

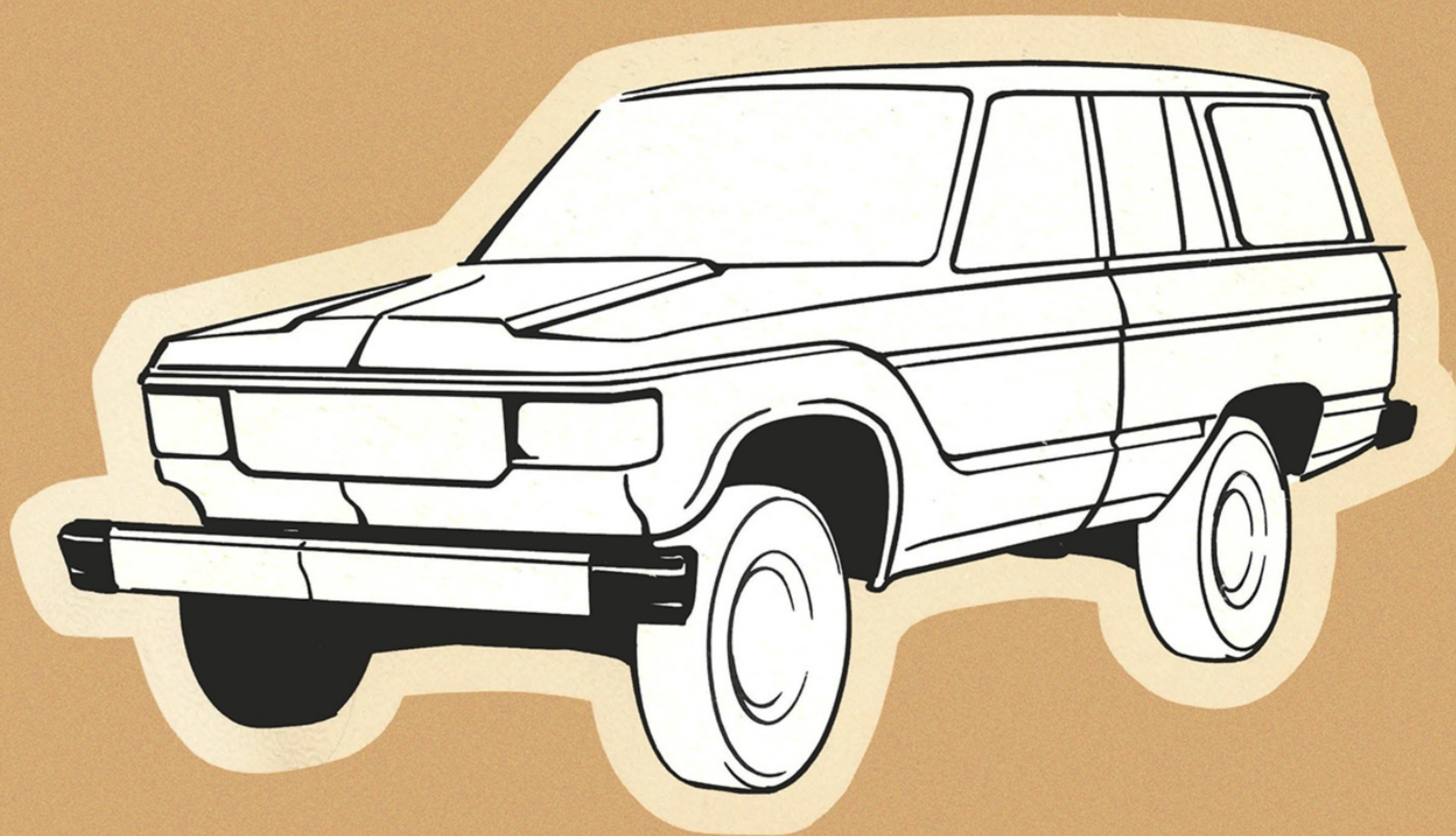
# TOYOTA

# LAND CRUISER

## FJ,BJ & HJ60 Series

### Service Training Information

**NEW  
CAR  
FEATURES**



 **TOYOTA MOTOR SALES CO.,LTD.**

© 1980 TOYOTA MOTOR SALES CO., LTD.  
All rights reserved. This book may not be  
reproduced or copied, in whole or in part  
without the written permission of Toyota Motor  
Sales Co., Ltd.

## **FOREWORD**

This manual contains a summary of the new mechanisms of the new TOYOTA LAND CRUISER, 60 Series.

As the TOYOTA LAND CRUISER has undergone a full model change, this Service Training Information has been prepared to assist you with new model training and to familiarize you with the modifications and mechanisms employed.

The areas marked in red in the illustrations indicate the key points covered in the explanations.

For details of repair procedures and specifications, please refer to the Repair Manual (Pub. No. 36044).

All information contained herein is the most up-to-date at the time of publication. We reserve the right to make changes without prior notice.

**TOYOTA MOTOR SALES CO.,LTD.**

# TABLE OF CONTENTS

	Page		Page
<b>GENERAL DESCRIPTION</b>			
<b>Development Objectives</b> .....	1	<b>Propeller Shaft</b> .....	21
1. 4 x 4 Multi-purpose vehicle styling .....	1	1. Front propeller shaft .....	21
2. Comfortability .....	2	2. Double cardan joint .....	21
3. Improved driving performance .....	3		
4. Easy operation .....	4	<b>STEERING</b>	
5. Improved economy and service ability ..	4	<b>Steering</b> .....	22
6. Multi-purpose use .....	5	<b>Ball-type Collapsible Steering</b> .....	22
<b>Major Specifications</b> .....	6	<b>Tilt Steering</b> .....	23
<b>Model Code</b> .....	7	1. Construction .....	24
<b>Model line-up</b> .....	7	2. Operation .....	24
<b>ENGINE</b>			
<b>3B Engine</b> .....	8	<b>BRAKES</b>	
1. Specifications .....	8	<b>Front Brakes</b> .....	26
2. Piston .....	9	<b>Rear Brakes</b> .....	26
3. Crankshaft .....	9	<b>Auto-adjuster</b> .....	27
4. Timing gear case cover .....	9	<b>Proportioning and Bypass Valve</b> <b>(P &amp; B Valve)</b> .....	27
5. Oil nozzle .....	10	<b>Construction and Operation</b> .....	27
6. Oil cooler .....	11	<b>Load Sensing Proportioning Valve (LSPV)</b> ..	28
7. Oil pump .....	11	<b>Brake Booster</b> .....	29
<b>2H Engine</b> .....	12	1. Tandem brake booster .....	29
1. Specifications .....	12	2. Tandem brake booster operation .....	30
2. Oil pump .....	13	3. Jumping mechanism .....	33
3. Timing gear case and cover .....	13		
4. Oil cooler .....	14	<b>BODY</b>	
5. Lubrication system .....	14	<b>Noise Reduction</b> .....	35
6. Centrifugal oil filter .....	15	1. Countermeasures against engine noise ..	35
		2. Countermeasures against interior noise ..	36
<b>ENGINE ELECTRICAL</b>		<b>Accelerator Pedal Stopper</b> .....	37
<b>Preheating System</b> .....	16	<b>Throttle Knob Operation</b> .....	38
		<b>Radiator Shutter</b> .....	38
<b>POWER TRAIN</b>			
<b>Clutch</b> .....	18	<b>BODY ELECTRICAL</b>	
1. Clutch housing .....	18	<b>Tachometer (Wagon G)</b> .....	39
2. Clutch cover .....	18		
3. Clutch release fork and release bearing hub .....	18	<b>AIR CONDITIONING SYSTEM</b>	
4. Clutch disc .....	18	<b>Heater and Air Conditioner</b> .....	40
<b>Transmission and Transfer</b> .....	18	<b>Heater Construction</b> .....	41
1. Transmission case cover .....	18	<b>Air Conditioner Construction</b> .....	41
2. Transfer case .....	19	<b>Heater Control Panel</b> .....	42
3. Shift lever .....	19	<b>Ventilation System</b> .....	43
4. Transfer idler bearing .....	19		
5. Output shaft front spline .....	19		
6. Cutaway view .....	20		
7. Gear ratio .....	20		

# GENERAL DESCRIPTION

● GENERAL DESCRIPTION ● DEVELOPMENT OBJECTIVES

## GENERAL DESCRIPTION

### GENERAL DESCRIPTION

Since its debut in 1967, the TOYOTA LAND CRUISER Station Wagon has been recognized in world-wide markets as a multi-purpose vehicle because of its excellent durability and mobility, and has now undergone a full model change as a new 60 Series.

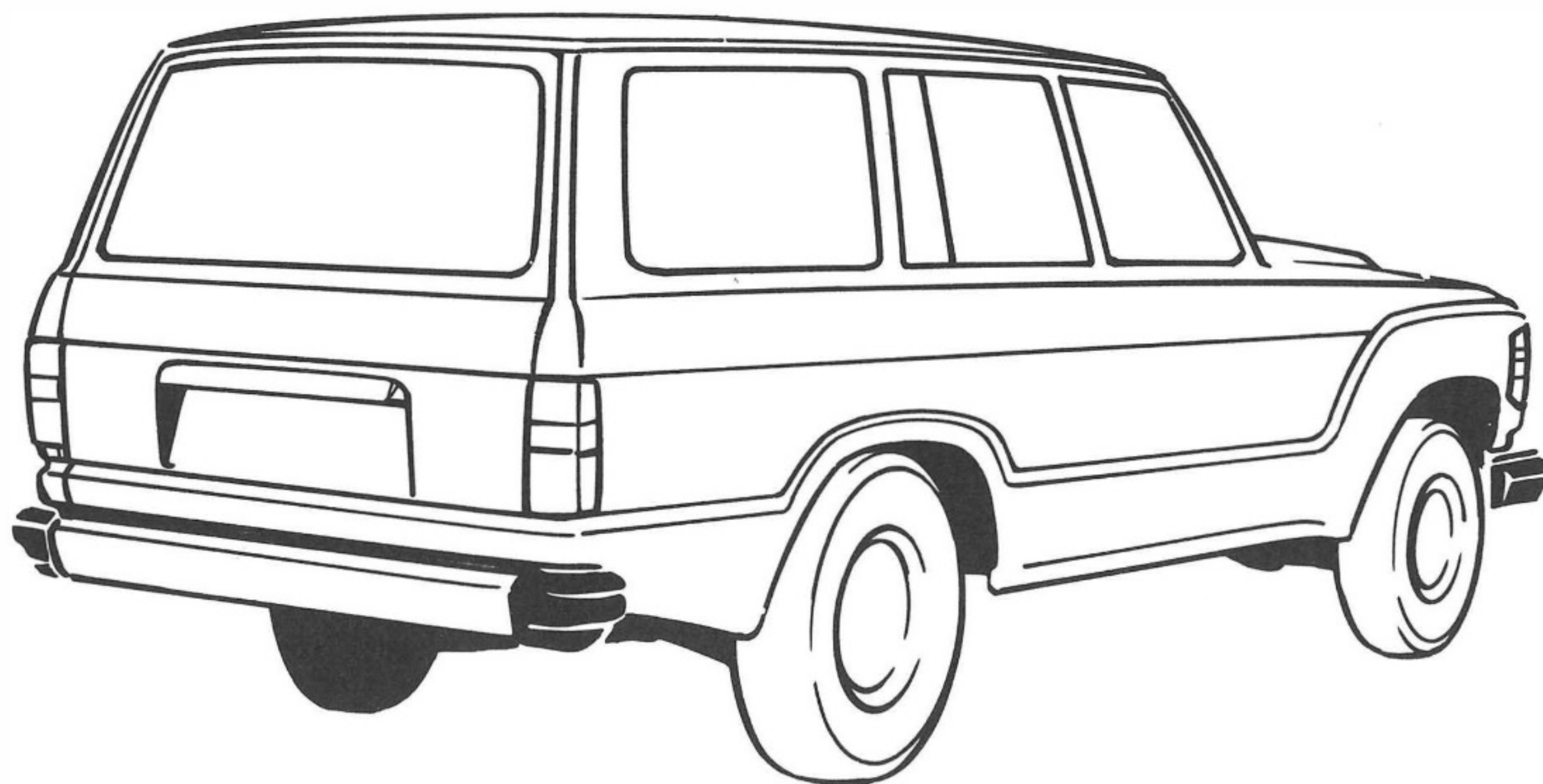
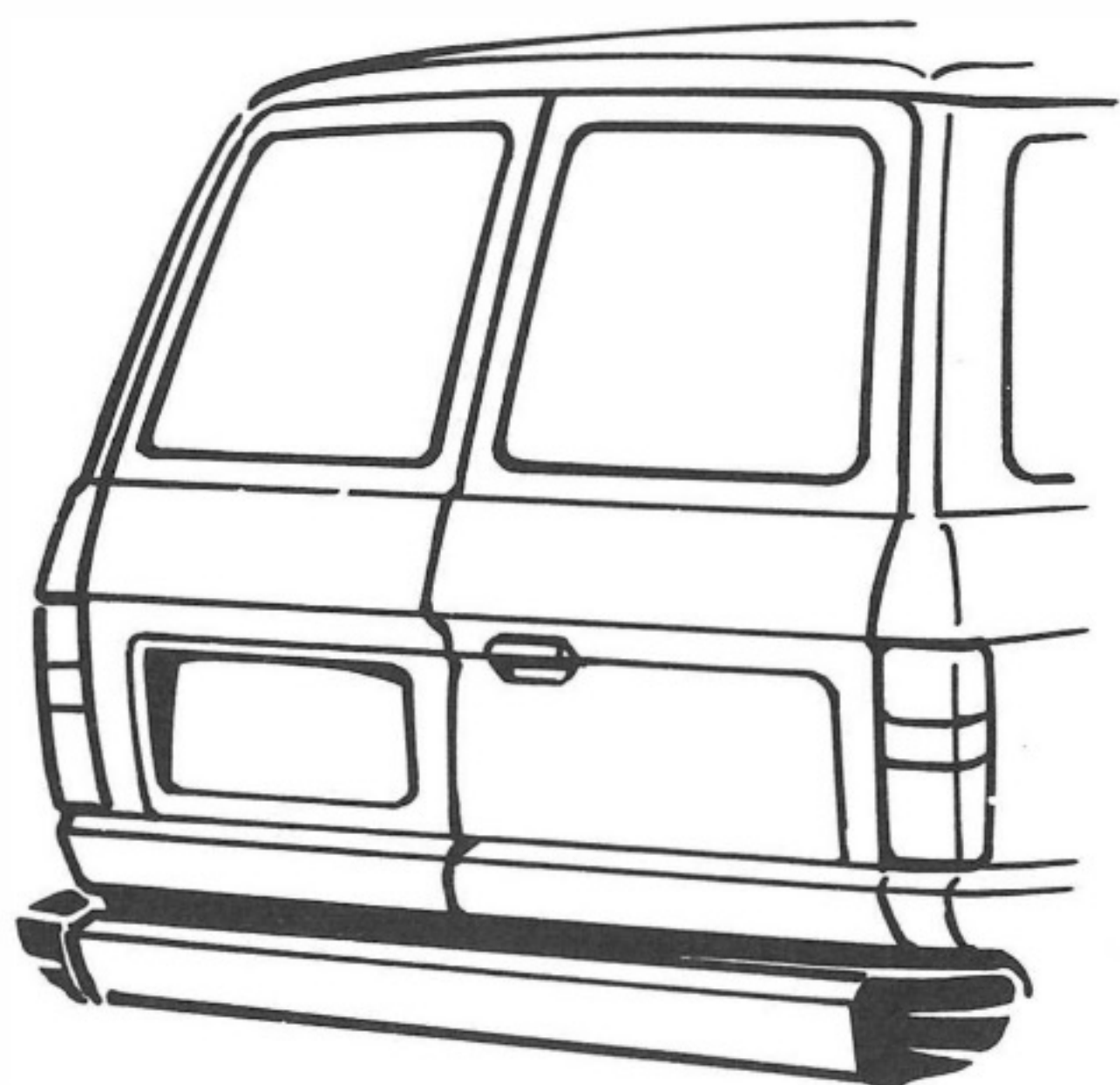
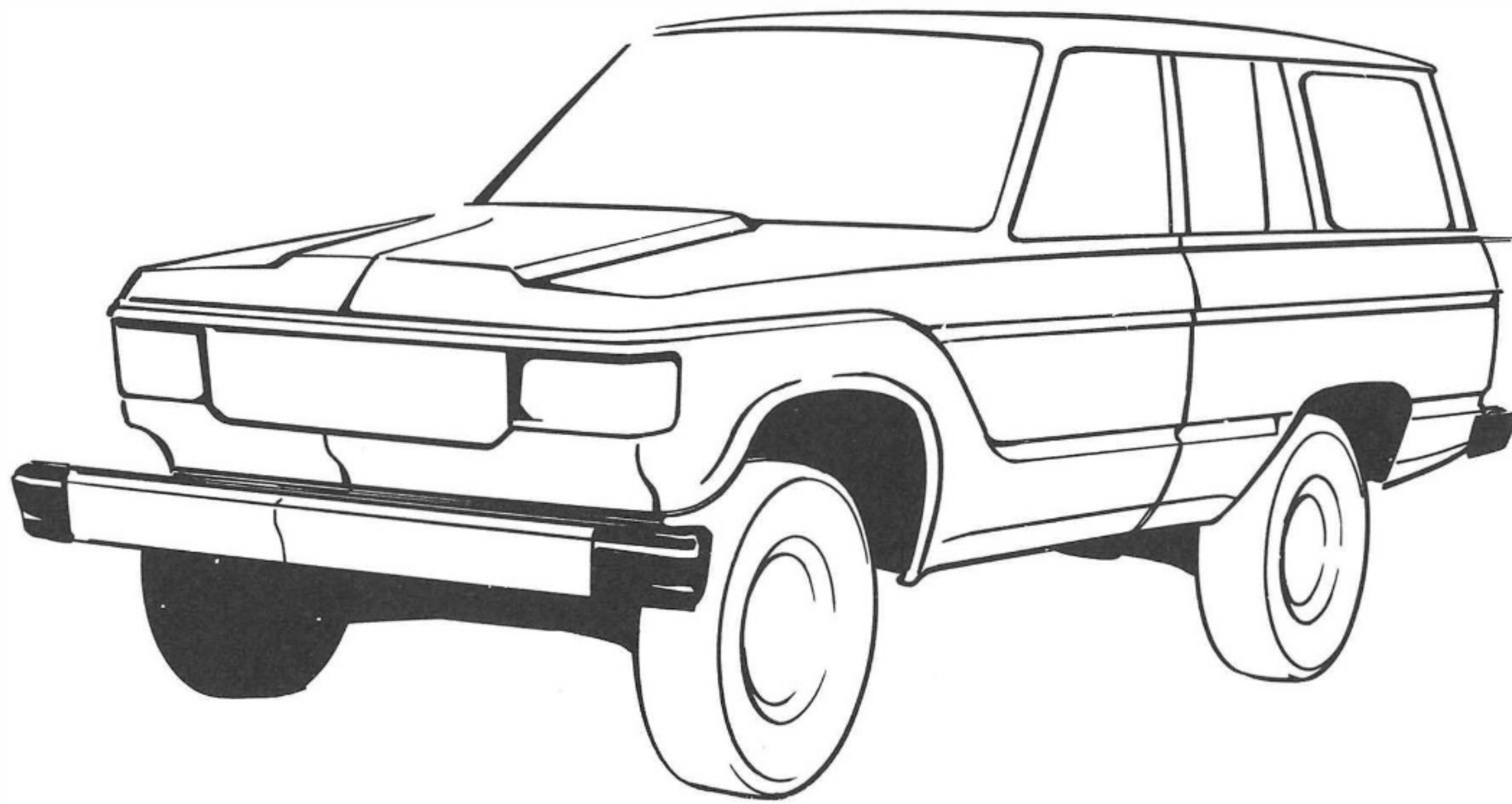
This new 60 Series was developed with the following objectives:

