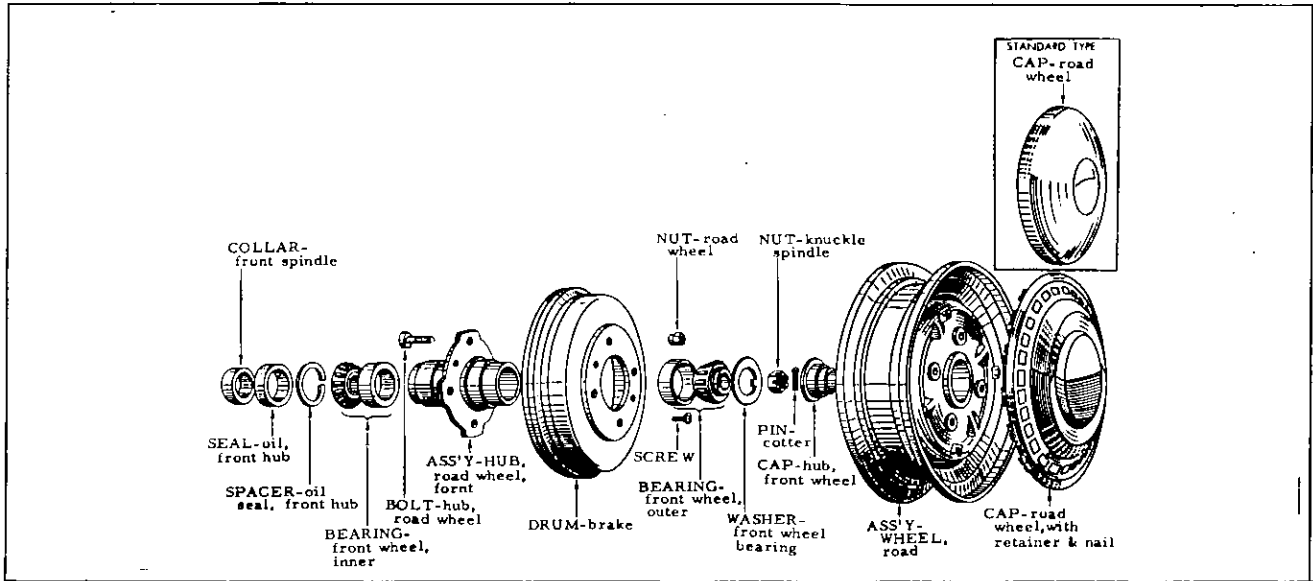


Fig. 1 Front Hub & Drum

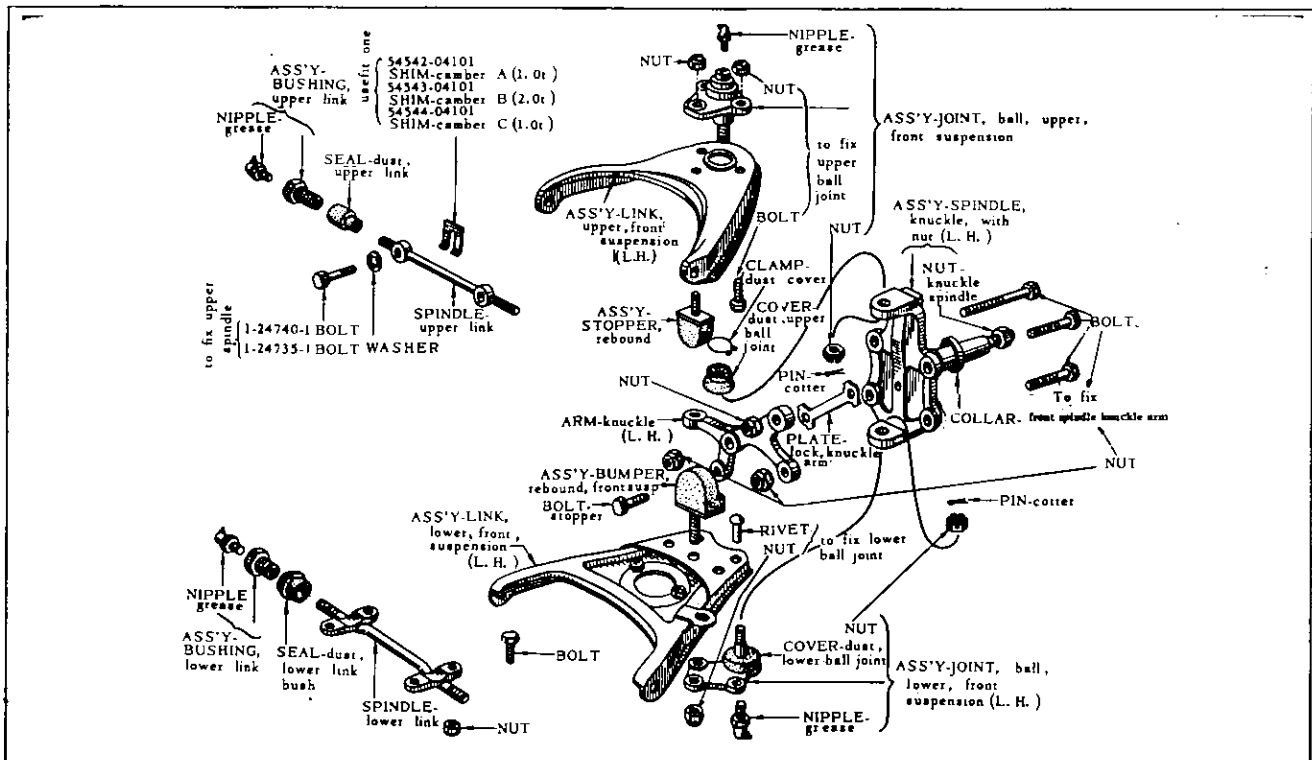


Fig. 2 Front Suspension Link

INDEPENDENT FRONT SUSPENSION

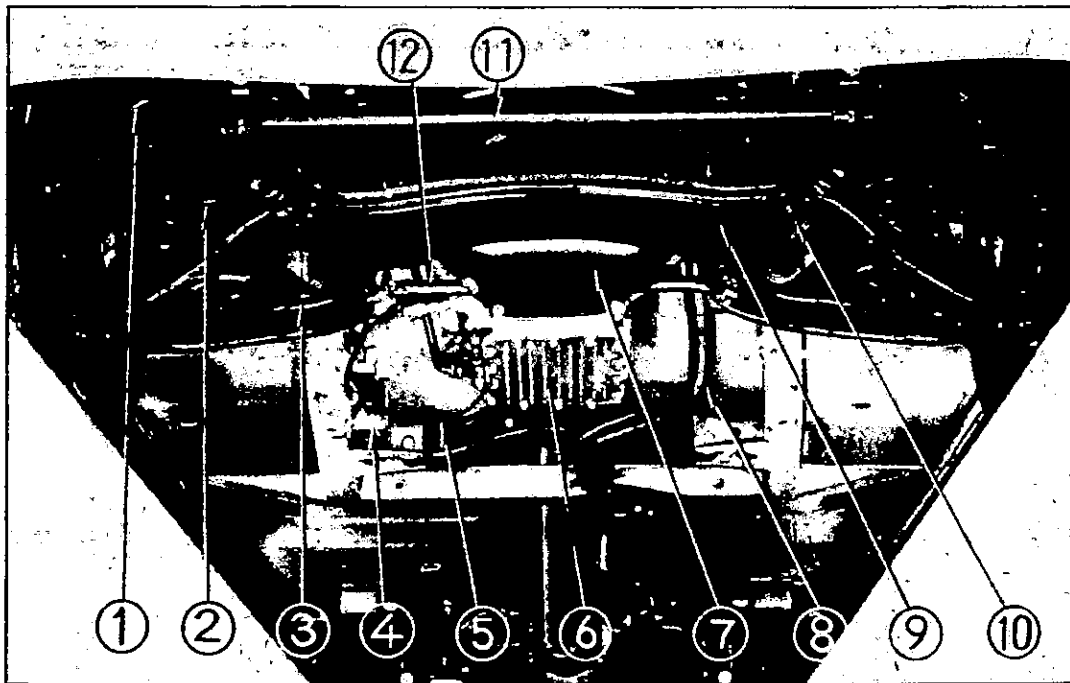


Fig. 1

The dependent front suspension is known as the wishbone type, since the top upper and lower bottom linkages roughly conform to the shape of a wishbone.

Between these two wishbones is the coil spring, held under compression between the upper and lower which is secured to the lower suspension member by four bolts. At the swivel axle end, the upper and lower linkages are joined by the ball joints. The upper spindle bracket is bolted to the front suspension member with caster shims and the lower spindle is connected to the lower bracket of the suspension member.

① Front suspension upper link	⑦ Oil pan
② Front coil spring	⑧ Exhaust front tube
③ Front suspension lower link	⑨ Front suspension member
④ Clutch operating cylinder	⑩ Lower link spindle
⑤ Speedometer cable	⑪ Stabilizer
⑥ Transmission	⑫ Cross rod

Adjust for	Change the number of Shims*		Camber	Caster
	Front side	Back side		
Both Camber & Caster	-1		-0° 01'	+0° 29'
		-1	+0° 16'	-0° 31'
	+1		+0° 02'	-0° 31'
		+1	-0° 04'	+0° 29'
Camber only	+1	+1	-0° 15'	
	+2	+2	-0° 27'	
	-1	-1	+0° 15'	
	-2	-2	+0° 27'	

\* ; a thickness of each shim. - 1 m/m

**Camber adjusting shims**

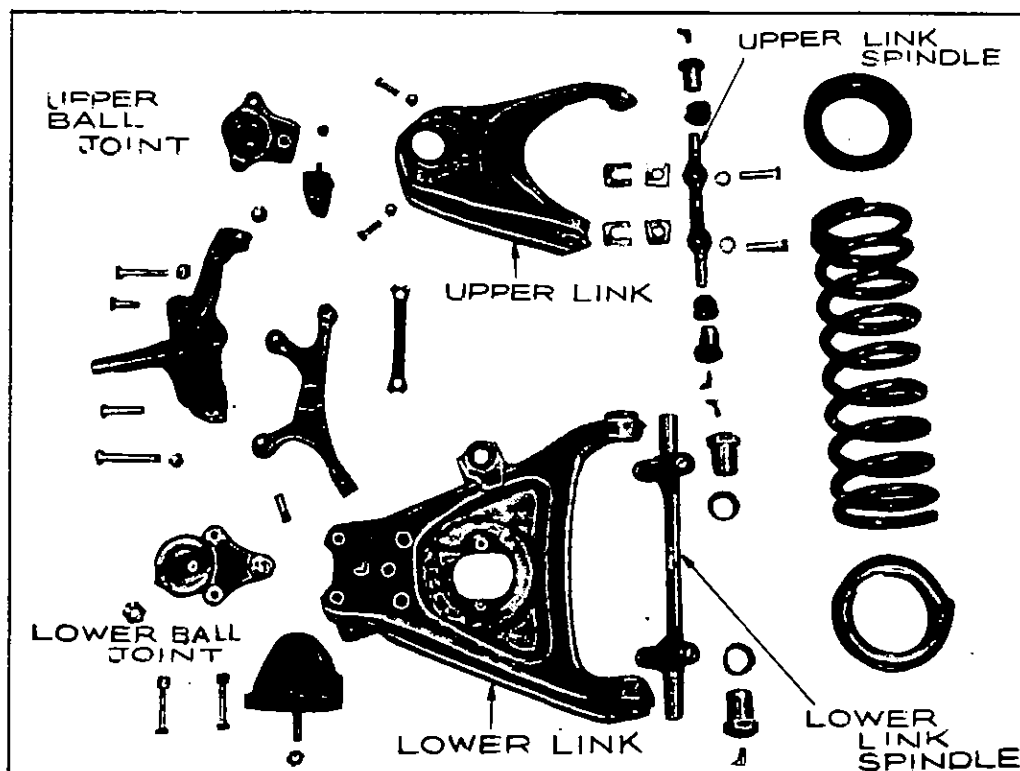
	Parts No. 54542 04100	1 mm
	54543 04100	2 mm
	54544 04100	4 mm
Standard adjustment	Camber 1° 30'	R/L difference within 40'
	Caster 1° 30'	R/L difference within 40'

**BALL JOINTS & BUSHES OF THE SWIVEL AXLE**

Wear if the swivel ball joint, or wear of the screw bushes of links, or both, may be checked by jacking the front of the car and endeavouring to rock the wheel by grasping opposite points of the tyre in a horizontal position. If any

movement can be detected between the upper and lower swivel joints and the swivel axle assembly, the ball joints or the screw bushes are worn and must be stripped for examination.

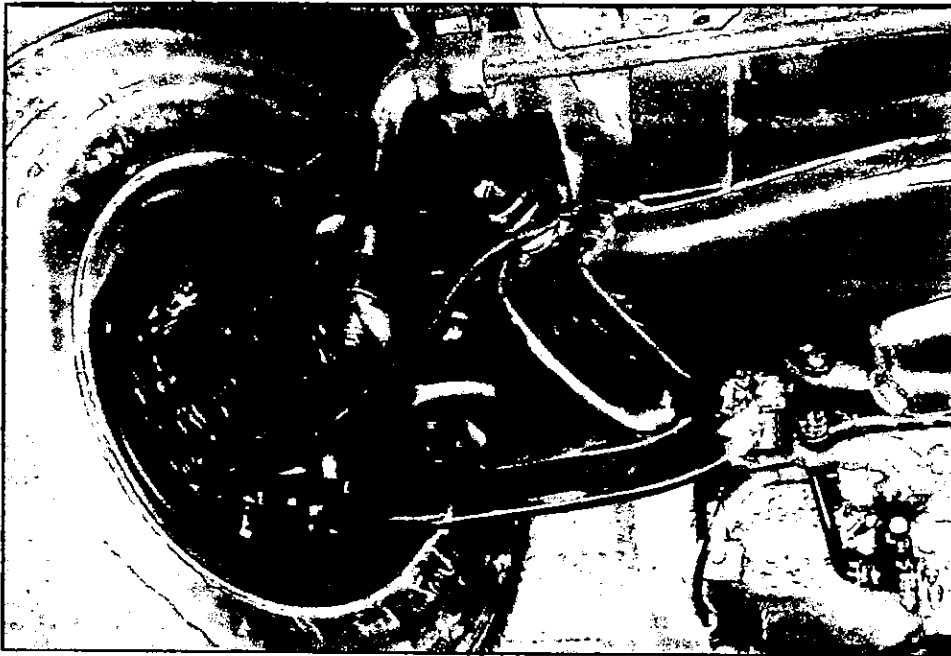
**Front Coil Spring**



*Fig. 2*

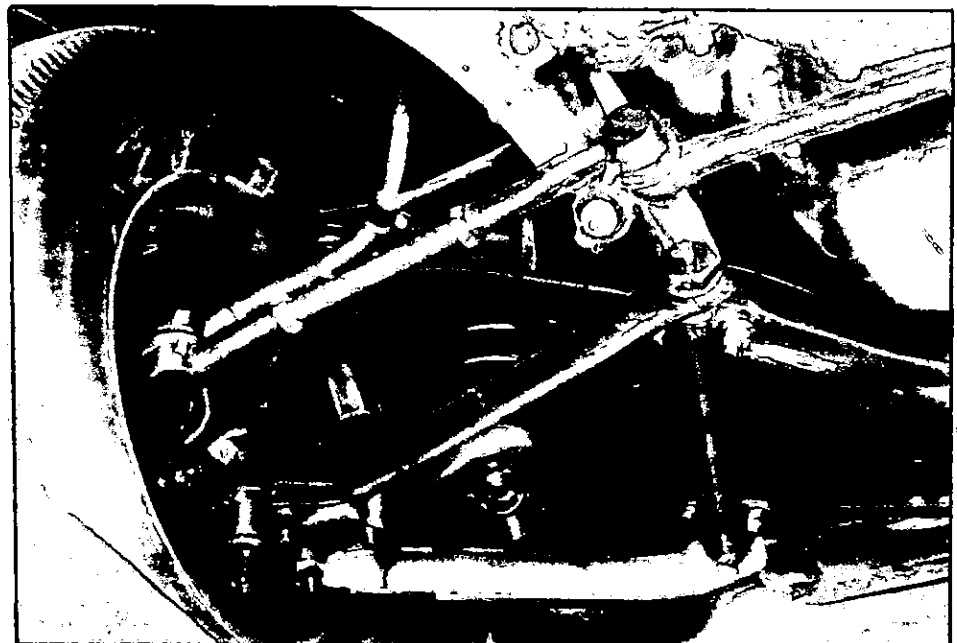
Between the upper and lower links is the coil spring, held under compression of it which is secured by nuts of the lower and upper ball joints.

Through the center of coil spring the telescopic type shock absorber which is connected to the top spring seat and lower link with nuts of the lower and upper.



*Fig. 3*

*FRONT SUSPENSION*



*Fig. 4*

The rubber bearing bushes or screw bushes may in time deteriorate and need renewing.

Excessive side ways movement in either of these bearings would denote softening of the rubber bushes or screw bushes.

The screwed bushes or the ball joints may develop excess free play due to wear of either of these parts. This assembly can best be checked when the suspension has been dismantled.

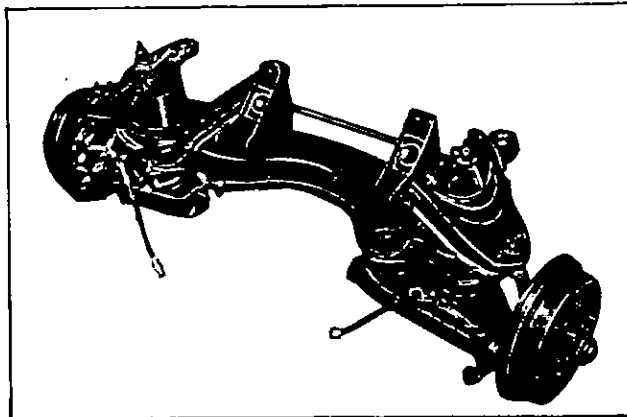
## Disassembling Order of Front Suspension

- 1) Remove shock absorber.
- 2) Compress the coil spring by tool.
- 3) Disconnect lower ball joint and rebound bumper from lower link.
- 4) Release the coil spring by loosening the nut of tool.
- 5) When the coil spring is fully extended, take out it.
- 6) Disconnect upper link spindle from suspension member (if need to inspect for).

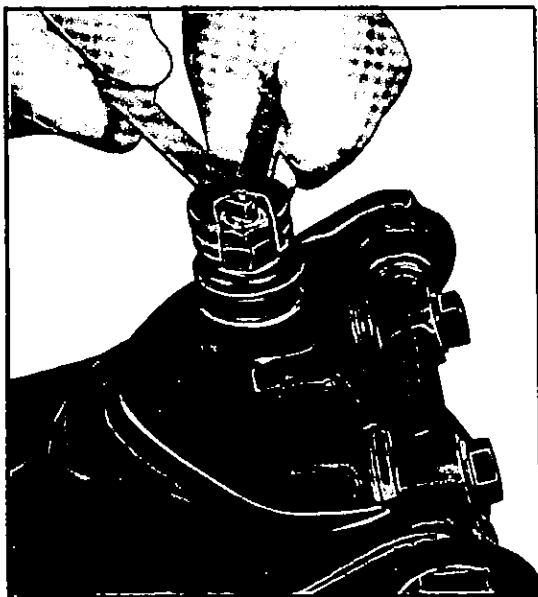
### Removing the Coil Spring

### METHOD (A)

- (1) Unscrew nut of the shock absorber at the top and take out it from down side after unscrew lower flange of it from lower link. Fit the service tool and screw up the spring compressor nut. In the absence of the service tool a suitable tool will be required to release the compression from the coil spring. Compressing the coil spring, unscrew the 3 nuts of lower ball joint which located under the edge of lower link. Remove these nuts and release the compression from the coil spring by loosening of nut tool. When the coil spring is fully extended, take out it.



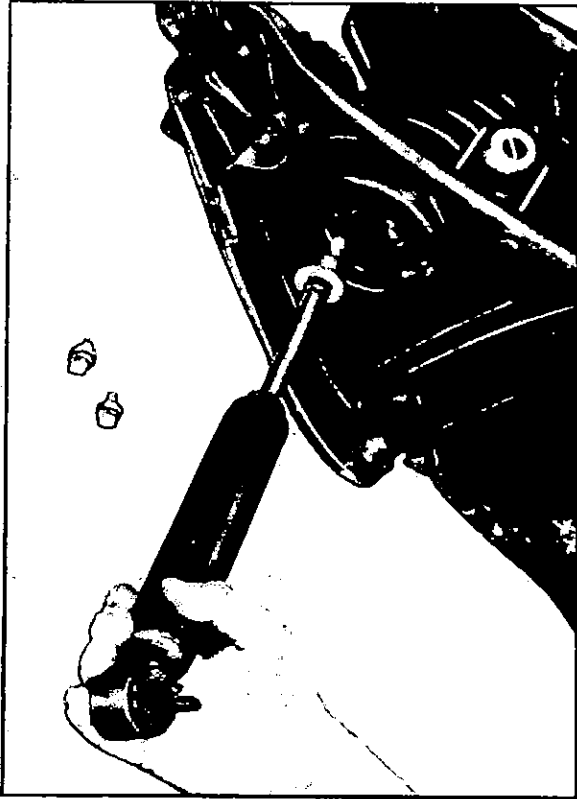
*Fig. 5  
Front Suspension  
Assembly*



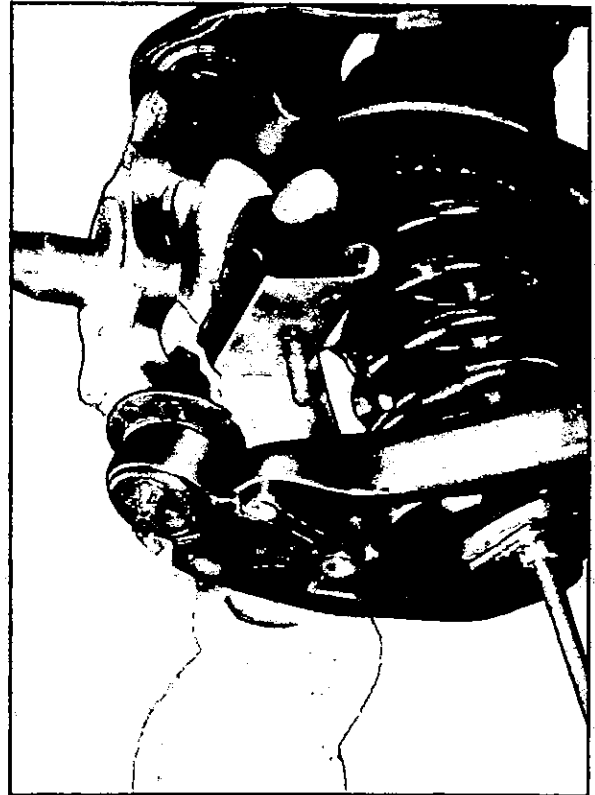
*Fig. 6 Detachment of Shock  
Absorber from Suspension*



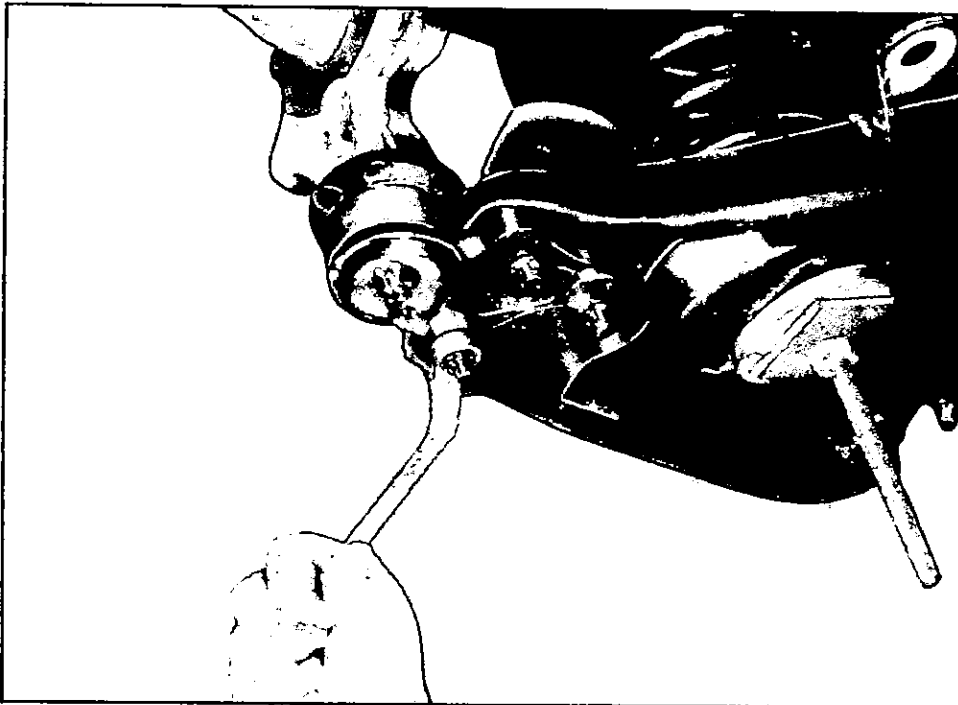
*Fig. 7 Detachment of Shock Absorber  
from Suspension*



*Fig. 8 Remove Shock Absorber*



*Fig. 9 Detachment of Rebound Bumper*



Assembling-  
Tightening torque  
4.0-4.5 kgm

*Fig. 10 Releasing the Nuts of Lower Ball Joints*

## METHOD (B)

Unscrew the four bolts of lower spindle which is secured to the suspension member. Remove these bolts and release the compression from the coil spring. When the lower link with spindle can be driven out.

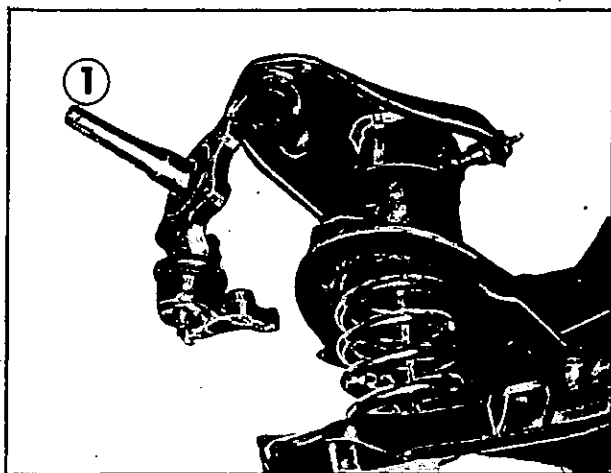


Fig. 11

## Refitting the Coil Spring

Use the coil compressor or jack against the lower link. Screw up the screw bolts of the lower link spindle to the front suspension member and then secure the bolts of the lower spindle. Release the compression by loosening the compressor nut or the jack screw down.

Set up the shock absorber by the double nut of upper side and the bolts of lower side.

## METHOD (C)

### Replacing Order of Upper Link

- 1) Prepare to remove front wheel.
- 2) Jack up and support front suspension lower link.
- 3) Remove wheel.
- 4) Disconnect upper ball joint and rebound bumper from upper link.
- 5) Detach upper link and spindle from suspension member.
- 6) Disassemble upper link spindle from upper link by unscrewing link bushings.
- 7) Reassemble upper link spindle and bushings to upper link of replacing reinforced part carefully following undermentioned instruction.
- 8) Reassemble whole parts back again to complete unit.
- 9) Check and adjust front wheel alignment.

### Instruction

- 1) Don't hold spindle tight against link when screwing-in bushings (Because the pitch of threads of spindle, inner and outer screw of bushing and link sleeve are all same).

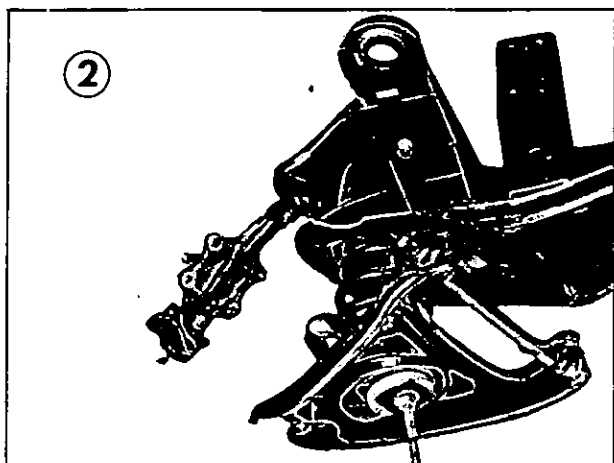


Fig. 12

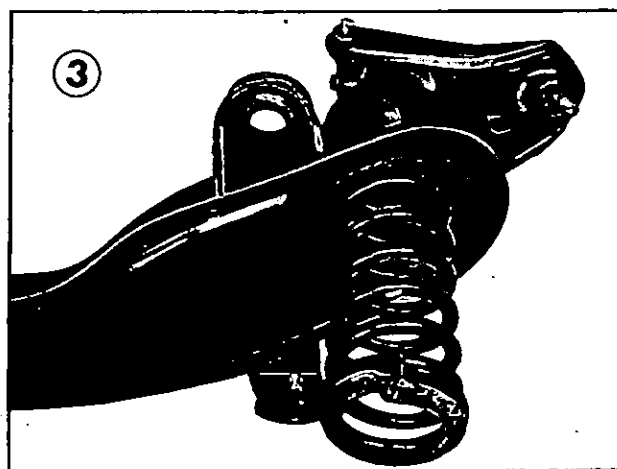


Fig. 13

# DATSUN

- 2) Apply sufficiently grease on to the inner screw of bushing and spindle.
- 3) Pay careful attention not to damage the thread when screwing-in the bushing. Tighten-up bushing against link sleeve by the torque of 19 ~ 20 kg-m (137 ~ 145 ft-lbs).
- 4) Friction resistance torque between spindle and bushing should be within 0.5 kg-m (3.6 ft-lbs) when assembled.
- 5) Adjust the relative position of spindle and link as shown in the figure by turning the spindle so as to the link and the spindle to have dimension of it.
- 6) Align the direction of grease nipples as shown in the figure.
- 7) Lubricate bushings with grease completely until the grease will come out from dust seal.

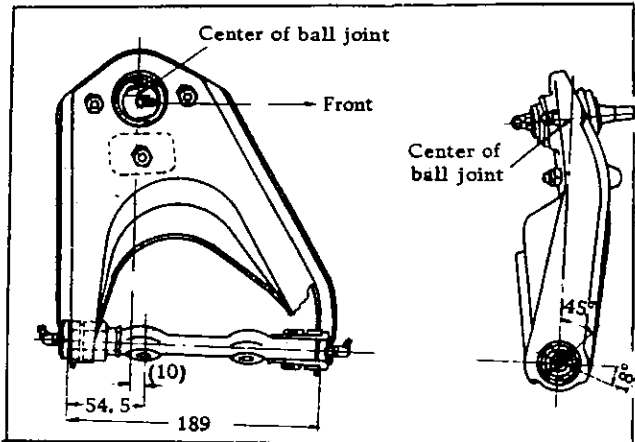


Fig. 14 Assembling of Upper Link

### Tightening Torque

Nuts fixing upper ball joint and rebound bumper to the upper link—2.4 ~ 2.6 kgm (17.4 ~ 18.8 lb/ft.).

Bolt fixing upper link spindle 4.7 ~ 5.0 kgm (34 ~ 36.2 lb/ft.).

Nut fixing lower link spindle 4.0 ~ 4.5 kgm (29 ~ 32.5 lb/ft.).

Prior to install the screw bush, sufficient grease shall be applied in the inside of the bush and screw threads of the spindle.

Pay carefull attention not to damage the threads when screwing in the bushing. Tighten up bushing against link sleeve by the torque of 24 ~ 25 kgm.

Assemble the upper and lower link to the knuckle spindle.

Tightening torque for ball joint nut.

Upper 6 ~ 7 kgm

Lower 9.5 ~ 12.5 kgm

Connect with upper link to the suspension member by tightening torque 4.7 ~ 5.0 kg-m.

Do not forget to insert the adjusting shims of chamber.

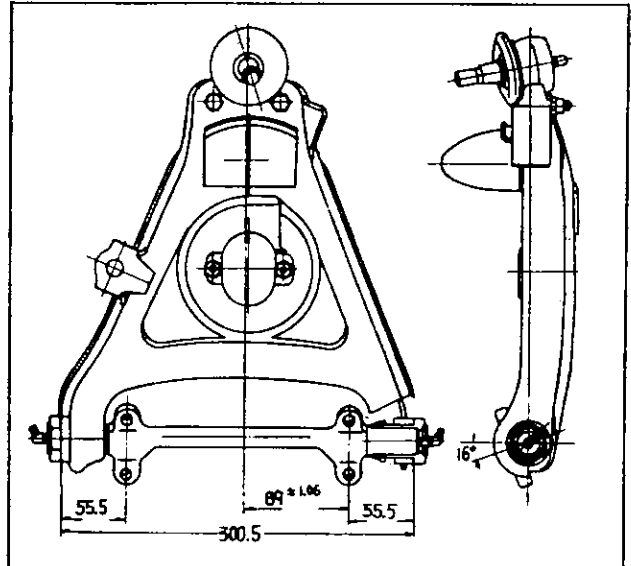


Fig. 15 Assembling of Lower Link

### Front Wheel Alignment

- Toe-in ..... 3 mm (1/8 in.)
- Caster ..... 1° 30'
- Camber ..... 1° 30'
- King-pin inclination angle ..... 6° 30'

Adjust camber with adjusting shim at upper bush spindle fixing portion.

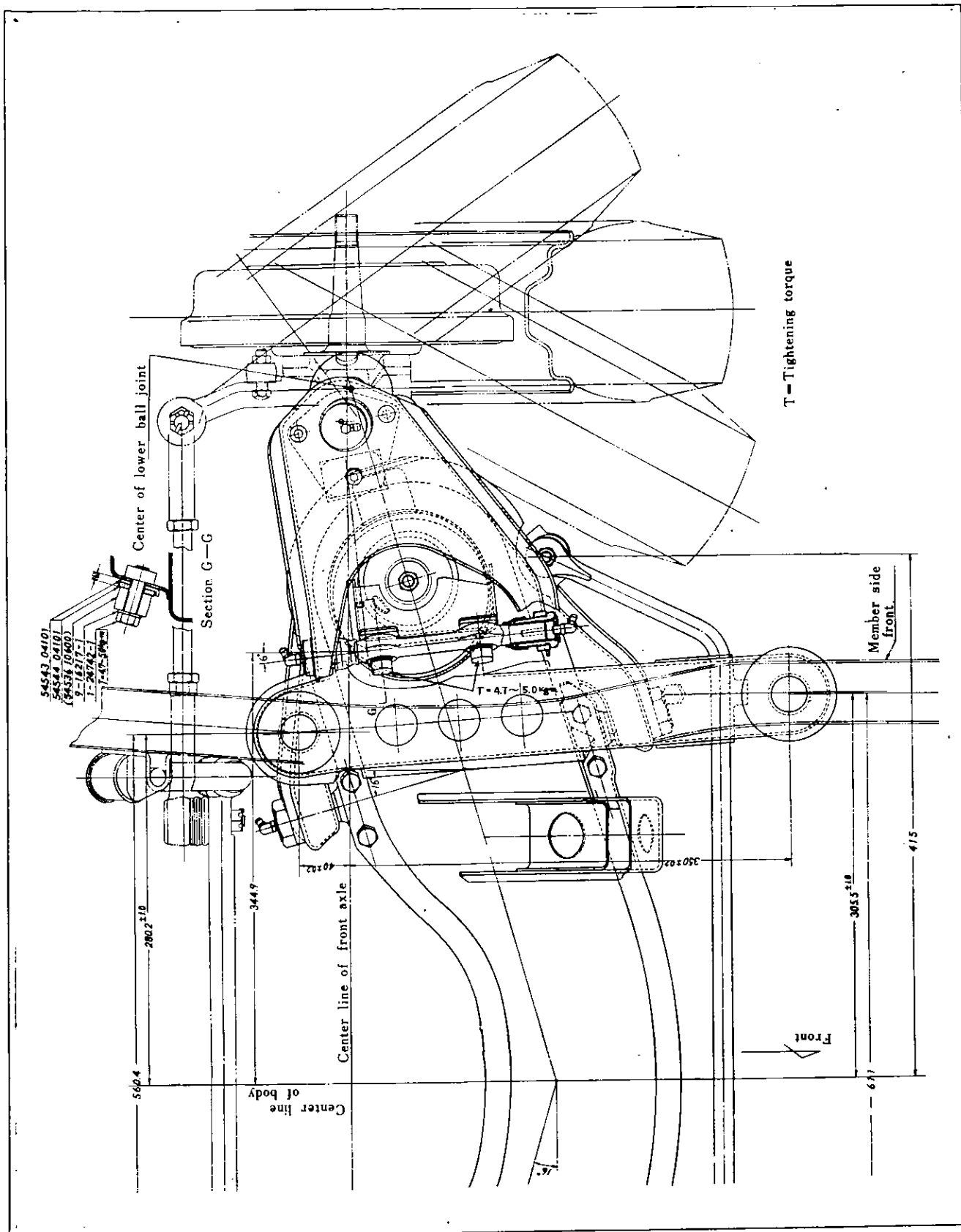
Adjust caster with the same shim or by turning upper link spindle only 1/2 one turn.