1. 4 x 4 multi-purpose vehicle styling
2. Comfortability
3. Improved performance
4. Easy operation
5. Improved economy and serviceability
6. Multi-purpose use

### DEVELOPMENT OBJECTIVES

#### 1. 4 x 4 MULTI-PURPOSE VEHICLE STYLING

Dynamic 4WD vehicle styling with a passenger car like appearance.



# GENERAL DESCRIPTION

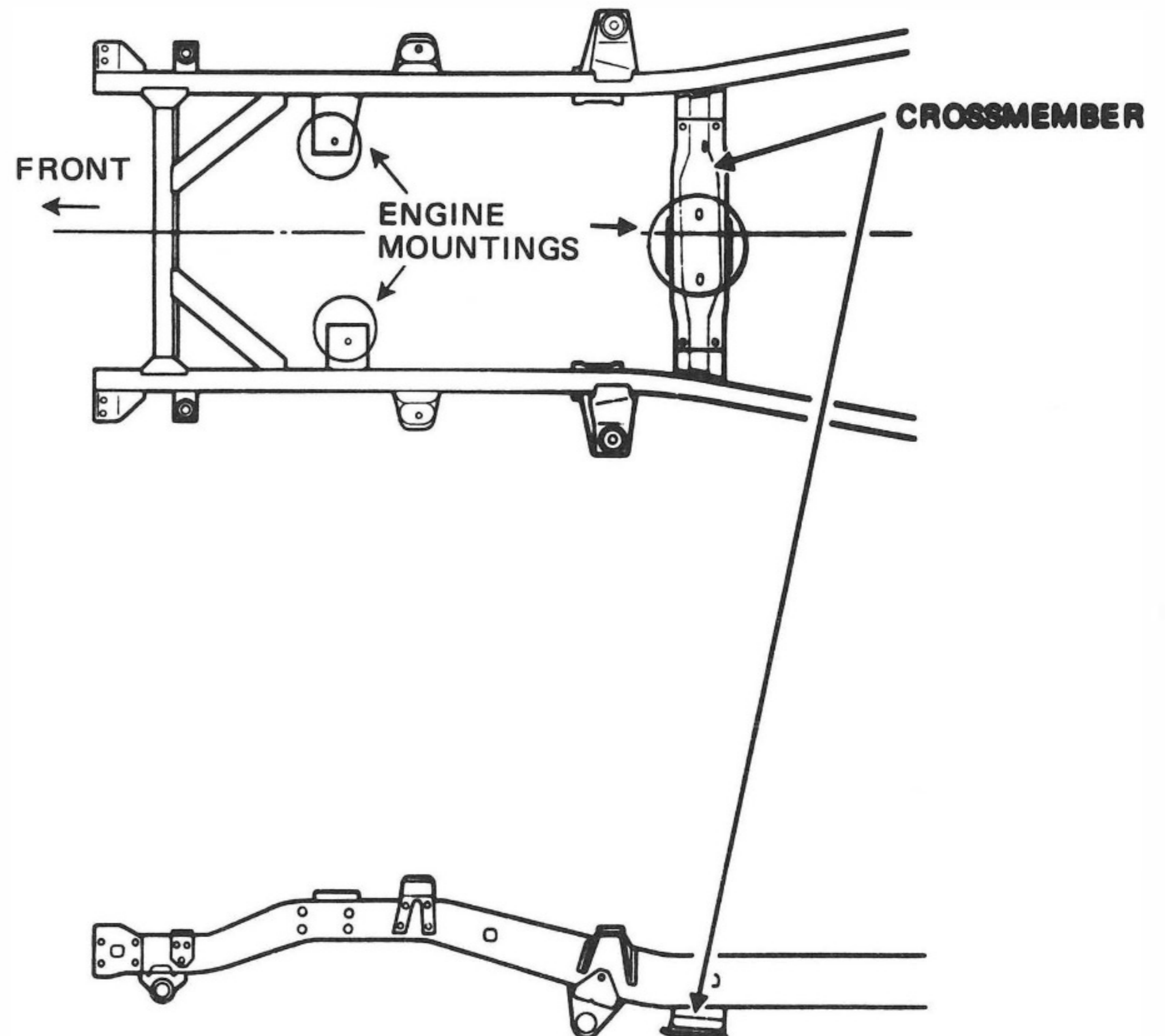
## ● DEVELOPMENT OBJECTIVES

### 2. COMFORTABILITY

#### (1) Quiet Interior

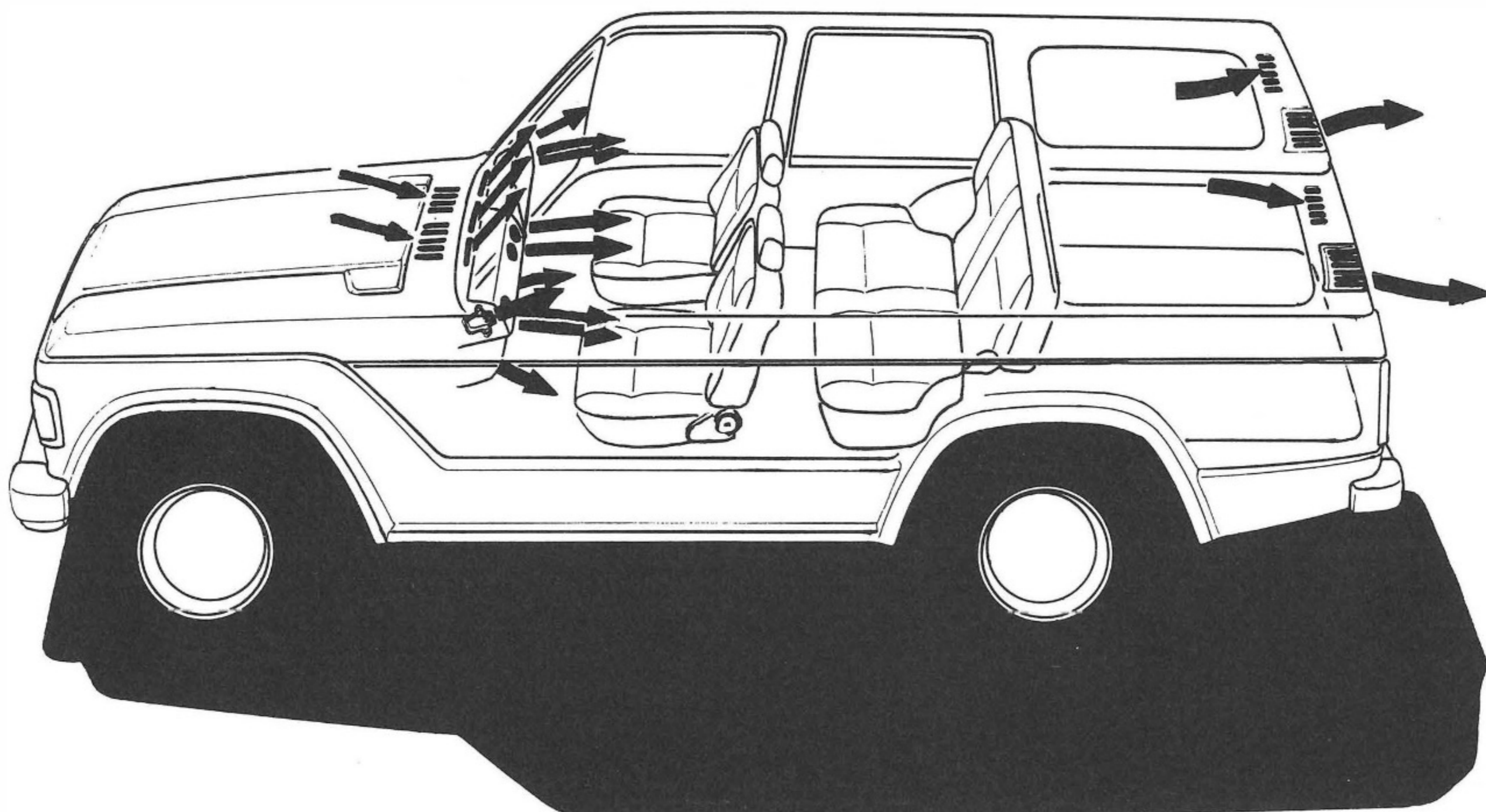
To reduce noise, vibration and harshness, a highly-rigid body has been adopted and the power train improved. For further noise reduction, a silencer has been incorporated and sealing has been improved.

- a) The engine mountings have been changed from a four-point support type to a three-point support type.
- b) A constant velocity joint (Double Cardan Type) has been adopted on the front propeller shaft.
- c) To reduce gear noise, a new transfer has been adopted and the gear specifications of the transmission and transfer have been modified.



#### (2) Air Conditioning and Ventilation Systems

An adequate ventilation system and air-mix type heater (3-way outlet) with easy temperature control has been newly designed.



# GENERAL DESCRIPTION

## ● DEVELOPMENT OBJECTIVES

### 3. IMPROVED DRIVING PERFORMANCE

#### (1) Suspension

a) Both front and rear treads have been increased 60mm to improve driving stability.

b) Re-designed leaf spring for improved stability and riding comfort.