	Turning of upper spindle**	
Caster Only	-360° (One turn)	-0° 32'
	-180° (Half turn)	-0° 18'
	+180°	-0° 13'
	+360°	+0° 27'

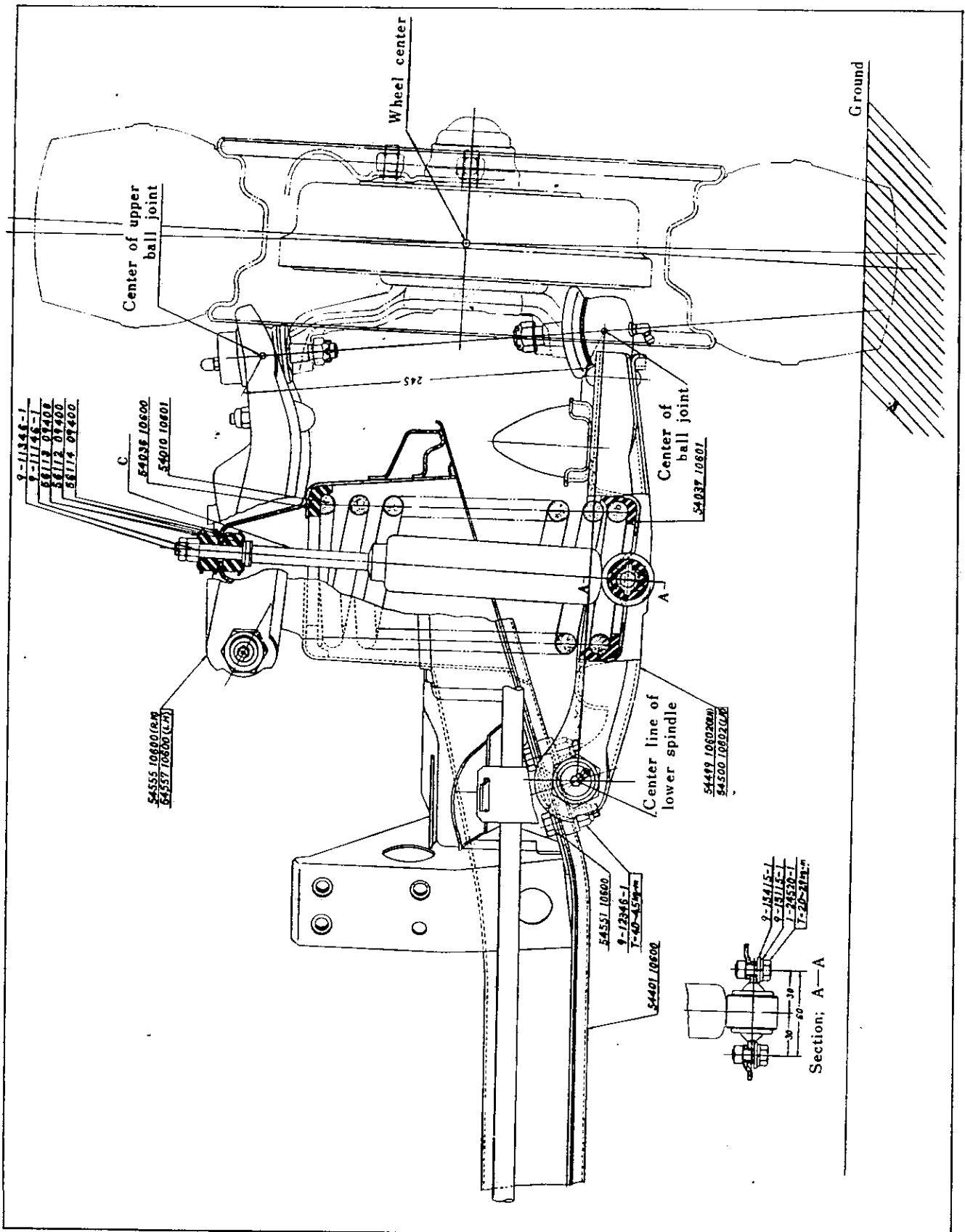
\*\* + ; Clockwise (See from back side)

- ; Counterclockwise (See from back side)





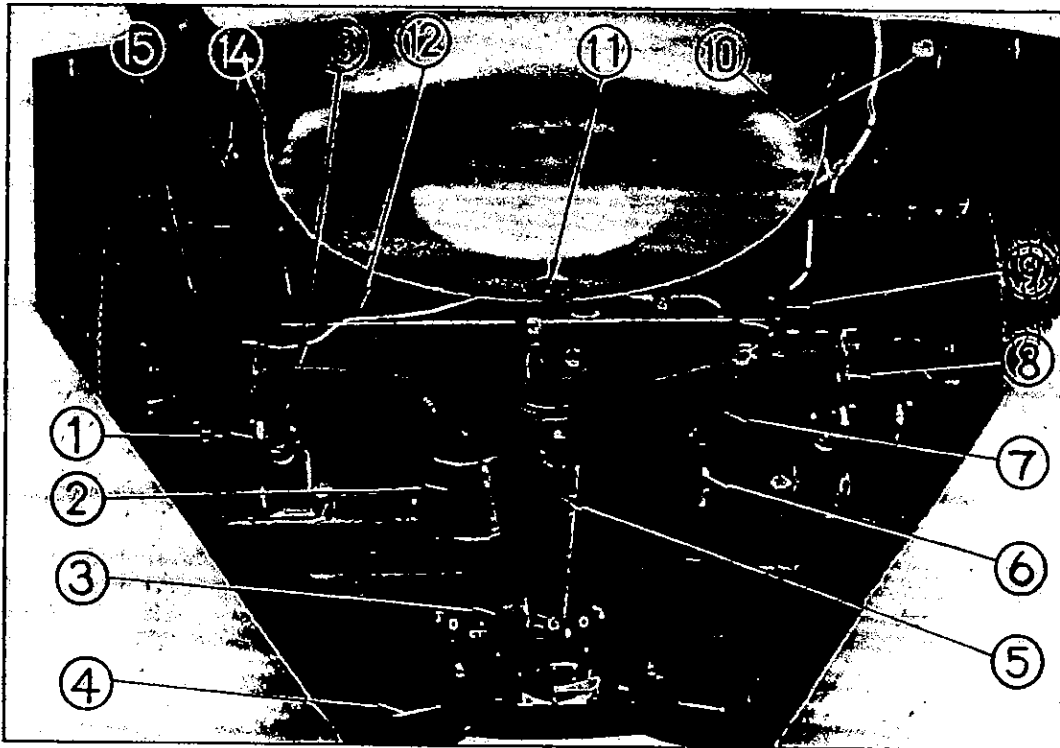
Front Suspension (A)



Front Suspension (B)



## REAR AXLE



1 Rear spring seat	6 Hand brake swing arm	11 Rear trunk drain hole
2 Muffler	7 Hand brake cable	12 Rear shock absorber
3 Pre-muffler	8 Rear spring U bolt	13 Rear axle case
4 Side rod	9 Hand brake balance lever	14 Exhaust rear tube
5 Propeller shaft	10 Rear spring shackle pin	15 Rear spring

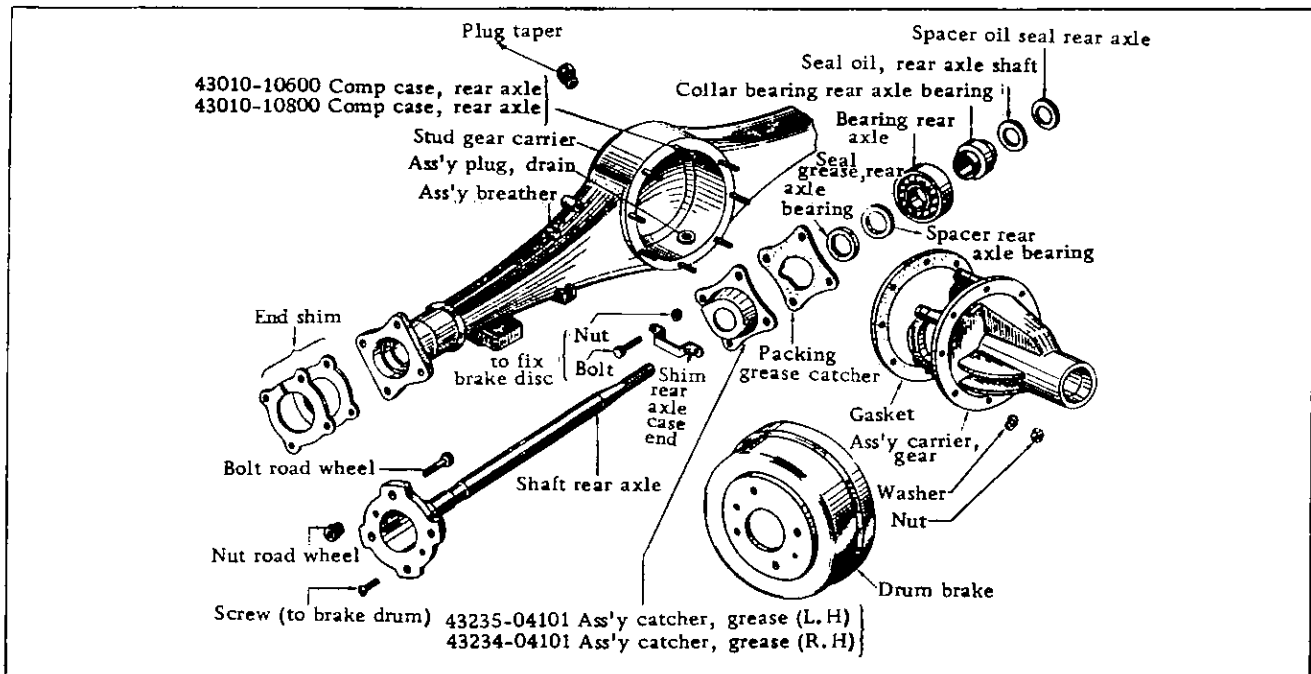


Fig. 1 Rear Axle Case & Shaft

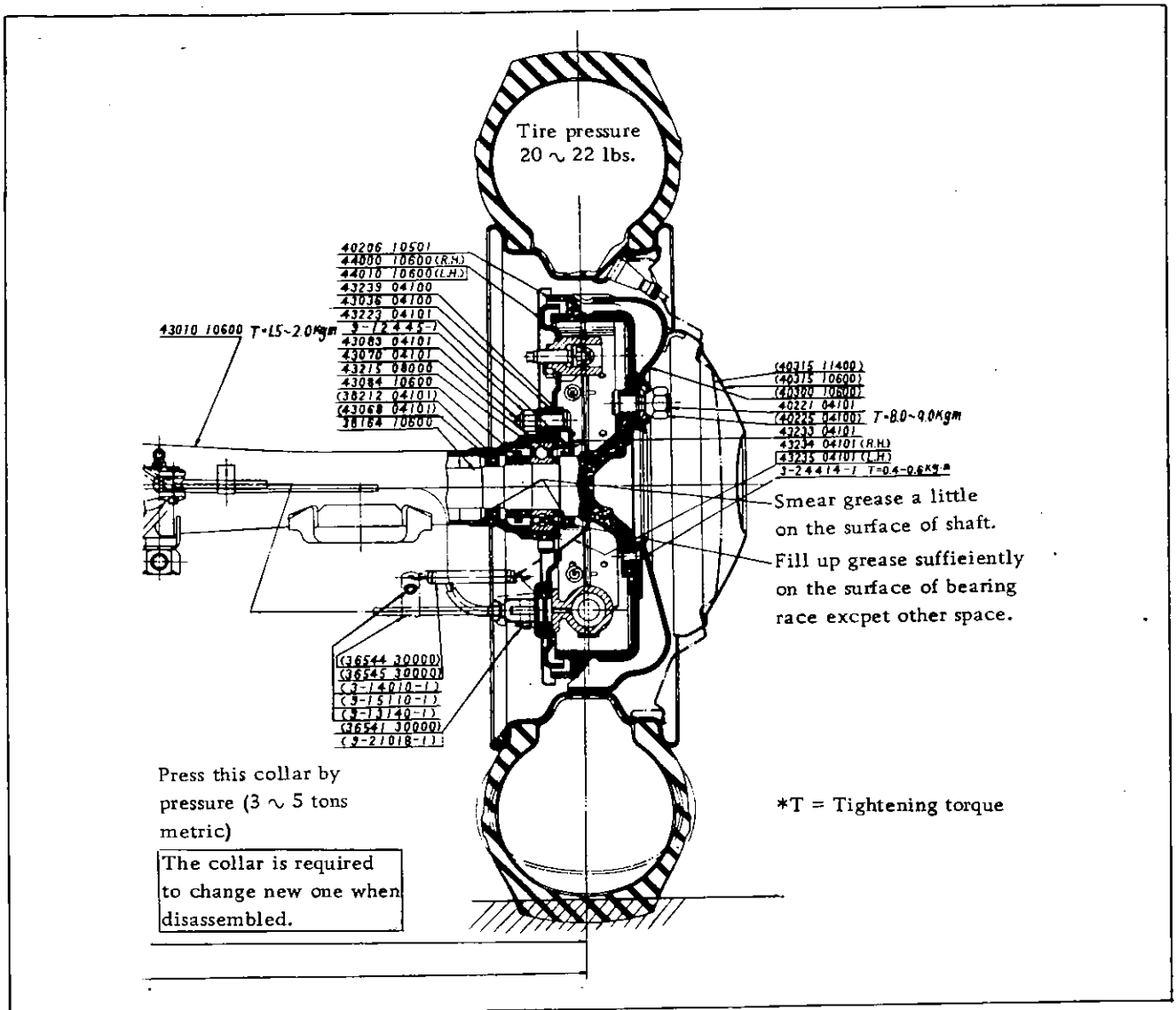


Fig. 2 Component of Rear Axle

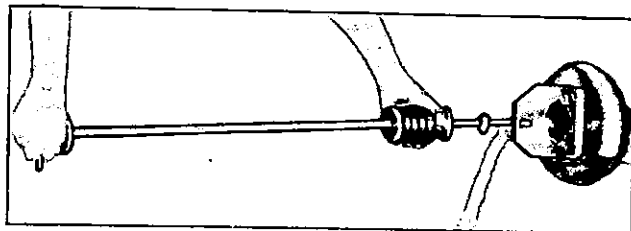
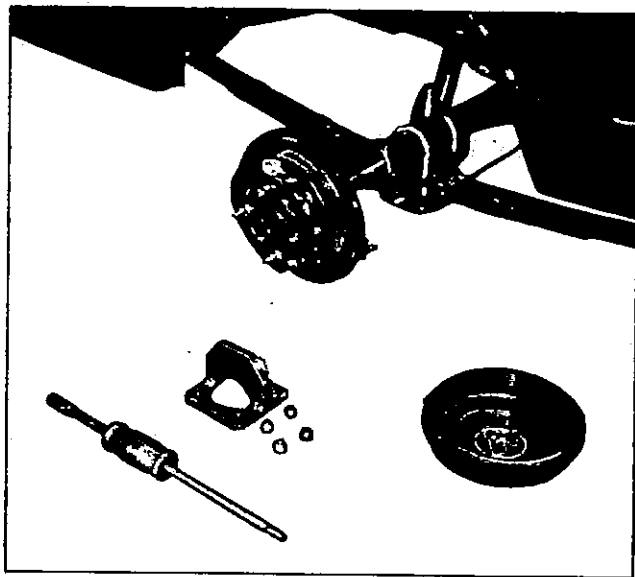
### Axle Shaft Removal

Choke all the wheels not being operated upon, jack up the car.

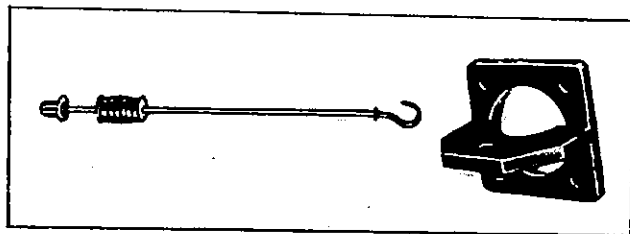
Lower the axle on to the blocks and remove the wheel using a screw driver unscrew the drum locating screws, release the hand brake and tap the drum off with the mallet. If the brake linings should hold the drum when the hand

brake is release, slack off the brake shoe adjuster a few notches.

Take off the fix bolts of the brake disc and remove the axle shaft as shown Fig. Tap with swing hammer holding the wheel studs bolt with the rear axle shaft stand draw out the shaft and disc assembly by gripping it outside of the disc.



*Fig. 3 Remove of Axle Shaft and Disc Assembly*



*Fig. 4*

DT-4679  
Special Stand

DT-4678  
Swing Hammer

### Order of Rear Axle Shaft & Brake Disc Assembly

The rear axle bearing with the brake disc assembly is replaceable in one operation by pressing into place. When fitting the axle shaft it should be compressed into the shoulder of the case end after inserting the end shim between its flange and hub. (Part No. 43036-04100).

The following points must be taken into consideration.

1. Nominated Hypoid gear oil No. MP90 must be used. (In warmer district than 32° C use MP# 140)
2. It is prohibited to use any other kinds of gear oil or any oil of different viscosity. The same brand must always be selected.

The standard capacity of oil is about oil 0.93ℓ. The method of feeding oil should be done by taking off the feeler plug at the rear cover of the housing and fill in full up to the feeding hole.

### Dismounting & Disassembling of Differential Gear Carrier

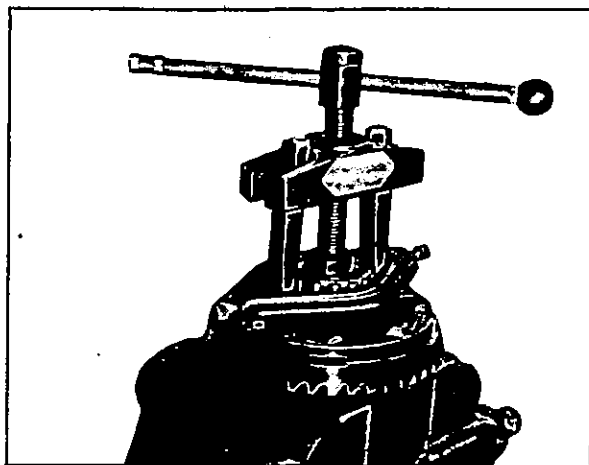
- 1) Take off and drain out the gear oil.
- 2) At the time of dismounting the gear carrier, pull out the both left and right axle shaft with the disc of the brake assembly.
- 3) Take off the joint flange from the side of propeller shaft.
- 4) Pull off the nuts of the housing and dismount forward the carrier ass'y.
- 5) Take off the side bearing cap of carrier and pry with a lever the differential gear case and the bearing.
- 6) Dismount the differential side bearing. As illustrated in Fig. 5 with the aid of side bearing puller, pull out the bearing. The puller should be handled with care in catching the hedge of bearing inner lace which is hard to hook. Both the left and right bearing should be arranged separately.
- 7) Dismount the differential drive gear. (Ring gear) by loosening the 8 fixing

### Disassembly and Assembly of Axle Shaft

When replacing the differential axle shaft do not forget the adjusting washer between the top of the axle flange and the brake disc assembly so as to keep the end play of the axle shafts.

screws on the differential gear case, and spreading out the lock washer.

Loosen them in a diagonal line considering to keep from the gear bending.



*Fig. 5 Using of Side Bearing Puller (DT-4686)*

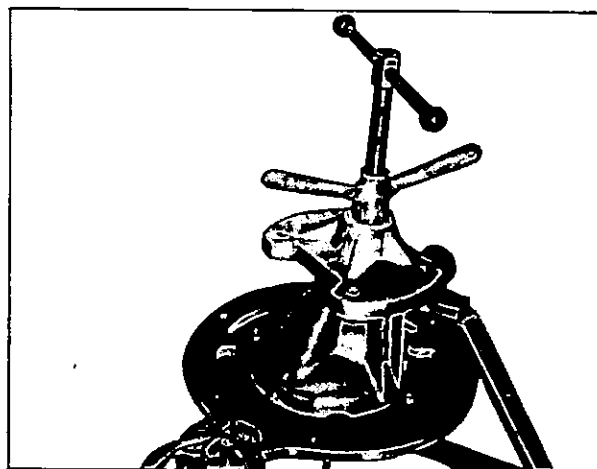
- 8) Take out the differential pinion as well as the side gear. The pinion mate shaft should first be pulled out by striking out the pinion mate shaft locking pin which is fixed on the differential case from left side (from the side of ring gear fixed) to the right before pulling out the pinion, side gear and the thrust washer. The gear as well as the thrust washer should be arranged separately as left and right, front and rear.
- 9) After taking out the nut of the carrier, pull out the companion flange. The drive pinion flange wrench should be employed, setting its four points in the holes of flange to keep it from moving, take off the nuts with the box wrench.
- 10) Take out the drive pinion of gear carrier by striking out lightly to the backwards the front end (at the side of companion flange) of drive pinion with the drift of soft metal. Thus, the pinion would be taken out together with the inner lace of rear bearing and roller, distance piece, and the adjusting shim and the oil seal, outer lace and pinion of front and rear bearing as well as the pinion adjusting shim left in the carrier.
- 11) Pull out the rear bearing inner race of the drive pinion.

11) As illustrated in Fig. No. 6 the drive pinion rear bearing inner race replace and the adapter should be employed in this case. The adapter in the round form is for fixing and the other for taking off. It is easy to handle with the vice fixing one end of replacer.

12) Taking out the rear bearing outer race of gear carrier.

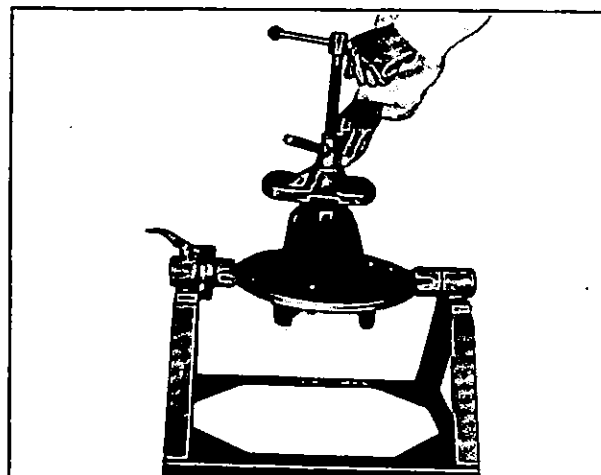
The drive pinion bearing outer race replacer as illustrated in Fig. 6 should be employed in this case. In other upon the stud so as to make the screw at the center of carrier, and set the adapter at the lower frim of the race.

Supporting the tommy bar (1) and screw up till the corn (7) closely touches the adapter, then screw the wing nut to take out the rear outer race.



Tool No. DT4782, DT4631 & DT4689

*Fig. 6 Pull out the Bearing Race*



13) To pull out the front bearing outer race from the gear carrier, set the tool body (3) as illustrated in Fig. 7 pull it out with adapter (B) in the way of rear race.

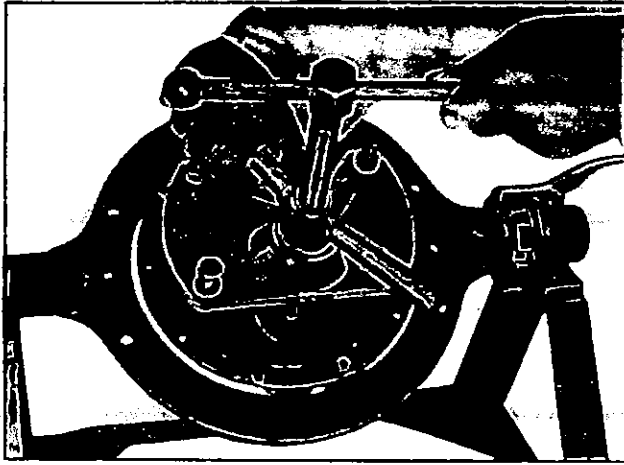


Fig. 7 Drive Pinion Front and Rear Bearing Outer Race Replacer

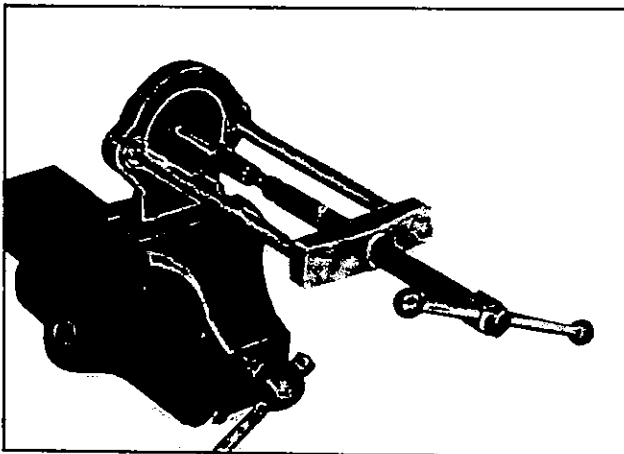


Fig. 8 Inner Race Replacer

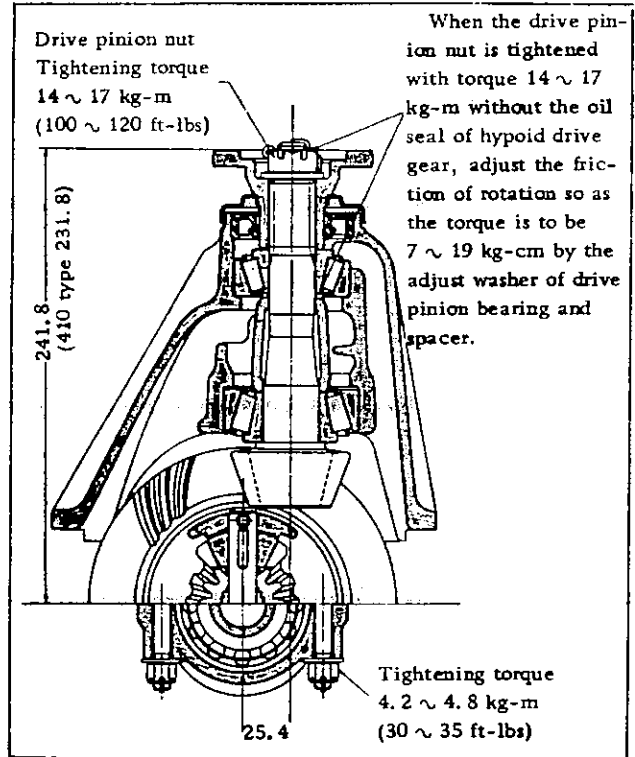


Fig. 9 Section of Differential Case

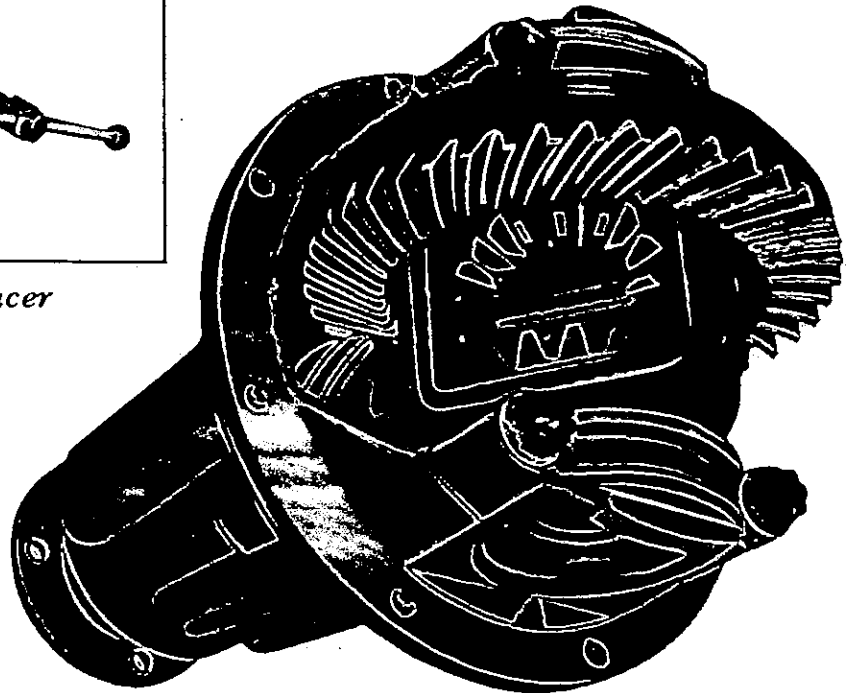


Fig. 10



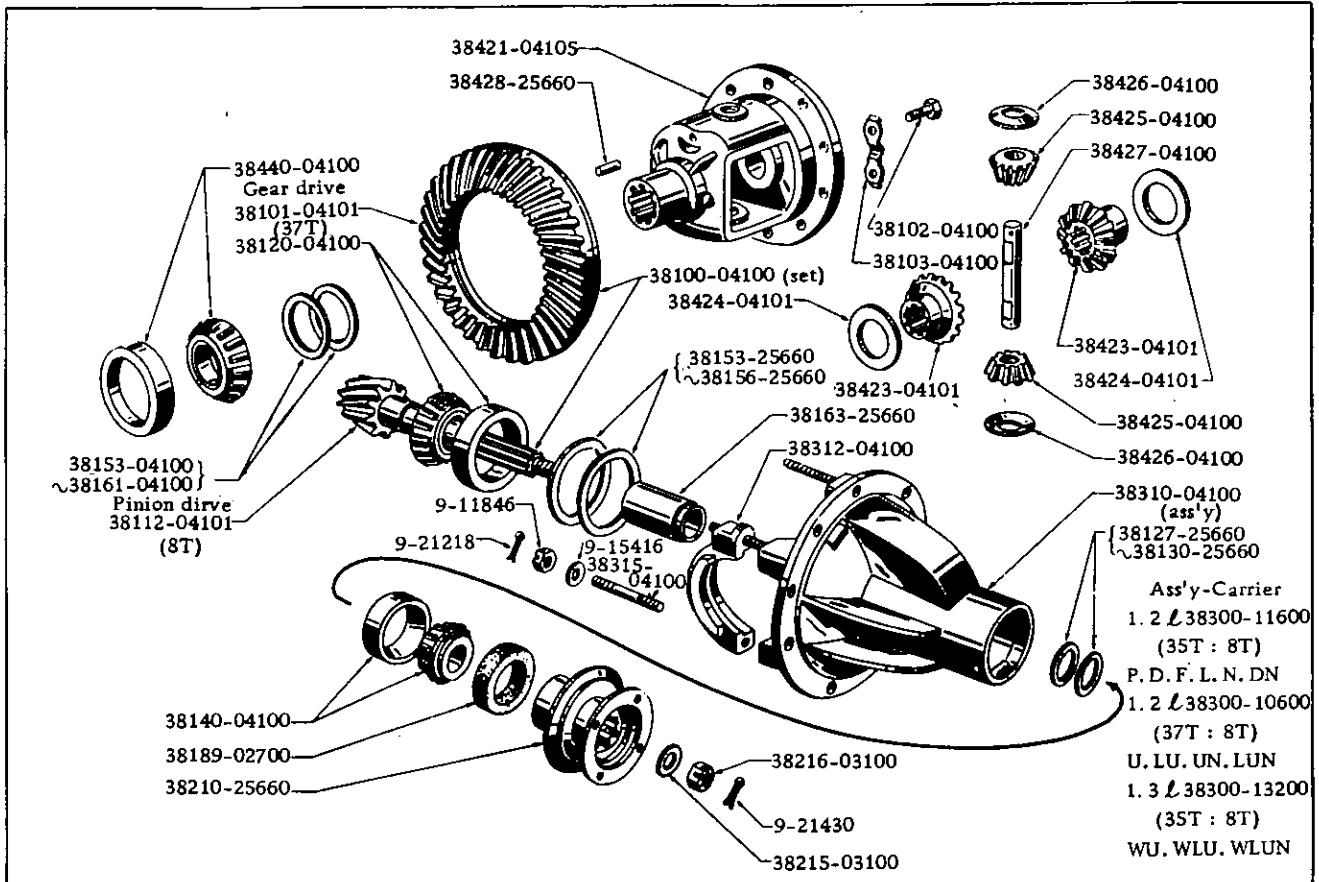


Fig. 11 Rear Axle

### INSPECTION & REPAIRING OF DISASSEMBLED PARTS

Every parts after they are disassembled should be cleaned and cleaned by the compressed air before making an inspection and adjustment.

- 1) Each bearing should be inspected in every unit of ass'y regard with the defect and defacement before deciding to re-use them.
- 2) The axle should be inspected in respect of the crack and the defacement of spline measuring the shake with the gauge by houlding the both end. The difference over 0.4 mm should be adjusted with 0.8 m/m or replaced.  
The clearance between the end of rear axle case and brake disc should be adjusted with the adjusting end shim. (Part No. 43036-04100)
- 3) Every gear should be inspected as to the

locking condition defacement or any defects on the surface to see if they can be re-used. In case of insufficient standard back lash, deformation or damage found, replacement is necessary.

Specially the drive pinion and drive gear should be replaced in a set whenever the locking condition gets worse and the defacement is already in progress, because it would cause the noise in later operation and be difficult to adjust even with proper adjustment is made.

The perfect driving condition at the surface of drive pinion gear should be about from 2/3 to 3/4 mm in unloaded driving while the gear surface should start to touch from tip to full surface in an ordinary loaded driving.

The inspection of this condition can be made as it is.

If it is hard to inspect them as it is, do otherwise by cleaning the both surface with the rags before disassembling and paint thinly and evenly with the mixed with thin oil on the gear surface (drive side) then turn the pinion with hand to print the track of it on the gear. Which shows the situations of considerably worn out gear.

In case of unloaded test, it is perfect that the gears contact for about three quarter at the center of  $1/4$  of whole gear length from tooth (interior tip end of the gear) on the pitch line.

- 4) Lock the side gear with pinion together with respective thrust in the gear case. In case of the back lash over 0.2 mm and the clearance between the side gear and thrust washer exceeds 0.5 mm replace the thrust washer.

The else worn out parts should also be replaced.

The contact when ring gear is too close to pinion center in case of back lash should be adjusted closely or it gives much noise.

- 5) Put the drive gear (ring gear) on the buoy block as it is fixed in the differential gear case, and measure with the dial indicator. Revolve the drive gear to turn around the differential gear case as the bearing do not move on the buoy block. Measure the shake at the rear side of gear by the scale and the shake should be within 0.5 mm. In mounting the gear, clean well the fitting face and rear face (measured face) of it and fix correctly, then there should not be any shaking.