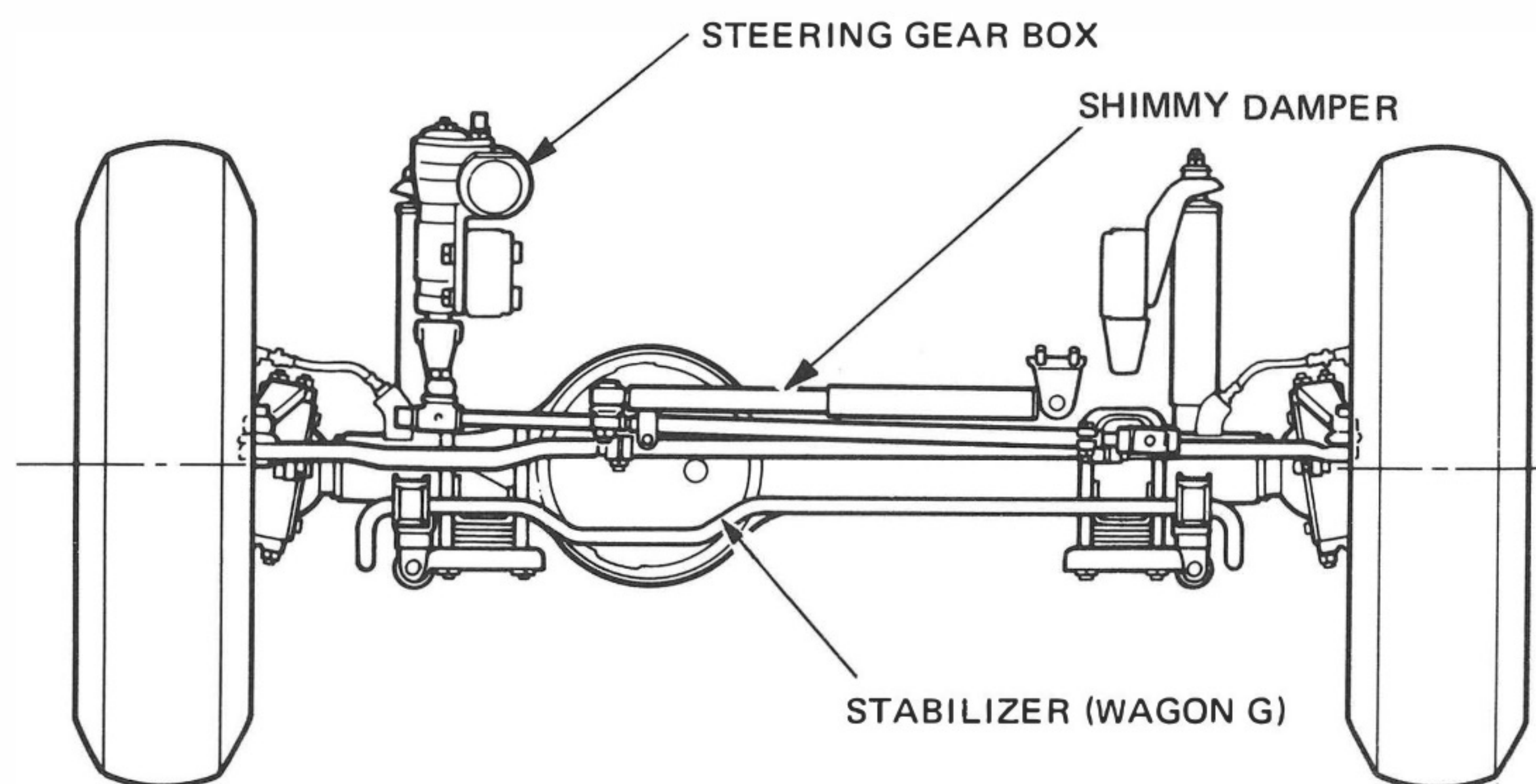
		New 60 series		FJ55 series
		Wagon	Wagon G	STD spring
Spring constant	Front	6.6kg/mm	3.9kg/mm	6.6kg/mm
	Rear	5.6 ~ 10.0kg/mm	5.0kg/mm	5.6 ~ 8.7kg/mm
Stabilizer		N A	Front only	N A

(Except U. S. A. specification)

#### (2) Steering

a) The steering linkage, directly linking the pitman arm and tie-rod by means of a relay rod, has been newly adopted to improve steering response.

b) The location of the shimmy damper has been changed to the relay rod to reduce steering wheel kick-back during off-road driving.



FRONT SUSPENSION

#### (3) Brakes

a) Front disc brakes (ventilated disc rotor) have been adopted on vehicles for a larger number of destinations.

has been changed from the center drum (propeller shaft) to the rear wheels.

b) The location of the parking brake

# GENERAL DESCRIPTION

## ● DEVELOPMENT OBJECTIVES

### 4. EASY OPERATION

- (1) The clutch cover has been changed to the diaphragm spring type to reduce clutch pedal depression force.
- (2) Power steering has been adopted as an option for a larger number of destinations.
- (3) Tilt steering has been newly adopted.
- (4) The location of the parking brake lever has been changed to the center floor for easier operation.
- (5) Window area has been increased by about 14 percent and the instrument panel lowered to improve visibility. The headlight and wiper switches have been centralized on the steering column for easier control.
- (6) The tailgate opening and luggage area have been enlarged and the floor level has been lowered for easier handling.

	New 60 series	FJ55V	Difference
Ground clearance to side step	550	580	- 30
Luggage compartment length	1770	1725	+ 45
Luggage compartment width	1520	1440	+ 80
Luggage compartment height	1045	1050	- 5
Tail gate opening width	1360	1075	+285
Tail gate opening height	895	915	- 20
Ground clearance to deck	750	795	- 45

unit: mm

### 5. IMPROVED ECONOMY AND SERVICEABILITY

- (1) Adoption of the new 3B and 2H diesel engines.

		3B	2H
Bore × Stroke	mm	102 × 105	91 × 102
Engine displacement	cc	3431	3980
Max. horse power (DIN)	PS/rpm	90/3500	105/3500
Max. torque (DIN)	kg-m/rpm	22/2200	24.5/2000
No. of cylinders		4	6

# GENERAL DESCRIPTION

## ● DEVELOPMENT OBJECTIVES

(2) Weight reduction and better aerodynamic features.

- a) To improve fuel economy, vehicle weight has been reduced by about 38 kilograms by means of improvements in body construction, changes in material and a more rational

design concept.

- b) An aerodynamic body styling has been adopted to reduce air resistance.

(3) Greater durability

More galvanized steel paneling has been used along with improved anti-rust treatment.

## 6. MULTI-PURPOSE USE

(1) New Wagon and Wagon G models

The major specification comparisons are as follows:

	Wagon	Wagon G
Rear door	Swing out (except Canada)	Upper and lower gate (incl. Canada)
Floor mat	Rubber	Carpet
Deck mat	Rubber (OPT)	Carpet
Door trim	Semi-trim	Full trim
Seat material	Printed vinyl	Fabric
Tachometer	OPT	STD
3rd seat	Parallel & Transverse (OPT)	NA
Tinted glass	OPT	STD (Except Aust.)
Rear wiper	NA	OPT
Rear window defogger	NA	OPT
Suspension	Heavy duty spec.	Soft ride spec.

(2) A wider choice of optional equipment

- a) Adoption of a radiator shutter on diesel engines to improve heater performance in arctic climates.
- b) Tilt steering
- c) Front door ventilation window
- d) Sliding rear side windows
- e) Winch

# GENERAL DESCRIPTION

## ● MAJOR SPECIFICATIONS

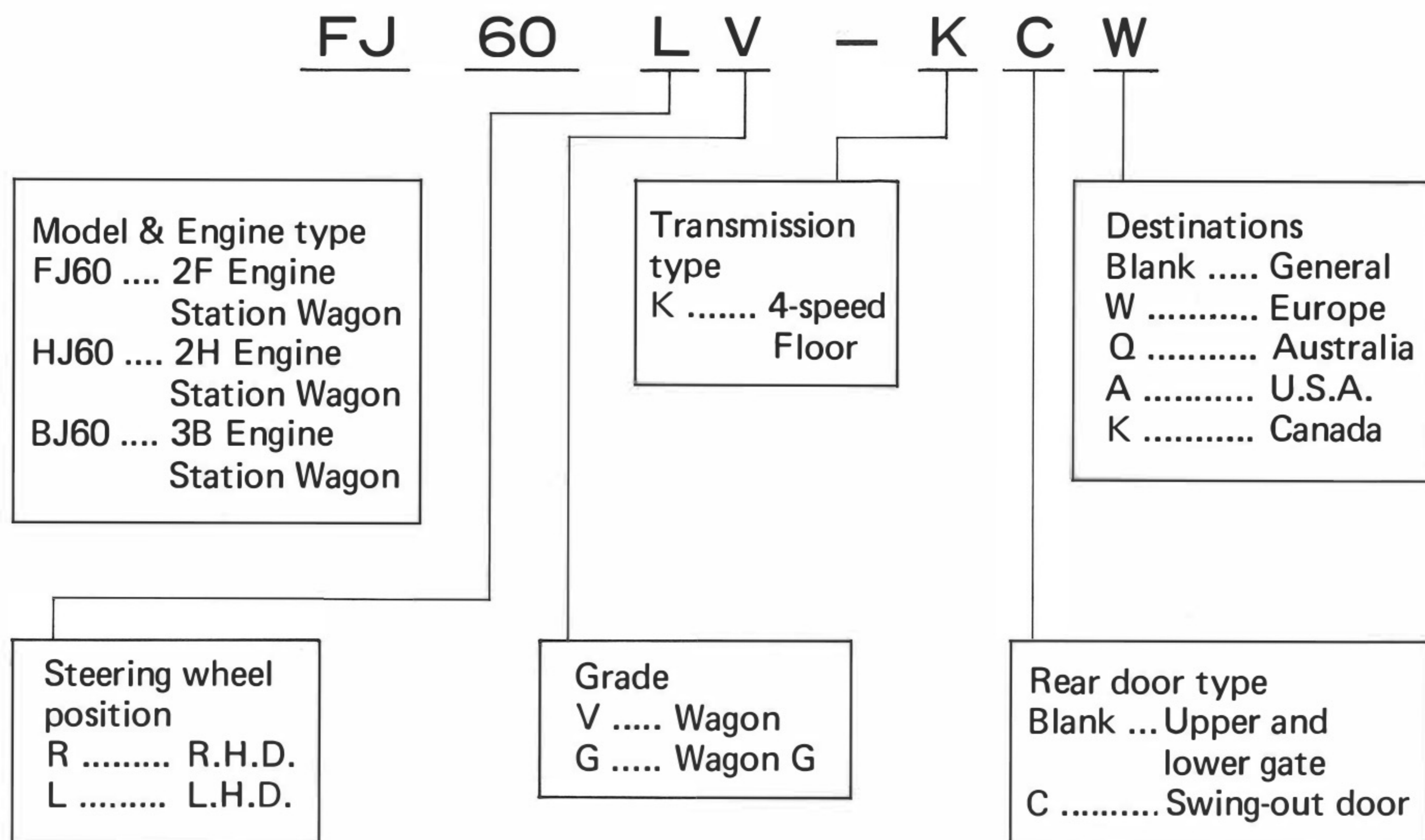
### MAJOR SPECIFICATIONS

Item	Wagon	Wagon G	FJ55
Engine	2F, 2H, 3B	2F, 2H	2F
Transmission	H41, H42	←	H41, H42, J30
Transfer	Direct only	←	Direct, magnet
FR Propeller Shaft	Cross & CV. Joint	←	Cross 2 x 2
Power Steering	OPT (2F, 2H only)	←	OPT
Free wheel Hub	OPT	STD	OPT
Steering Column	Rigid	Rigid/tilt or Collapsible/tilt	Rigid
FR Brake	Drum or Disc	Disc	Drum or Disc
RR Brake	Leading & Trailing	←	Dual 2-leading
Brake Booster	7.5" Single 7.5" Tandem 9.0" Single	7.5" Tandem 9.0" Single	7.5" Single
Parking Brake	Rear Wheel	←	Center drum
Air Conditioning System	Air Conditioner (OPT)	←	Cooler (OPT)
Side Defroster	OPT	←	NA
Radio	AM, AM/FM, AM/SW	AM, AM/FM, AM/SW AM/FM multi	AM only
Stereo	OPT (non-reverse or auto-reverse)	←	NA
Tachometer	OPT	STD	NA
Trip Meter	STD	STD	NA
Intermittent Wiper	OPT	STD	NA
Rear Wiper	NA	OPT	NA
Rear Window defogger	NA	OPT	NA
Head Lamp Cleaner	OPT	←	NA
Front door ventilation window	OPT	←	NA
Rear Quarter Window	Fixed type (STD) Slide type (OPT)	← ←	Fixed type
Rear Door Type	Swing-out Upper and lower gate	Upper and lower gate	Swing-out & Drop gate
Seat	Separate Split bench	← ←	Bench