## ASSEMBLING ADJUSTMENT

### Assembling Differential Gear

- 1) Assemble the pinion and side gear in the differential case.

Every parts should be cleaned and oiled with new gear oil, then the pinion mate side gear and the thrust washer should be assembled by the mentioned inspection and selection before pushing in the pinion mate to shaft. Inspection should be made again in the clearance of between the washer or the back lash. Adjustment must be made in case any abnormal, is found,

Strike in the pinion shaft locking pin from the right side of the case (opposite side of drive gear) and must be fixed by setting well the striking hole of it after putting it to the required piston so as the pin should not loosen.

- 2) Fix the drive gear (Ring gear) with the differential case.

The drive gear as well as the drive pinion should be well inspected to they must be replaced as a set whenever the replacement is required.

Otherwise, they would not properly lock after assembling is completed.

In mounting in the case, the fitting surface must specially be cleaned and fixed with 8 set screws as well as lock washer bend the washer with sureness after the drive gear shake is adjusted. In tightening up the screw, it should be set and supported by vice or any other setting tools so as not to damage it and screw up in a diagonal line with a wrench which fit correctly with the head of the screws. The standard screwing torque for this is 25 ft/lbs. to 30 ft/lbs. Screw in for sure, striking lightly the head of screw by one quarter pound hammer.

- 3) Mount the side bearing in the differential case.

Press in the both side of the bearing by the drift.

It is important in this case to assemble by putting the side bearing adjusting shim to give the bearing a proper preload in fixing with the carrier.

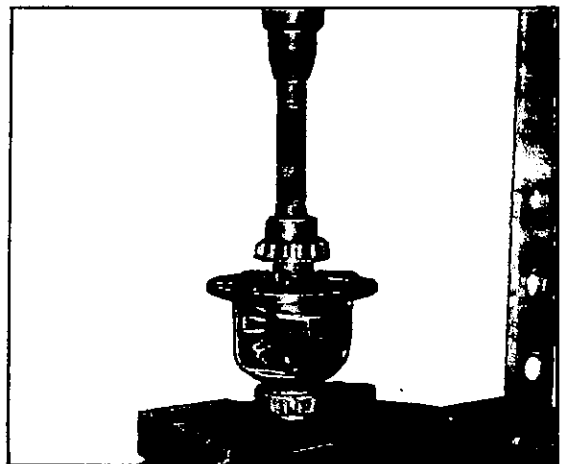


Fig. 12

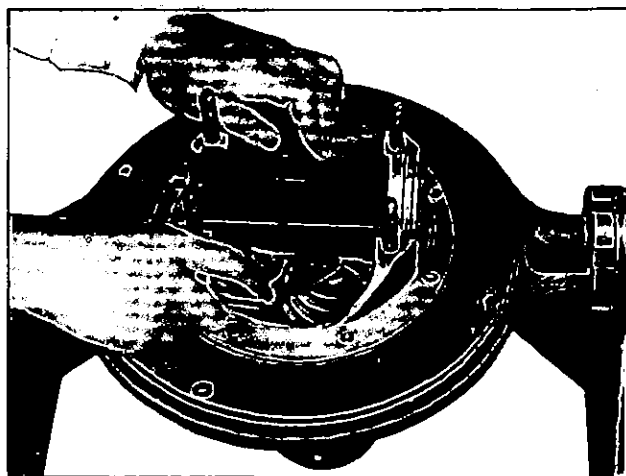
**ASSEMBLING & ADJUSTMENT BY  
GEAR CARRIER ASS'Y**

It is to decide the assembling & adjustment of gear which is very important in an rear axle ass'y and should be carried in accordance with the exact sample shown by the manufacturer.

The construction and mechanism must well be comprehended referring to Fig. 19 & 21 and the adjustment & repairing exactly according to the condition of practical use based on the adjustment by exact calculation.

**(A) The Preparation for Mounting the Drive Pinion in the Gear Carrier**

- (1) If the drive gear, drive pinion, and bearing are to be reused as they are as a result of disassembling and inspection, they should be assembled in the same order of disassembling at the previous condition of adjusting shim. In case any item should be replaced or required to be reused even if any item is worn out, prepare the various shim as mentioned later because the position of drive pinion to be fixed with carrier must be adjusted by the adjusting shim between the carrier and pinion rear bearing outer race.
- (2) There are few numbers with 0 & + or - besides set number marked by an electric pen on the tip head surface of drive pinion.



*Fig. 13 Adjustment of Pinion Height*

They show the manufacturing error in a figure at the unit of 0.001 in. (0.025 mm) to decide the thickness of adjusting shim for adjustment of standard position. (The standard pinion height is 51.0 mm from axle center as shown in Fig. 13 & 17.) If the figure is difficult to discriminate due to the corrosion, scrape off the oxidized substance on the surface by a somewhat narrow grind stone with care not to scrape off even the mark. Adjust to the direction of the arrow in accordance with the Pinion mark.

- (3) The thickness of drive pinion adjusting shim are arranged as following.

The use of the adjusting shim will be explained in the following paragraph of adjustment. Supposing the drive gear and the drive pinion were replaced as a new set and the height of drive pinion previously used was right, prepare the shim of thickness which equals to the difference of figures on the new and this pinion. Deduct the previously used shim in case it is plus, increase in case of minus and have the general idea of required thickness of the shim for assembling to prepare.

	Part No.	Thickness	Standard Leaf No.
Drive pinion adjusting shim	38153 25660	0.75 mm (0.030 in.)	1-0 1-0
"	38154 25660	0.25 mm (0.010 in.)	2
"	38155 25660	0.125 mm (0.005 in.)	2-1
"	38156 25660	0.075 mm (0.003 in.)	2-1

It is convenient to inspect the condition before disassembling in a way as mentioned later in the measurement of pinion height. Besides the condition of defacement on the carrier, the pinion bearing must be taken into consideration though it will be explained in detail later.

(B) Fixing and Adjustment of Drive Pinion

- (1) Drive pinion rear bearing outer race should be mounted in the carrier in this case, after inserting the properly selected adjusting shim as previously mentioned between the carrier and bearing race, mount the outer race by the special tool of drive pinion front, rear bearing outer race replacer.

For adjustment of previously mentioned pinion height, the shim at the rear side of this outer race is increased or decreased, and the race also must be taken off in each time for this adjustment, therefore the tools must be handled properly to avoid such a situation as to make the bearing hole of carrier in on oval.

Referring to Fig. 8 for handling method of tool, set the adaptor ring on the corn to guide the body of tool at the small hole of carrier put the rear outer race on the corn as the bearing surfaces inside at the tip end of screw and put the split adaptor inside race. At the same time, supporting it by the bar, twist up the corn till the adaptor and race come to the setted position then screw up the wing so as the race be housed properly at the setted position.

- (2) Mount the front bearing outer race in the carrier.

For mounting the front outer race, take off at first the adapter from the front end of the carrier and fix the tool at the side of stud in opposite side, tighten the screw as to be the center of carrier as shown Fig. 14 then mount it by using adaptor as in a way of mounting the rear outer race.

- (3) Mount the rear bearing inner race and roller to the drive pinion. By using the round adapter attached to the drive pinion rear bearing inner race replacer which was employed at disassembling, press in the drive pinion.

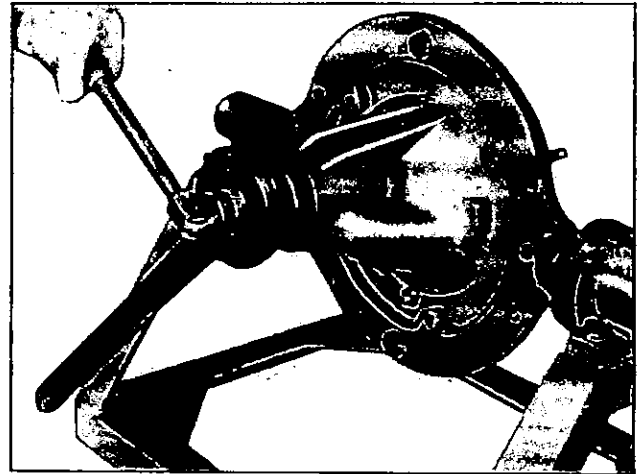


Fig. 14

This might as well be done in pressing in by the use of a certain drift.

- (4) Mount the drive pinion in the carrier and adjust by measuring the position. The pinion height must be adjusted as mentioned in the previous paragraph by mounting temporarily the pinion in the carrier and the bearing be given a regular preload. On the other hand, the bearing of drive pinion should be newly oiled after the pinion is inserted from the inside of the carrier, the inserted end of pinion should be locked with front bearing corn and tightened up by the pinion nut fixing with the companion flange till the regular revolving torque is required. As this is not yet at the final assembling, the bearing spacer (distance piece), bearing adjusting shim and oil seal are not mounted.

At the time of inserting the front bearing, as pushing in the inner race by pulling out the drive pinion from the rear side of the carrier.

Put the rear side of the carrier downward and set the tool under it, then supporting the end surface of drive pinion, press in the bearing by using the drift. The operation would be easier by using the drive pinion front bearing inner race inserter as shown in.

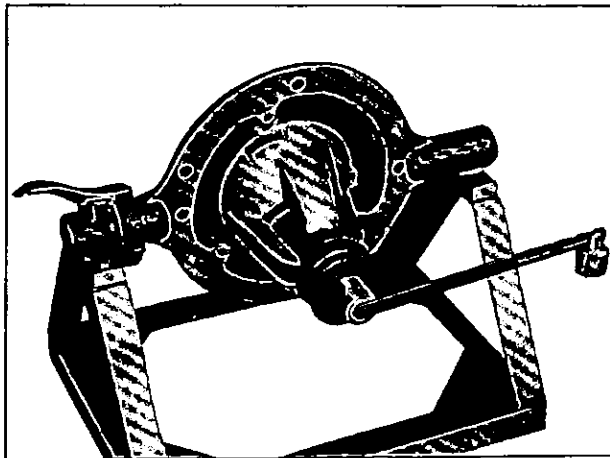
Tighten up the pinion nut by turning it

slowly with hands with the use of preload gauge as Fig. 15 to the degree that support the bearing preload at 7-10 kg-cm.

When the drive pinion is mounted in the previously mentioned condition it is necessary to measure the height of rear surface of the pinion whether in is higher or lower than the standard. Make use of the special drive pinion arrangement gauge.

The standard height of the pinion is 51.0 mm from the bottom of the side bearing fixed with the carrier.

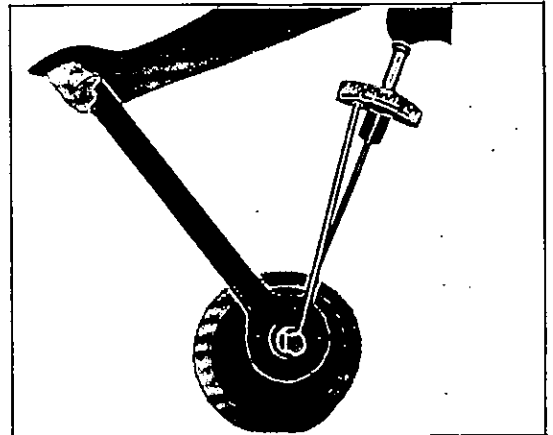
The fixing position can be measured by setting an arc of circle on both sides of arrangement gauge at the position of side bearing and insert the thickness gauge in the clearance between the tip of gauge bar and the pinion such as to push in by scraping of the carrier in diagonal, otherwise preload and the pinion height of the bearing would come out of order and tend to cause an unexpected trouble in future.



*Fig. 15*

- (5) The formal adjustment of the drive pinion, bearing and preload. After the fixing position of drive pinion is decided as mentioned in the previous paragraph, take off the pinion nut & companion flange to mount again the drive pinion bearing spacer (distance piece) and nut. Tighten up the nut as Fig. 16 by using the torque wrench at the regular torque of 100-120 ft/per lbs.

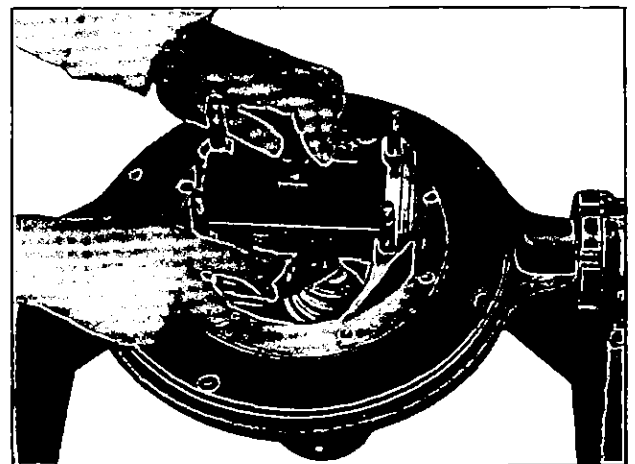
The preload supported the bearing in this case is different according to the condition of the bearing adjusting shim inserted.



*Fig. 16*

The more of the shim inserted, much the play of pinion to the direction of axle is increased.

The less of the shim inserted, the more the bearing tightened by the previously mentioned nuts and cause it to be burned if left and turned as it is. Therefore, for readjustment of the bearing preload in this case, it must be adjusted by increasing or decreasing the number of four kinds of adjusting shim as shown in the following list and measuring with the use of the drive pinion bearing preload gauge as Fig. 15 so as to make the



*Fig. 17*

revolving torque of pinion at 7-10 kg/cm if there should not be any error in the pinion with the head mark at 0 and the clearance should be sealed at 0.2 mm (0.008 in.) by the feeler gauge, thus pinion is regarded as at the correct position because the height of the gauge is made shorter for 0.2 mm than the standard size (51.0 mm).

Remarks: \_\_\_\_\_

When measuring the height of the pinion head, set the semi-circular side portions of the gauge on the side bearing seats; insert a feeler gauge into the clearance between the tip of the gauge center rod and the pinion head, and adjust the pinion. The gauge rod is made 0.2 mm (8/1000 in.) shorter than the standard measurement (51 mm).

Therefore, adjustment is made by selecting a feeler gauge in accordance with the plus or minus valve marked on the pinion head.

If it is necessary to adjust the pinion height, take off the drive pinion as well as pinion rear bearing outer race from the carrier to adjust by increasing or decreasing the number of the adjusting shim. In other words, read the mark on the head of the drive pinion, before adjusting by increasing or decreasing the number of drive pinion adjusting shim (110-50936) to insert the feeler gauge which is deducted for the number of mark from 0.008 in. in case of minus side added for the number of mark to 0.008 in. in case of plus.

For instance, the mark shows +2, adjust the position of drive pinion by deducting the number of shim so as to make the clearance at 0.008 in. + 0.002 in. = 0.001 in. It is necessary to give the bearing a right preload. At the time of pushing the outer race into the carrier, it must be done in a right way, otherwise.

Specially when the old bearing is to be used again in assembling, the adjustment should be made at the lower torque than standard in accordance with the conditions of

practical use so as not to give it an over preload.

- (6) When the former adjustment of preload of the bearing is completed as in the previous paragraph, inspect the pinion height again. Unless any thing wrong is found, loosen the pinion nut, take off the flange, insert the new oil seal in the rear of the carrier and formerly fix the flange, washer and pinion nut. The nut should be tightened up at the standard torque. In case the cotter pin hole fitted, the adjustment should be made not by tightening the nut, but by filling the washer.

## (C) Mounting the Differential Gear Assy in Carrier

- (1) Mount the complete unit of differential gear in the carrier and fix the bearing cap. There is an engraved mark on the side of cap which should be fitted with mark on the leg of bearing housing when mounting. It is important to note that the fixing part of the cap of each bearing housing is machinerly finished up.

The differential gear case is inserted by the bearing adjusting shim with the side bearing as explained in (3) of (A) and by housing in the bearing housing of carrier, the bearing must be given the regular preload. The screwing torque of the fixing nut of the side bearing cap is at 35-40 ft/lbs and should be equally locked with fixing cotter pin.

So far, only the differential unit is mounted and the drive gear is locked with the drive pinion, therefore, the following adjustment must be made to acquire the regular side bearing preload & the gear back lash.

- (2) Adjustment of side bearing preload & back lash.

To give the right preload on the side bearing of differential gear case and in pressing the bearing in the differential case adjust by inserting inside the bearing adjusting shim of

thickness calculated in accordance with the following method of computation.

There is a marked numeral of adjusting basis on the bearing housing of the gear carrier and differential case. The numeral is the manufacturing error in a unit of 1/1000 in. against each standard measurement of A.B.C.D. in Fig. 18.

To measure the width of the side bearing on left and right, use the standard guage (18.5 mm thickness) and dial gauge on a flat board. In this case, place the load on the bearing with the aid of weight block for about 2.5 kg to acquire the steady figures. Calculate the error on minus side against the each standard measurement of 18.5 mm on the unit basis of 1/1000 and assume each of them as E & F. Take the left side bearing, for example. When the measured width is 18.3 mm it is -0.2 mm (-0.008 in.) against the standard measurement and the E is, by excluding the minus sign, 0.008 in.

The thickness of the shim is acquired by applying the numerals to the following method of computation.

It may as well be assembled by using the shim of thickness which is in accordance with above method of computation. The left and right bearing must be well pressed in, otherwise the preload changes.

Measure the back lash of the drive pinion & ring gear as Fig. 20 by using the dial indicator to make sure that it is within 0.1 mm-0.2 mm

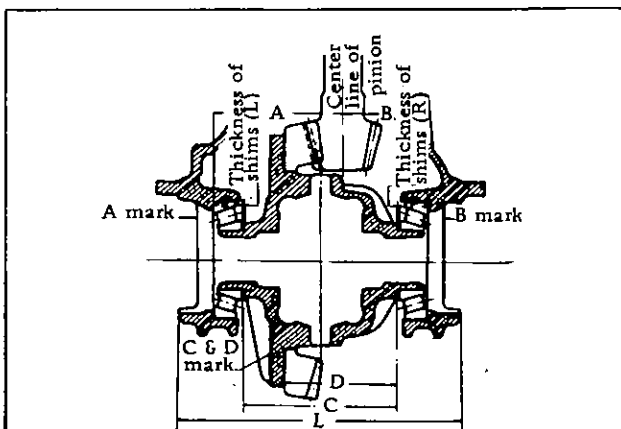


Fig. 18

(0.004"-0.008"). If it is much, move to left by taking off the right shim, for adjustment.

Thickness of Shim of Left Side (Ring gear side) Left Side $T_1 = A - C + D + E + 7$	Thickness of shim on Right Side (Pinion mate side) Right Side $T_2 = B - F + 6$
---	---

Example of calculation:

A = +1                      E = 8 (0.2 mm / 0.025 mm = 8)  
B = -2                      F = 10 (0.25 mm / 0.025 mm = 10)

(Left)  $T_1 = A - C + D + E + 7 = 0.025 \text{ mm} \times 20 = 0.5 \text{ mm}$   
(1 - (-1) + 3 + 8 + 7)

(Right)  $T_2 = B - D + F + 6 = 0.025 \text{ mm} \times 15 = 0.375 \text{ mm}$   
(2 - 3 + 10 + 6)

$T_1 = A + D - C + 0.07 + E$ = 0.001" + 0.002" - 0.002" + 0.007" + 0.008" = 0.016" (Thickness of left side shim)	$T_2 = B - D + 0.006" + F$ = 0.002" - 0.003" + 0.006" + 0.010" = 0.015" (Thickness of right side shim)
--	--

The numeral marked by the electric pen on the side of the drive gear shows that of the recommended back lash besides the set number. For example, (b-6) means the back lash of 0.006 in. (0.025 mm x 6 = 0.15 mm).

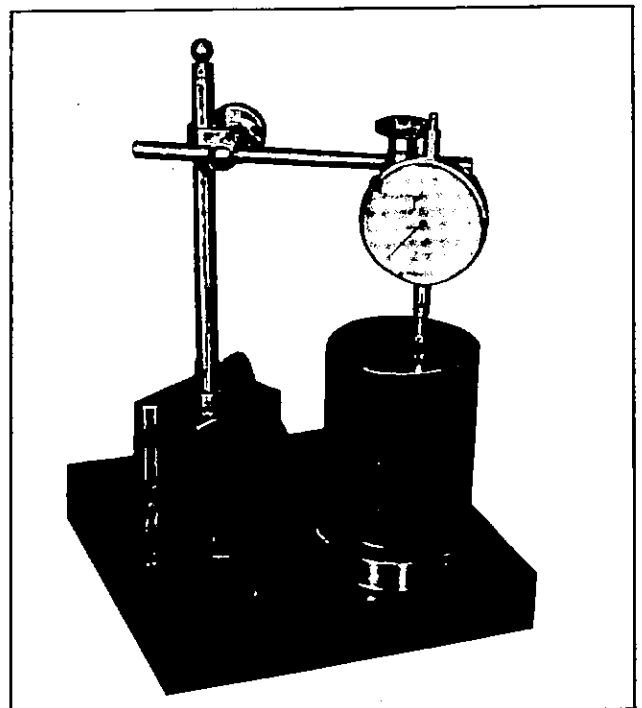
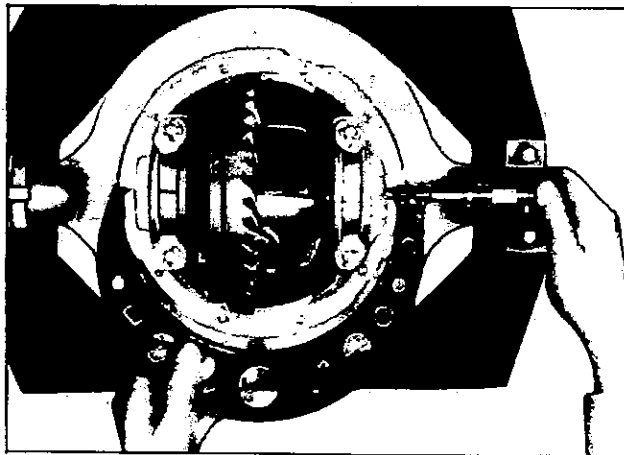
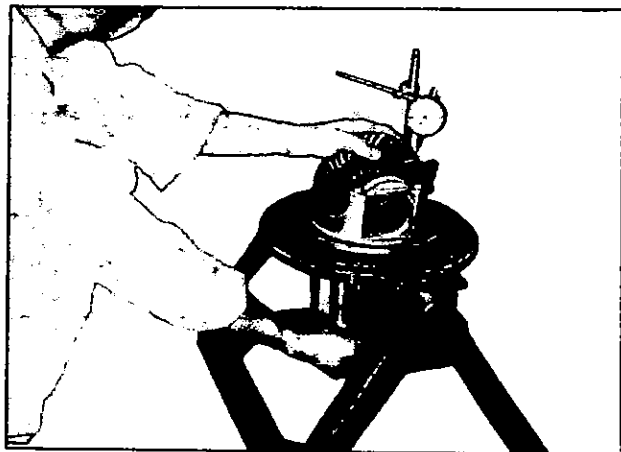


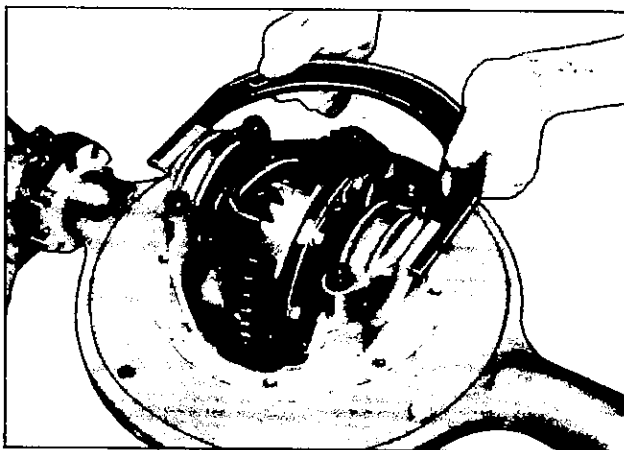
Fig. 19

After the Operation



*Fig. 20 Measurement of Back Lash for the Drive Pinion & Ring Gear*

If it is necessary to use the bearing again at the time of repairing, the thickness of each shim of left & right must be reduced for 0.001"-0.003" on the basis of 80 % or 60 % against standard preload in accordance with the practical condition of use, because over preload is given to the bearing with the shim of thickness calculated from above method of computation.



*Fig. 21 Using the Differential Side Bearing Cap Gauge*



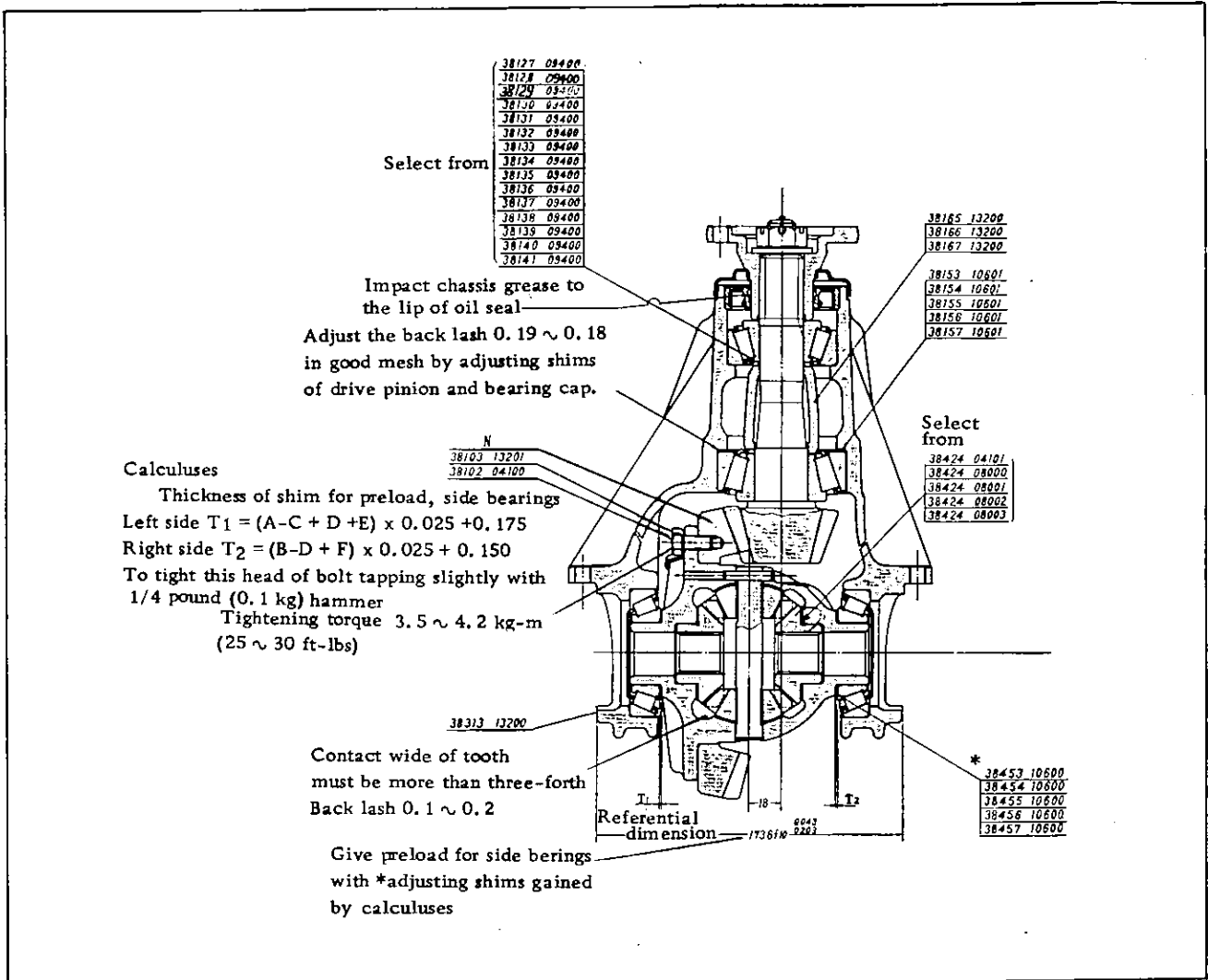


Fig. 22 Carrier

Thus the adjustment is completed. By way of precaution, measure with micrometer of the large size the L measurement which is within 173.40-173.55 mm as Fig. 21 (Service No. tool DT-4685). If it is insufficient, add an additional shim of 0.002 in. (0.05 mm) left and right. In this case, the said micrometer, Fig. 21 or special gauge should be employed for scaling.

The shake of the back of drive gear which has been fixed with the carrier should be measured by dial indicator to confirm that is within 0.05 mm.

### Mounting the Gear Carrier Ass'y on the Rear Axle Housing

Interior of the axle housing should be cleaned well.

The carrier packing should also be replaced with new one.

Mount the gear carrier ass'y without mistaking its upper side with down side and through 8 studs, then fix with the lock washer & nut. The nut must be tightened in a diagonal line so as not to cause the oil leaks.

When it is mounted on the vehicle, feed the gear oil immediately. The oil of the designated hypoid gear oil No. 90 should be feed.

Feed the oil till it comes up to the down side of the feeding hole.

STEERING

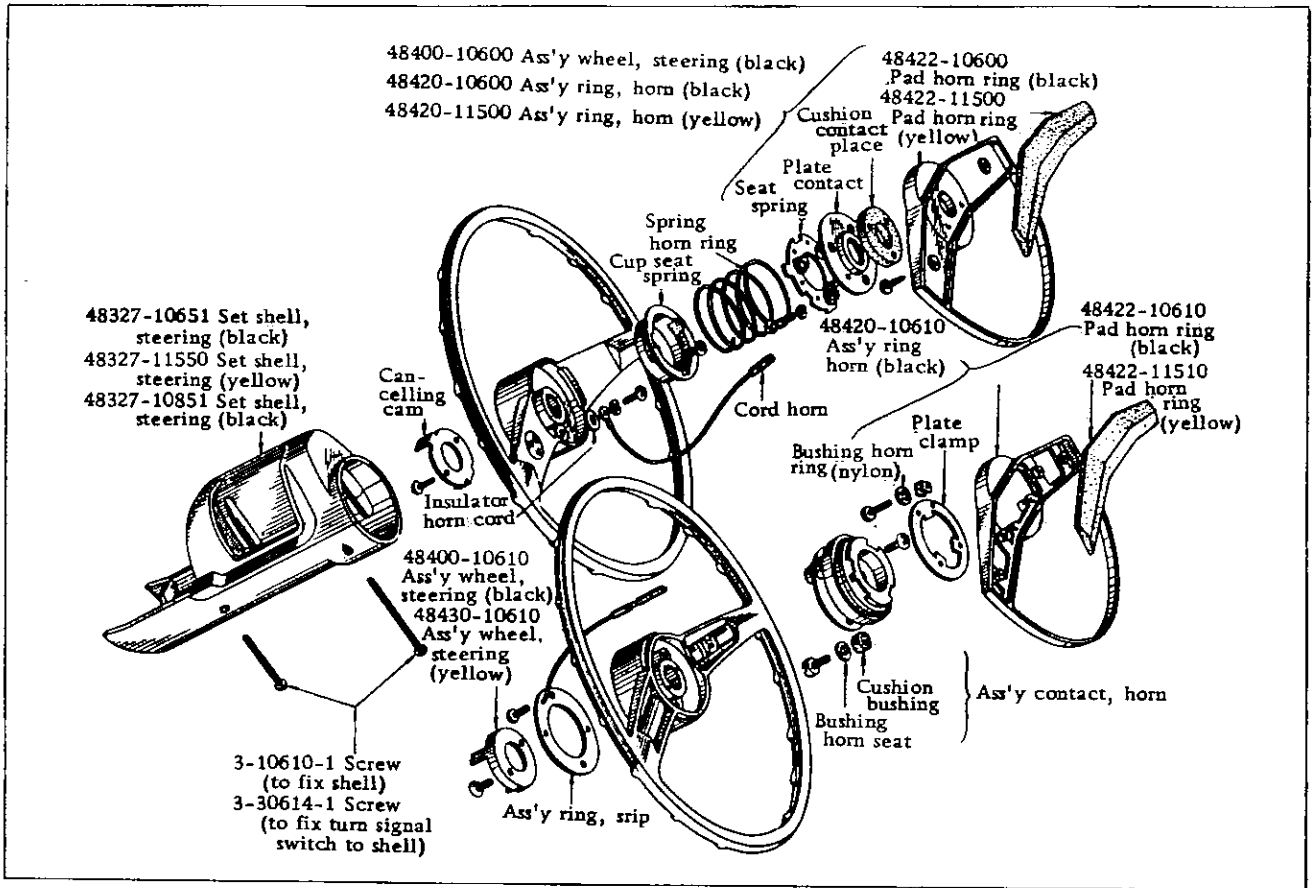


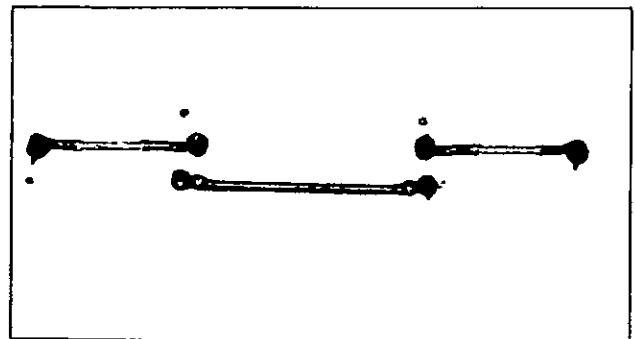
Fig. 1 Steering Wheel

Type	Recirculating ball type
Gear	15.0
Rotational numbers	2.96
Distance between sector shaft & worm shaft	45 mm
Gear oil capacity	0.3ℓ

connected to the rocker shaft is a steering side cross rod lever, that links up with the steering linkage. The steering is of the three cross rod connecting the side and cross rod lever to the gear arm on the idler shaft. Two shorter side rod, one on either side, connect the steering gear arm to the steering gear and idler arms respectively.

Steering system consist of the recirculating ball type robust structure and gives light handling and stable functioning. The worm gear supported with upper and lower angular contact ball bearings to the housing is meshed with the sector arm through the circulating steel ball and ball nut. This assembly is enclosed in an oil tight casing which carries two ball bearings at either end of the cam.

When the steering wheel is turned the tube revolves the cam, which in turn, causes the taper peg to remove over a predetermined arc, thus giving the rocker shaft its desired motion,



## Side Cross Rods

The side and cross rods are held in position by a castlited nut and split pin at each end.

To remove the rod, withdraw the split pin and release the nut at each end of the rod and then carefully tap the rods clear of the levers to which they are connected.

## Removing the Steering Gear Arm

These are secured to the steering gear rocker shaft and idler shaft respectively by a nut and split pin each. Normally these levers need not be removed for any general maintenance. The only occasion requiring their removal would be when damage has occurred, under which circumstances the steering box or idler should also be removed for inspection when the arm concerned can be withdrawn once the steering gear box or idler has been removed to the work bench.

The gear arm should be with drawn from the shaft concerned using a suitable extractor. The gear arm must not be hammered from its shaft.

## Removing the Idler



After the side and cross rods disconnected the idler can be detached from the body. It is secured by two bolts to the front suspension member.

Holding, the idler body on the bench and take off rubber cover.

Unscrew the idler shaft out of the body.

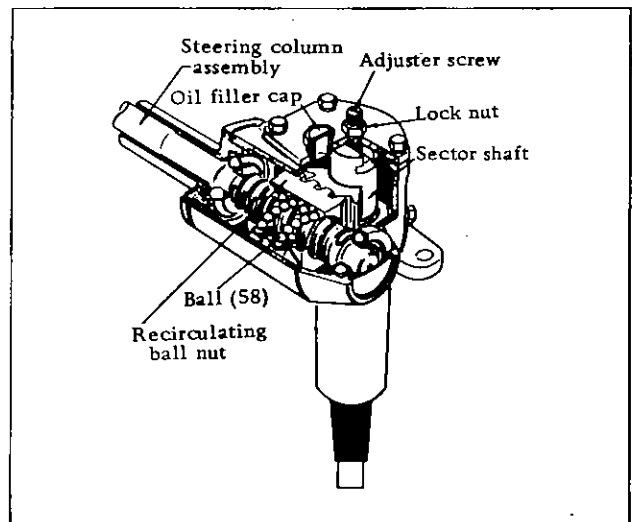
## Steering Gear Housing Removal

Removing the horn ring assembly from the steering wheel, unscrew the column lock, then disconnect higher up the column jacket from the housing.

First disconnect ball stud nut and draw out from the end of steering gear arm.

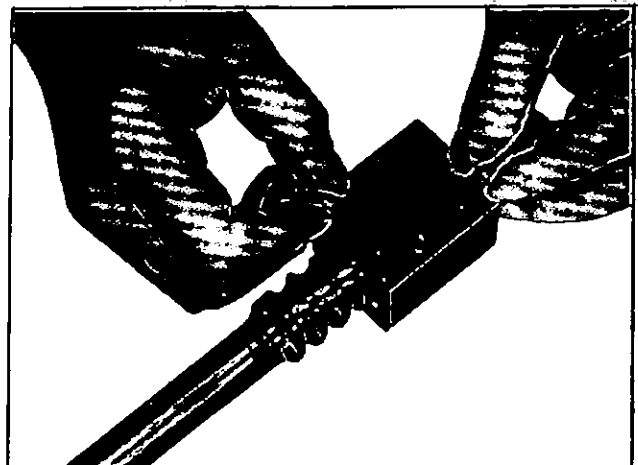
Unscrew the bolts secured to front suspension member. Thus, the steering gear housing assembly should be removed from its position.

## STEERING GEAR



*Referential Figure of Recirculating Ball Type*

## Ball Nut Assembly



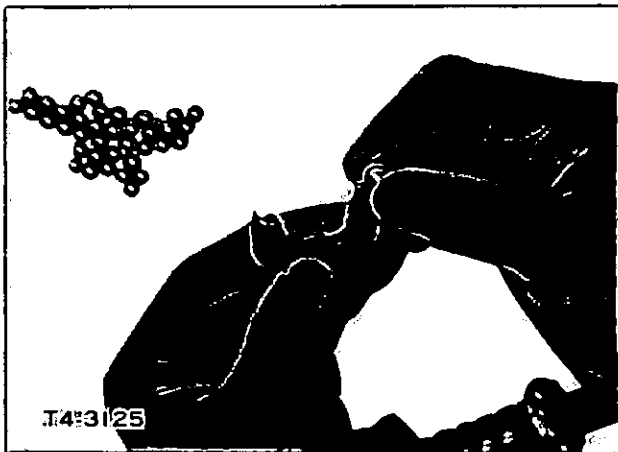
Slip the nut over the worm with the ball guide holes up and the shallow end of the rack teeth.

Align the grooves in the worm and nut by sighting through the ball guide holes.

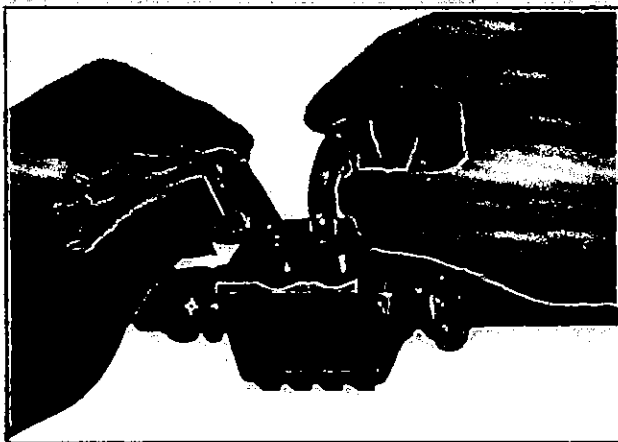
Count 58 balls into a suitable container. This is the proper number of balls for this ball nut.

Drop balls into each of two holes on the same side of nut (this operation may be performed from either side of nut, but two holes on the same side must be used, not two holes on same end). Shake the nut gradually away from hole being filled. Continue until all 42 balls are installed.

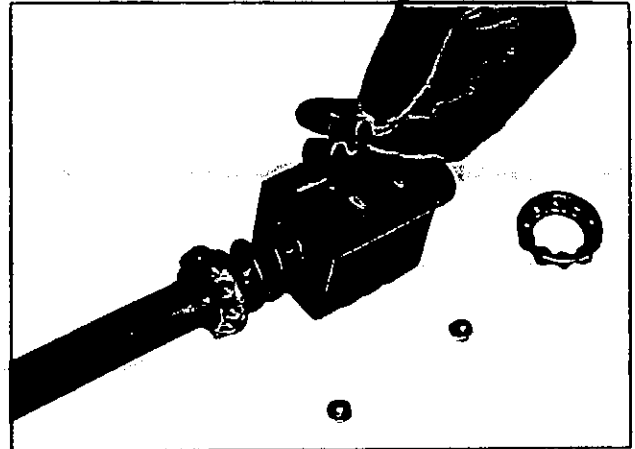
Place remaining 16 balls in ball guides, 8 in each of two halves.



Push the guides into the guide holes of the nut. If the guides do not push all the way down easily, tap lightly into place.



Assemble the ball guide clamp to the nut, being sure to use a lock washer under the clamp screw then tighten the screw securely. Check the assembly by rotating the nut on the worm to see that it moves freely.



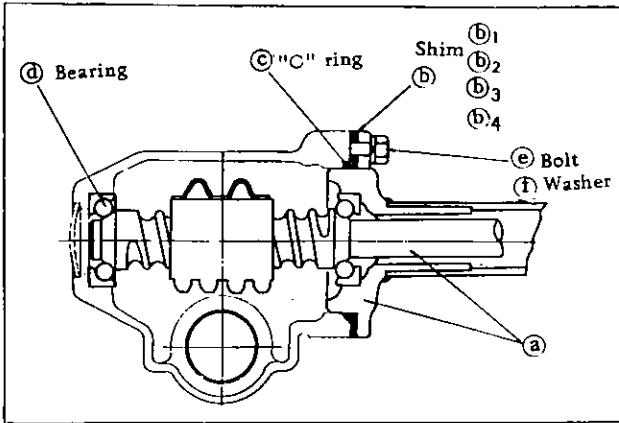
### ASSEMBLING

1. Fix the completed gear housing with needle roller bearings and oil on the vice.
2. Set (a) the main column unit to the gear housing with (b) the worm adjust shims and (c) o-ring.
3. Insert correctly (d) the bearing to the housing.
4. Tight (e) temporarily the bolts with (f) washer after finding correct position.
5. Retighten (g) the bolts surely with tightening torque 1.8~2.5 kg/m (13~18 lbs-feet).
6. To carry on the adjustment of main column after oiling for the worm bearing by rotation of steering wheel.
7. Motive power should be adjusted by (h) shims (2.3 & 4) with 200~450 grams at 20 cm R on the circumference of steering handle.

### ADJUSTING

- a. Adjust for rotation of steering gear after fixing the main column and column gasket.

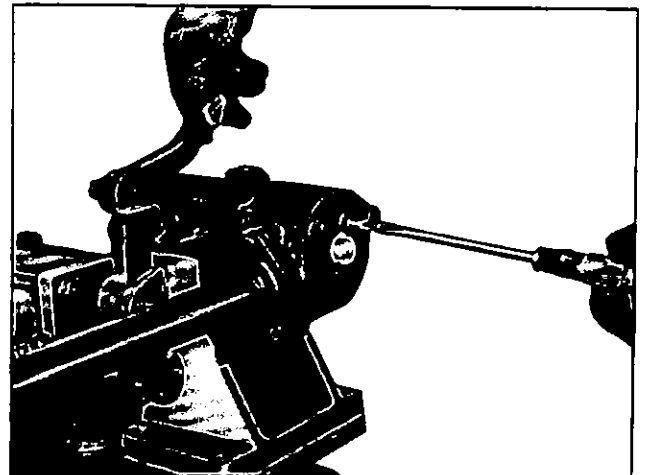
# CHASSIS



c2	Roller shaft adjust shim 1.550~1.575 mm	1	48130 71200
c3	Roller shaft adjust shim 1.525~1.550 mm		48131 71200
c4	Roller shaft adjust shim 1.500~1.525 mm		48132 71200
d	Sector shaft gasket	1	48204 16500
e	Sector shaft cover	1	48201 16500
f	Bolt 5/16-24 x 18	3	1-24518
g	Lock washer 5/16	3	9-15115
h	Lock nut 3/8-24	1	9-11346
i	Filler plug	1	48064 16500

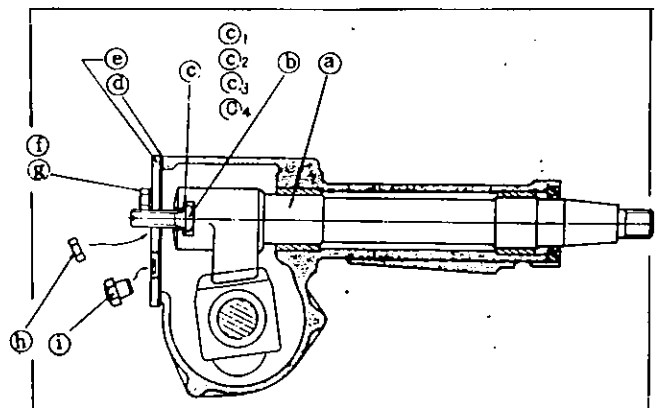
Part No.	No. s	
48029 71200	1	0.762
48030 71200	2	0.254
48031 71200	1	0.127
48032 71200	1	0.050

Signs	Parts Name	Q'ty	Part No.
a	Steering column assembly	1	48024 16500
b1	Worm bearing shim	(1)	48029 71200
b2	Worm bearing shim	(2)	48030 71200
b3	Worm bearing shim	(1)	48031 81200
b4	Worm bearing shim	(1)	48032 71200
c	"O" ring	1	48035 71200
d	Steering worm bearing	1	48025 16500
e	Bolt	3	1-24520
f	Lock washer	3	9-15115



b. Insert the sector shaft and then attach housing cover.

Signs	Part Name	Q'ty	Part No.
a	Steering sector shaft	1	48103 16500
	Arm sector shaft for RH	1	48502 16500
	Arm sector shaft for LH	1	48502 17000
b	Roller shaft screw	1	48135 32200
c1	Roller shaft adjust shim 1.575~1.600 mm	1	48129 71200

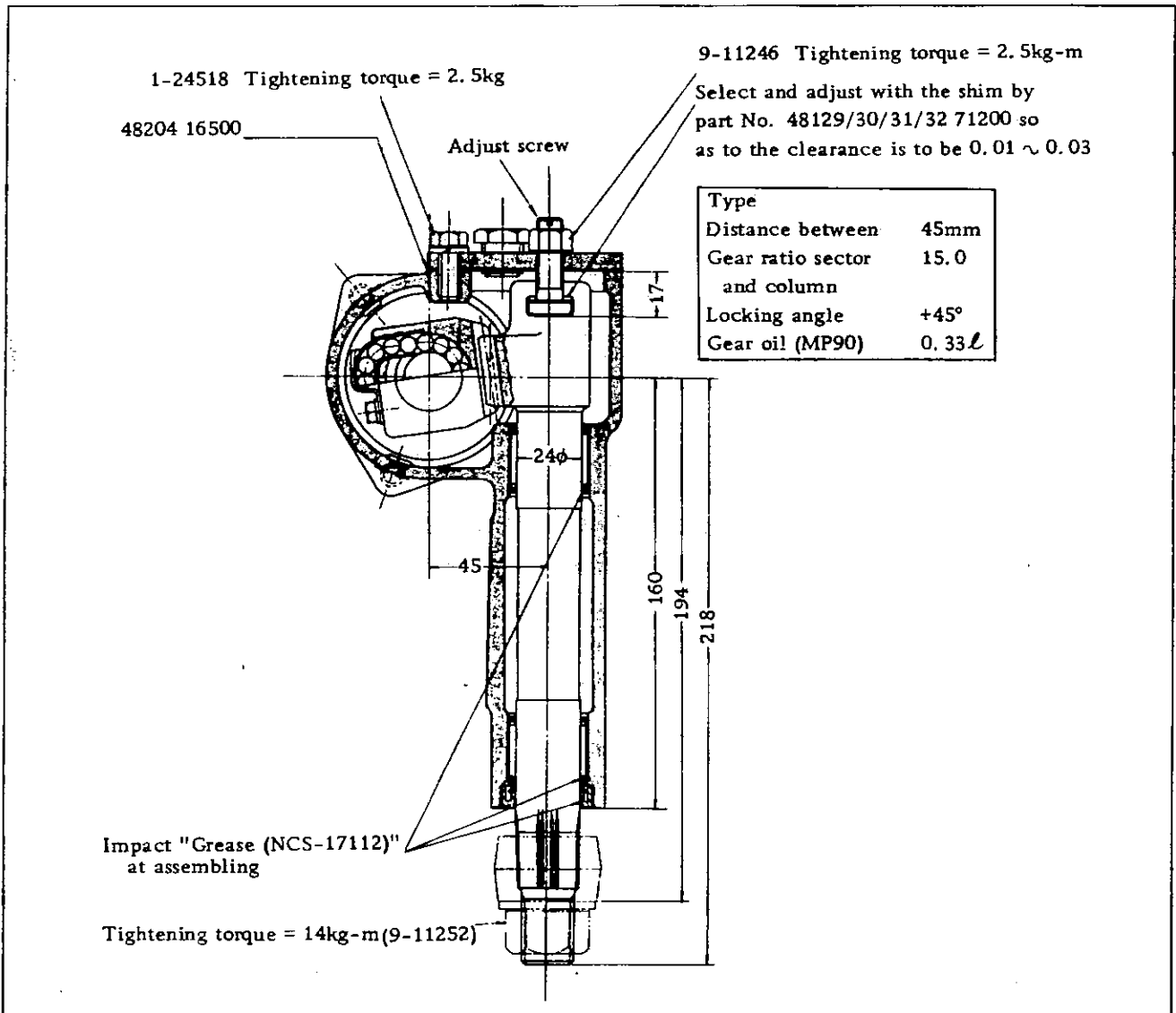


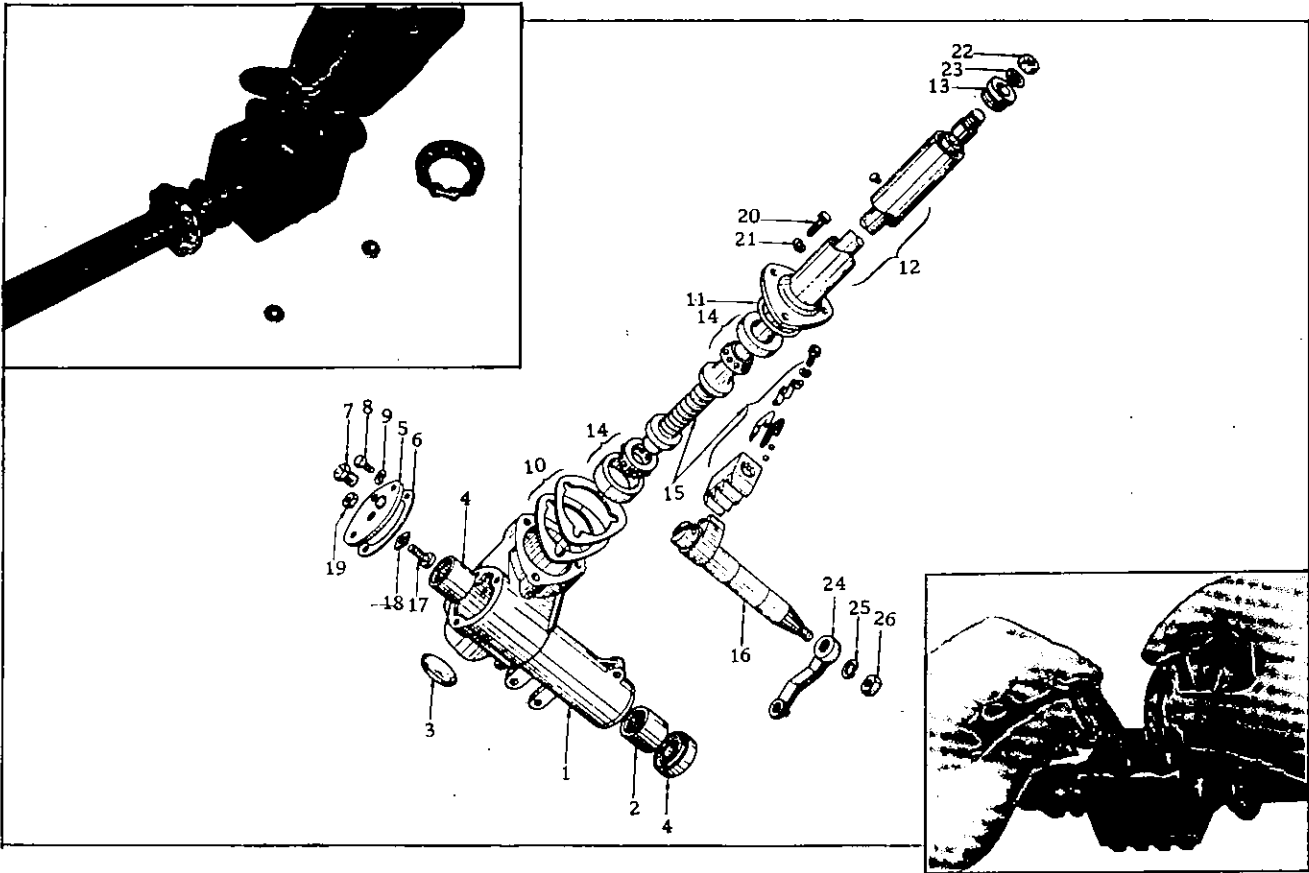
1. Set with the selected 4 numbers shims (C<sub>1</sub> C<sub>2</sub> C<sub>3</sub> C<sub>4</sub>) after fitting (b) the adjusting screw to (a) the sector shaft.  
Gap at adjust screw to the direction of shaft should be 0.01~0.03 mm.

ADJUSTING

2. Correct the position of ball nut to the center, and insert oiled sector shaft to the housing.
3. Stick the gasket on the housing with sealing cover.
4. Fitting with (b) adjust screw, screw up temporarily the bolt and washer with (c) the housing cover.
5. Pull up the sector shaft 2 ~ 3 mm to the direction of cover, retighten the bolts of housing cover with the torque 1.8 ~ 2.5 kg-m (13 ~ 18 lbs-ft).

1. Attach with temporary sector gear arm. Rotating slowly the sector shaft, find and adjust meshed point of the clearance "O" at center of.
2. Fix (h) the lock nut.
3. Make sure smooth rotation of gears.
4. The back lash of gear arm should be adjusted by the screw 0 ~ 0.1 mm at the neutral position.
5. After finishing adjustment, rotate the gears repeatedly then lock (h) the nut surely after retightening adjust screw more 1/8 ~ 1/6 up.





① Steering gear housing ass'y	⑭ Steering worm bearing
② Needle bearing complete	⑮ Steering column assembly
③ Expansion plug	⑯ Steering sector shaft
④ Sector shaft oil seal	⑰ Sector shaft adjusting screw
⑤ Sector shaft cover	⑱ Sector shaft adjusting shim
⑥ Sector shaft cover gasket	⑲ Lock nut
⑦ Plug	⑳ Bolt
⑧ Bolt	㉑ Lock washer
⑨ Lock washer	㉒ Nut
⑩ Worm bearing shim	㉓ Washer
⑪ "O" ring	㉔ Steering gear arm
⑫ Steering column jacket complete	㉕ Lock washer
⑬ Steering column bearing assembly	㉖ Nut

Fig. 2 Components of Steering Gears

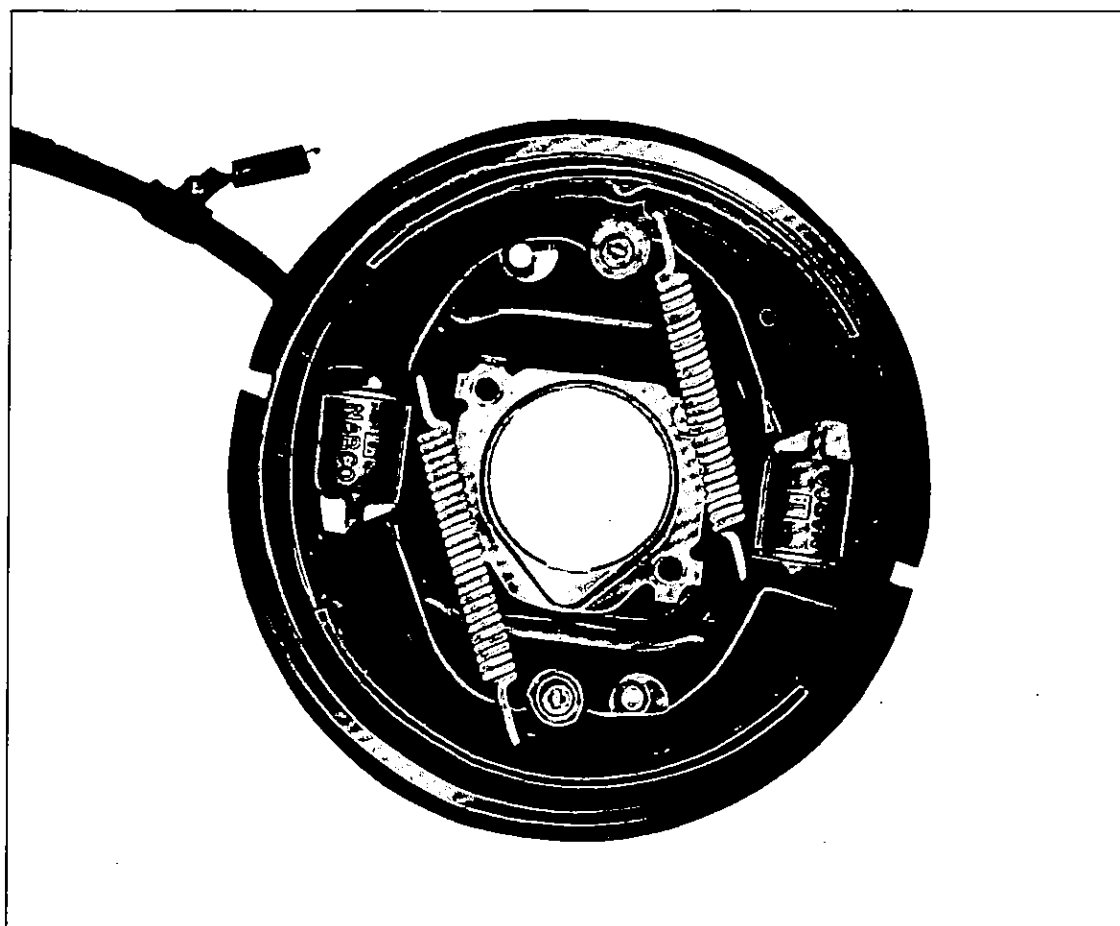




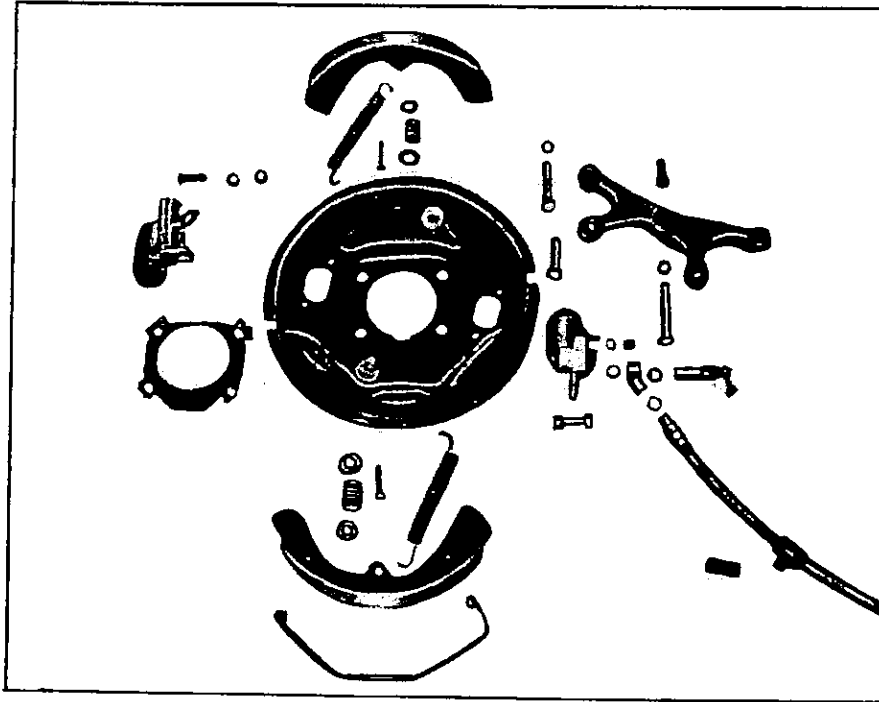
**BRAKE**

*GENERAL DATA*

Type - Foot brake Hand brake	Hydraulic expansion, 2 shoes for 4 wheels Mechanical, internal expansion, rear 2 wheels braked
Lining - Width x Thickness x Length Area of surface (cm <sup>2</sup> )	40 x 4.5 x 215 mm (Same for Front & Rear) 35 (Front & Rear)
Brake drum dia. (Front & Rear)	228.6 cm <sup>2</sup> (Same for Front & Rear)
Master cylinder bore Inner dia.	22.22 mm
Wheel cylinder bore Inner dia.	Front wheels 25.40 mm Rear wheels 23.81 mm



*Fig. 1 Front Brake Flange  
(Brake Disc)*



*Fig. 2 Front Brake (Out Side)*

The brake on all four wheels are hydraulically operated by foot pedal application, directly coupled to a master cylinder in which the hydraulic pressure of the brake operating fluid is originated. As supply tank cast integrally with the master cylinder provides a reservoir by which the fluid is replenished, and a pipe line consisting of tube, flexible hose and union, inter connected the master cylinder and wheel cylinders.

The pressure generated in the master cylinder by application with the foot pedal is transmitted with the equal and undiminished force to all wheel cylinders simultaneously.

This moves the pistons out wards, which in turn expand the brake shoe thus producing automatic equalisation, and efficiency in direct proportion to the effort supplied at the pedal.

When the pedal is released the brake shoe spring return the shoe which then return the wheel cylinder pistons, and therefore the fluid back into the pipe lines and master cylinder. An independent mechanical linkage actuated by a hand brake, mounted drivers seat side. This is positioned on the right-hand side of seat if the car has right-hand steering, and on the left-hand side if it has left-hand steering. Operated the rear wheels by mechanical expanders attached to rear wheel cylinder bodies.

## FRONT BRAKE

The front brakes are constructed by the two leading system with each two wheel cylinder.

The shoes are allowed to slide and centralize automatically during the actual braking operation which distributes the braking force strongly

over the lining area ensuring high efficiency the brake disc caused by adjuster housing against the friction of the brake linings of front and rear shoes and even lining wear.

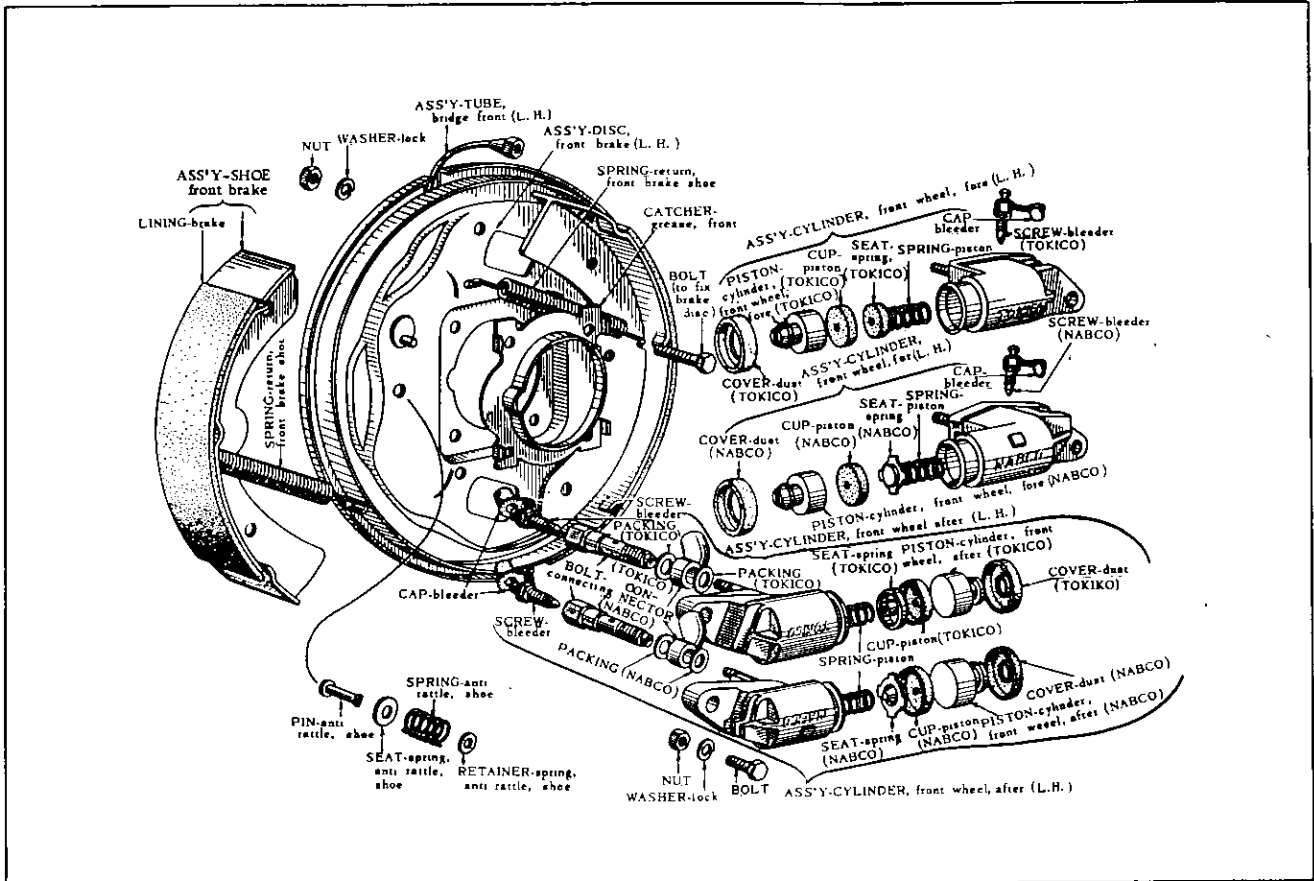


Fig. 3 Front Brake (L.H.)

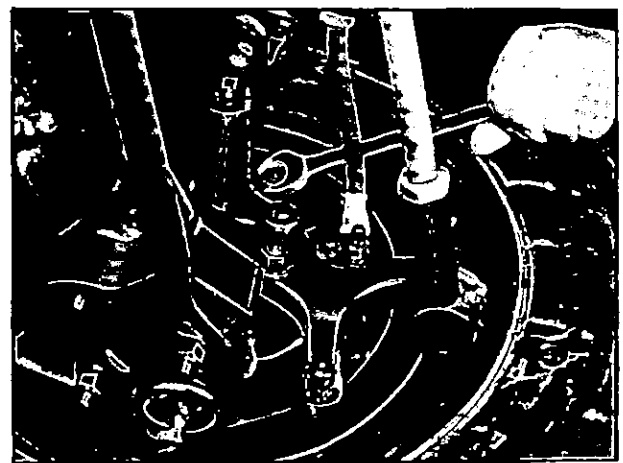


Fig. 4 Adjusting of Front Brake

Adjustment for the front brake shoes is by means of the bolts of adjuster which located at the lower and upper position of the out side of the brake disc. Turn adjusting bolt to the left

direction until the shoe becomes locked on the brake drum, then turn back it until the shoe becomes just free form the brake drum.



REAR BRAKES

The rear brake shoe are not fixed but are allowed to slide and centralize with the same effect as in the front brake. They are

hydraulically operated by wheel cylinder and independent hand brake mechanism.