# GENERAL DESCRIPTION

● MODEL CODE ● MODEL LINE-UP

## MODEL CODE



## MODEL LINE-UP

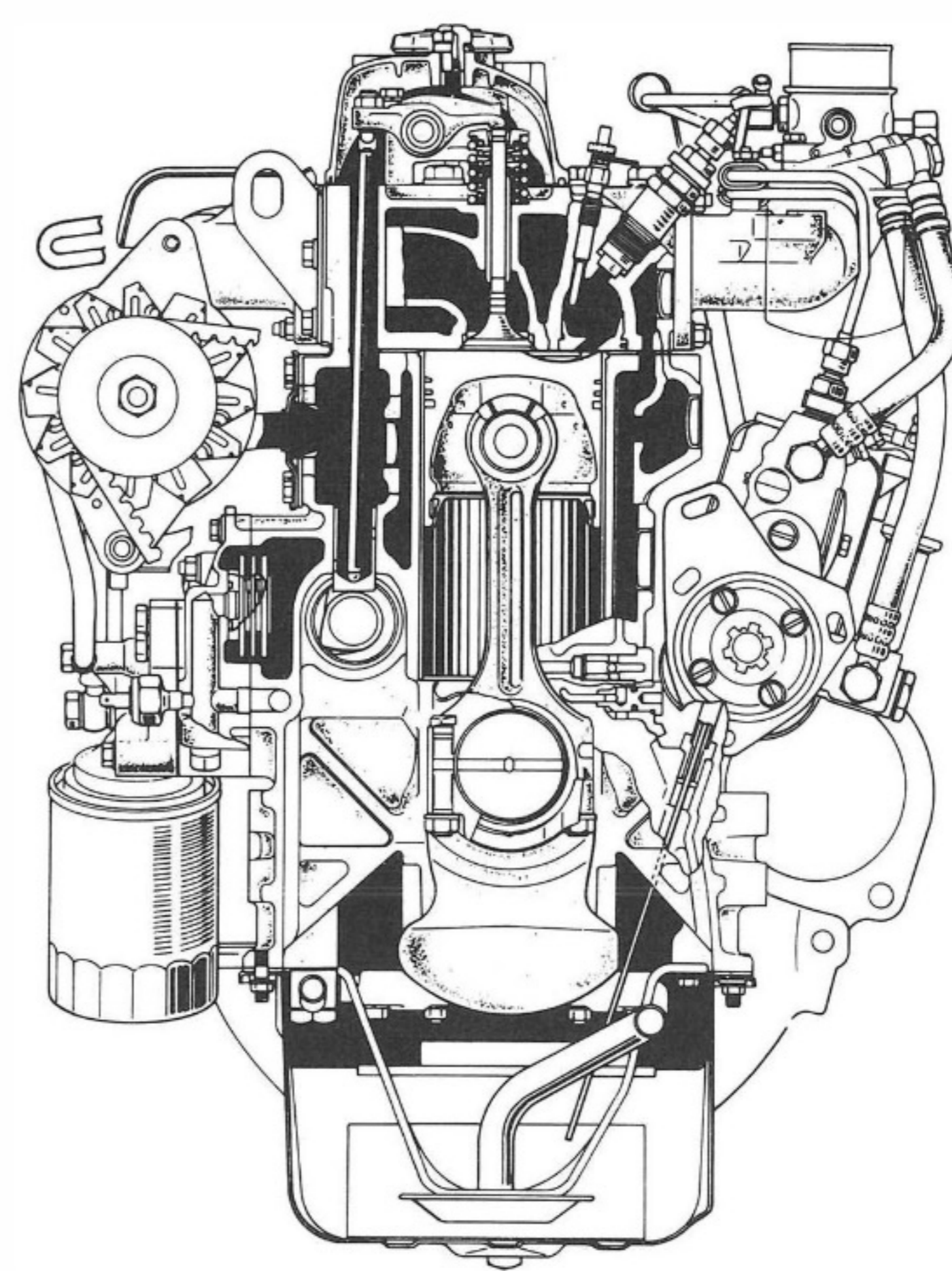
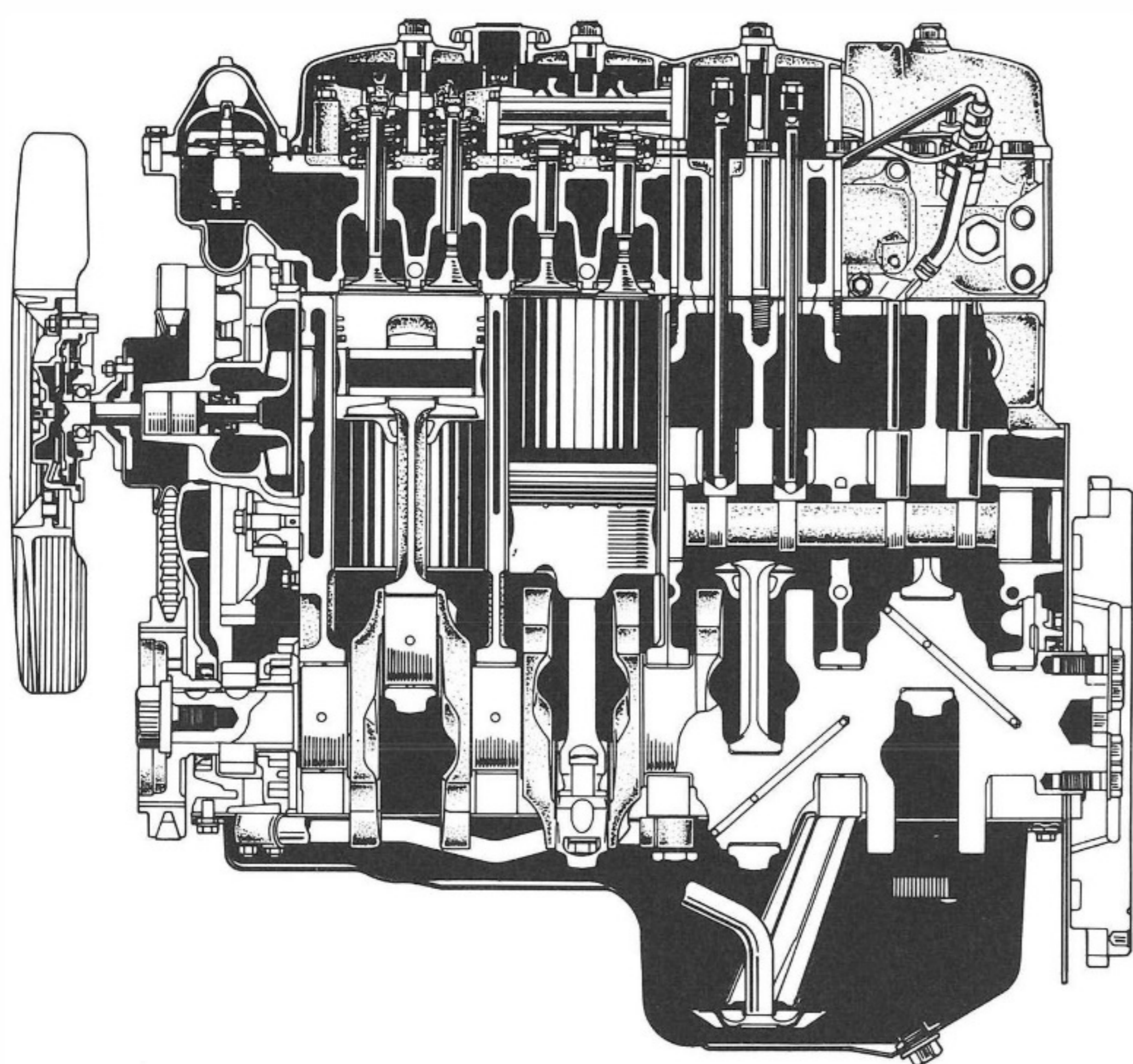
Destination	Engine	Grade	Transmission	Manual
				4-Speed Floor
GENERAL	2F	DLX		FJ60R(L)G-K
	2H	DLX		HJ60R(L)G-K
	2F	STD		FJ60R(L)V-KC
	3B	STD		BJ60R(L)V-KC
EUROPE	2F	DLX		FJ60LG-KW
	2H	DLX		HJ60LG-KW
	2F	STD		FJ60LV-KCW
	2H	STD		HJ60LV-KCW
AUSTRALIA	2F	DLX		FJ60RG-KQ
	2H	DLX		HJ60RG-KQ
	2F	STD		FJ60RV-KCQ
	2H	STD		HJ60RV-KCQ
U. S. A.	2F	DLX		FJ60LG-KA
CANADA	2F	STD		FJ60LV-KK
	3B	STD		BJ60LV-KK

# ENGINE

## ● 3B ENGINE

### ENGINE

#### 3B ENGINE



CUTAWAY VIEW

#### 1. SPECIFICATIONS

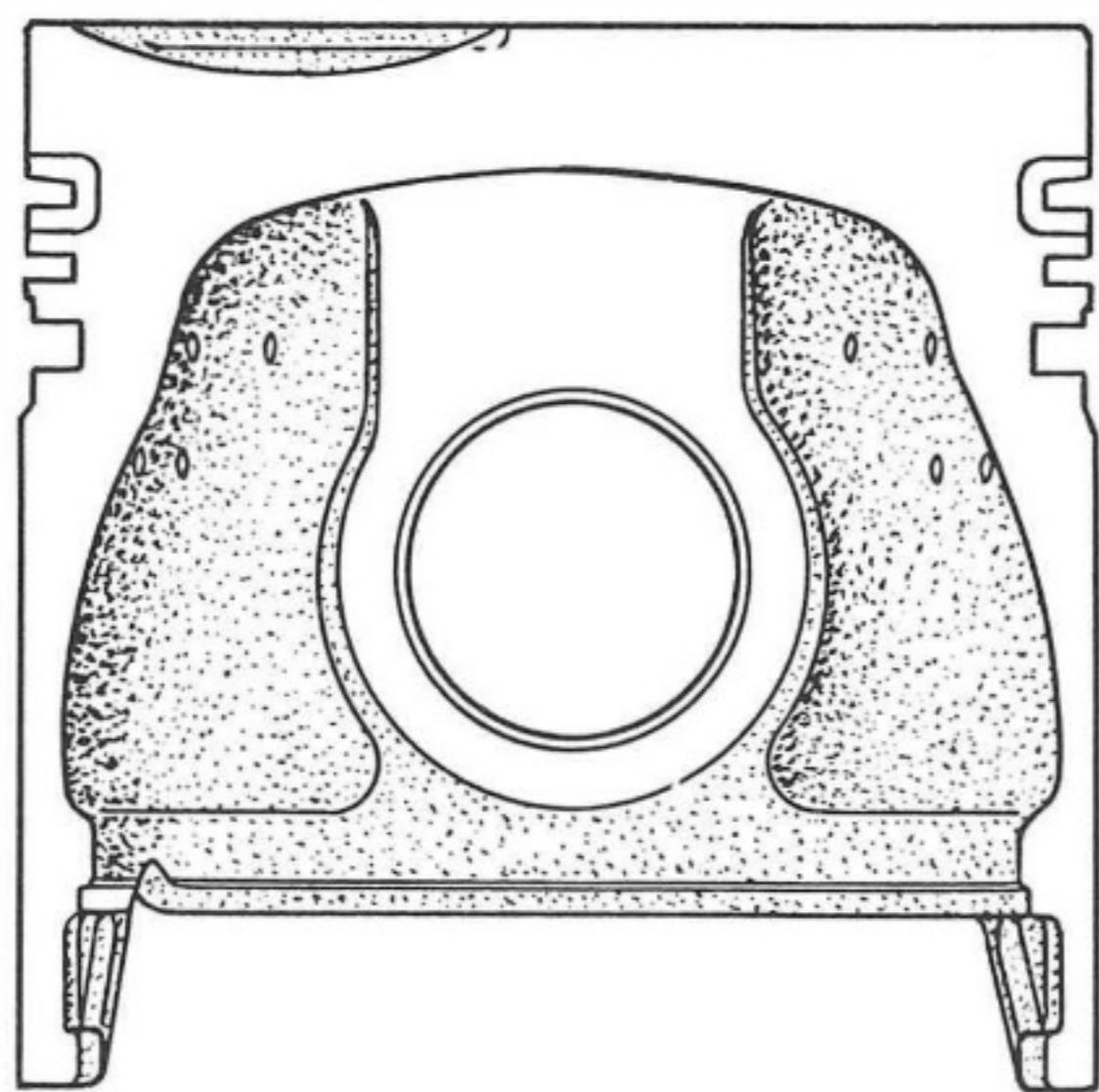
		3B	B
No. of cylinders		4	4
Bore × stroke		102 × 105mm	95 × 105mm
Piston displacement		3,431 cc	2,977 cc
Max Horsepower (DIN)		90ps/3,500rpm	80ps/3,600rpm
Max torque (DIN)		22kg-m/2,200rpm	19.5kg-m/2,200rpm
Valve dia.	IN	46mm	45mm
	EX	41mm	37.5mm
Valve pitch	IN	25mm	23.5mm
	EX	27.5mm	26mm
Crank pin dia.		61mm	59mm
Piston pin dia.		32mm	29mm
Connecting rod bolt		R12 × 1.25	M11 × 1.0
Water pump impeller dia.		85mm	80mm
Crankshaft balancer		8pcs	4

# ENGINE

## ● 3B ENGINE

### 2. PISTON

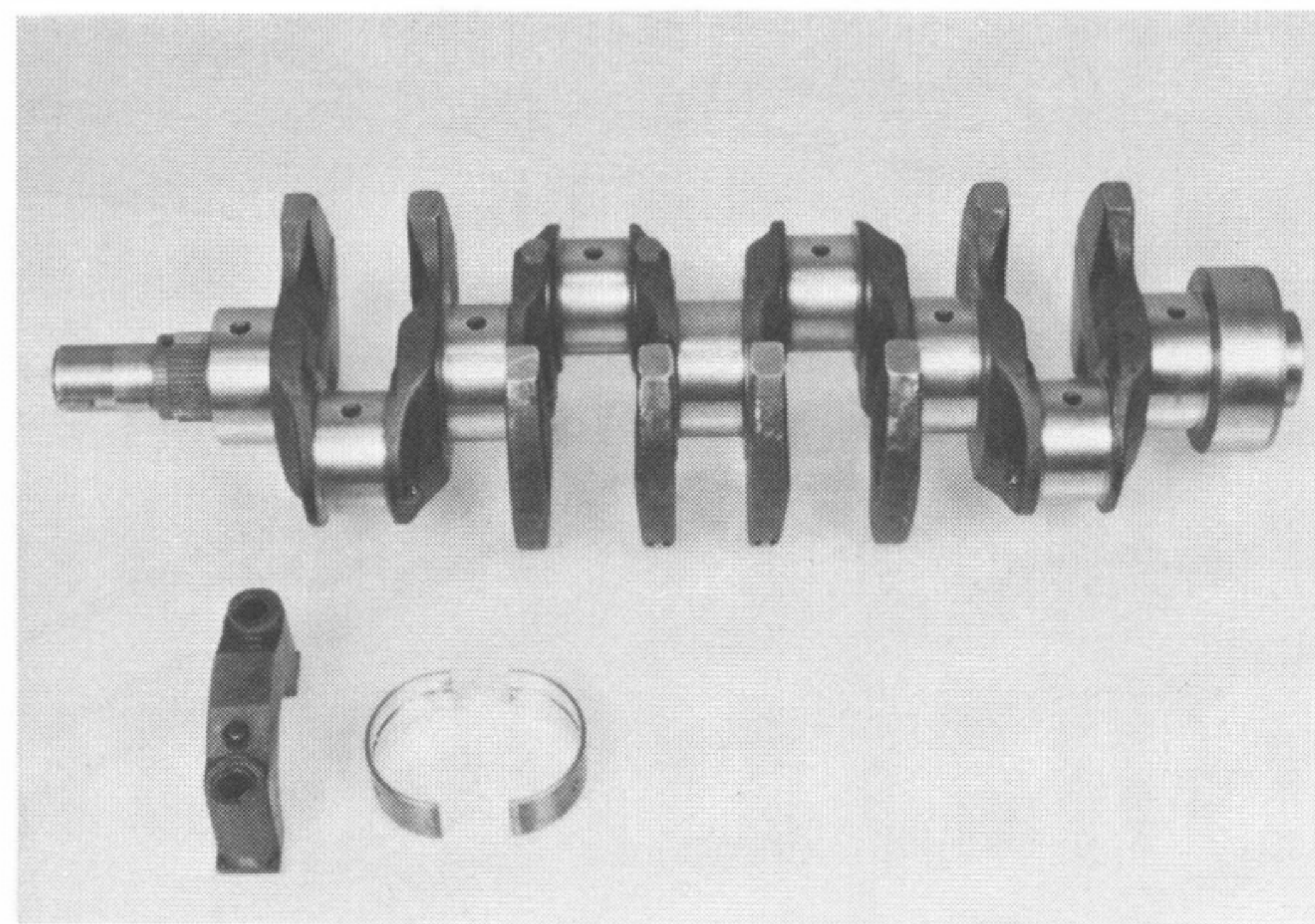
An anti-wear ring has been casted to the piston top ring groove to improve durability.