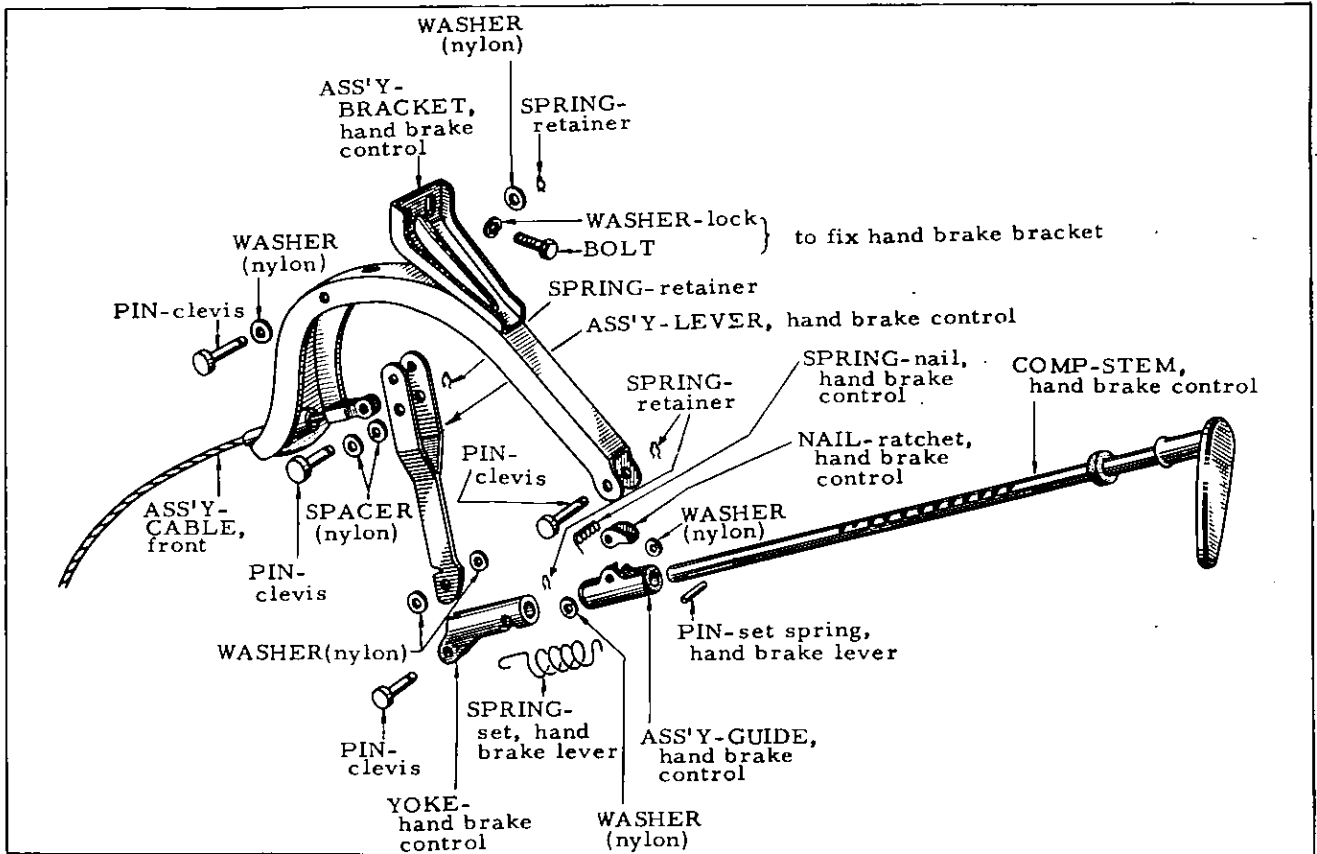
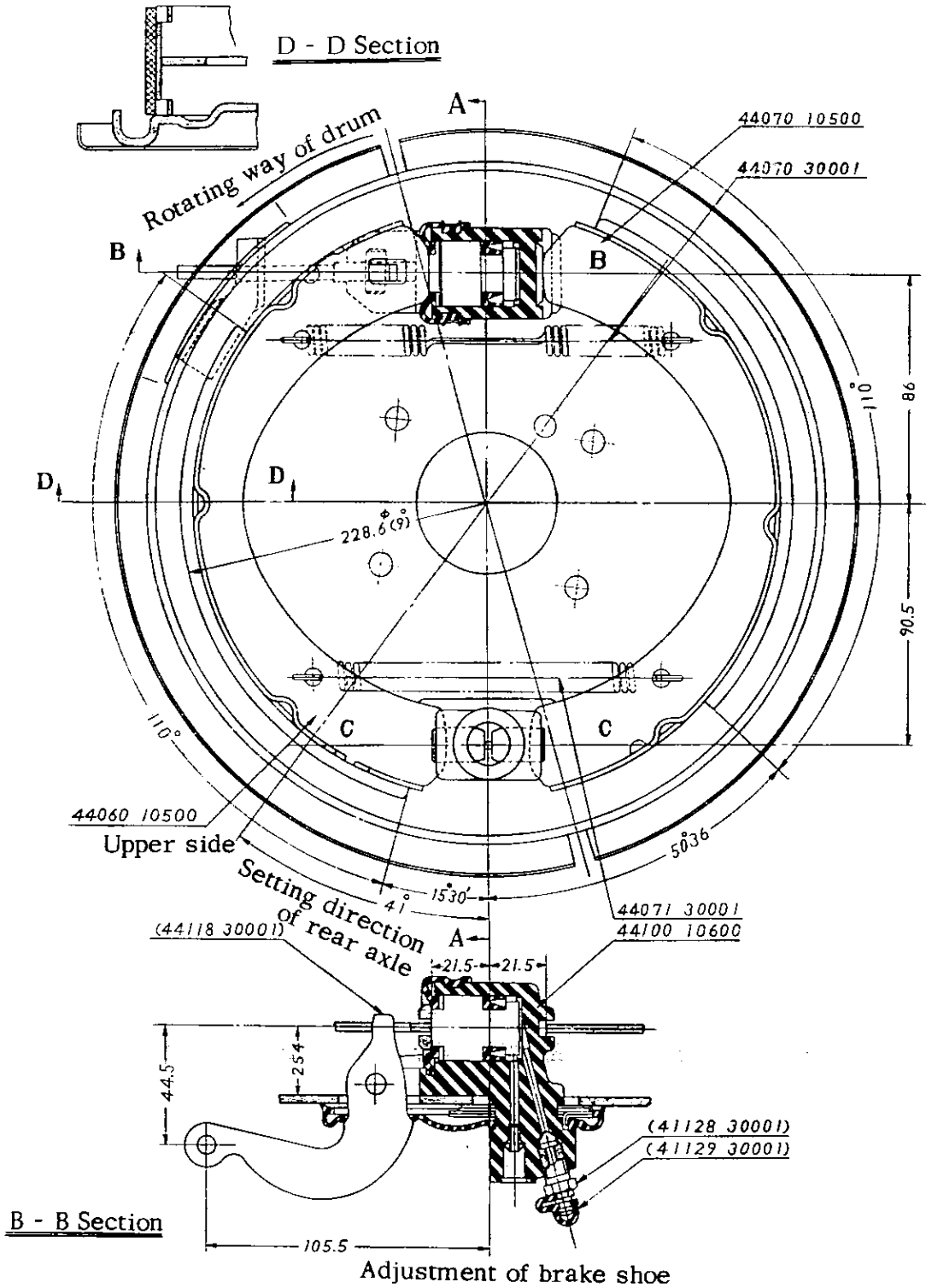


Fig. 6 Hand Brake Control



Fig. 7 Adjusting Brake Shoe

Adjustment for the rear brake shoes is by means of the screw bolt which located at the outside of brake disc. This precaution should be taken to eliminate the possibility of brake shoe drag due to mis-adjusted parking brakes. Turn the bolt to screw direction tightly and then turn back screw 2 ~ 3 notches until the wheel drum turns just free from the shoe.



This precaution should be taken to eliminate the possibility of brake shoe drag due to mis-adjusted parking brakes. Turn the bolt to screw direction tightly and then turn back screw 2 ~ 3 notches until the wheel drum turns just free from the shoe.

Fig. 8 Rear Brake (No. 1)

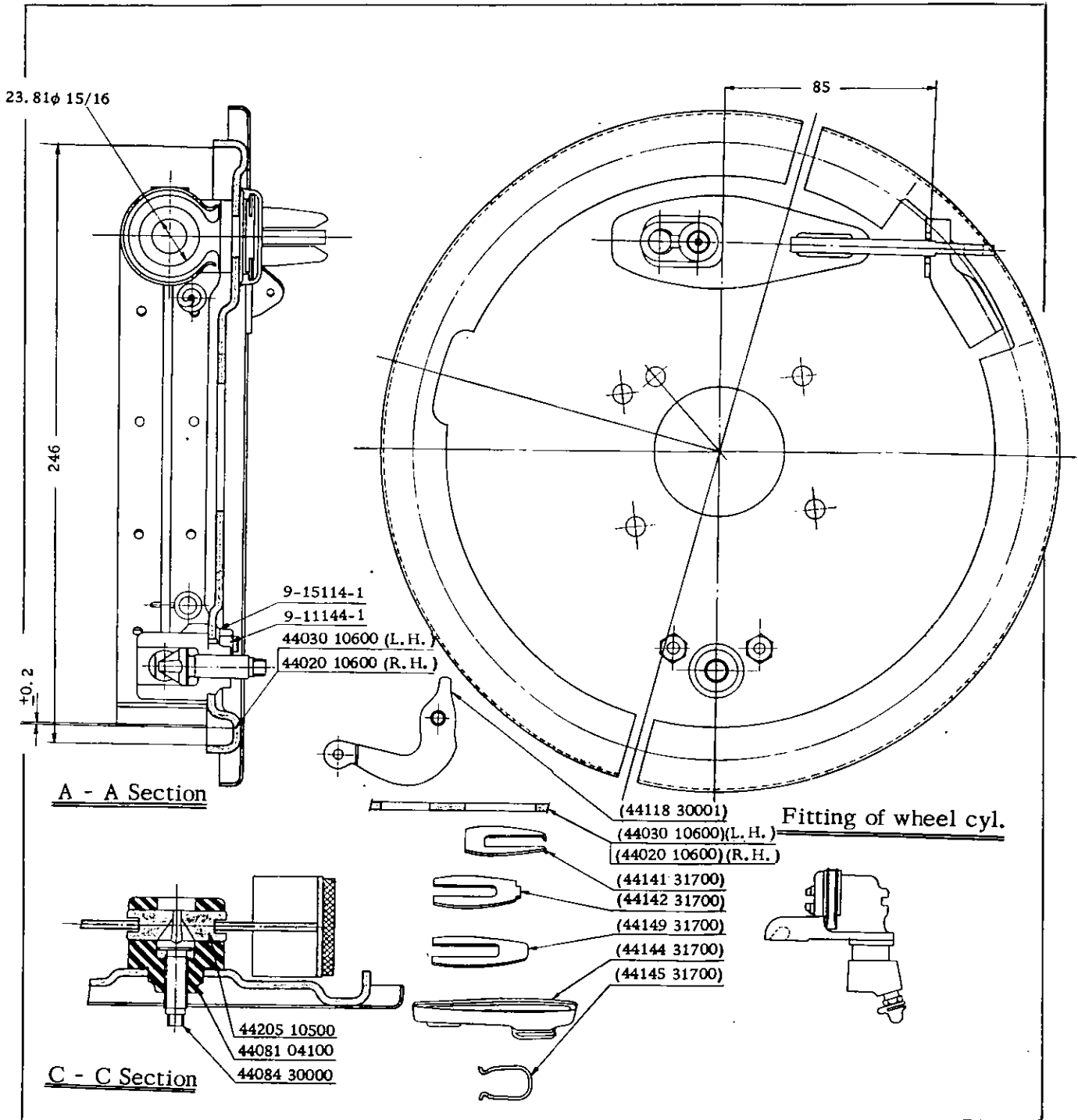


Fig. 8 Rear Brake (No. 2)

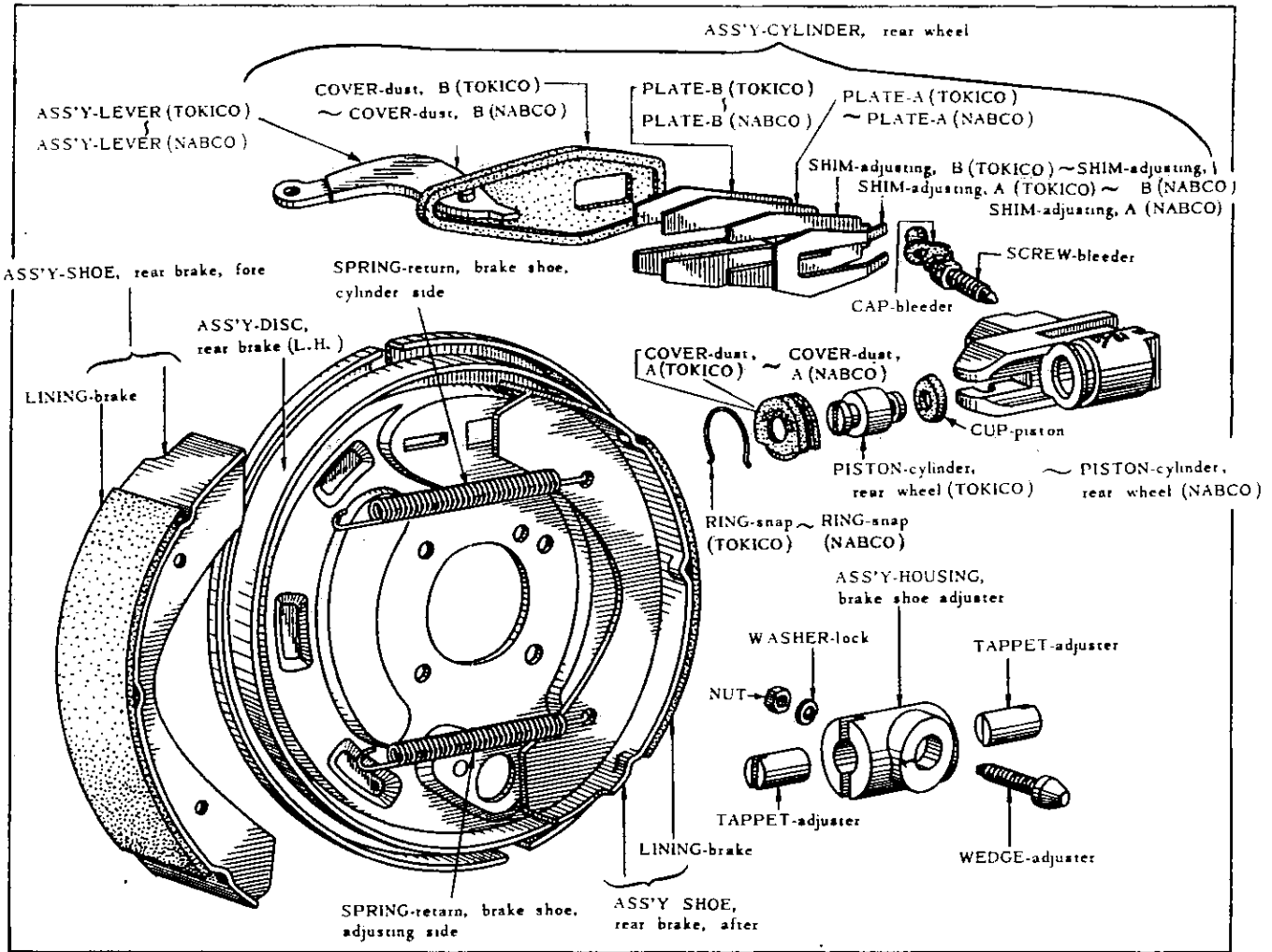


Fig. 9 Rear Brake (L.H.)

**HAND BRAKE**

The hand brake operates on the rear wheels only and is applied by a pull-up type of lever situated along-side the driver's seat. The cable from the control is attached to the toggle lever connected with the rear brake disc. The hand brake linkage is set when leaving the works and should not require any attention under normal maintenance. Only when a complete overhaul is necessary should the hand brake linkage require resetting.

When this is correct the rear shoes should be locked to the drums, the hand brake control just slightly applied and the wire rope set with the slackness just removed, by means of a nut at the center rod of the equalizer drag link.

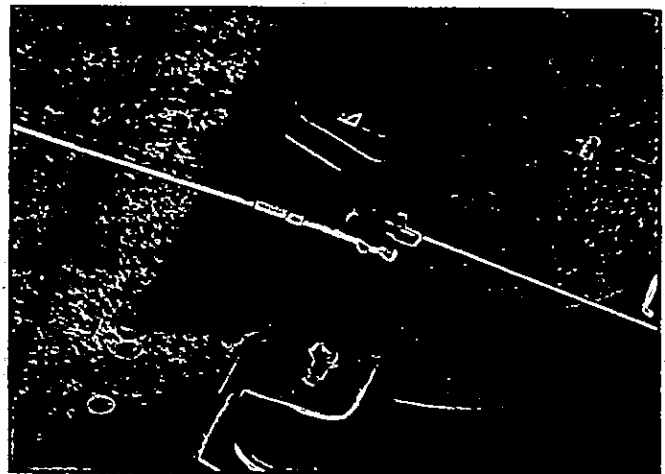


Fig. 10 Adjusting Nut



MASTER CYLINDER

This consists of an alloy body with a polished, finished bore, and reservoir with cap.

The inner assembly is made of the push rod, stopper plate ring, piston, secondary cap, return spring, let out valve and check valve seat.

The open end of the cylinder is protected by a rubber boot as shown Fig. disassembling the Brake Master Cylinder.

Disconnect the pressure pipe union from the cylinder and remove the securing bolts, when the master cylinder and fluid reservoir may be withdrawn complete from the car. Remove the

filler cap and drain out fluid. Pull back the rubber boot and remove the stopper ring with a pair of long-nosed pliers. The push rod assembly can then be removed. When the push rod has been removed the piston with the secondary cap will be exposed, therefore remove the piston assembly complete.

The assembly can be separated by taking out other small parts.

Examine all parts, especially the rubber primary cap, for wear of distortion and replace with new parts where necessary.

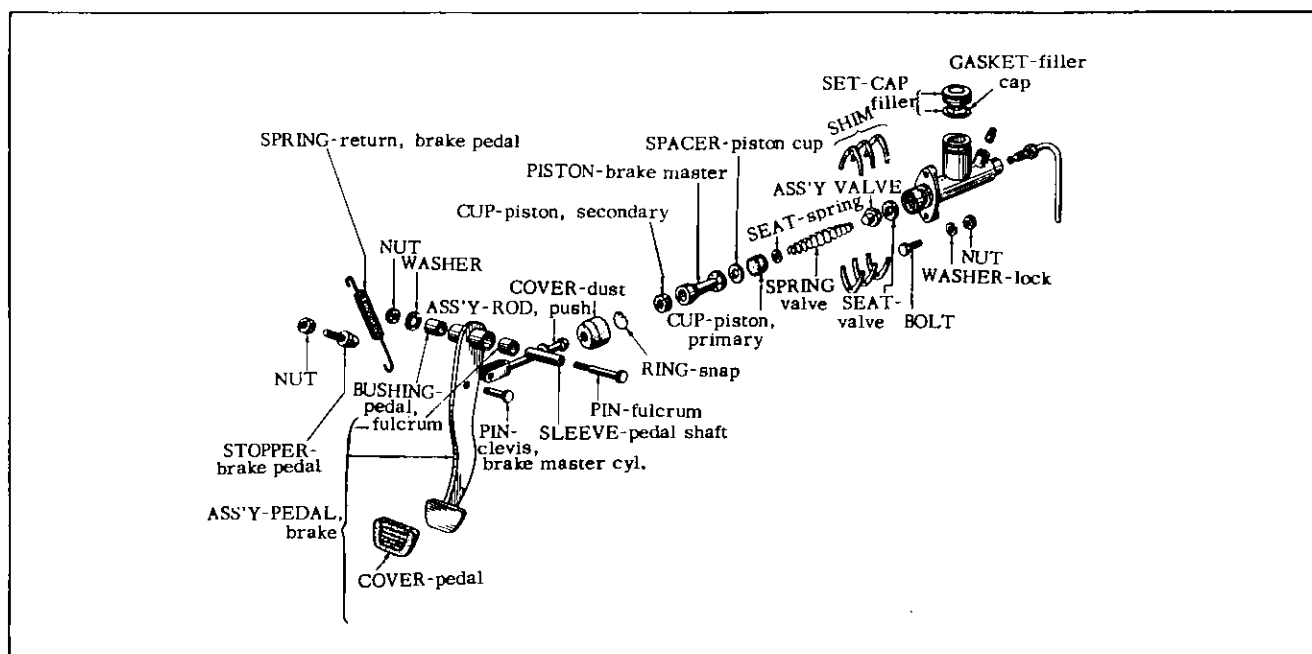


Fig. 11 Brake Master Cylinder

Bleeding the Hydraulic System

Bleeding is necessary any time a portion of the hydraulic system has been disconnected or if the level of the brake fluid has been allowed to fall so low that air has entered the master cylinder.

With all the hydraulic connections secure and the supply tank topped up with the fluid, remove the cap from the bleed valve and fit the bleed tube over the bleed valve, immersing the free end of the tube in a clean jar containing a little brake fluid.

Unscrew the bleed valve cap about three-quarters of a turn and then operate the brake pedal with a slow full stroke until the fluid

entering the jar is completely free of air bubbles. Then, during a downstroke of the brake pedal, tighten the bleed screw cap sufficiently to seat, remove bleed tube.

This process must now be repeated for each of the other wheel cylinder.

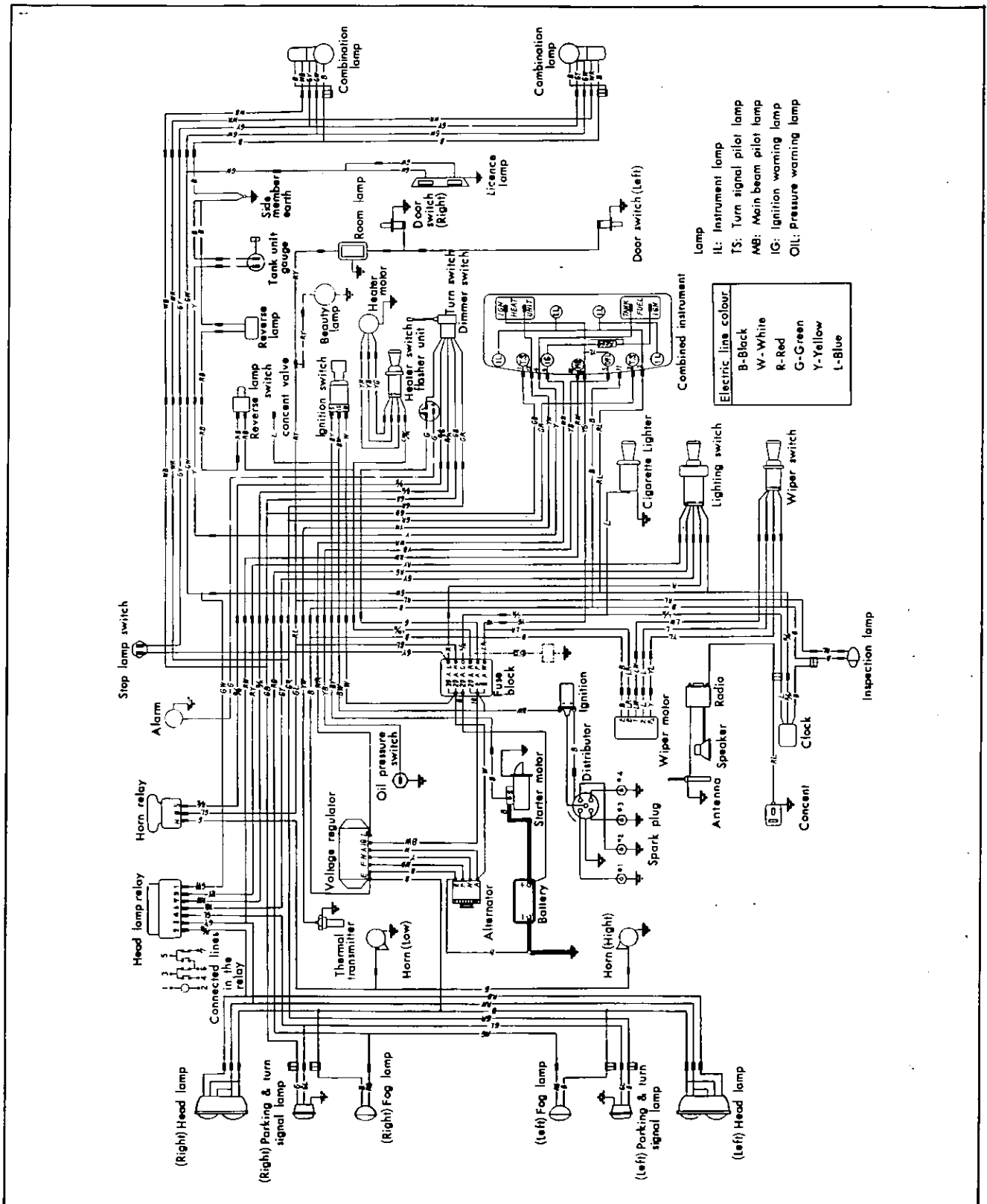
Always keep a careful check on the supply tank during bleeding since it is most important that a full level is maintained.

Should air reach the master cylinder from the supply tank, the whole of the bleeding operation must be repeated.

After bleeding, top up the supply tank to its correct level of approximately three-quarters full.



ELECTRICAL SYSTEM



WIRING DIAGRAM MODEL 411

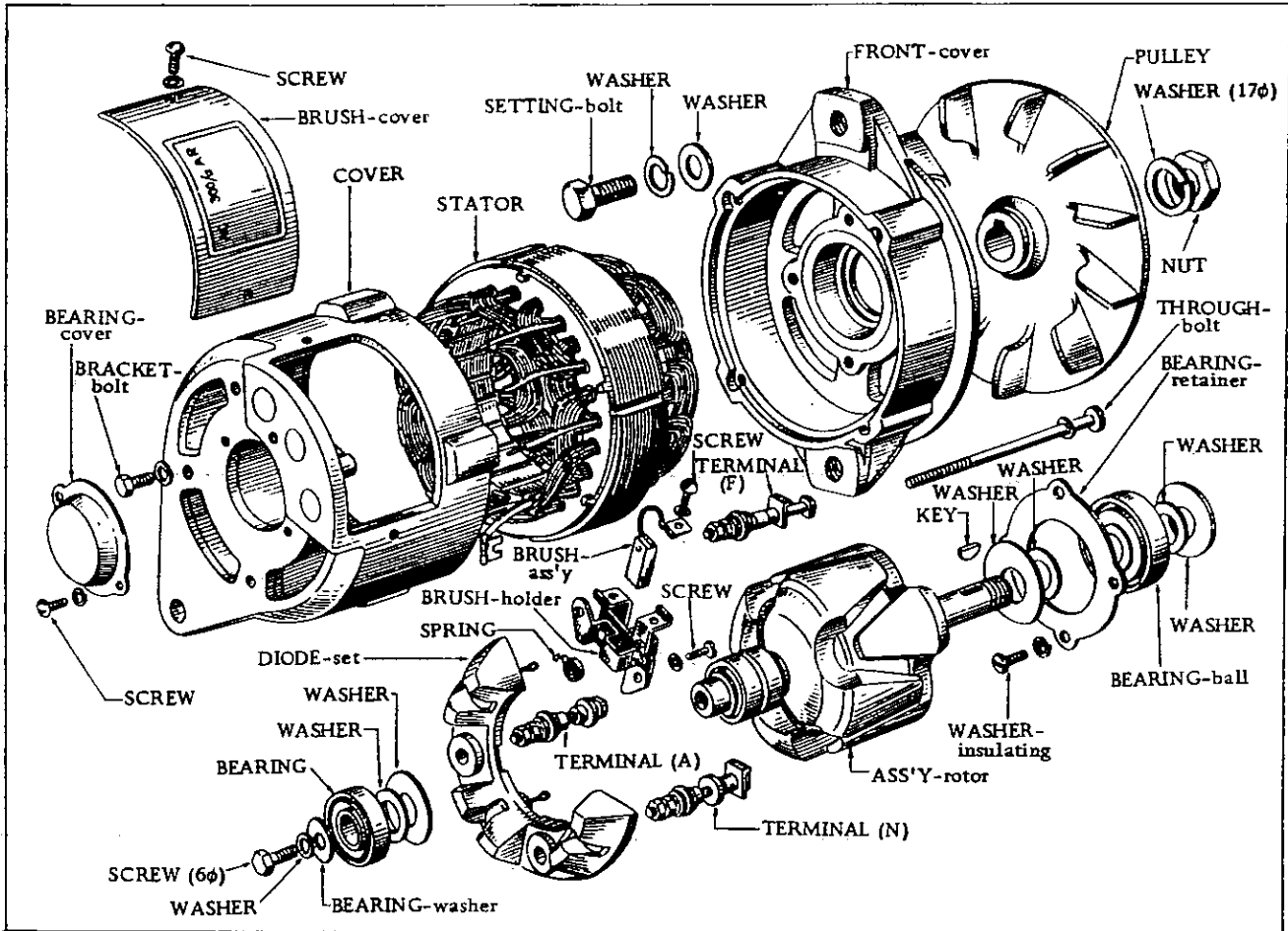


Fig. 1 Alternator (Mitsubishi)

ALTERNATOR

Alternator Model	Mitsubishi Denki Co. AC300/12WR
Nominal output	12V-300W
Constant Pole	Successive - side ground
Constant revolution	2,500 r.p.m.
No load minimum revolution	1,000 r.p.m. down 14V (normal temp.)
Output current	2,500 r.p.m. 14V 24.5A up (normal temp.) 2,500 r.p.m. 14V 21.5A up (high temp.)
Pulley ratio	1 : 1.73
Regulator	Mitsubishi Denki Co. (23500-12200)
Model	RL-2BI
Type	Tirrill type (leaf spring)
Element	Constant voltage relay. Pilot lamp relay.
Constant voltage relay	3 contact point type

	Primary side	Secondary side
Adjust, valve	14 ~ 15V	14 ~ 15V
Dynamo revolution	4,000r.p.m.	4,000r.p.m.
Load	Battery + resisting load 21.5A approx.	Battery

Note: Use battery charged in full.

Pilot lamp relay (3 contact point type)

Put-off voltage	Put-on voltage
4.5 ~ 5.2V	0.5 ~ 3V

MAJOR COMPONENTS OF ALTERNATOR FOR 411

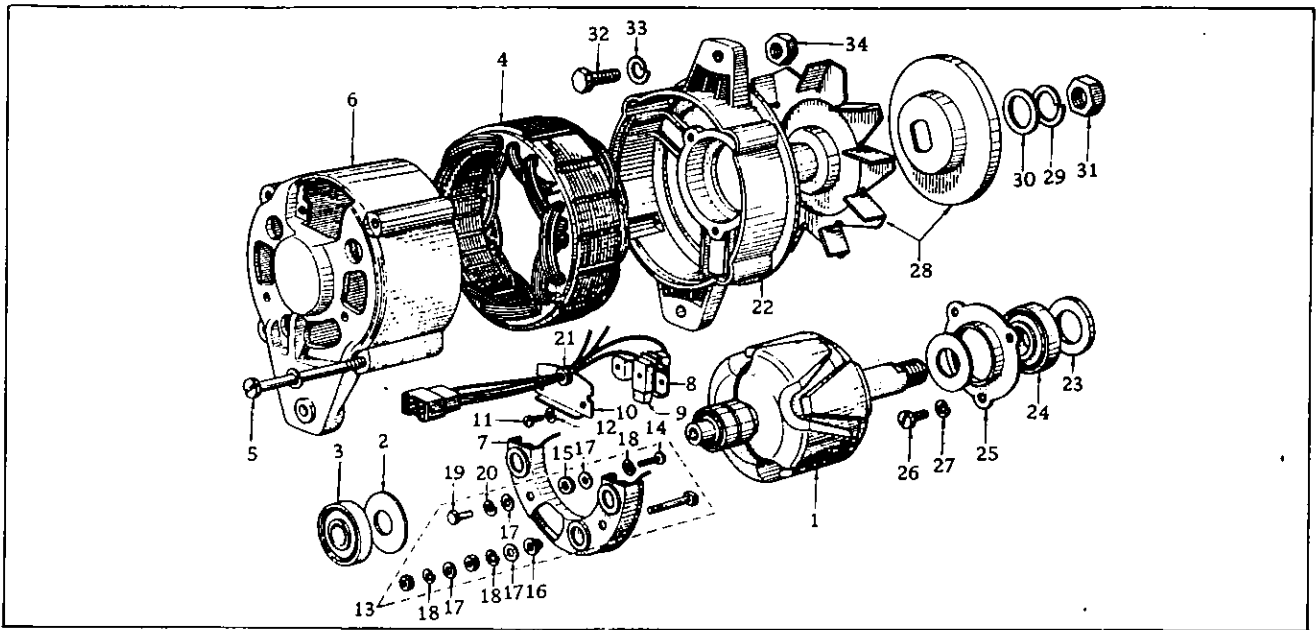


Fig. 1 Major Components

Key No.	Part No.	Part Name	Q'ty	Key No.	Part No.	Part Name	Q'ty
	23100 14600	Ass'y-alternator (Mitsubishi 12V-300W)	1	21	23159 14610	Grommet	1
	23100 14602	Ass'y-alternator (Mitsubishi 12V-300W)		22	23233 14610	Clip	1
1	23108 14610	Ass'y-rotor	1	23	23118 14610	Ass'y-cover, front	1
2	23116 14610	Washer-seal	1	24	23121 14610	Washer-seal	1
3	23120 14610	Bearing-ball	1	25	23120 14611	Bearing-ball	1
4	23102 14610	Ass'y-stator	1	26	23123 14610	Retainer-bearing	1
5	23131 14610	Bolt-through	4	27	23352 12210	Screw	3
6	23127 14610	Ass'y-cover, rear	1	28	22203 32210	Washer-spring	3
7	23230 14610	Ass'y-diode, set	1	29	23151 14610	Ass'y-pulley	1
8	23133 14610	Ass'y-holder, brush	1	30	23152 12210	Washer-spring	1
9	23135 14610	Ass'y-brush	2	31	23162 12210	Washer-plain	1
10	23107 14610	Cover-brush	1	32	23153 35010	Nut	1
11	23352 09160	Screw-4 $\phi$ x 10	2	33	23139 12900	Bolt	1
12	22156 01302	Washer-spring	2	34	9 15115 1	Washer-lock	1
13	23156 14610	Ass'y-terminal	1			to bracket	
14	23158 14610	Screw	1			fix	1
15	23161 14610	Insulator	1				
16	23157 14610	Insulator	1				
17	22213 71311	Washer	1				
18	22203 22210	Washer-spring	1				
19	23139 12210	Bolt-terminal (E)	1				
20	22203 32210	Washer-spring	1				
					Part No.	Part Name	Remarks
					23500 14602	Regulator ass'y	The connector was enlarged in this type.
					23100 14602	Alternator ass'y	
					24299 14801	Connector-regulator	
					24299 14800	Connector-alternator	

# DATSUN

## GENERATOR

### Construction and Feature

Different from the DC generator, the AC generator turns the magnetic pole and fixes armature making it generates 3-phase alternate

current, and rectifies all waves with the silicon diode, (+) (-) each three, that are built within, and takes out as direct current.

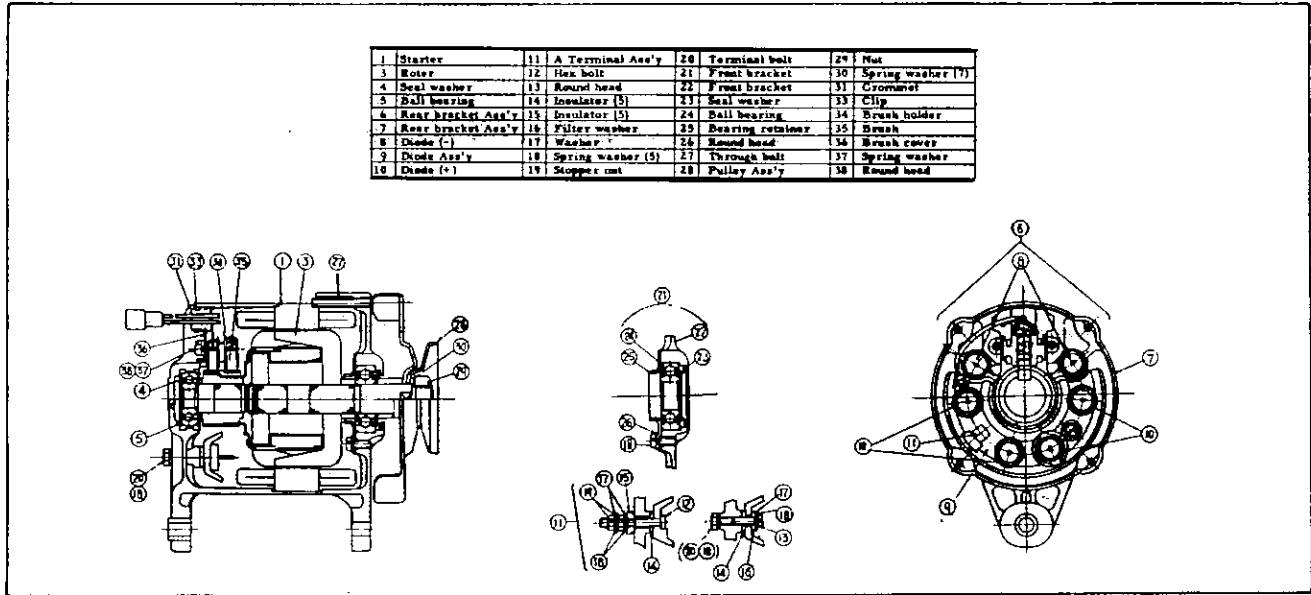


Fig. 2-1. 1 Sectional View of Dynamo

The sealed ball bearing ⑫, ⑬ are used to support the rotor. Clearance between the brush and brush holder is also made so as to prevent it from dust. Thus the AC generator will increase milage without maintenance. Each 3 diodes are pressed in the rear cover and the diode base respectively.

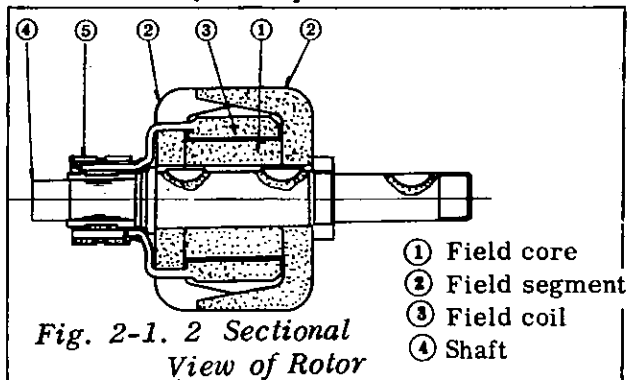


Fig. 2-1. 2 Sectional View of Rotor

The clip ring pressed in the shaft is soldered at both ends of the field coil to pass magnetic current.

The pole of rotor makes out the magnetic circuit as shown in Fig. 1-3 and all the poles are magnetized by doughnut coil.

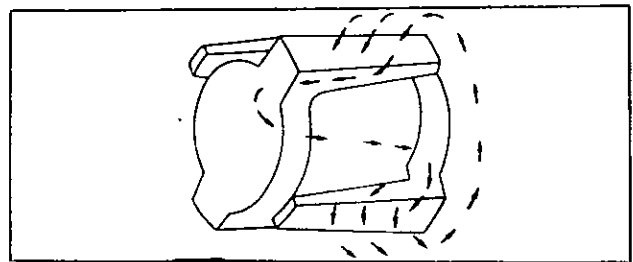


Fig. 2-1. 3 Magnetic Circuit

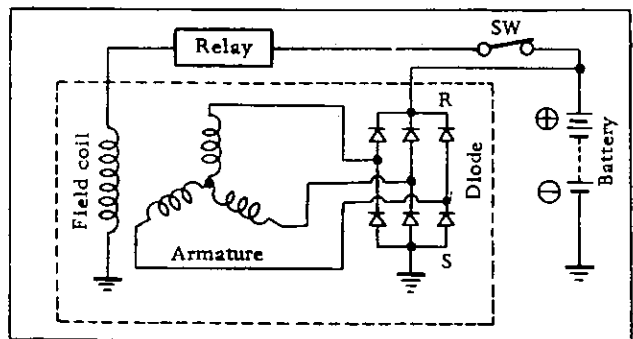


Fig. 2-1. 4 Connection within Dynamo

The armature is of a three phase Y connection type and the silicon diode rectifies all waves.

It pulls out the neutral point and adds voltage having conducted 3 phase half wave rectification in the circuit of relay and controls the voltage coil of the pilot lamp relay.

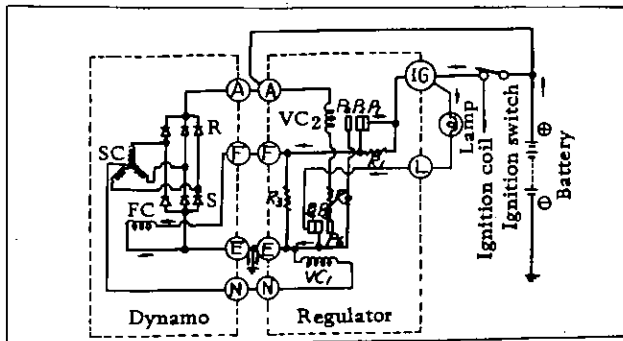


Fig. 2-1. 5 Charging System

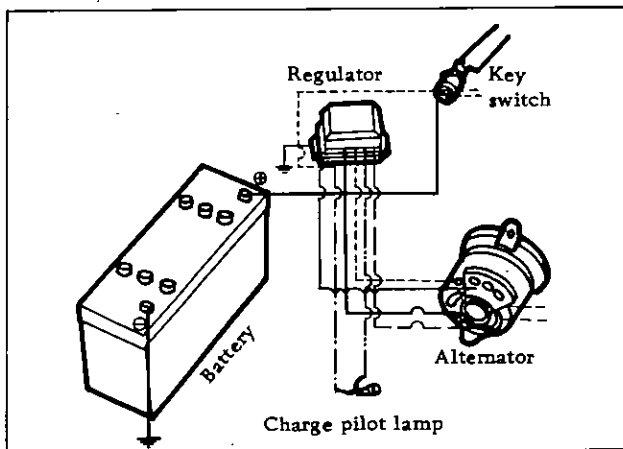


Fig. 2-1. 6 Outside Connection

When the ignition switch is put on, the battery current flows in the arrow marked direction passing through the dynamo E terminal, brush slip ring, field coil, slip ring, brush, dynamo F terminal, relay F terminal and IG terminal and completes the field circuit. It is difficult for the dynamo to stand up only by residual magnetism of the field core, so that magnetization is necessary until voltage rises to suit charging after the engine has started.

This is because the diode is used and when the voltage to add to it is so low, large proportional resistance shows up and current does not flow through the field coil unless the dynamo makes very high revolution.

This is because the diode is used and when the voltage to add to it is so low, large proportional resistance shows up and current does not flow through the field coil unless the dynamo makes very high revolution.

## Disassembly and Assembly

### A. Disassembly

The dynamo is disassembled in the following order.

a)

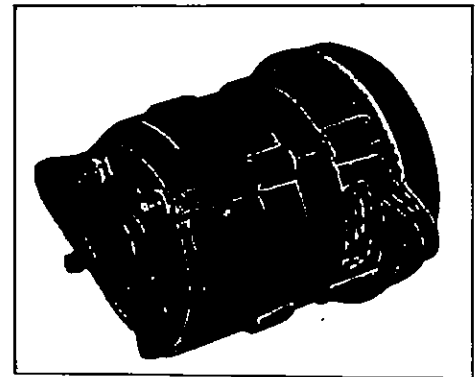


Fig. 2-2. 1

\*The completed

The parenthesized is the part number for SP311.

b)

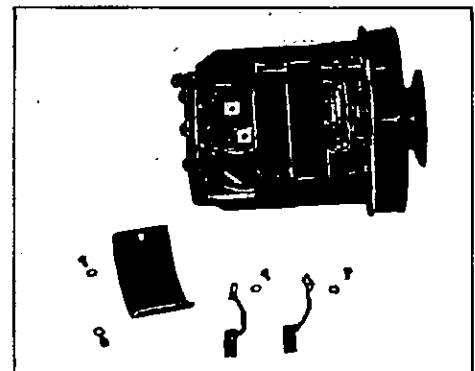


Fig. 2-2. 2

Remove the brush cover and pull off the brush, 2 ea.

c)

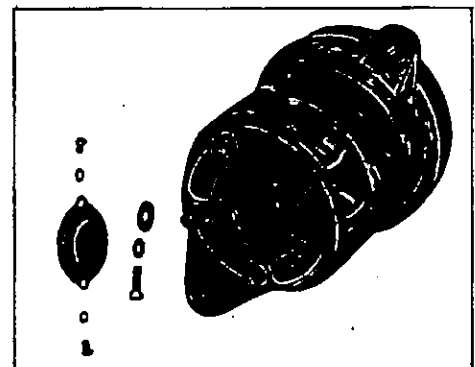


Fig. 2-2. 3

Remove the cover of bearing and take off the hex. bolt of shaft.

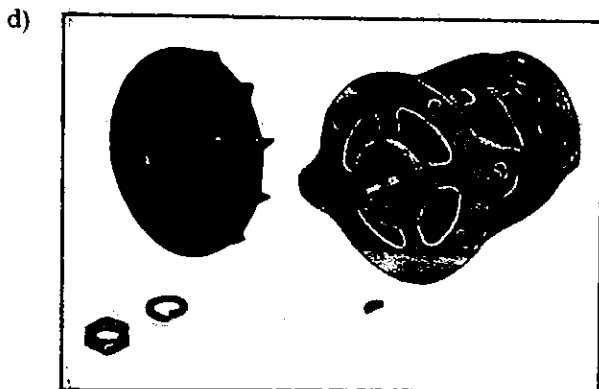


Fig. 2-2. 4

Remove the hex. nut of pulley and pull off the pulley and the half-moon key. Be careful not to injure the fan when the nut is removed.

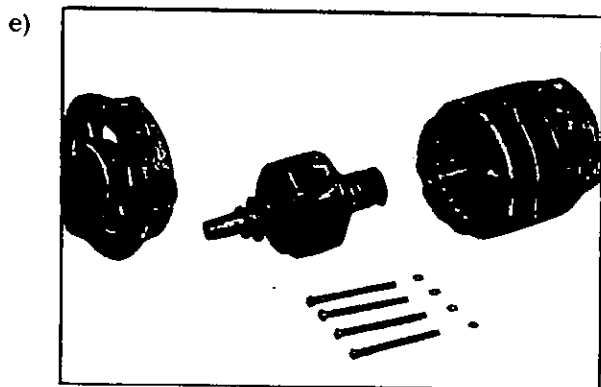


Fig. 2-2. 5

Remove the through bolt tightening bolt front cover and rear cover, pull off the front cover and rotor.

Use a hammer of wood or plastic if necessary.



Fig. 2-2. 6

Remove the ball bearing from the front cover. Remove the bolt or tightening the bearing plate and or pull off the bearing with such as a hand press.

Slacken N terminal bolt on the rear cover side and remove the clip terminal, then the rear cover and the stator can be separated.

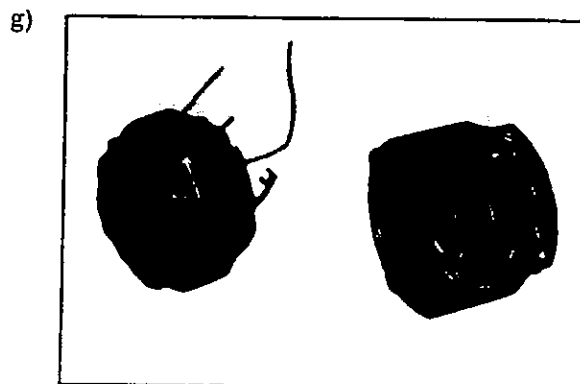


Fig. 2-2. 7

Remove the rear cover and stator.

Separate the silicon diode, 3 ea. from the stator coil lead wire, 3 ea. by melting soldering with an electric iron.

Slacken N terminal bolt on the rear cover side and remove the clip terminal, then the rear cover and the stator can be separated.

NOTE: When temperature within diode gear up over 150°C the diode will lose functioning, so that use the electric iron, 100~200W, for around 2 seconds at the soldered portions.

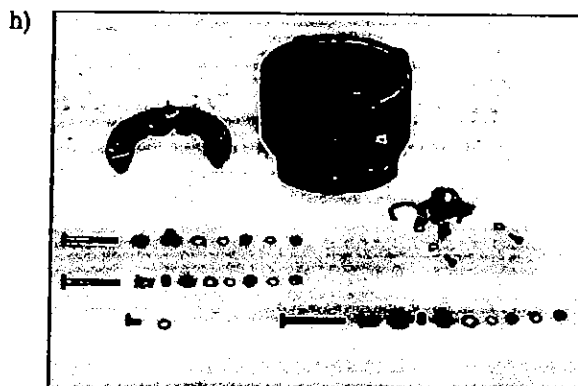


Fig. 2-2. 8



Remove the diode set and brush holder from the rear cover.

When be careful not to lose small parts such as screws, washers and bushings.

## B. Assembly

Assembly is done in the reverse sequence of disassembly.

Always make sure the polarity of alternator or regulator before replacing the diode either positive or negative. The polarity of alternator or regulator is usually marked on the name plate or lable which is attached to each model.

In case the alternator or regulator shows the positive ground, the red coloured diode should be mounted in the frame of slip ring end and the black coloured diode in the heat sink.

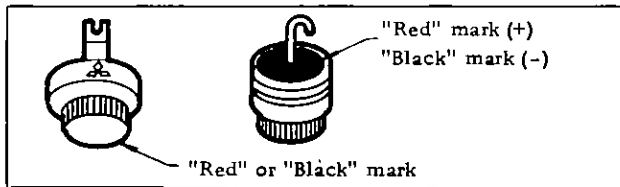


Fig. 2-2. 9

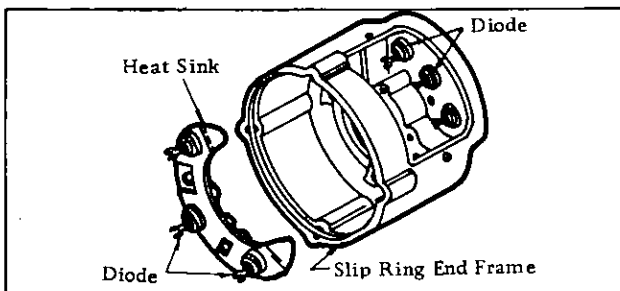


Fig. 2-2. 10 Exploded View

## Removal

To remove a diode, use a suitable tool to support the end of the frame, or heat sink, and push the diode out by using an arbor press as shown the below.

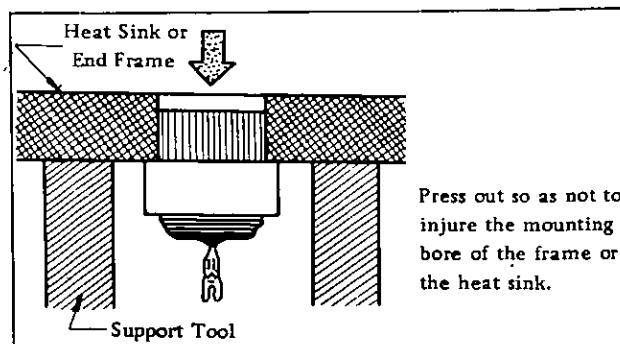


Fig. 2-2. 11

## Installation

Support the heat sink or end frame with a suitable tool and then press the diode in the heat sink and end frame by using the tool shaped (A) which fits over the outer diode edge A portion.

Press down perfectly the diode in the mounting bore of C portion to the lower edge of B portion of the diode.

Checking the replaced diodes.

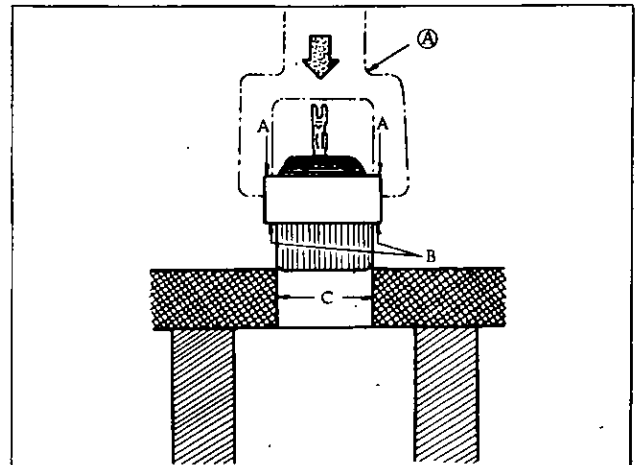


Fig. 2-2. 12

## Inspection of Troubles

### A. Inspection of Output

For inspection of output, remove the dynamo from the vehicle and connect wiring as shown in Fig. 3. 1 and drive it with motor.

(For inspection of output of dynamo without removing it from the vehicle, refer to "Inspection of AC generator" to be published later.)

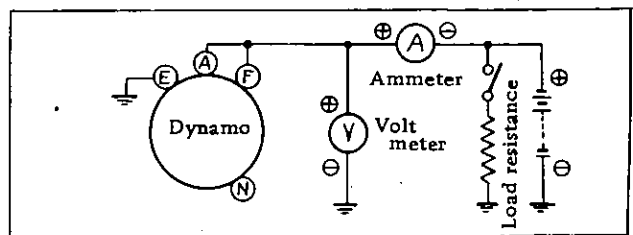


Fig. 2-3. 1

NOTE: Use the battery charged in full up to the normal capacity.

Through the wiring shown in Fig. 3. 1, magnetic current flows from the battery to the field coil of dynamo. In this state, raise revolution of dynamo slowly up to the speed

where there is no reverse flow (2 A approx.) to the field coil and read the revolution. Correct revolution is approx. 1000 rpm. without load.

Next, increase load resistance to the maximum and almost stop flowing of load current, and put off the switch. Then, raising the load current slowly, increase revolution of dynamo. Observe thus increasing output current as revolution of dynamo increases. If there is no large difference from the specification, it is correct.

No matter how the battery is over-charged or discharged, if the charging current is small, first make sure either the dynamo or the relay is in disorder. See the charging current by inserting the ammeter between A terminal of relay and the battery.

Disconnect wire passing from the dynamo F terminal to the relay F terminal at the relay F terminal and make the removed lead wire short circuits at the relay A terminal, when if the charging current highly increases, the relay is in disorder.

## B. Short Circuits on Diode "-" Side

It can be judged as the pilot lamp does not flare even if the key switch is turned on. Actually a trouble such as "diode open" is very rare and short circuits at the polar line are also rare. Ordinarily, there are many cases of "+" side short circuits.

## C. Inspection of Diode with Tester

### a) Simple Inspection

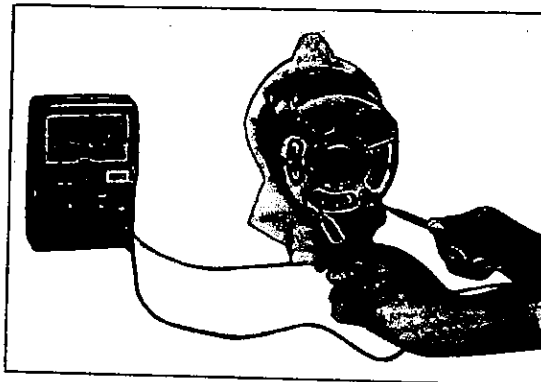


Fig. 2-3. 2

Check between the terminals, A-N as shown in Fig. 3.2. Set the dial of tester for conductivity and put the tester needles

at both terminals alternately.

When one shows low resistance and the other shows pretty high resistance, the 3 diodes in the diode set are all right.

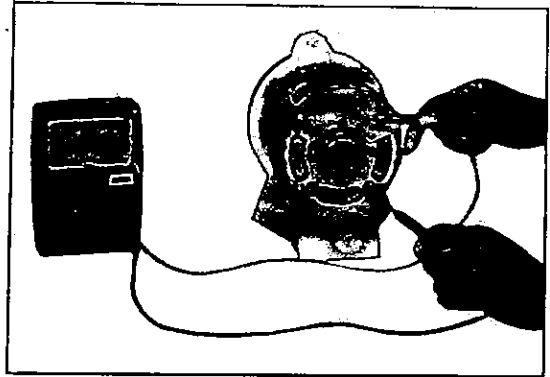


Fig. 2-3. 3

Check between the terminals, A-E same as above.

When the same result is obtained, 3 diodes are also all right.

However, when there is no disorder found in this simple test and the dynamo output is somewhat lower than the standard, 1~2 diodes are often in opening, when one by one checking will be necessary.

### b) Separate Inspection

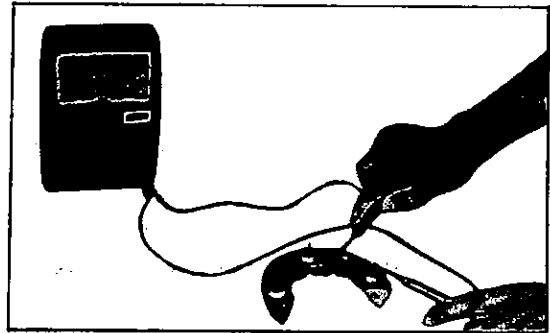


Fig. 2-3. 4

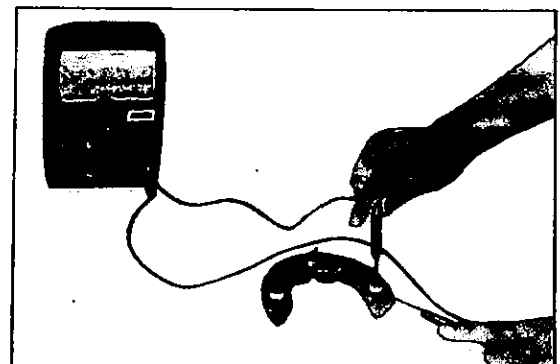


Fig. 2-3. 5

Check resistance with the tester between the diode base commonly used for 2 diodes and lead wire on the rear cover -2 times changing the poles.

When one side shows low resistance and the other shows high resistance, there is no disorder. If both sides are low, there will be short circuit and both sides are high there will be open.

### D. Inspection of Diode with Lamp

#### a) Simple Inspection

Check positive diodes

Check negative diodes

Test Method	Test	Lamp	Method	Test Method	Test	Lamp	Method
	Connection	Lamp	Result		Connection	Lamp	Result
Should be conductive (A) to (B)	Connect ⊕ to (A) and ⊖ to (B)	Light	Good	Should be non-conductive (A) to (B)	Connect ⊖ to (A) and to (B)	Light	Good
		No Light	Defective			No Light	Defective
Should be non-conductive (B) to (A)	Connect ⊖ to (A) and ⊕ to (B)	No Light	Good	Should be conductive (B) to (A)	Connect ⊖ to (B) and ⊕ to (A)	Light	Defective
		Light	Defective			No Light	Good

The soldering for the lead wires should be performed in less than 20 seconds, as the

excessive heat may damage the diodes.

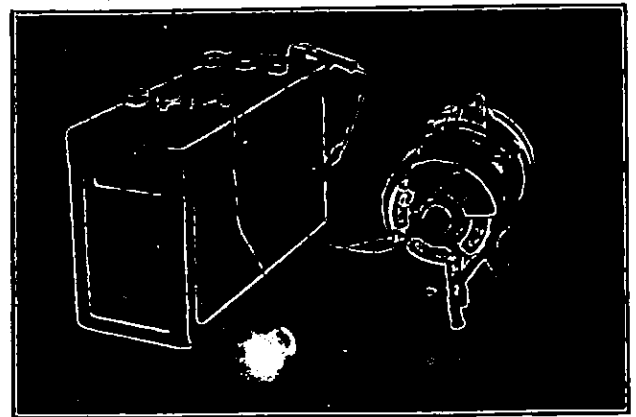
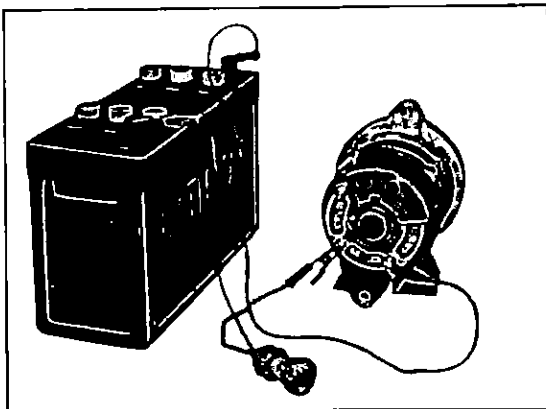


Fig. 2-3. 6

Check between the terminals, A-N as shown in Fig. 3.6.

Connect with the lamp (12V) in straight and put both ends at A and N terminals

alternately. On one side the lamp flares and on the other the lamp is off, when 3 diodes of the diode set are all right.

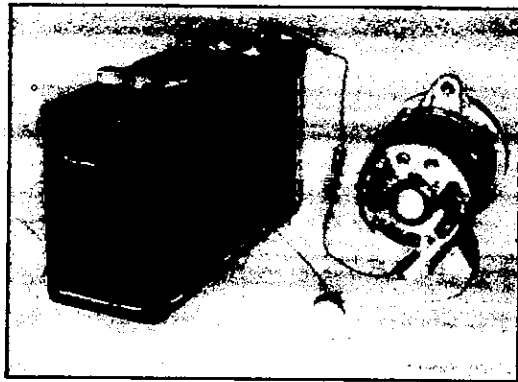
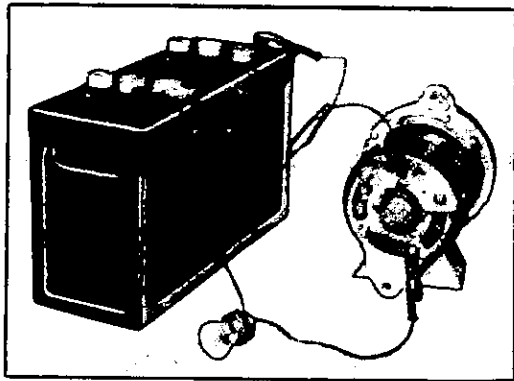


Fig. 2-3. 7

The same step is taken between the terminals, N-E. When the same result is obtained, 3 diodes pressed in the cover are all right. However, if the simple test is all right, but when the dynamo output is lower than the standard, 1~2 diodes may often be opening, so that one by one check will be necessary.

b) Separate Inspection

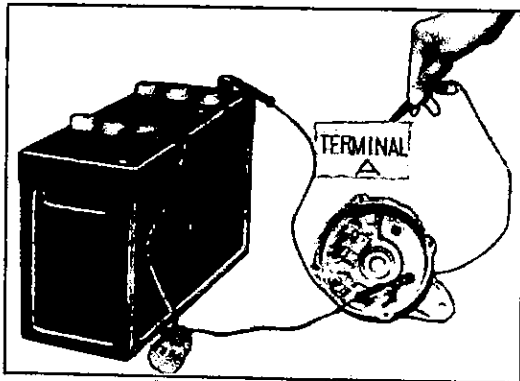


Fig. 2-3. 8

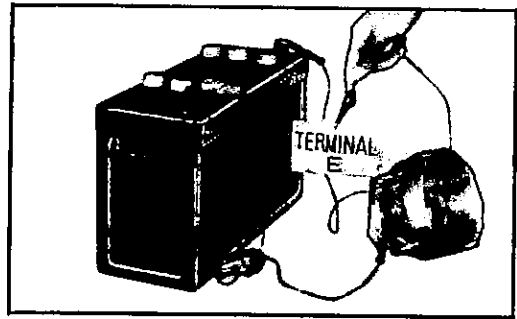


Fig. 2-3.9

Check between the lead wire and the diode set common with the other 2 diodes or the rear cover with the lamp and battery. It is all right if one side flares and the other is off. If both sides flare, there is short circuit and both sides are off, there is open.

E. Inspection Field Coil

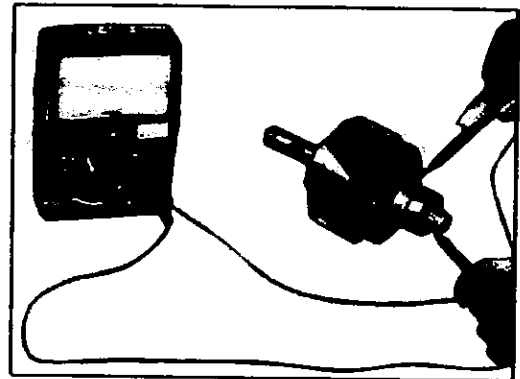
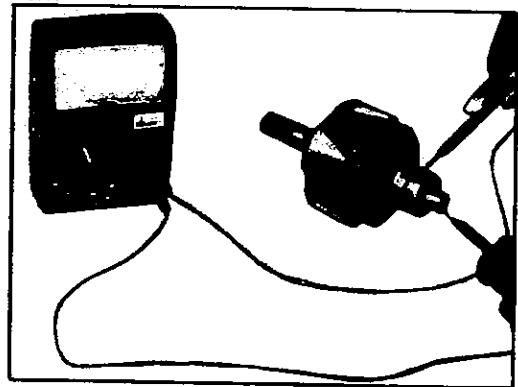


Fig. 2-3. 10

As shown in Fig. 3. 10, put the tester between the slip ring of rotor and if there are 6~7Ω, it is all right. Make sure there is no conduction between the rotor slip ring and the shaft.

## F. Ball Bearing

Both sides sealed ball bearing is used, so lubrication is not necessary.

## G. Inspection of Stator (Armature)

### a) Conduction Test

If the terminal connected to the diode is not conductive with the stator core, that is all right.

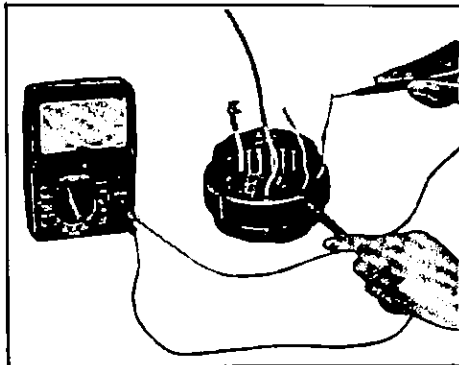


Fig.  
2-3. 11

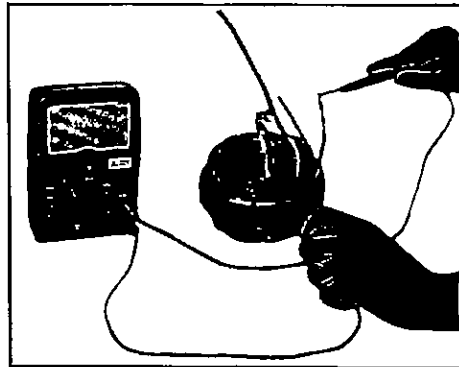


Fig.  
2-3. 12

If each terminal of the coil and the terminal connected to N terminal are not conductive, that is all right.

### b) Layer Test

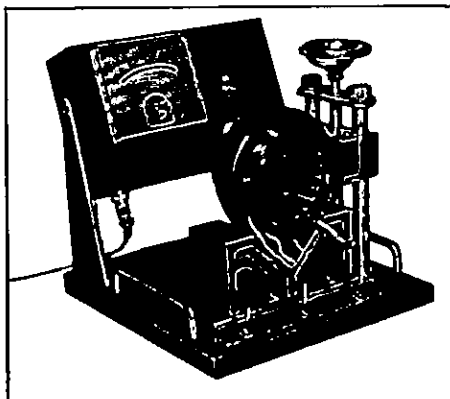


Fig.  
2-3. 13

Connect the tester cord to 100V wire, put the stator on the test stand and make the tester one turn reading the ammeter. If there is short circuit on the coil, swings of the ammeter abruptly increase and if there is no trouble, there will be no change.

## H. Inspection of Brush

Wipe with clean cloth when oil or dust is on the contact surface of the brush and slip ring.

Same as in case of DC generator, replace the brush when wear of it reached to the wear limit.

## REGULATOR

### 1. Construction and Operation

#### (1) Construction

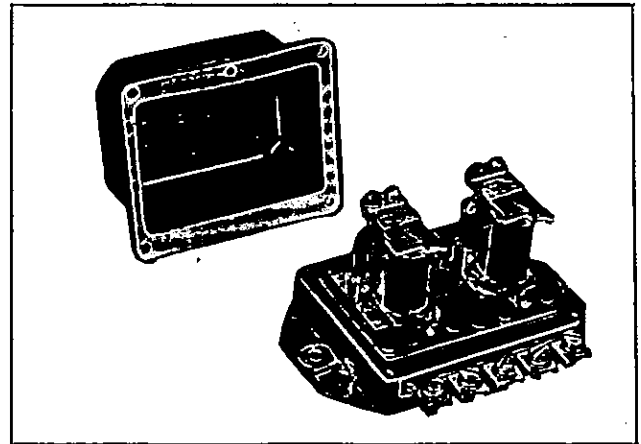


Fig. 3-1. 1

#### (2) Operation of Constant Voltage Relay

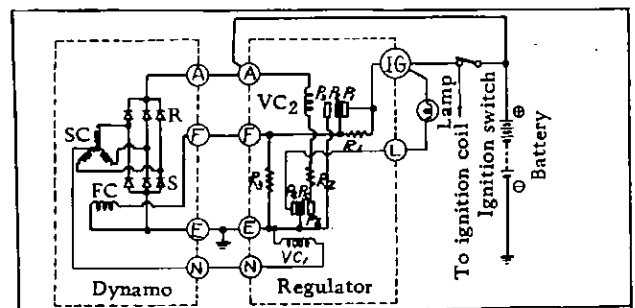


Fig. 3-1. 2

When the ignition switch is on, current from the battery passes through the dynamo E terminal, field coil, contact points P<sub>2</sub>, P<sub>1</sub> and the dynamo is magnetized.

While it also flows the regulator E terminal, contact points P<sub>5</sub>, P<sub>4</sub> and the lamp flares.

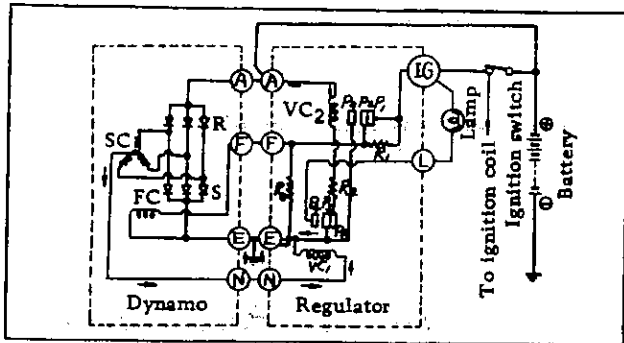


Fig. 3-1. 3

When the engine starts and the dynamo is driven, three phase alternate current generates on the stator coil, passing through the three phase all wave rectifier (diode) and changes to direct current between the terminal A-E for charging.

At the N terminal, voltage, half of that between A-E, generates and passes through the circuit, N terminal, VC<sub>1</sub>, coil, E terminal and with action of the VC coil, the movable contact point P<sub>5</sub> leaves from P<sub>4</sub> and makes contact with P<sub>6</sub>, so that the lamp is off and it passes through the circuit, E terminal, contact points P<sub>5</sub>, P<sub>6</sub> resistance R<sub>2</sub>, VC<sub>2</sub> coil and A terminal, then the VC<sub>2</sub> coil animated and prepares to vibrate the movable contact point P<sub>2</sub> of the constant voltage relay.

When the dynamo revolution gets higher, the contact point P<sub>2</sub> separates from P<sub>1</sub> with electric magnetism of the VC<sub>2</sub> coil and the field current from the circuit of the dynamo E terminal, field coil, F terminal and resistance R<sub>1</sub> and when the

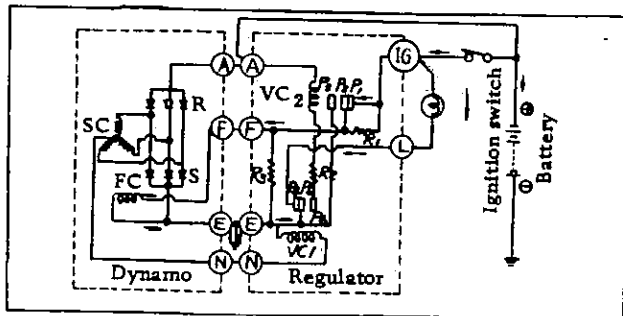


Fig. 3-1. 4

contact point P<sub>2</sub> contacts with P<sub>1</sub>, the current flows through the circuit of dynamo E terminal, field coil, F terminal, contact points P<sub>2</sub>, P<sub>1</sub>. This is repeated according to vibration of the contact point P<sub>2</sub> and the dynamo terminal voltage

is kept evenly and continues charging.

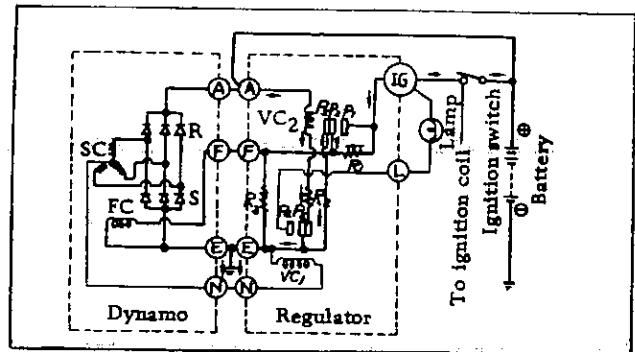


Fig. 3-1. 5

When the dynamo revolution gets still higher, the movable piece is drawn and the movable contact point P<sub>2</sub> sticks to P<sub>3</sub>, so that current almost does not flow the field and the generated voltage of dynamo goes down. As the result, the contact point P<sub>2</sub> separates from P<sub>3</sub> and the current from through the dynamo E terminal, field coil, F terminal, resistance R<sub>1</sub> and voltage goes up again. At such a high speed, with open and close of the contact points, P<sub>2</sub> and P<sub>3</sub>, the dynamo terminal voltage is always kept evenly.

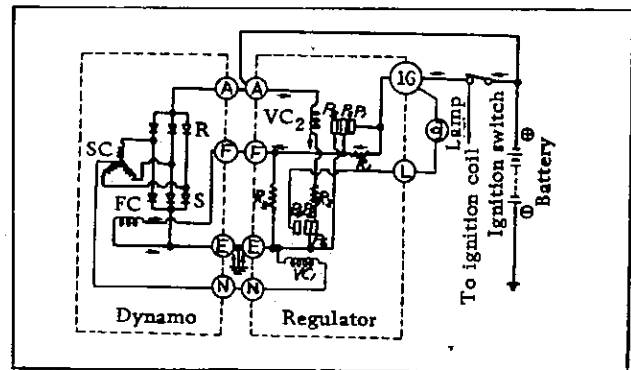


Fig. 3-1. 6

The operation of this time is called a high speed operation and the adjust voltage is called a secondary voltage.

When the dynamo revolution goes down and charging capacity reduces, the voltage between the terminals, N-E, also lowers.