An iron alloy containing a large quantity of nickle with superior anti-wear features.

### 3. CRANKSHAFT

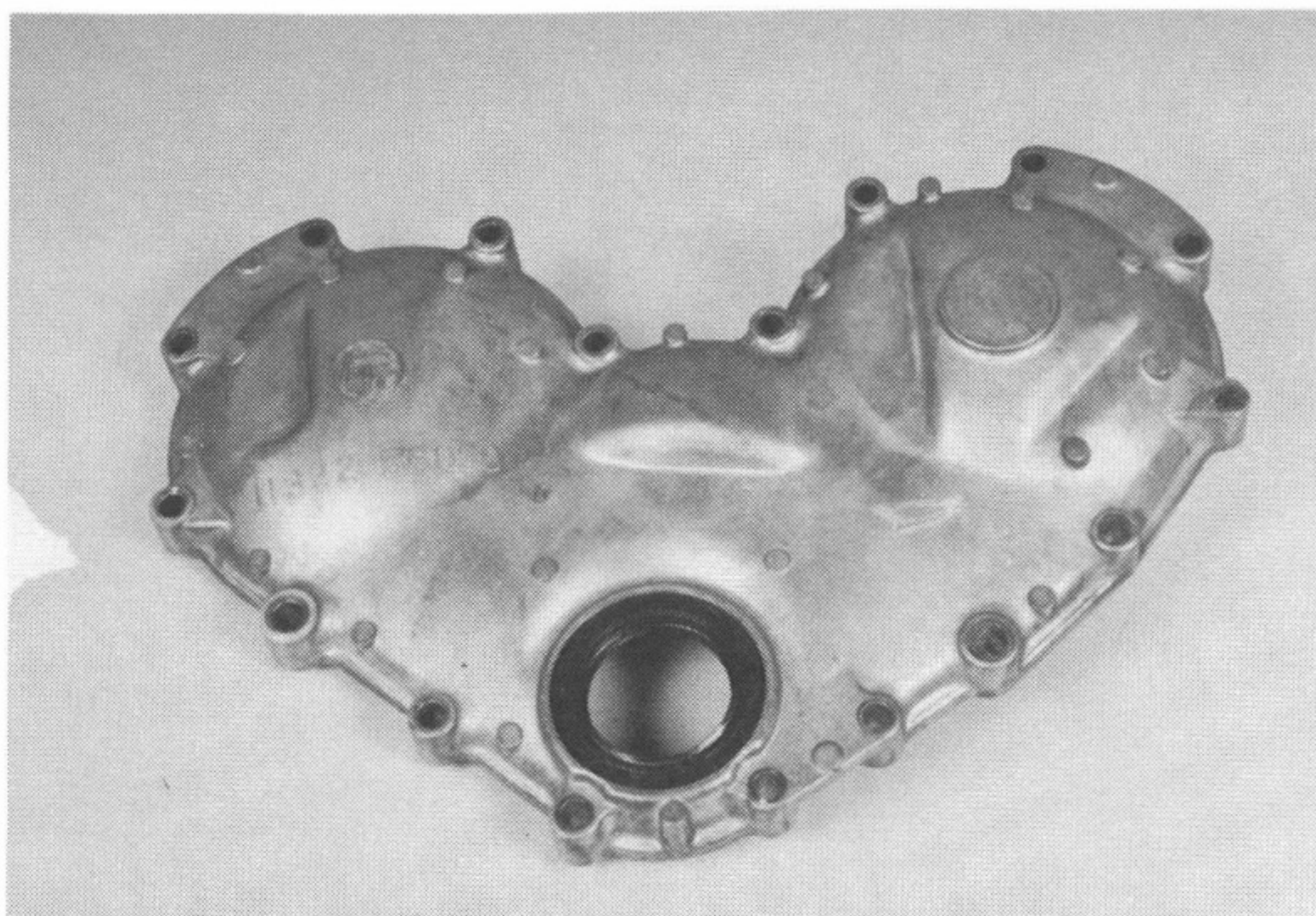
To reduce vibration and noise, the crankshaft has been changed from a 4-balance type to an 8-balance type.



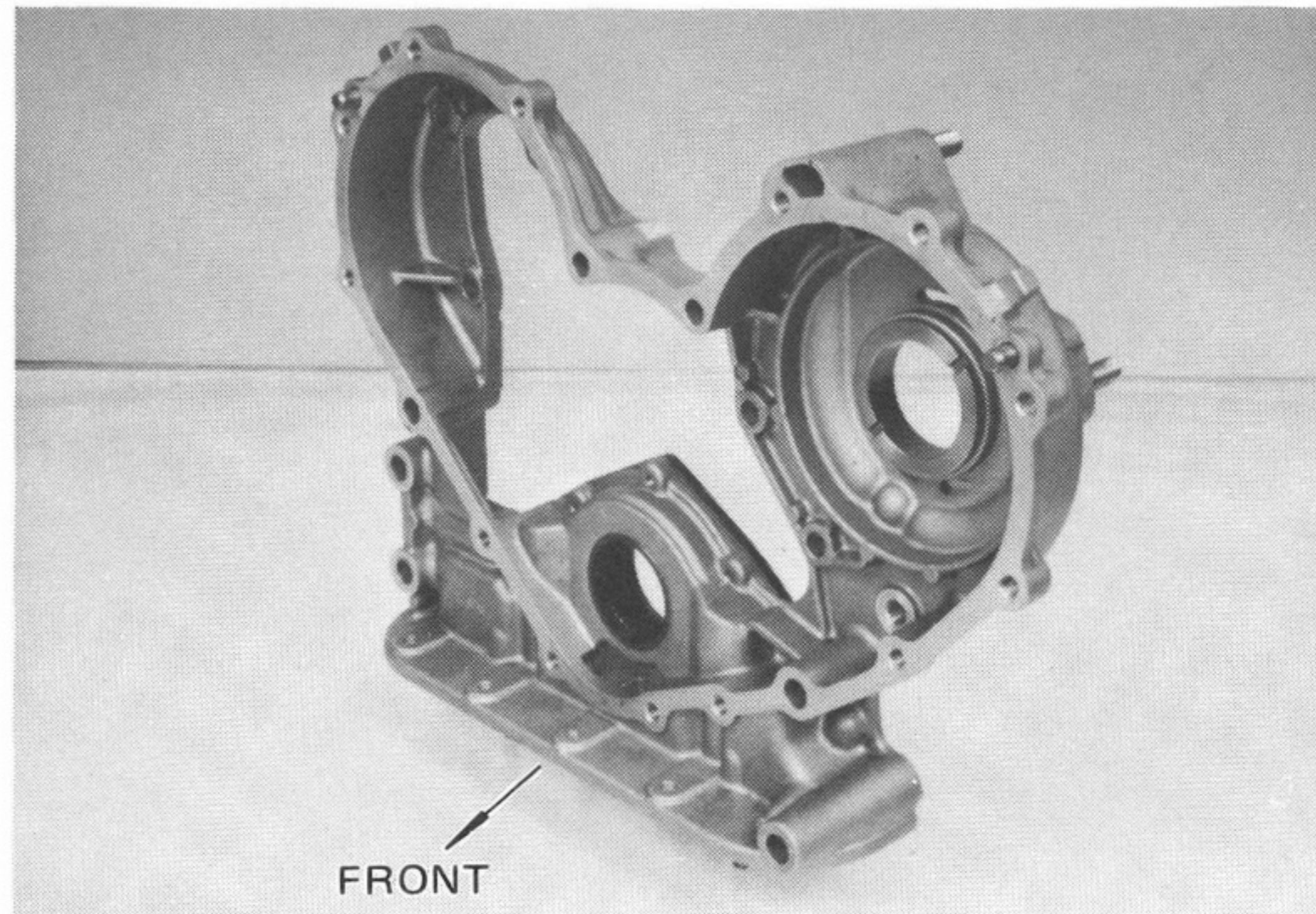
CRANKSHAFT

### 4. TIMING GEAR CASE COVER

The timing gear case cover was previously installed to both the oil pan and timing gear case. However, to improve serviceability, it is now installed to the timing gear case only.



TIMING GEAR CASE COVER



TIMING GEAR CASE

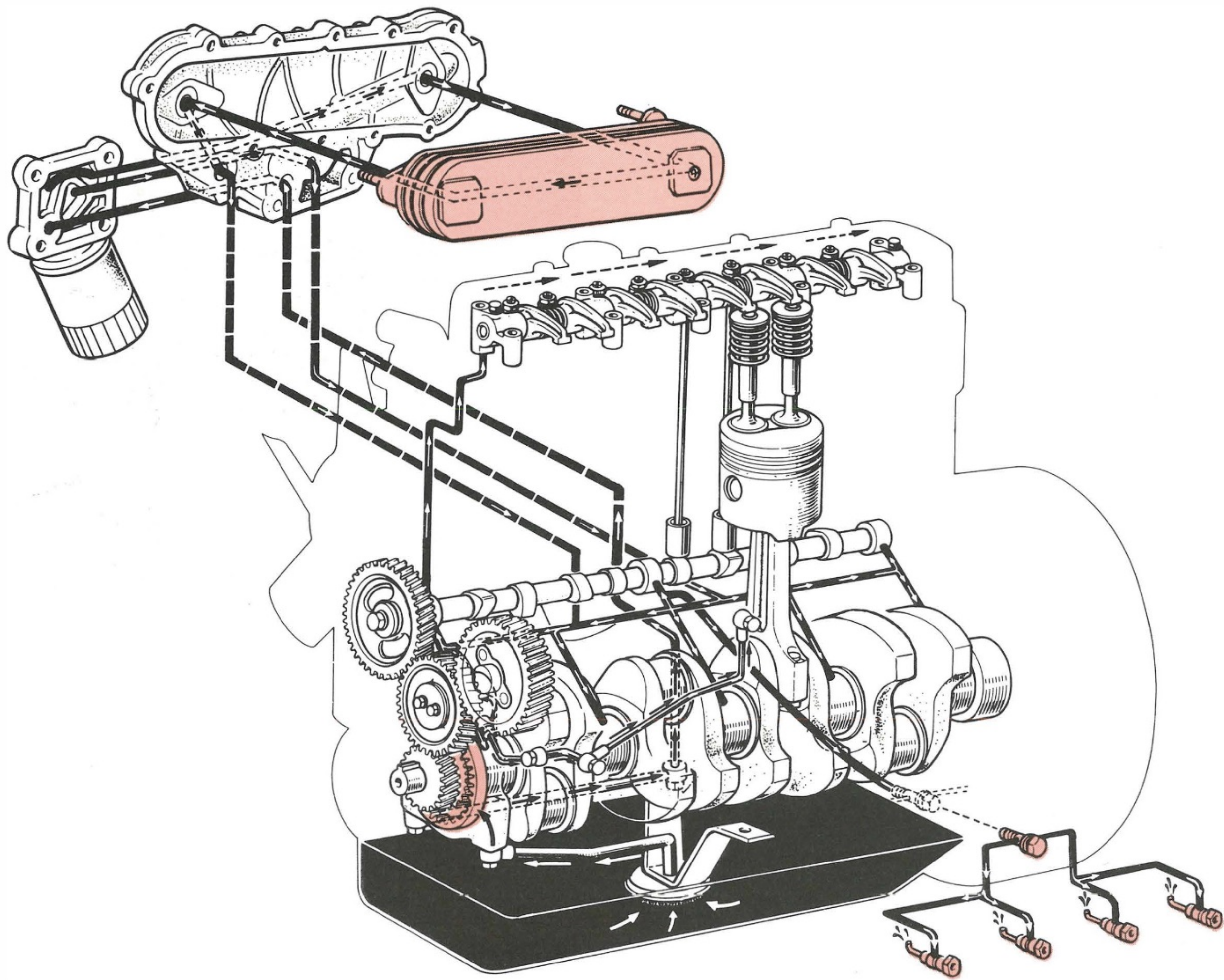
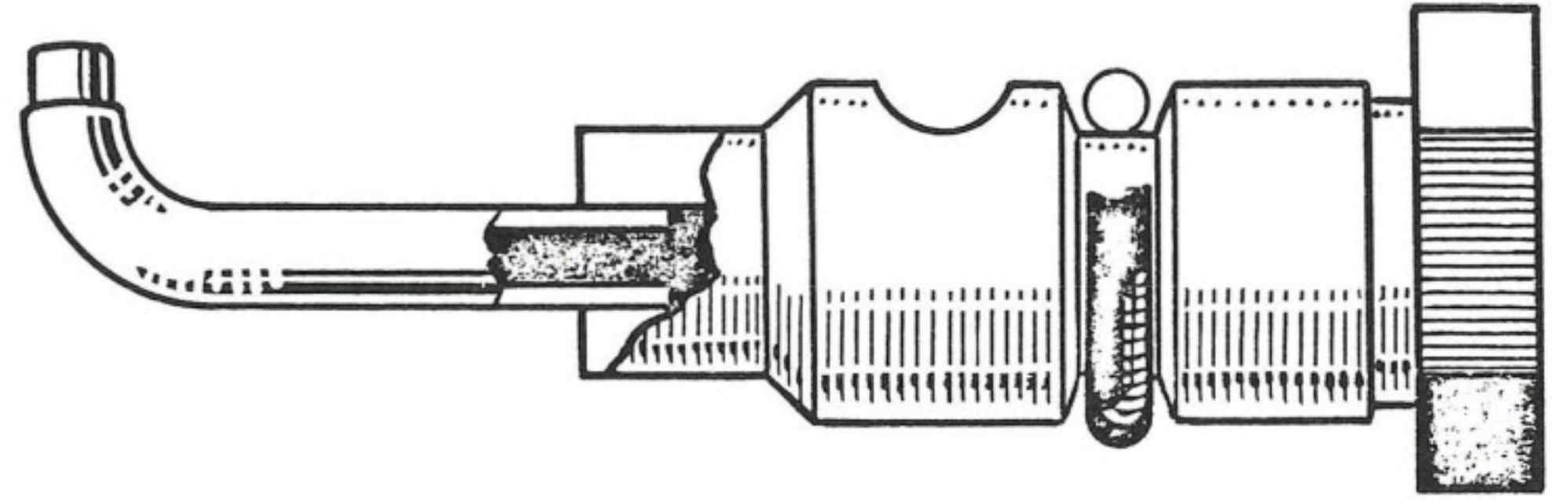
# ENGINE

## ● 3B ENGINE

### 5. OIL NOZZLE

For piston cooling, an oil nozzle is located at the bottom of each cylinder to inject oil onto the underside of the piston head.