As the result, the electric magnetism of VC<sub>1</sub> coil weakens and the contact point P<sub>5</sub> fixed with the movable piece can not continue contact with P<sub>6</sub> and changes to P<sub>4</sub> side and lights the lamp indicating non generation.

When the ignition switch is turned off to stop the engine, the lamp goes out and the current to the field coil is suspended.

(3) Operation of Pilot Lamp Relay

As shown in Fig. 3-1. 2, this is made up with the contact points, P<sub>4</sub>, P<sub>5</sub>, and P<sub>6</sub>. The contact point P<sub>5</sub> is on the movable side and usually makes contact with P<sub>4</sub>. Between the terminals, N-E, the movable piece is drawn when voltage half of the battery is added and P<sub>5</sub> fixed to the movable piece separates from P<sub>4</sub> and makes contact to P<sub>6</sub>. When the voltage between N-E terminals is conspicuously reduced, P<sub>5</sub> makes contact with P<sub>4</sub> again.

The voltage between N-E terminals necessary for P<sub>5</sub> to make contact with P<sub>6</sub> is "Put-off voltage" and that P<sub>5</sub> changes from P<sub>6</sub> to P<sub>4</sub> is "Put-on voltage".

2. Adjustment

(1) Check Adjust Value of Constant Voltage Relay

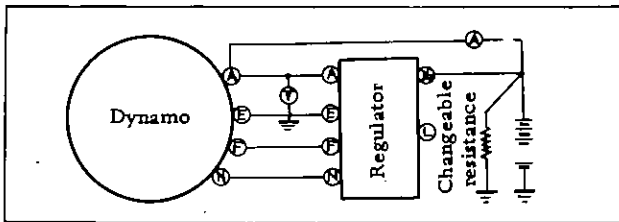


Fig. 3-2. 1

Connect the battery almost charged in full as shown, and make the dynamo revolution with 4000 rpm.

When the voltage of this time is 14~15V, it is all right.

(2) Check Voltage of Put-off, Put-on Pilot Lamp Relay

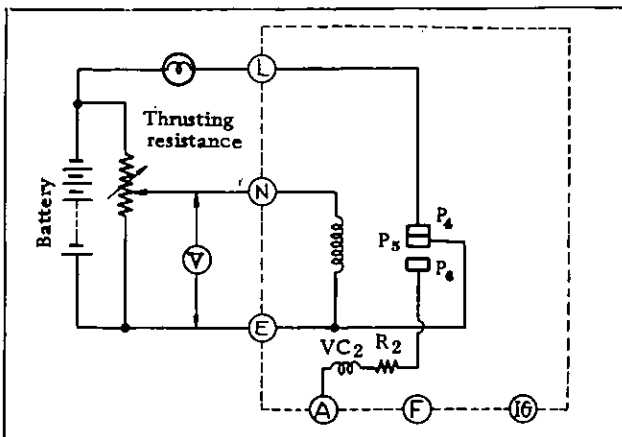


Fig. 3-2. 2

First, put on the lamp with connection as shown in Fig. 2.2 and read the voltage between N-E by putting off the lamp moving the volt split point of the rubbing resistance. This is a put-off voltage.

From this state, move the rubbing resistance volt split point and lower the voltage and read the voltage when the lamp flares.

This is a put-on voltage. If the put-off voltage is 4.2~5.2V and the put-on voltage is 0.5~0.3V, it is all right.

(3) Adjustment of Gap (Constant Voltage, Pilot Lamp Relay)

The voltage adjust values of the constant voltage relay and the pilot lamp relay must be as shown in Fig. 2.3.

	Gap		
	G <sub>1</sub>	G <sub>2</sub>	G <sub>3</sub>
Constant Voltage Relay	0.8~1.0	0.7~0.9	0.3~0.4
Pilot Lamp Relay	0.8~1.2	0.8~1.1	0.8~1.1

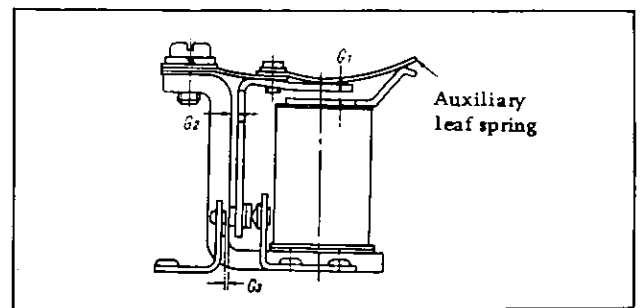


Fig. 3-2. 3

(4) Adjustment of Voltage

Put-off voltage of the constant voltage relay and pilot lamp relay.

Adjust the voltage by bending the stopper up and down. Bend upward to heighten adjust value and bend downward to lower adjust value.

**14 ITEMS ON HANDLING**

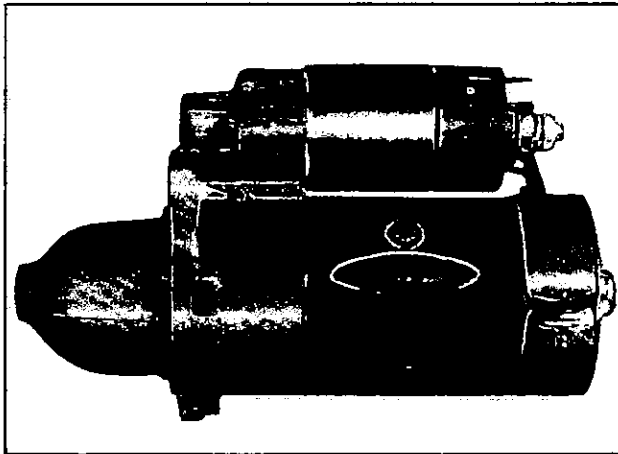
Prohibition	Reason
<p>(1) When mounting on vehicle, polish the contact points on both sides removing point, rust or oil.</p> <p>(2) Make sure the engine side pitch and dynamo side pitch of the front cover are well fitted together.</p> <p>(3) Be attentive to the belt tension.</p> <p>(4) Regulator is sealed with lead. If the seal is removed during the claim period, the claim will be invalid.</p> <p>(5) If the earth is not correctly set, the adjust value will change.</p> <p>(6) Connect the dynamo and battery with full attention.</p> <p>(7) Make sure the whole circuit is completely composed.</p> <p>(8) Change wiring with full attention.</p>	<p>When the battery poles are connected in reverse, large current flows from battery to dynamo, resulting in damages of diode or lead wire.</p> <p>When after the engine started the dynamo is magnetized from the ignition switch, so that incorrect wiring will result in hampering magnetization and then generation.</p>
<p>(9) Do not use the high voltage tester such as megger.</p>	<p>As diode is built in, the diode will be damaged with high voltage.</p>
<p>(10) Engine room must be kept in the condition of standard usage.</p>	<p>Because there is diode which will deteriorate or be damaged with temperature higher than the normal.</p>
<p>(11) Do not separate the battery terminal (dynamo terminal) during driving vehicle.</p>	<p>Separation of the terminal causes surge voltage within battery and damages diode.</p>
<p>(12) When cleaning with steam cleaner, do not expose dynamo to steam directly. When washing with water, dynamo must be free from reckless pour of water.</p>	<p>If the diode is moistened, the performance will be lowered.</p>
<p>(13) When the battery is quickly charged with the quick charger, the lead wire or regulator A terminal (dynamo A terminal) should be disconnected.</p>	<p>Surge voltage of the quick charger will also damage diode.</p>
<p>(14) Put the key switch off when the engine in a stop except when particularly needed.</p>	<p>When the key switch is on, magnetic current always flows on the field coil and might damage the dynamo and often causes over discharge of battery.</p>



TROUBLE SHOOTING LIST

Trouble & Cause	Remedy
<p><i>5-1 Over-discharge of battery</i></p>	
<ol style="list-style-type: none"> <li>1. Slackness of fan belt</li> <li>2. Earth or breakage of stator coil</li> <li>3. Breakage of rotor coil</li> <li>4. Mal-contact of brush and slip ring</li> <li>5. Mal-function of diode</li> <li>6. Adjust voltage of constant voltage relay is low.</li> <li>7. Mal-contact of low speed side contact point of constant voltage relay.</li> <li>8. Adherence of high speed side contact point.</li> <li>9. Shortage or unfitness of electrolyte.</li> <li>10. Mal-function of battery pole. (short circuit)</li> <li>11. Mal-contact of battery terminal</li> <li>12. Mal-contact or breakage between ignition switch and relay IG terminal.</li> <li>13. Mal-contact or breakage between regulator F terminal and dynamo F terminal.</li> <li>14. Excessive electric load.</li> </ol>	<p>Adjust                      Repair or replace                      Replace                      Replace brush, clean holder                      Replace as a set                      Readjust</p> <p>Polish contact point                      Replace                      Add distilled water, check S.G.                      Replace or repair                      Clean, retighten terminal</p> <p>Repair</p> <p>Repair                      Check power consumed</p>
<p><i>5-2 Over-charge of battery</i></p>	
<ol style="list-style-type: none"> <li>1. Constant voltage relay adjust voltage is too high.</li> <li>2. Constant voltage relay coil breakage or rare short.</li> <li>3. Constant voltage relay coil straight resistance breakage.</li> <li>4. Constant voltage relay low speed side contact point adherence.</li> <li>5. Constant voltage relay high speed side contact point mal-contact.</li> <li>6. Breakage or rare short of pilot lamp relay.</li> <li>7. Mal-contact of pilot lamp relay contact point.</li> <li>8. Mal-function of regulator earth.</li> <li>9. Mal-contact or breakage between regulator N terminal and dynamo N terminal.</li> </ol>	<p>Readjust</p> <p>Replace</p> <p>Replace</p> <p>Replace</p> <p>Polish contact point                      Replace                      Polish contact point                      Adjust</p> <p>Repair</p>
<p><i>5-3 Noises of Dynamo</i></p>	
<ol style="list-style-type: none"> <li>1. Mal-function of bearing.</li> <li>2. Mal-function of diode.</li> <li>3. Earth or rare short of stator coil.</li> </ol>	<p>Replace                      Replace diode as a set.                      Replace.</p>

STARTER MOTOR



Type S114-92 Starting Motor

Make Hitachi  
Weight 4.6 kg

Type		S114-92
Rated Output	V-Kw	12-1.0
Meshing Device		Magnetic
No Load Current	V-A	Under 12-60
No Load Rev.	rpm	Above 7,000
Brush Normal Height	mm	14
Brush Wear Limig	mm	4.5
Brush Spring Tension	kg	0.8
Commutator	Dia. mm	33
Commutator Wear		
Limig	Dia. mm	2
Pinion Operating Voltage	V	Under 8
Pinion Gap	mm	3-5

Construction and Operation

The starter motor is a 1.0 horsepower sliding inertia type electric motor for use in starting. The motor when mounted on the engine is on the front right side of the transmission with its pinion gear directly opposite to the ring gear. The construction of the starter motor is similar to that of the generator but differs only in that its armature shaft extends out backwards with a pinion group installed on the end as show in Fig. 1 & 2.

The connection diagram for the starter is shown in Fig. 3.

The starter switch is a key type combined

with the ignition switch. By turning switch to the right direction, the relay on the magnetic switch move to permit current to flow to the starter and cause the armature to start turning suddenly.

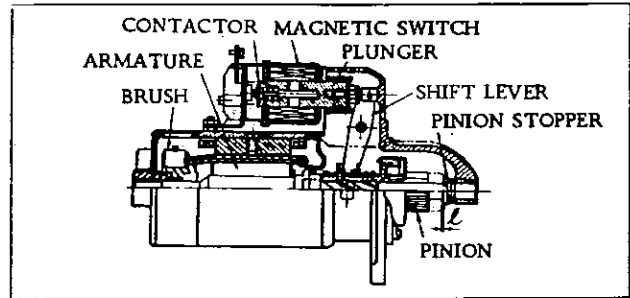


Fig. 1 Magnetic Shift Type

After advancing about 14 mm, the pinion completes the meshing into the ring gear and drives it with a powerful torque. The direction in which the pinion moves is from the end of the shaft towards the starter bracket, thus reducing the bending torque. After the engine starts and its speed becomes greater than the no-load speed of the starter, the pinion is kicked back to unmesh and return to its former position.

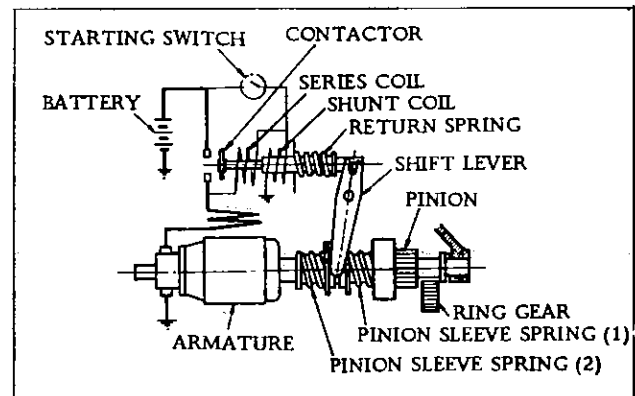


Fig. 2 A View of Starter System

Operational Precautions

The instructions to be observed when starting the engine are as follows:

- (1) The starter should be securely mounted on the engine and should not show any looseness.

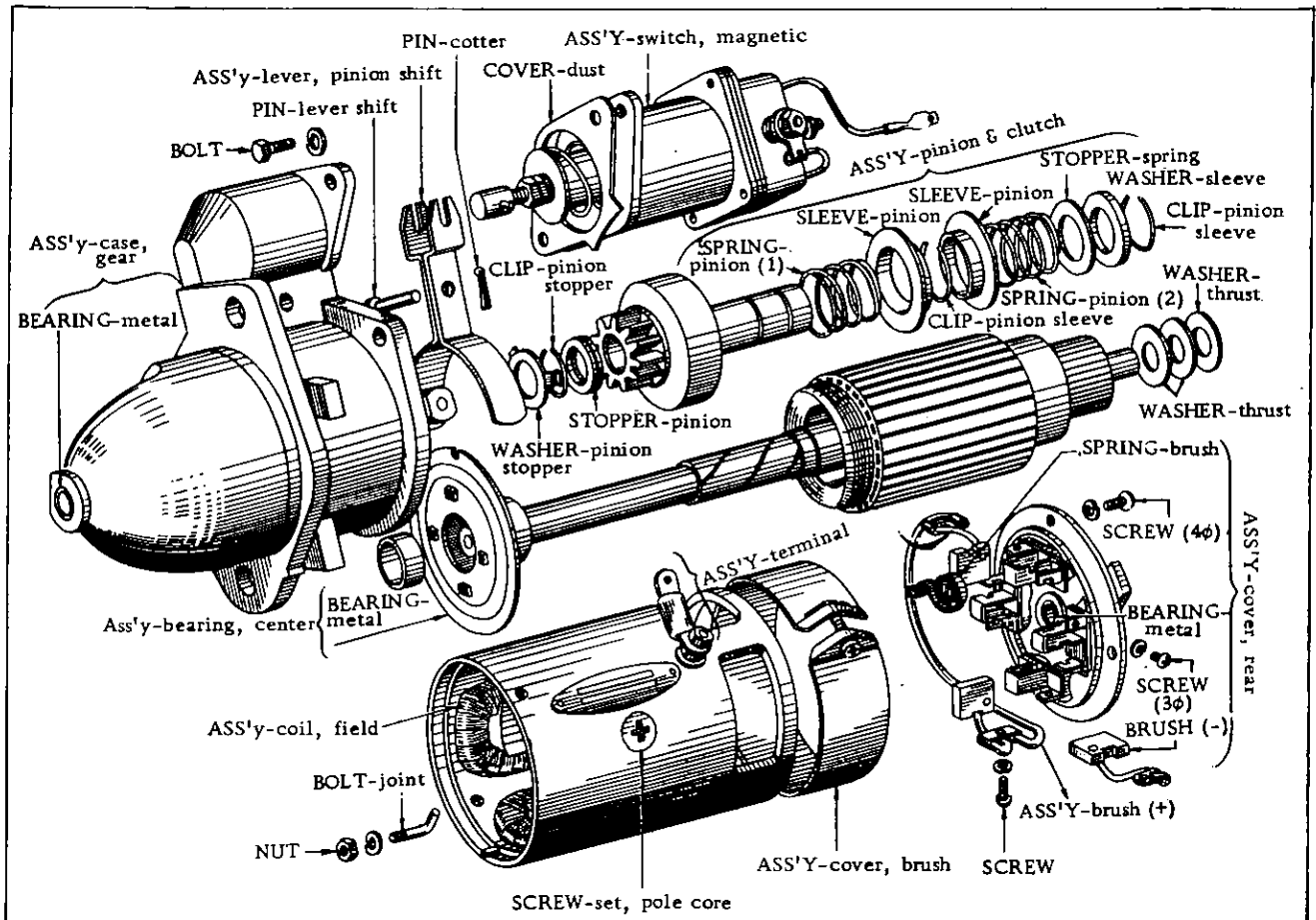


Fig. 3 Starter Motor (Hitachi)

- (2) The starter switch should be operated properly and should be release immediately when the engine starts.  
Excepting in extremely cold weather, the engine should normally start within 10 seconds.
- (3) The starter switch should not be operated when the engine is running. If the engine fails to start, allow time for the pinion to come to rest before turning the starter switch again.
- (4) When the engine fails to start after turning the starter key for over 10 seconds, do not continue turning the key time after time but try to save the battery. In this case, check for the cause of the trouble and correct so that the engine will start.

Checking While in Operation

- (1) With a fully charged battery and with the lamps lighted, the starter switch is used. If the lamps become dim, especially when the engine does not start, the current is flowing through the starter motor coil but for some reason the armature is not turning. Careful check should be made since the starter pinion may be locked in the flywheel ring gear and unable to return, a trouble usually caused by turning on the starter while the engine is still running.
- (2) When the starter switch is turned up and the starter motor fails to turn although the lights remain bright, the switch should first be checked. If the switch is in satisfactory condition, then the condition of all the terminal and ground connections of the battery, starter switch and starter are

checked. If the starter motor runs but its movement is sluggish, it indicates either a high resistance due to loose connection in the starter circuit or a badly discharged battery.

- (3) If after the above troubles are corrected and the starter fails to operate occasionally and shows defective performance, it is due to internal defects so that in this case, it should be dismantled and checked.

## Dismantling and Disassembling

- (1) The starter can be dismantled easily by removing the two stud nuts mounting the starter on the engine.
- (2) The two stay bolts on the starter rear cover (front end when mounted on the engine) are removed.
- (3) After removing the band cover, the brushes and lead wires are removed.
- (4) By properly protecting and holding the starter body, the armature shaft is pulled out.
- (5) The armature and the front cover are taken out together.
- (6) To remove the pinion group from the armature shaft, the cotter pin on the end of the shaft is pulled out and by removing the pinion nut, the pinion group is removed.

## Inspection and Repairing Parts

The same procedure as that for the generator parts is followed, the parts being cleaned and inspected after which determinations are made as to whether they can be reused or if repairs or replacements are necessary.

- (1) The pinion is inspected for defects and if the tooth face is worn or the tooth edge is damaged, the pinion should be replaced. Worn or broken teeth will not only make the gear mesh poorly but will hasten the wear on the opposing gear and also, poorly meshing gears will cause bending in the armature shaft. For this last reason, care should be

taken, when inspecting, to also check the flywheel and take remedial measures if the ring gear is found worn or damaged. When the pinion is found defective, replaced the entire pinion group.

- (2) When inspecting the armature, check the armature to core gap, shaft to bushing clearance, bending in shaft, etc., in the same manner as that for the generator and are corrected to the specified limits, or the armature is replaced. Special attention should be given to the clearance between the armature and the core to see that they are not contacting, and corrosion found on the outside surface of the armature or the inner surface of the core should be removed by polishing, and the surfaces painted with rust preventive oil.
- (3) The armature is inspected and repaired in accordance with the procedures outlined for the generator. Especially to improve or correct the brush contacting condition, the brushes are resealed. At the same time, the brush spring are checked and are corrected or replaced.
- (4) The insulation on the wires are carefully inspected and wires found with weak or damaged insulation should be replaced.
- (5) An armature found with one part especially damaged by burning should be strictly tested by the insulation test.

## ADJUSTMENT

### a. Meshed Pinion Position by Magnetic Switch

The correct clearance between the pinion stopper and pushed out pinion which is shown by  $\ell$  dimension in Fig. 4 must be following.  $\ell = 0.3 - 1.5$  mm.

In case that the  $\ell$  dimension is incorrect, adjust plunger gap of the magnetic switch by following paragraph b. Pay attention that the  $\ell$  dimension must be measured when the pinion is at most pushed out by the shift lever of the plunger and the back lash of the pinion is eliminated by pushing gear inward with finger as Fig. 3 shows. If the  $\ell$  dimension is incorrect, it will be the

possible cause of large meshing noises or early wear and damage of the pinion and ring gear.

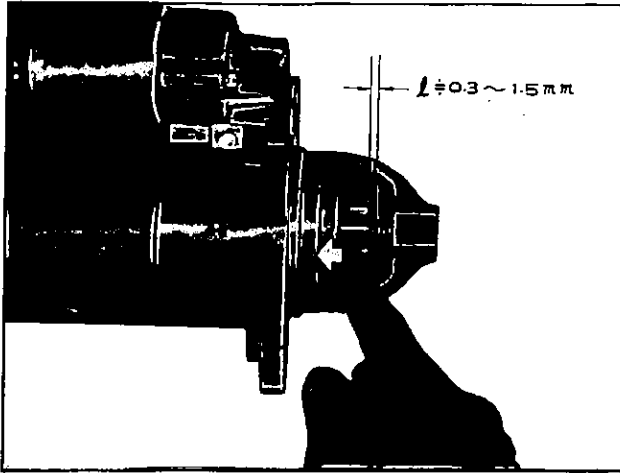


Fig. 4 Checking Dimension

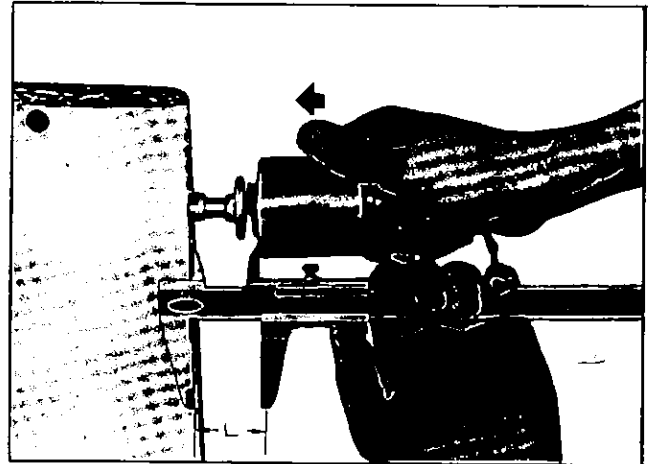


Fig. 6 Measurement of Plunger Cap

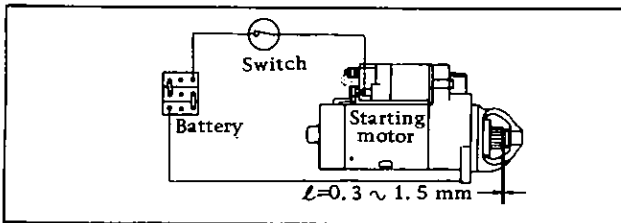


Fig. 5 Cable Connection of Dimension Adjust

b. Adjustment of Plunger Gap of Magnetic Switch

The L dimension when the plunger gap is compressed to 0, must be following in Fig. 6.  
 $L = 31.7 - 32.3 \text{ mm}$

This adjustment is carried out at the adjuster and the adjusting nut.

DISASSEMBLING AND ASSEMBLY OPERATION

5-1 Disassembling the Armature, Gear Case and Pinion

Disassembling order is shown by Fig. a to Fig. c.

Disassembly is operated by removing magnetic switch fixing bolts, through bolts and the armature shaft clip. Before disassembling main body, remove brushes by unscrewing brush fixing screws as Fig. 6.

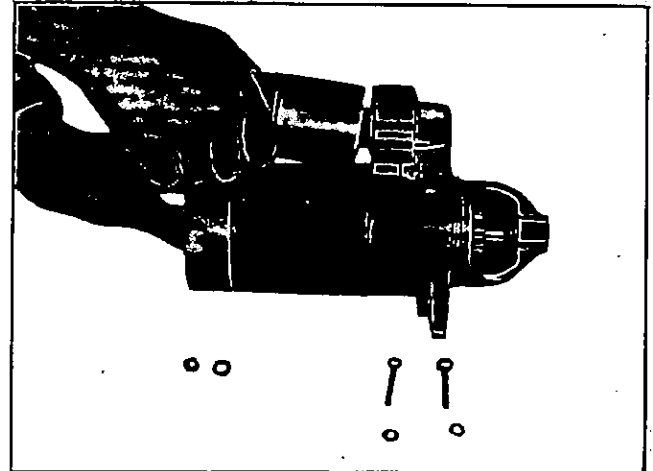


Fig. a Removing Magnetic Switch

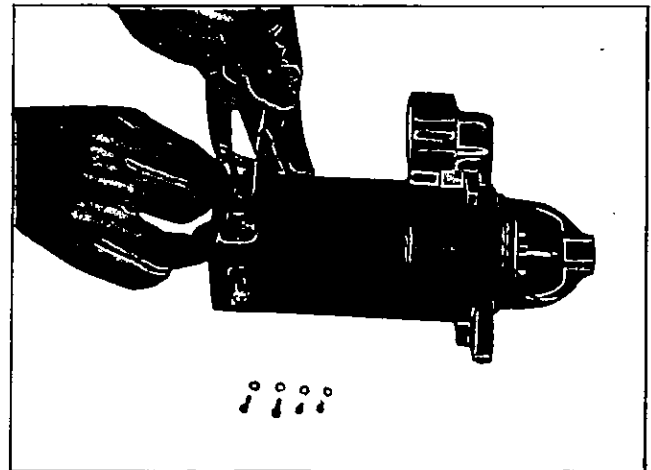


Fig. b Drawing out Brushes (After removing fixing screw)

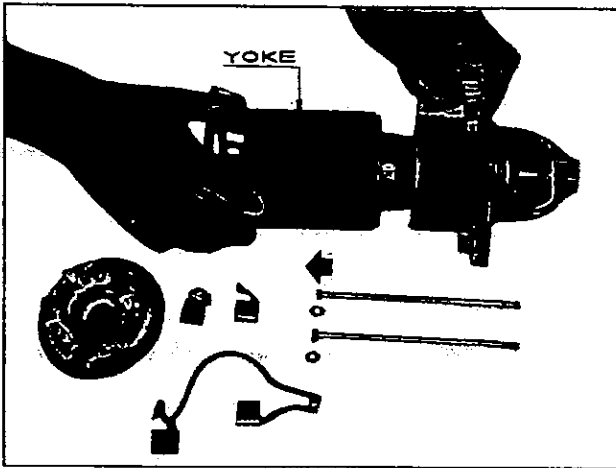


Fig. c Drawing Out Yoke

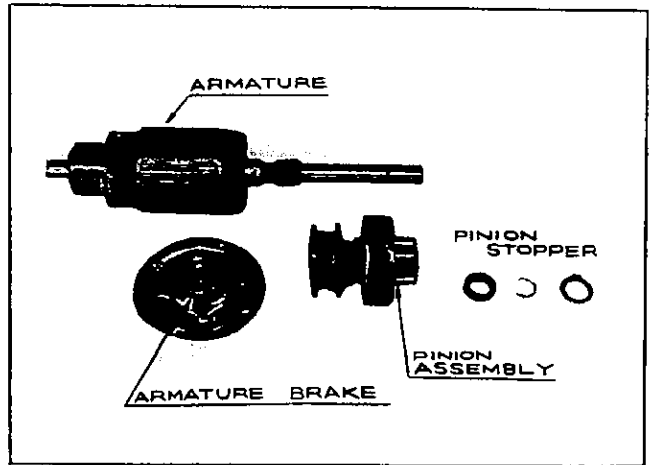


Fig. f Disassembling Armature

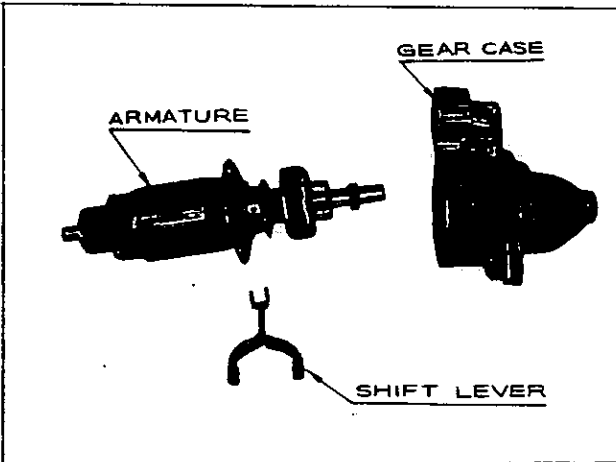


Fig. d Disassembling Armature and Gear Case

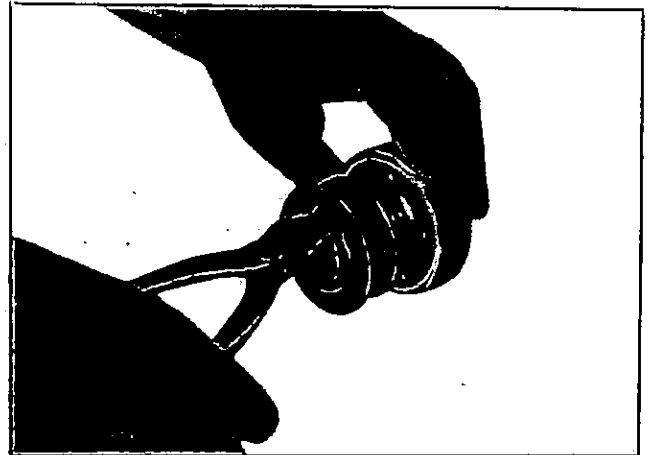


Fig. g Removing Pinion Clip

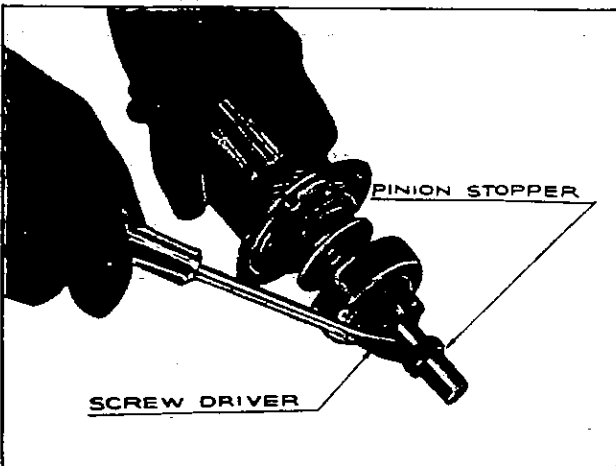


Fig. e Removing Pinion Stopper

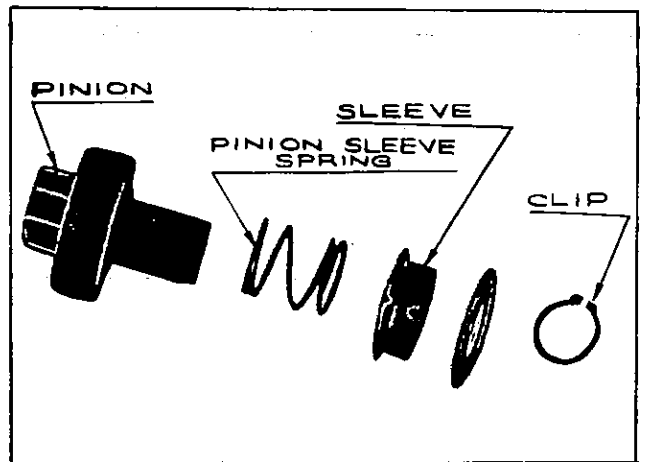
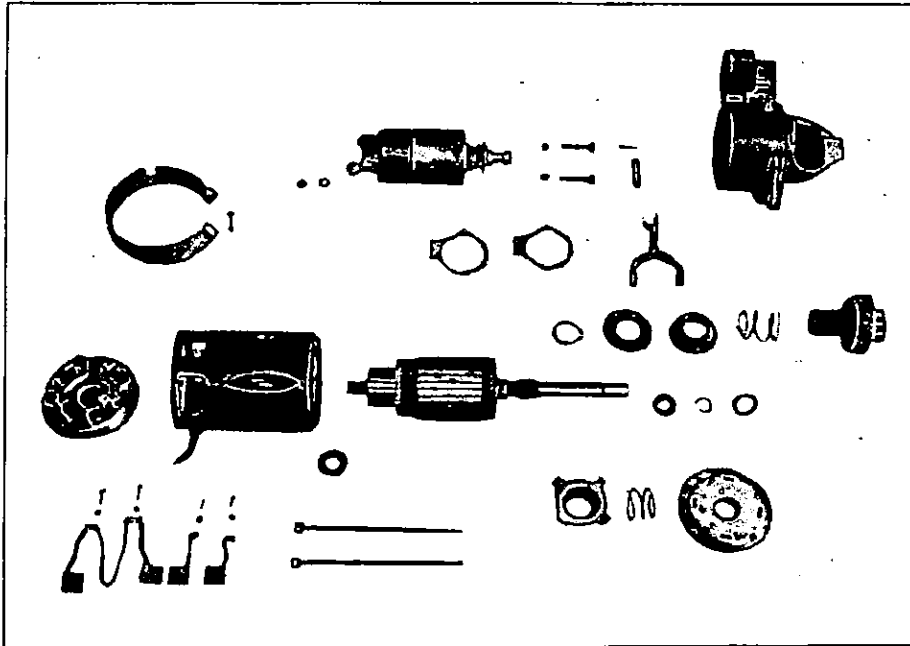


Fig. h Disassembling Pinion Subassembly



*Fig. i Display of all Component*

**Disassembling Pinion**

Disassembling is carried out by removing pinion clip as Fig. g.

Assembling will be done in reverse sequence of disassembling operation. At assembly, check each dimension and major specification standard.

**Assembling and Testing Starter**

Reassembling is performed by following the reverse procedure for disassembling. All frictional parts are lubricated with mobile oil (SAE 30) while the bearings are coated with a small amount of grease circuit in the magnetic switch and causes the main circuit  $S_2$  in the magnetic circuit to close. Releasing the starter switch opens the magnetic circuit which also opens  $S_2$ .

(1) Causes for magnetic switch failing to operate can be divided into electrical and mechanical sources.

Causes for electrical troubles.

(A) Current failure in magnetic circuit.

When the starter switch in pressed and

the current falls to pass through the magnetic circuit, most of the trouble is due to broken soldered connection between the magnetic coil wire add the magnetic switch (+) terminal, and defective ground connection from the coil wire to the magnetic switch body.

(B) Defective contact in main circuit  $S_2$ .

When the magnetic circuit is satisfactory and  $S_2$  is closing but only a small current flowing due to high contact resistance, and the opposite case of switch  $S_1$  opening but  $S_2$  remains closed. In either case, the trouble lies in the faulty moving of the core or roughness of the contacting point surface. Therefore polished the surface well, then the operation will become satisfactory.

Causes for mechanical troubles.

Failure to operate is caused in many cases by the guide shaft on the moving core of the magnetic switch main circuit  $S_2$  sticking against the cover hole.

Correction can be made in this case by loosening the cover screws (4 pieces) and retightening them so that the shaft moves freely.

## (2) Precaution

In removing nuts from the magnetic switch main circuit terminals when installing or removing cables, the lower nut of the double nuts should be kept in a tightened state while unscrewing. If the lower nut is loose, the terminal bolt may turn together and ground the terminal to the cover and cause damage.

## Starter Troubles, Their Causes and Remedies

The following is a list of troubles which can be determined from the state the starter is installed on the engine.

### (1) Starter fails to turn.

The engine is checked to see if it can be cranked by hand.

If it cannot be cranked, the engine is at fault and should be checked. If it can be cranked easily, the starter including the wiring should be checked and correction made accordingly.