When the oil pressure reaches  $2.6 \text{ kg/cm}^2$ , the oil check valve opens and oil is injected.



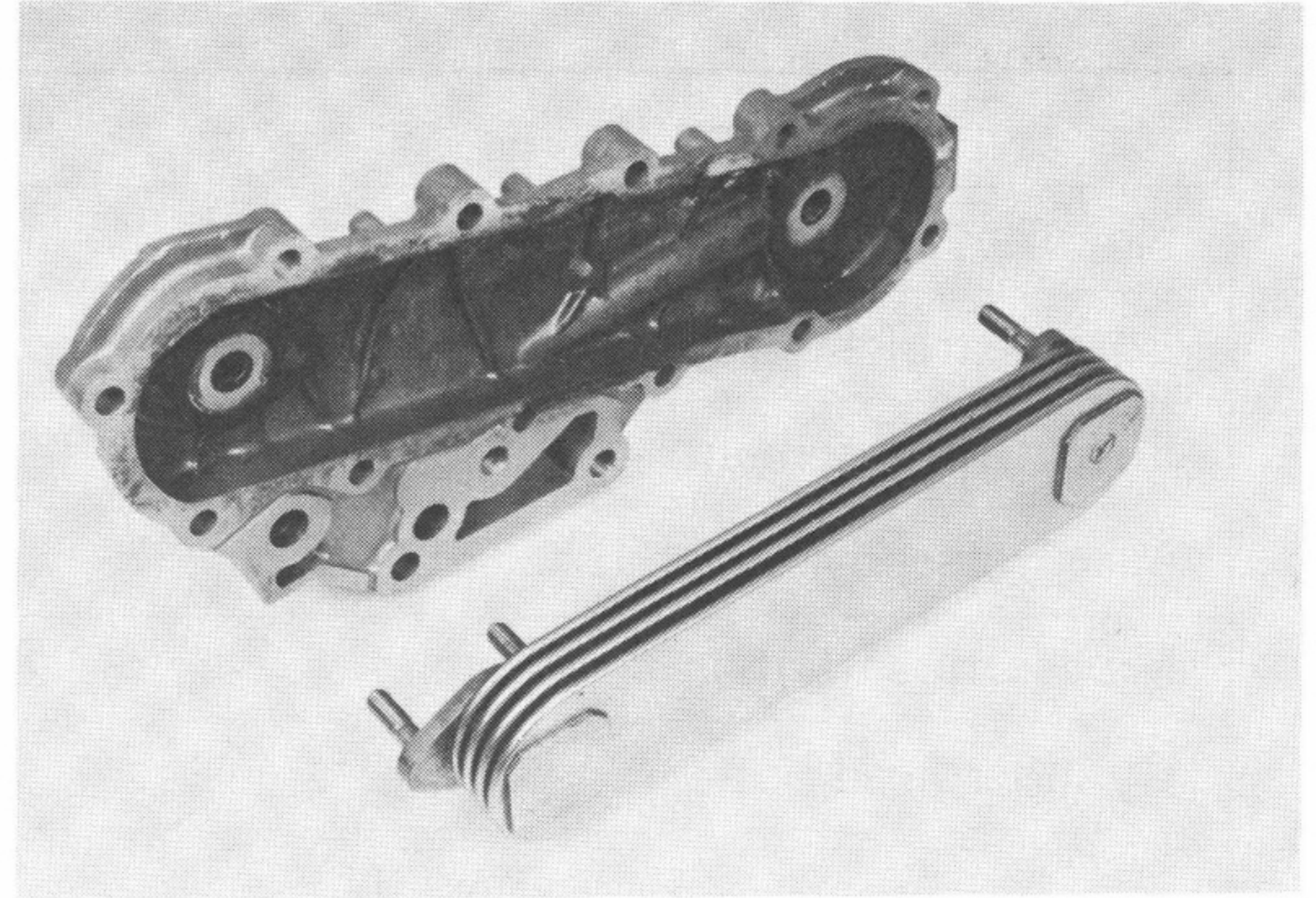
LUBRICATION SYSTEM

# ENGINE

## ● 3B ENGINE

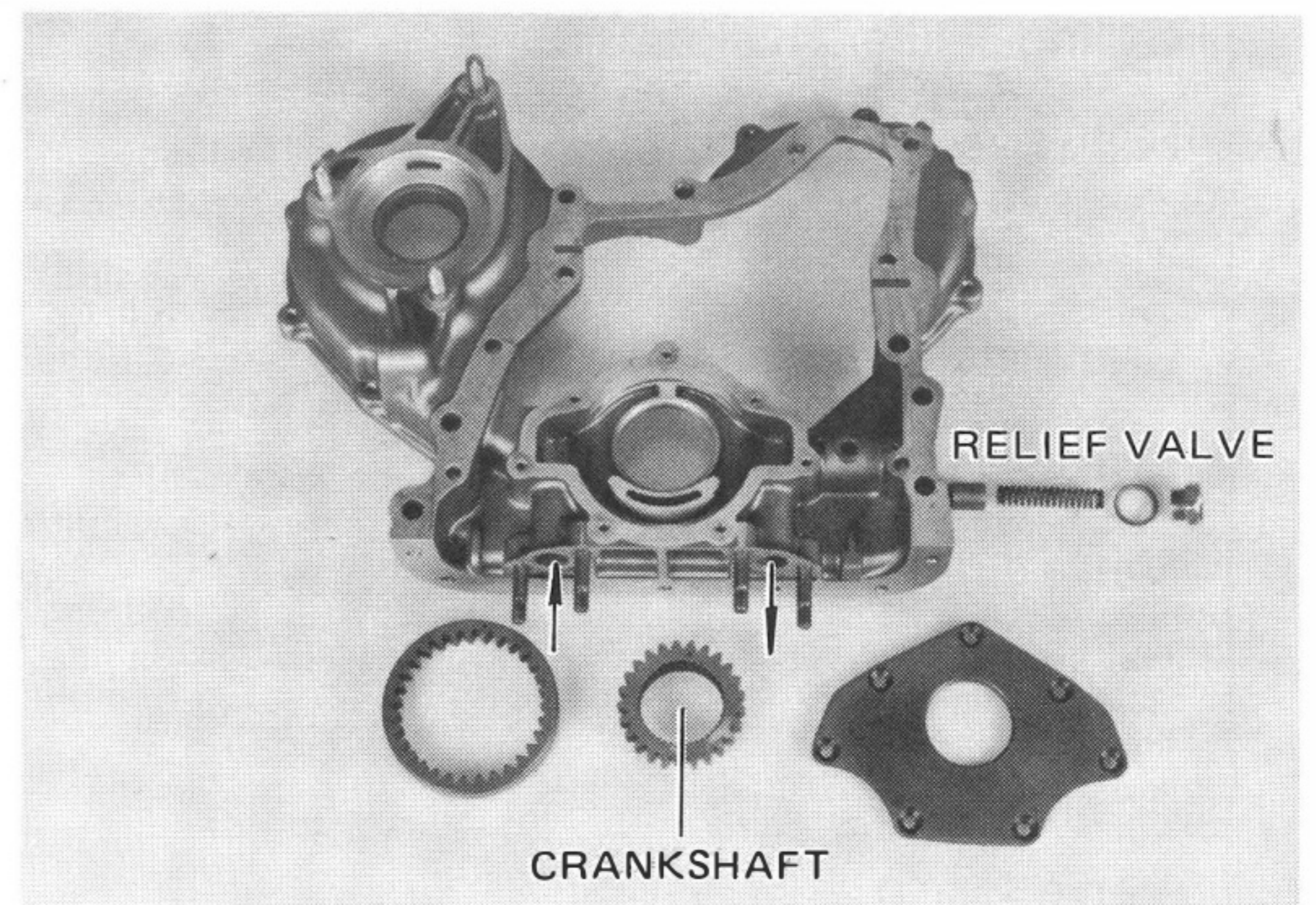
### 6. OIL COOLER

The oil cooler has been changed from an external type to an internal type.



### 7. OIL PUMP

The oil pump is an internal-external gear oil pump and is assembled inside the timing gear case. The oil pump drive gear is driven directly by the crankshaft.



# ENGINE

## ● 2H ENGINE

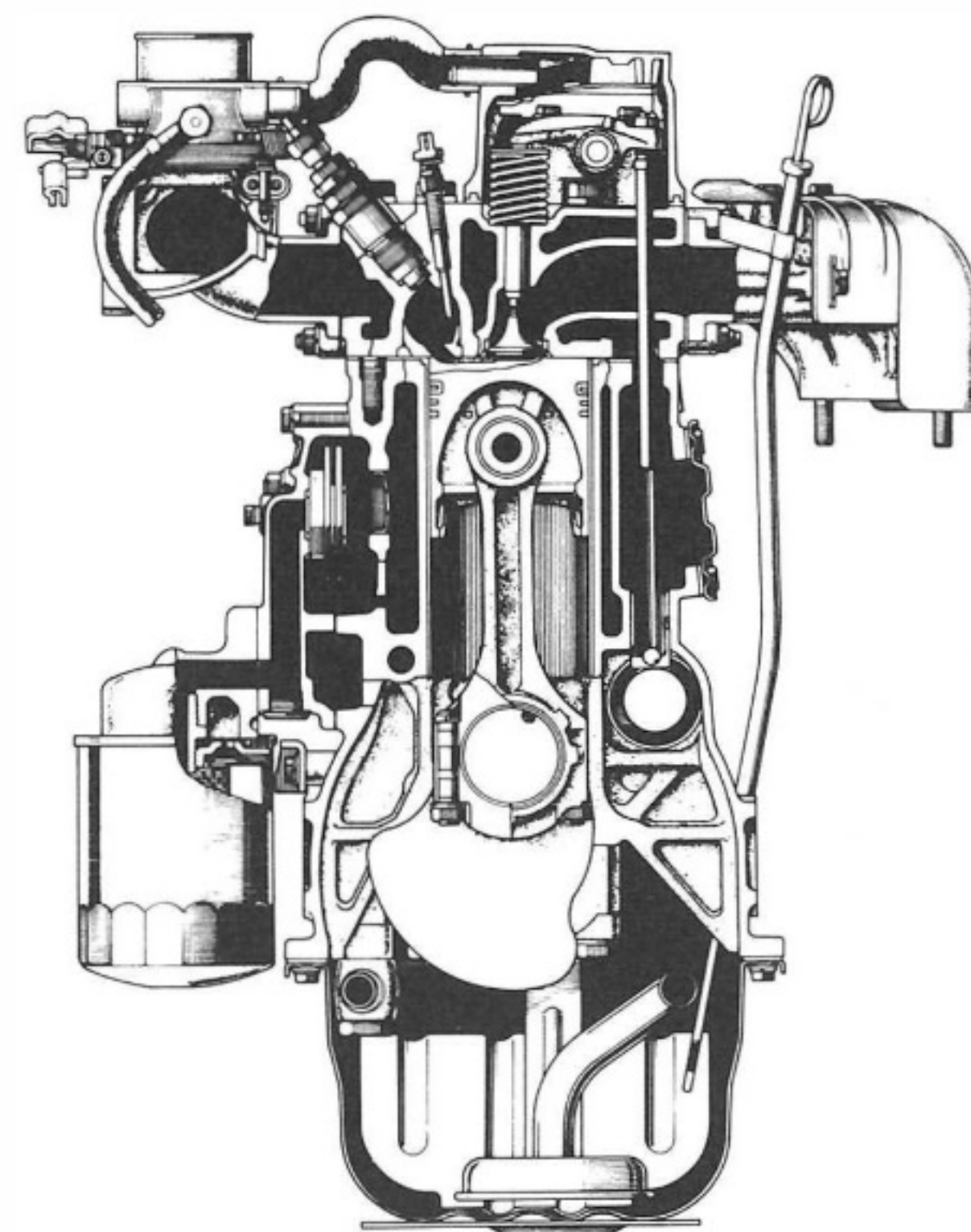
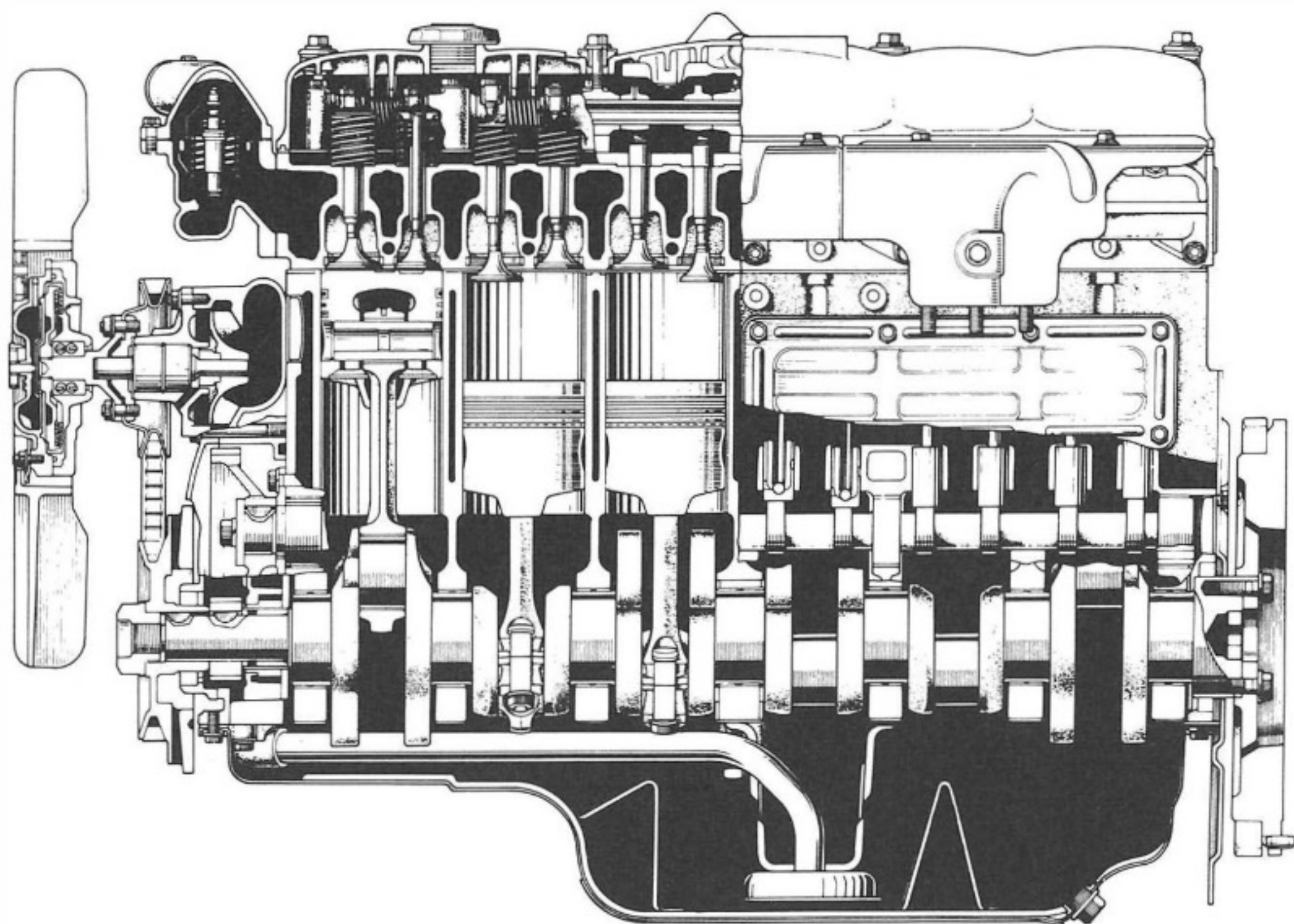
### 2H ENGINE

#### 1. SPECIFICATIONS

		2H	H
No. of cylinders		6	6
Bore x stroke		91 x 102mm	88 x 98mm
Piston displacement		3,980cc	3,576cc
Max Horsepower (DIN)		105ps/3,500rpm	95ps/3,600 rpm
Max torque (DIN)		24.5kg-m/2,000rpm	22.0kg-m/2,200rpm
Cylinder head bolts		6pcs/cyl.	5pcs/cyl.
Valve pitch	IN	22.0mm	21.0mm
	EX	25.5mm	24.5mm
Valve dia.	IN	42mm	40.5mm
	EX	35mm	33.5mm
Cylinder liner thickness		2.0mm	2.5mm
Main bearing cap bolt		M13 x 1.5	M12 x 1.25
Main oil hole dia.		16mm	13mm
Crankshaft balancer		8pcs	4pcs
Piston pin dia.		29mm	27mm
Valve timing		IN. close 48° ABDC	IN. close 44° ABDC
Cam lift		9.74mm	9.45mm
Valve rocker support		7pcs	6pcs
Valve spring		Double	Single
Water pump impeller		85mm	80mm
Air venturi dia.		52mm	48.5mm
Air cleaner dia.		291mm	260mm
Connecting rod bolt		M12 x 1.25mm	M11 x 1.0mm

# ENGINE

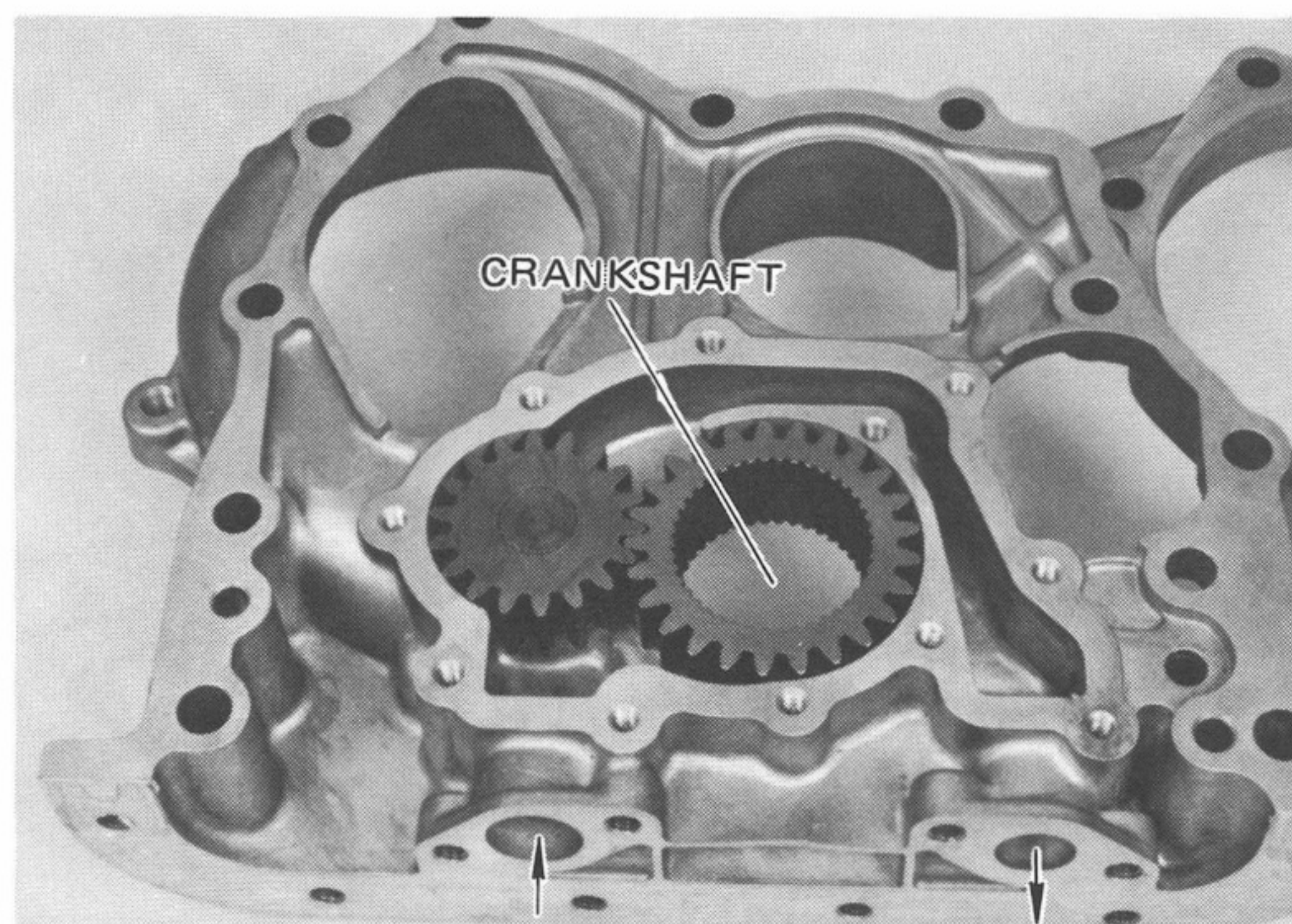
## ● 2H ENGINE



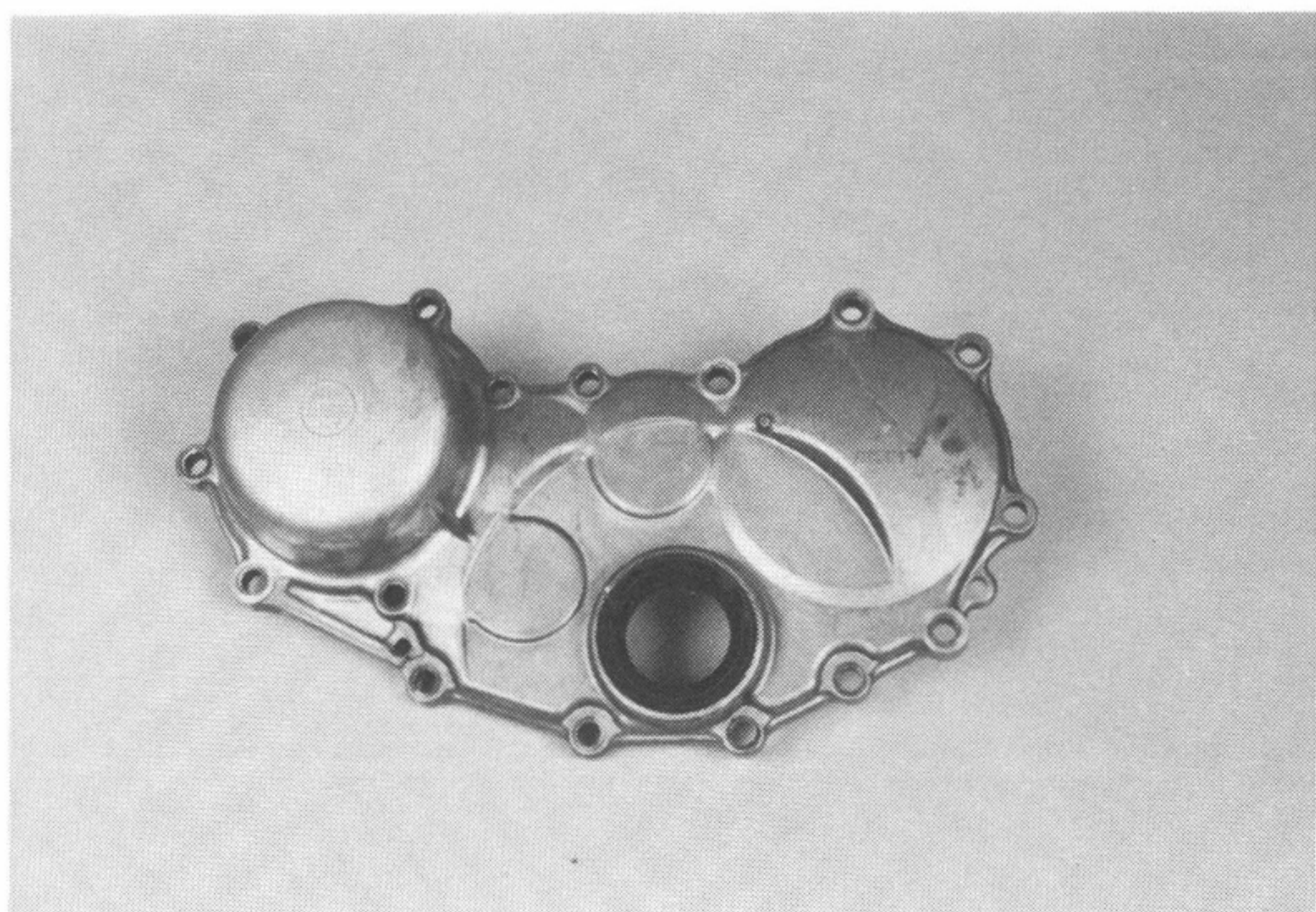
CUTAWAY VIEW

### 2. OIL PUMP

The oil pump drive gear is driven directly by the crankshaft. These gears are placed in a timing gear case.