Is the battery run down? Check the specific gravity of the battery fluid to see if it is over 1.240 and recharge or replace the battery as found necessary.

All loose battery and ground cables should be cleaned and properly tightened.

(Magneto grease or Gargoyle (BRB No. 1). All cord connections are carefully tightened and special attention given to the condition of insulation. The assembly check is made by testing the starter as a single unit using a fully charged battery. Tests are made with a starter motor tester or with the apparatus shown in Fig. 4 by which braking torque is measured. In this case, the normal value should be 0.9 m-kg.

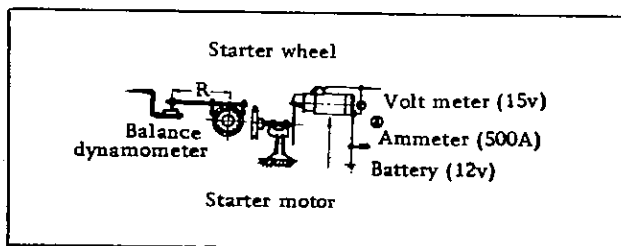


Fig. 7 Torque Testing Apparatus

## Construction of Magnetic Switch and Instructions

The magnetic switch is an apparatus when the engine is being started by shift lever, serves to close the circuit between the battery and the starter motor, and permits a large current to flow and actuate the starter motor. After starting or when the engine is stopped, the switch serves to keep the circuit open. The principles of operation can be seen from Fig. 7. Closing the starter switch  $S_1$  allows the current to flow through the magnetic.

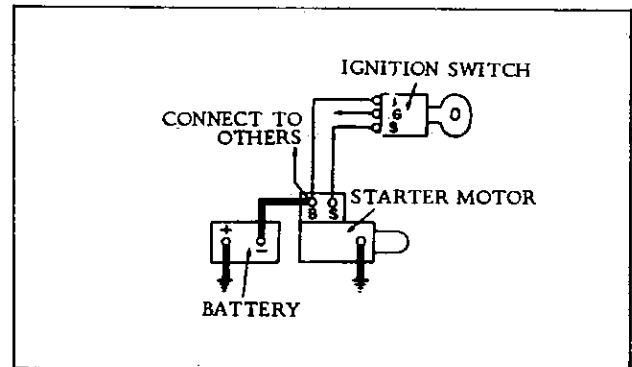


Fig. 8 Magnetic Starter Circuit

If there is trouble in the magnetic circuit, it should be corrected.

For improperly contacting starter brushed, the brushes together with the armature should be checked, and corrections or replacement made as found necessary.

If all of the above checks with their corresponding repairs have been made and the starter still fails to operate, the trouble can be assumed to be in the starter itself so that it should be removed from the engine and checked.

This is exceedingly rare but care should be taken to see that the starter pinion is not locked into the flywheel ring gear. Cases like this are usually caused by badly worn gears meshing improperly and if the defect is not too severe, it can be remedied by placing the gear shift lever into fourth speed and rocking the car back and forth to free the gears. If this trouble is frequently repeated, the starter should be dismantled from the engine for checking and repairs.



## ELECTRICAL SYSTEM

- (1) Starter turns but its turning power is weak and fails to start the engine.

If the trouble is due to a run down battery, loose terminals, troubles in magnetic shift switch, worn and sticking brushes, dirty and damaged commutator, etc., the checking and repairs are made in the same manner as described in the preceding chapters.

If the outer surface of the armature is rubbing against the core, the starter should be dismantled, disassembled and repaired.

Besides the above, there is the case of the pinion meshing improperly. If the trouble is due to the gear teeth being badly worn, the gears should be replaced but if it is due to the screw guide on the pinion shaft being dirty and not allowing the pinion to advance smoothly and causing improper meshing, the shaft should be cleaned and oiled.

- (2) Starter exceeding noisy when operation.

The flywheel ring gear is checked and if the teeth are deformed, they should be repaired or the gear replaced.

Rattling noise caused by loose starter mounting bolts are corrected by retightening the bolts.

Noise caused by brushes improperly contacting the armature required correcting as this condition not only produces noise but will hasten wear on both parts.

Noises made by the armature rubbing against the core while in operation is caused by too large a clearance between the armature shaft and the bushing so the worn parts should be replaced. Wear between the shaft and bushing is due to lack of oil so that attention should be given to proper lubrication.

Lubricate once every half year using good grade of machine or mobile oil and lubricate the parts through the oil nipples. The amount of oil required is about 0.5 cc. for each bracket.

# BODY

## DISMOUNTING & ASSEMBLING

### Body Parts

#### Hood (Bonnet top)

To completely remove the hood (Bonnet top) is simply a matter of detaching the bolts of the hood and hinge at each side, visible when the hood is remove after disconnecting the support of it.

Assembling of the hood is a reversal of dismantling process.

#### Hood Lock

To adjust the position of the hood lock bolt for the hole of the radiator top frame.

##### To remove up or down way

By removing the nut at the top of the center bolt of the spring unit, the spring, center bolt, etc., can be separated from the bracket to the bonnet top.

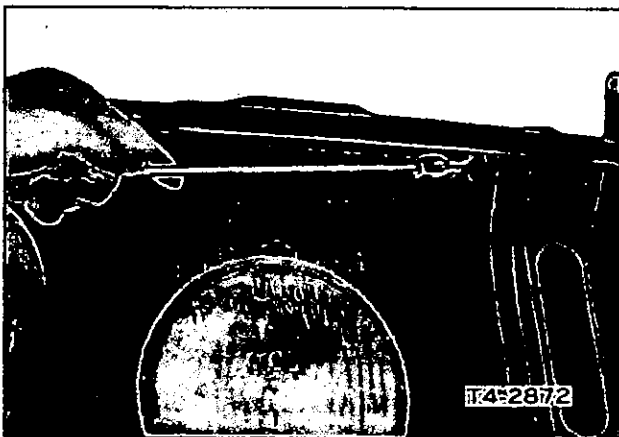
##### To remove left or right side way

By removing the position of the hood and hood hinge bolts can be adjusted the direction to left or right side.

#### Adjusting the Hood Lock Lever

In the event of the hook working loose through the lever the hood lock cannot be hold the hood tightly.

Adjust by removing the position of the hood lock lever as showing the figure.



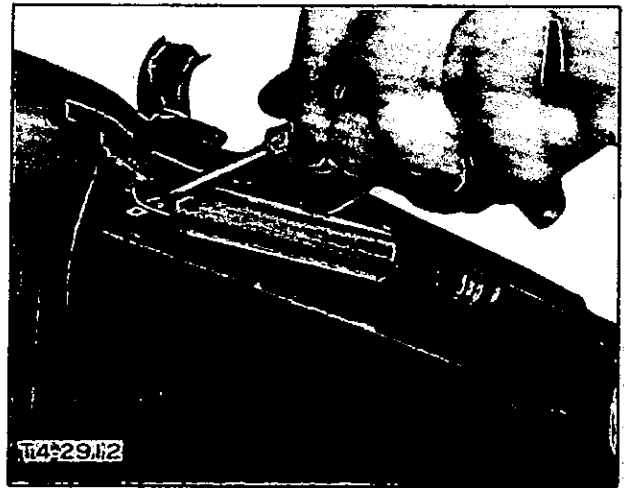
*Adjust the Position of Hood Lock Lever*

### Mechanism of the Hood Lock

#### Disassembling

Detach the grill of radiator from the front of body.

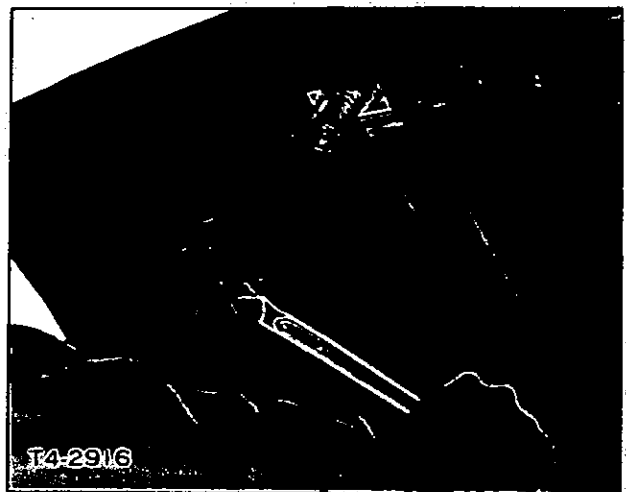
Disconnect the return spring of the hood lock lever from back of the radiator top frame.



*Disconnect the Return Spring*

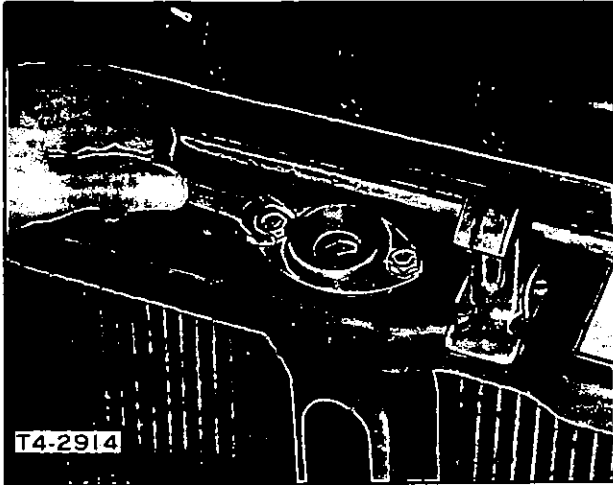
Remove the hood lock lever clamp from its lever.

Detach the assembly of female from the front panel.

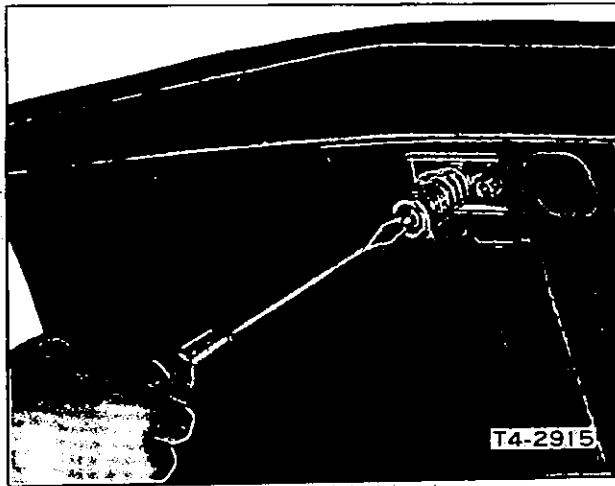


*Disconnect the Hood Lock Male Assembly from the Hood*

Assembling of the hood lock system is a reversal of disassembling routine.



*Disconnect the Hood Lock Female*



*Adjusting the Position for Upper or Lower Direction*

### Front Fender

Detach the front bumper

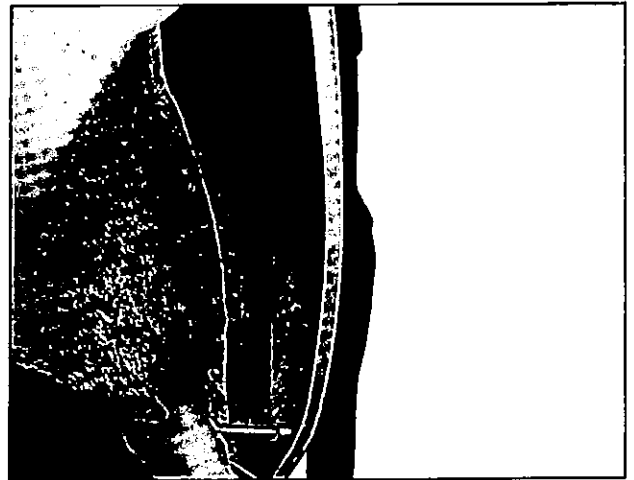
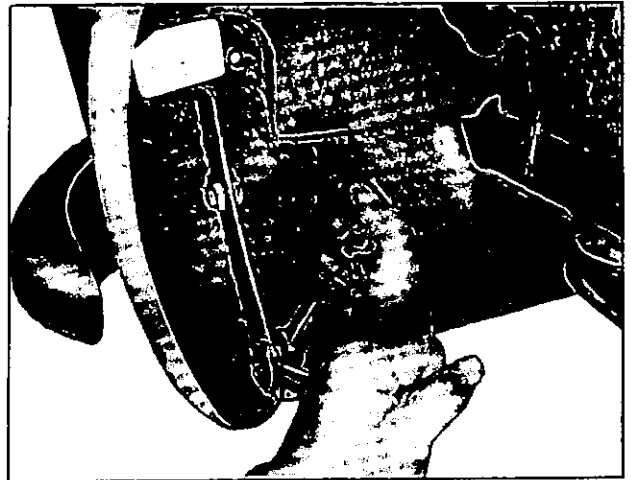
Jack up the front wheels and take out the tire

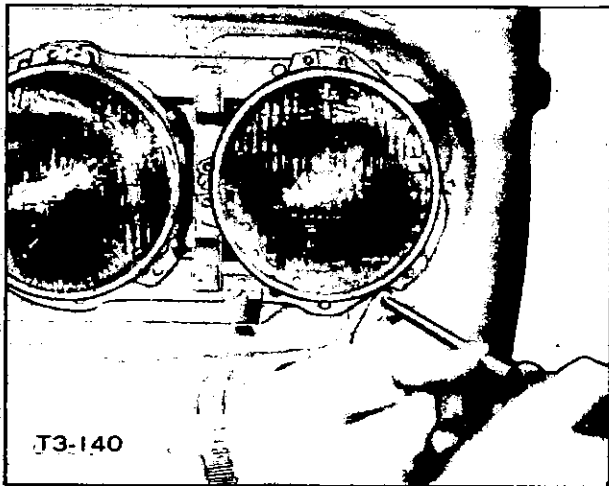
Disassemble the head lamps and parking lamps from front the body

Remove the antenna assembly

Detach the fender milar and side emblem

Disconnect the bolts and screws as showing the figures



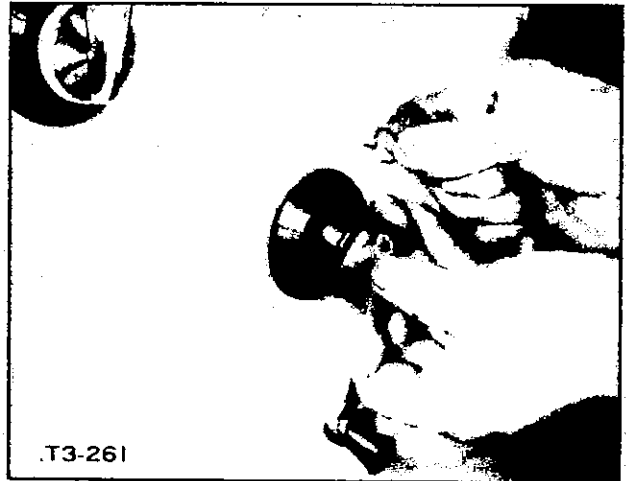


moulds inside and out must be removed, also the door glass must be removed from the door upwards through the main aperture.

## Front Door

### Front door trim panel

- 1) Take out the door inside handle and window regulator handle, as shown the figure.



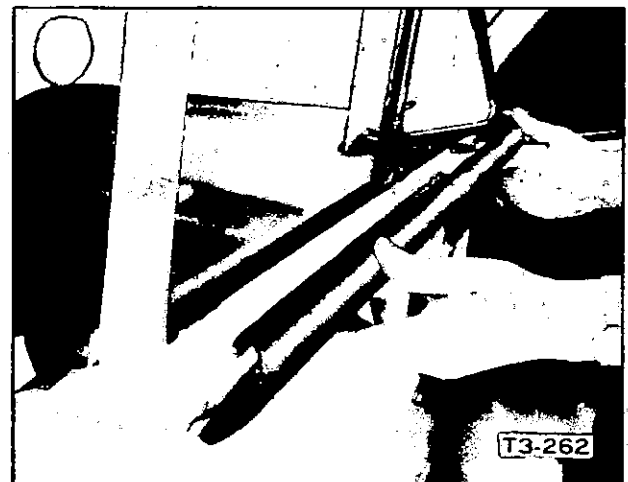
Assembling of the front fender is a reversal of the disassembly routine

## Front Door Window

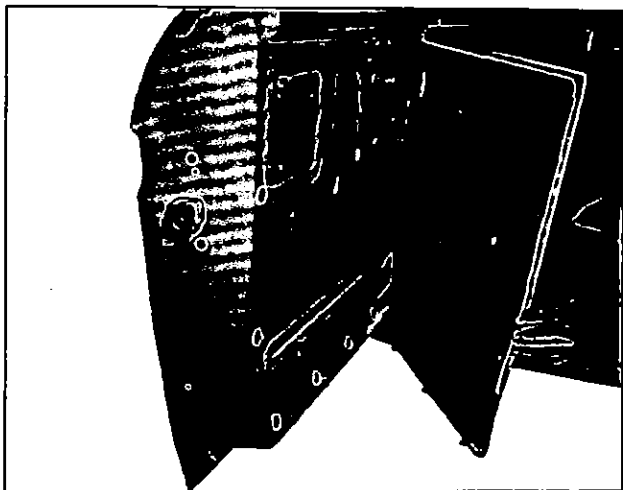
To change a front door window, first remove the door trim, then lower the window. Extract the drive screws that secure the window rear channel to the door frame.

## Rear Door Window

The same routine for removing a rear door window is adopted as that outlined for a front door window, namely removal of trim, in this instance front window channel, window stop bracket, and regulator. In addition the window



Remove the front door finish as showing in the figure.

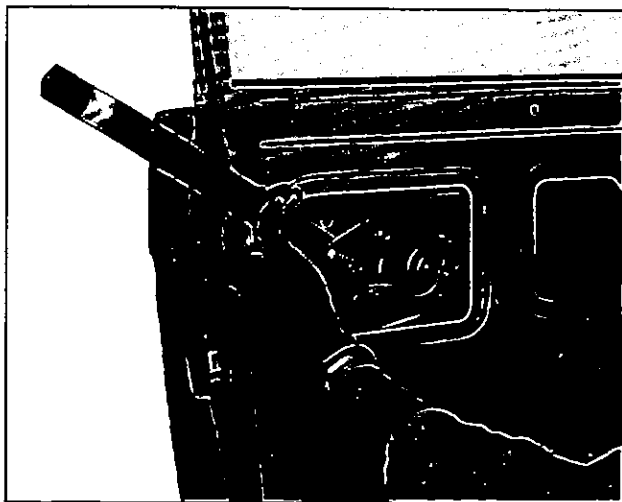


*Springing Door Trim Clips from Door Shell*  
Assembling of the front door is a reversal of the disassembling routine

### Front Door Glass

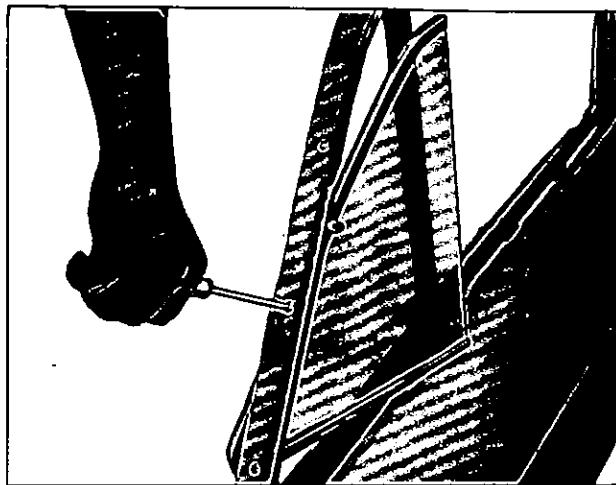
Take out the panel of front, door trim and strip the vinyl cover on the operation hole.

Loosing the screws, remove the door regulator.

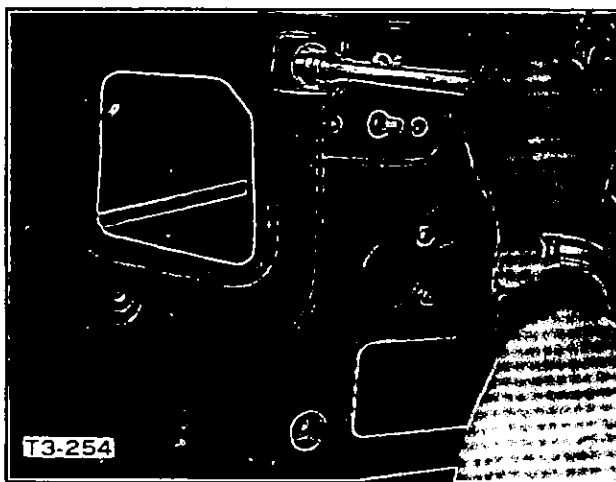


*Detaching Door Regulator*

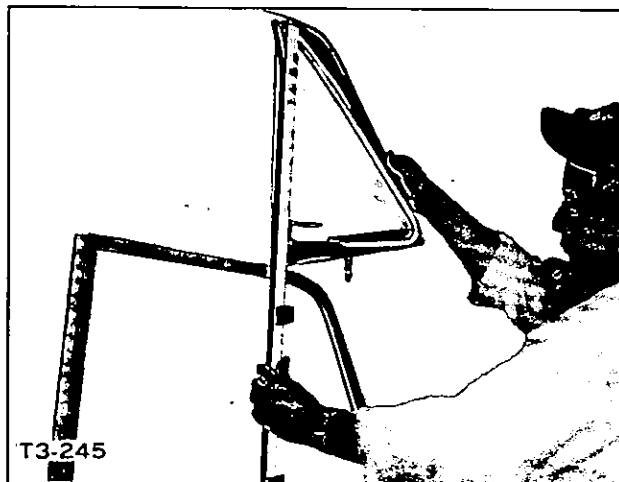
Remove the fixing bolts and screws as showing figure.



*Remove the Front Door Ventrator*



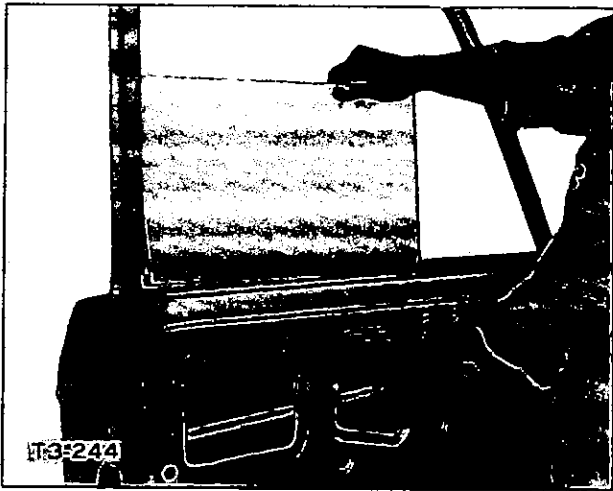
*Unscrew the Bolts & Screws*



*Remove the Ventilator Glass Frame*

# DATSUN

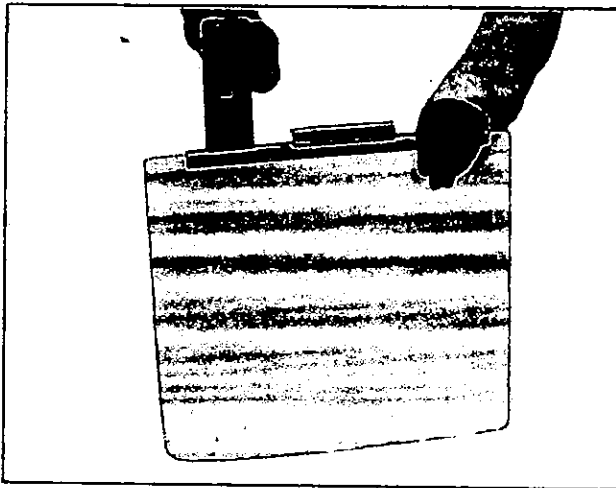
The door glass must be removed from the door upwards through the main aperture.



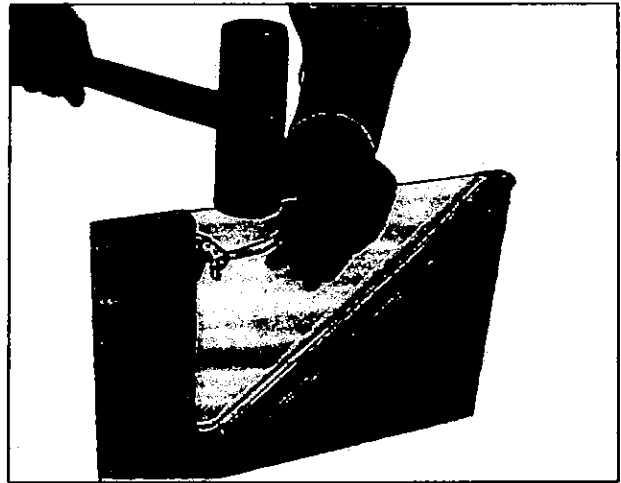
*Remove the Door Glass*

Removing the front door glass from the bezel of channel

1. Remove the glass of channel by tapping slightly with wooden hammer.



2. To fixing for the channel, insert the glass with the weather strip in the bezel and tap with wooden hammer slightly.

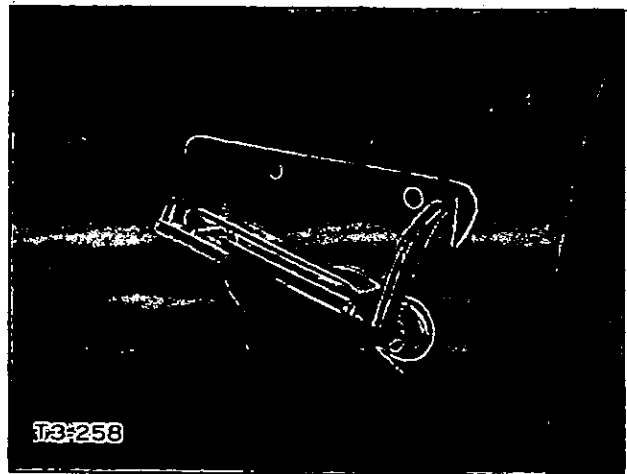


- (1) Remove the nut of pivot pin and the spring.
- (2) Detach the rivet and then remove the ventilator window.
- (3) Take off the lock of ventilator.
- (4) Change the glass as same as the method of the front glass replacement.

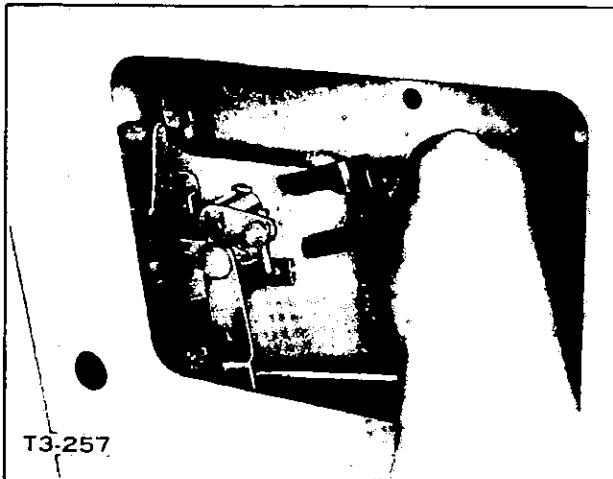
## Door Lock Mechanism

Removing

- (1) Detach the front door trim panel from the body and strip the vinyl cover of the operation hole.
- (2) Take off the 2 numbers set screws and detach out-side handle from the door.

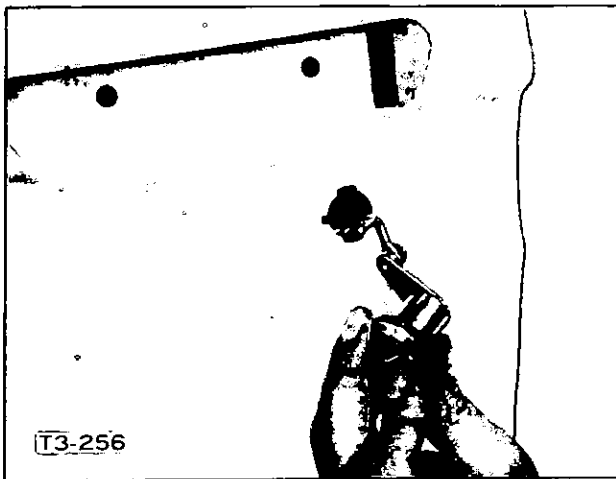


*Detaching Outer Handle*

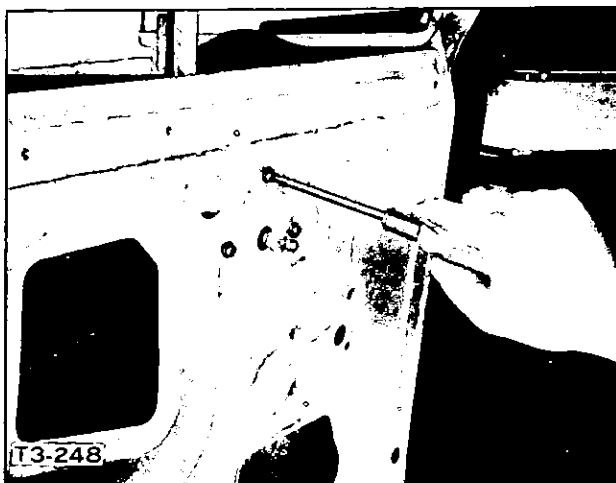


*Removal the Retaining Plate*

- (3) Remove the retaining plate of the door lock cylinder and detach the cylinder assembly.

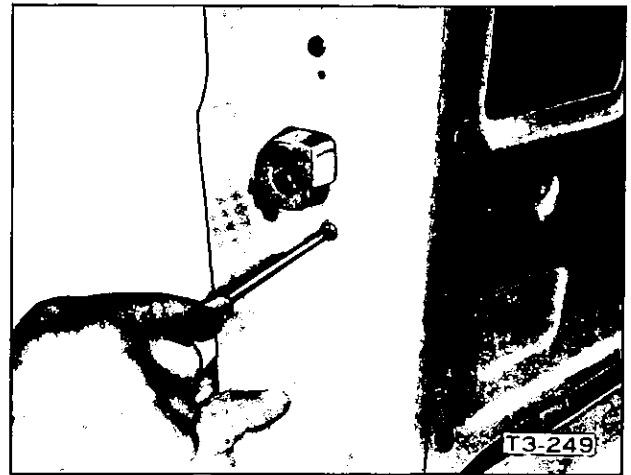


*Extract the Door Lock Cylinder*



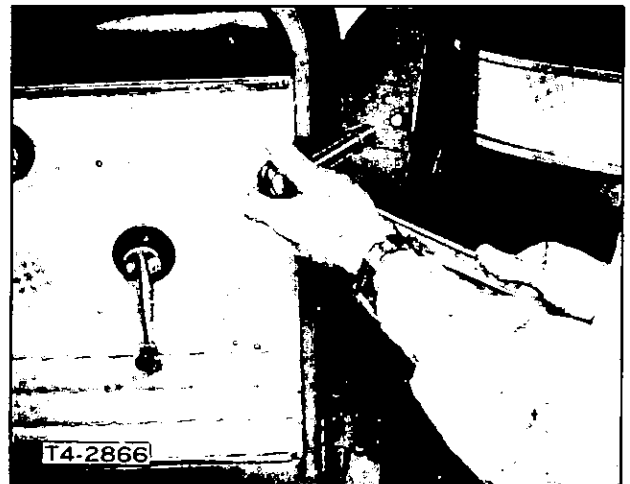
*Unscrew the Front Door Lock*

Loosing the screws, detach the assembling of front door lock remote control as the shown in the figures.



## Front door

- (1) Removing the pin of the door check linkage, detach the check link.



- (2) Detach the bolts of door hinge at the front pillar, take off the door assembly.

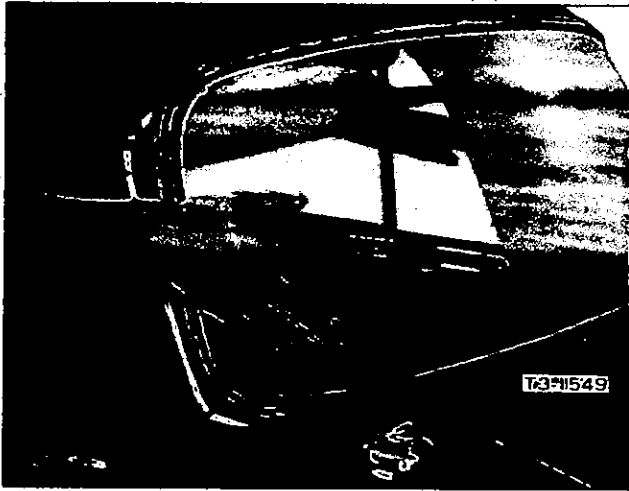
## Wind Shield Glass

### Removing the wind glass

- (1) Extract the wiper arms.  
(2) Detach the shield molding if used.  
(3) Strip out contact portion between the weather strip and the body with a spatula.

# DATSUN

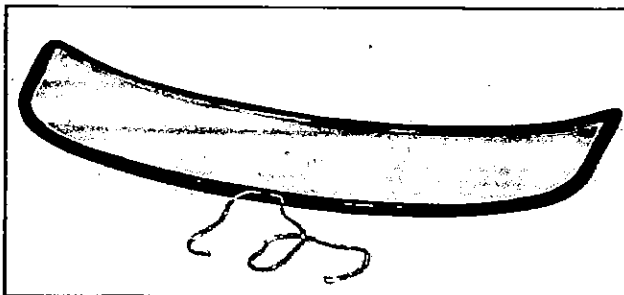
- (4) Detach the front wind glass with the weather strip carefully as showing the figure.



- (5) Remove the weather strip from the detached wind glass assembly.

## Fixing the wind glass assembly

- (1) Assembling the weather strip with the sealing material (cemendine 366E) to the wind shield glass, insert the strong cotton cord to the groove of the weather strip inside around of it.
- (2) Then, insert the above the prepared wind shield glass assembly to the frame of the front body where the bezel is to fit.

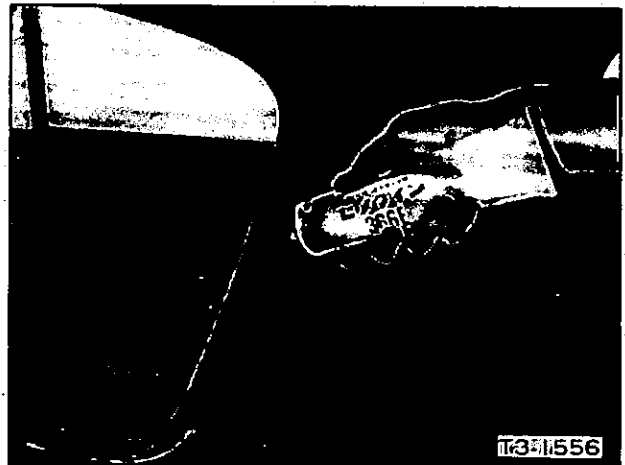


- (3) To assemble to fix for the frame  
Two operators are essential when fitting the wind glass.  
First, the rubber must be sprung over the glass which fits into the deep square groove whilst the large portion of the bead bulges to the inside of the curvature.  
Next insert sealing compound between glass and bead on the outside face.



- (4) Offer the window to the aperture frame of the car from the outside and whilst one operator maintains pressure on the glass the operator on the inside of the car should peel out the cord of the inner lip which fits over the aperture frame. The outside operator then arrange the outer edge which will bring the outer rubber lip over the scuttle, side and top window frame.

Finally peel out the cord so that the rubber lip settles over the fascia, side fillets and headlining. Pushing or tapping the front wind glass assembly from the outside of it, assemble the glass as pulling out the cotton string to a right angle slowly.



- (5) Filling up the sealing material (cemendine 366E) between the weather strip and body.
- (6) Clean and wipe off the excess sealing material around the weather strip by a spatula.
- Fixing the rear wind glass is a same method of the front glass fixing.