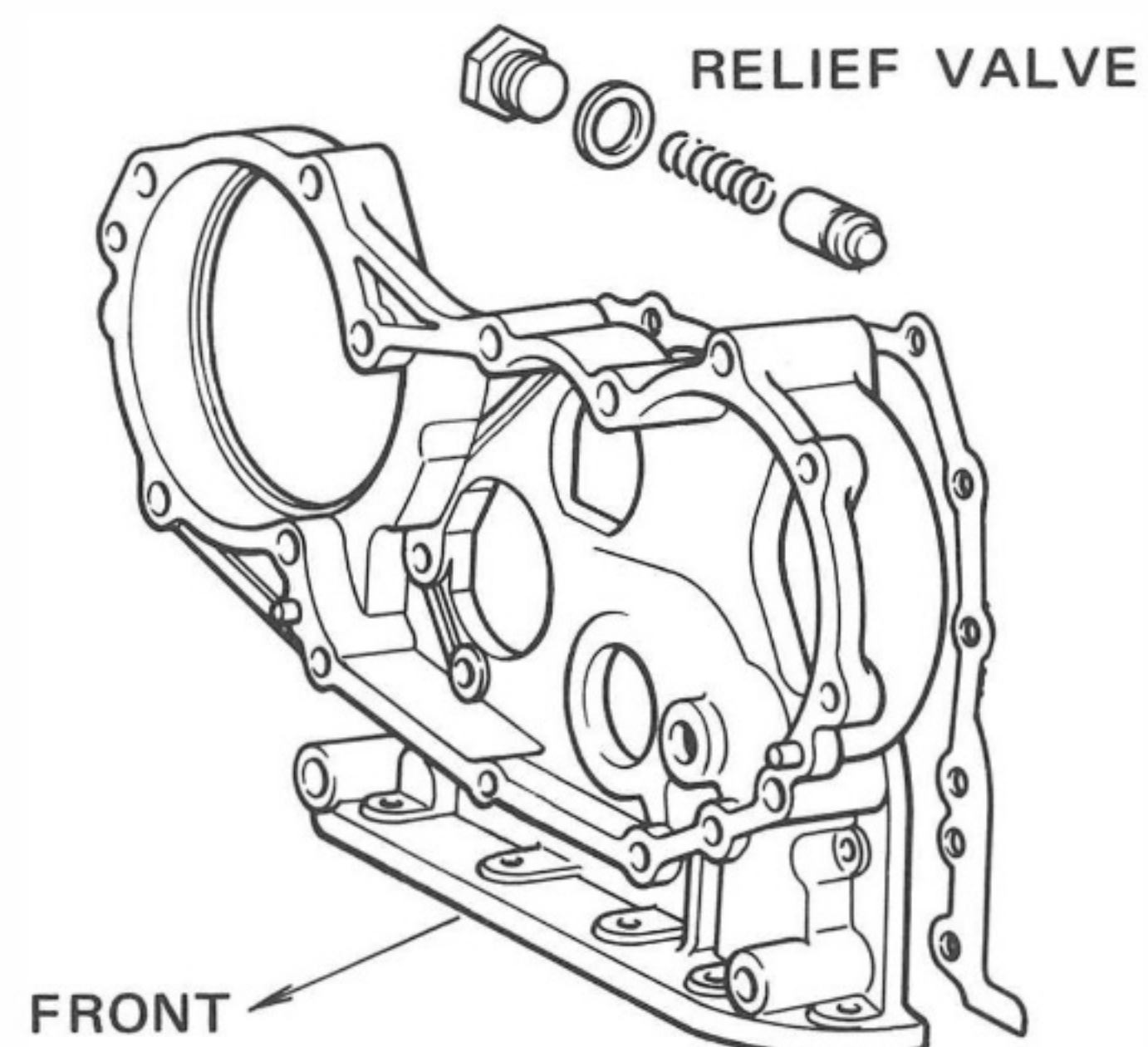


### 3. TIMING GEAR CASE AND COVER



TIMING GEAR CASE COVER

### OIL PUMP



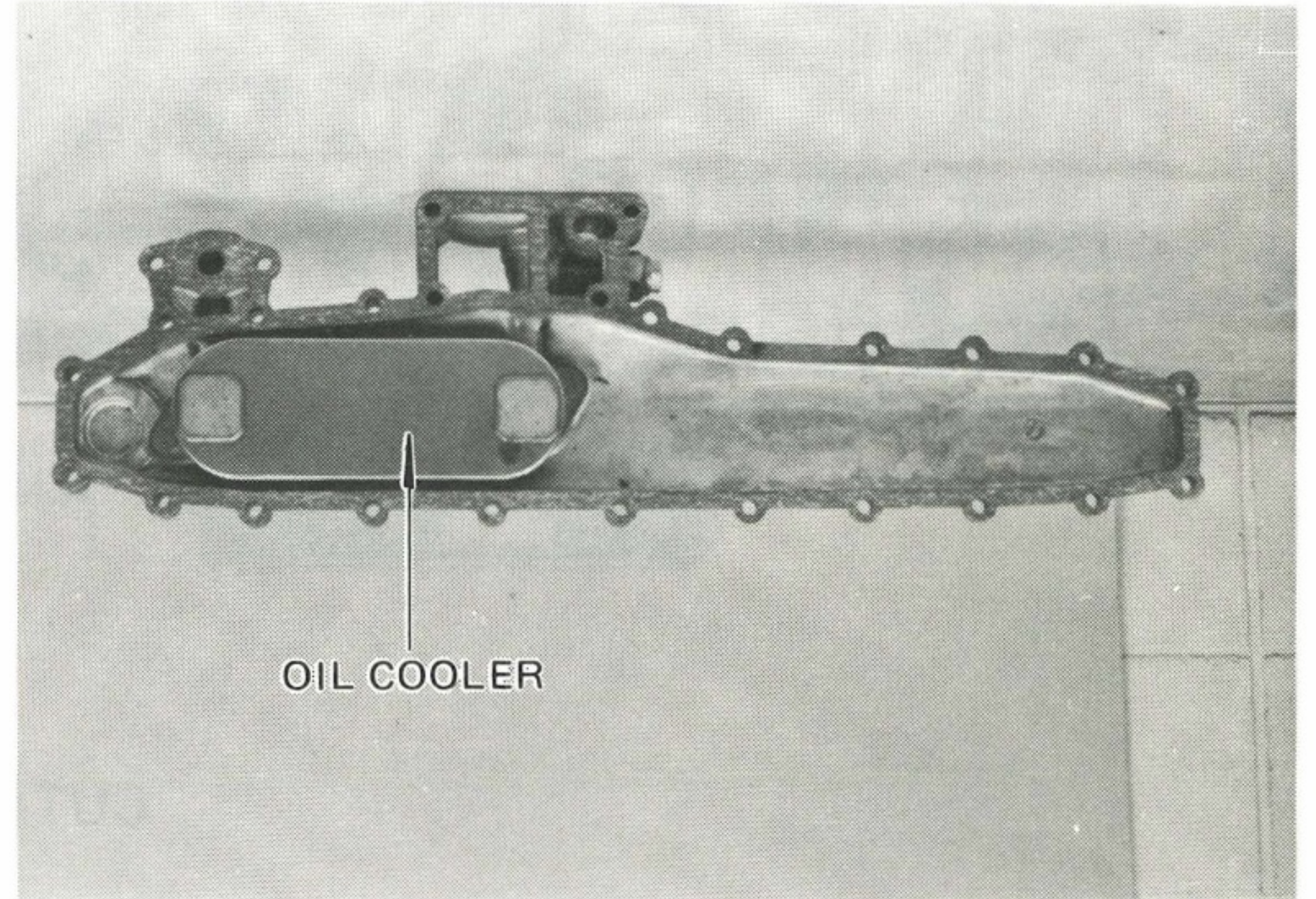
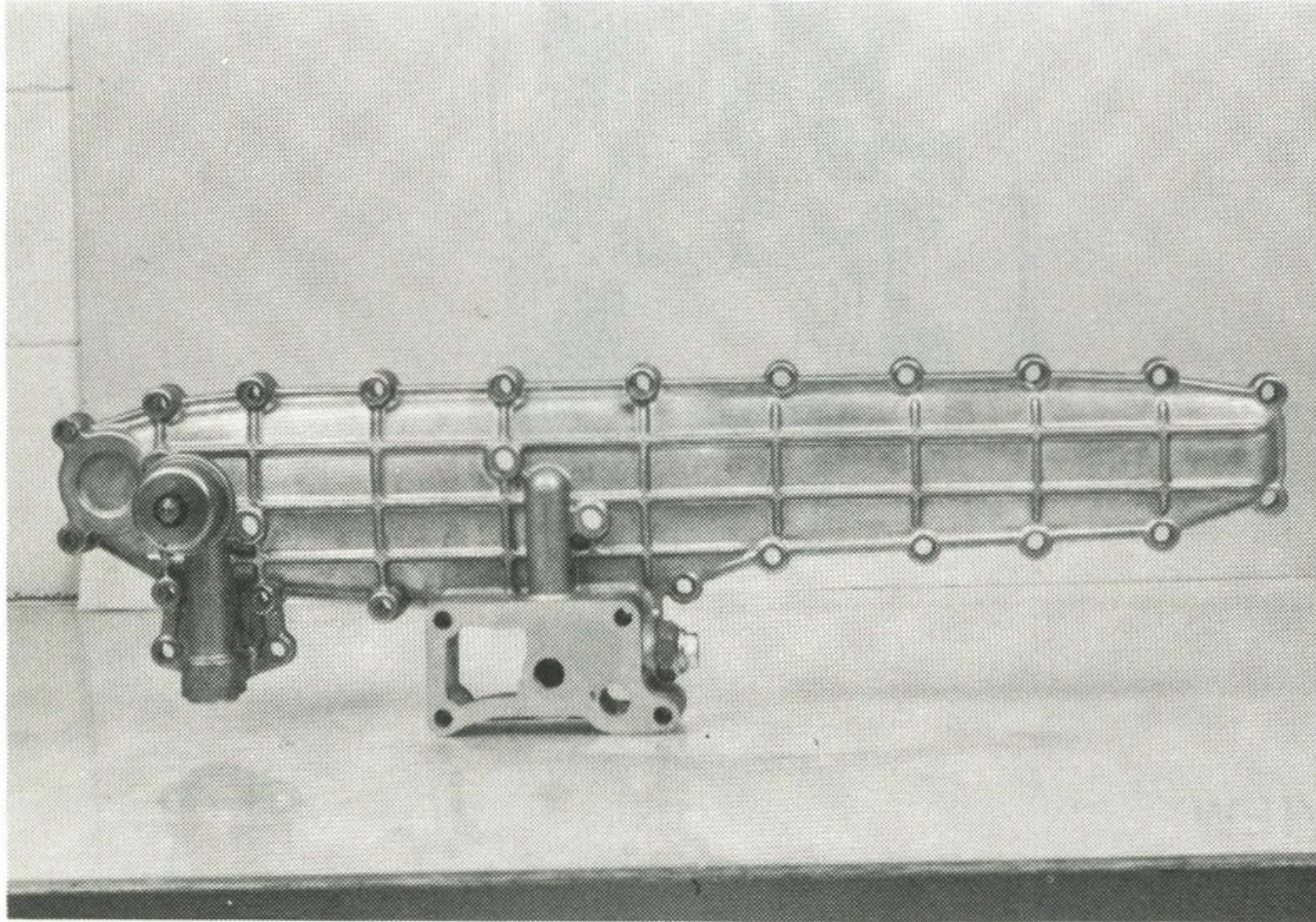
TIMING GEAR CASE

# ENGINE

## ● 2H ENGINE

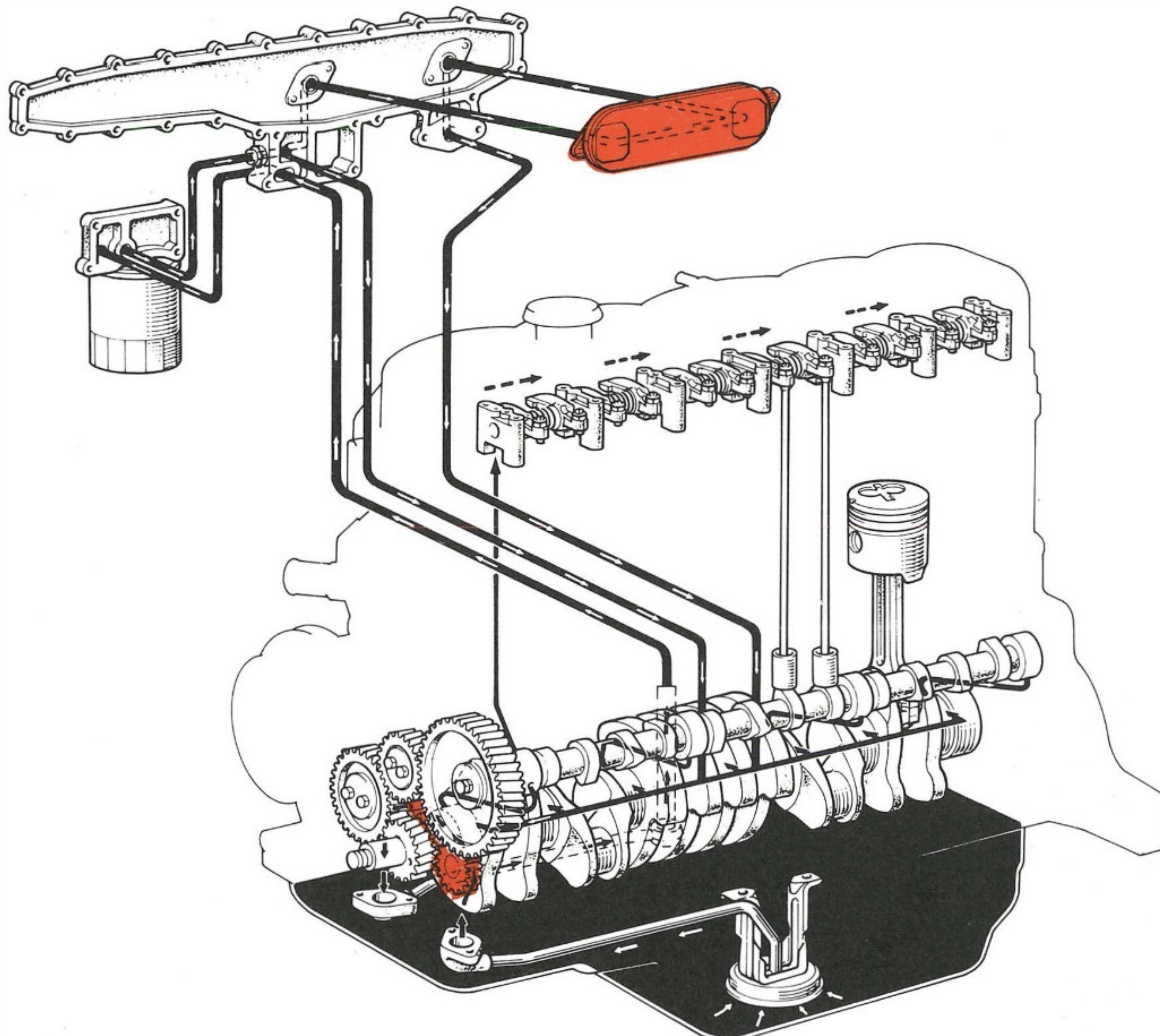
### 4. OIL COOLER

The oil cooler has been changed from an external type to an internal type.



OIL COOLER ASSY

### 5. LUBRICATION SYSTEM

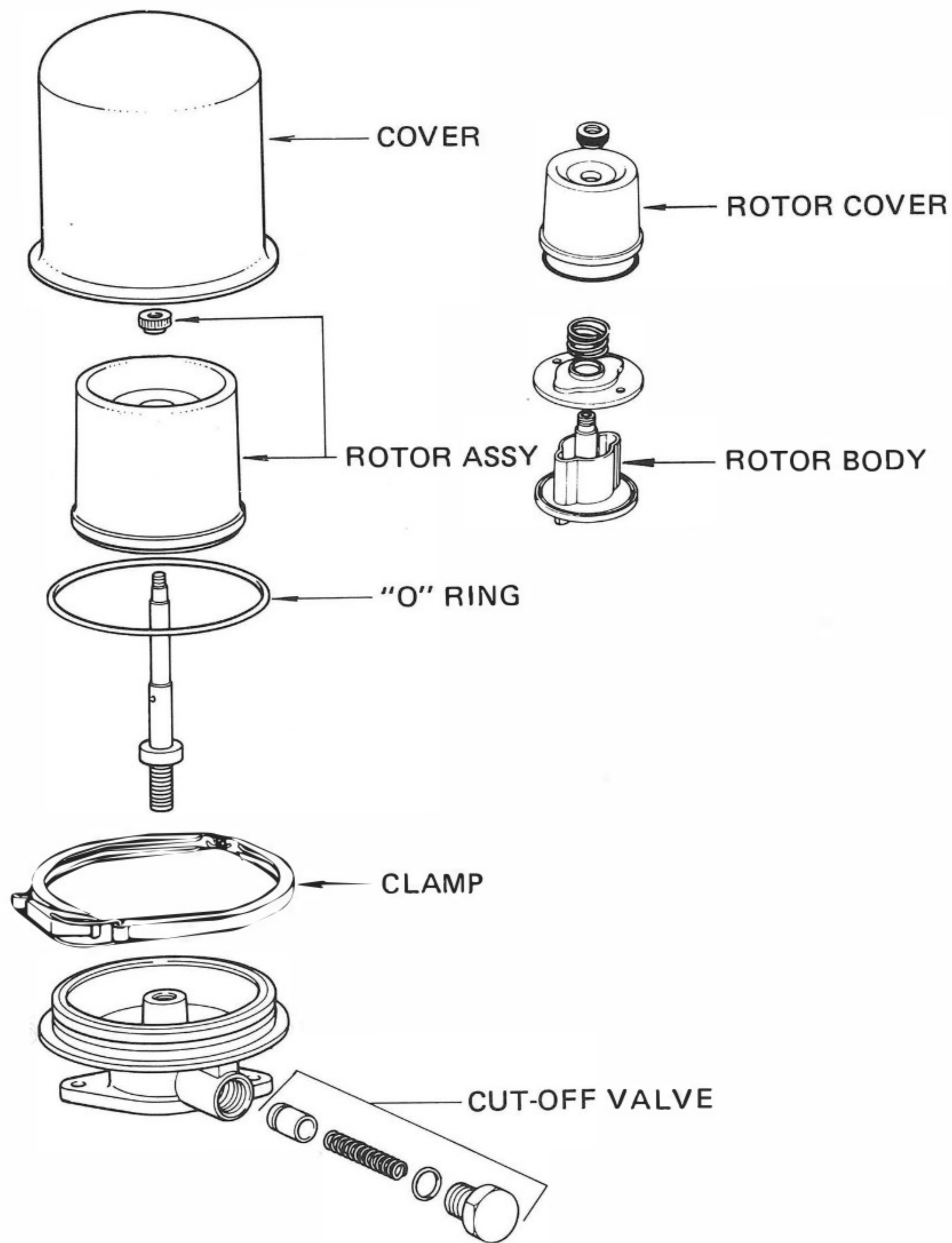


LUBRICATION SYSTEM

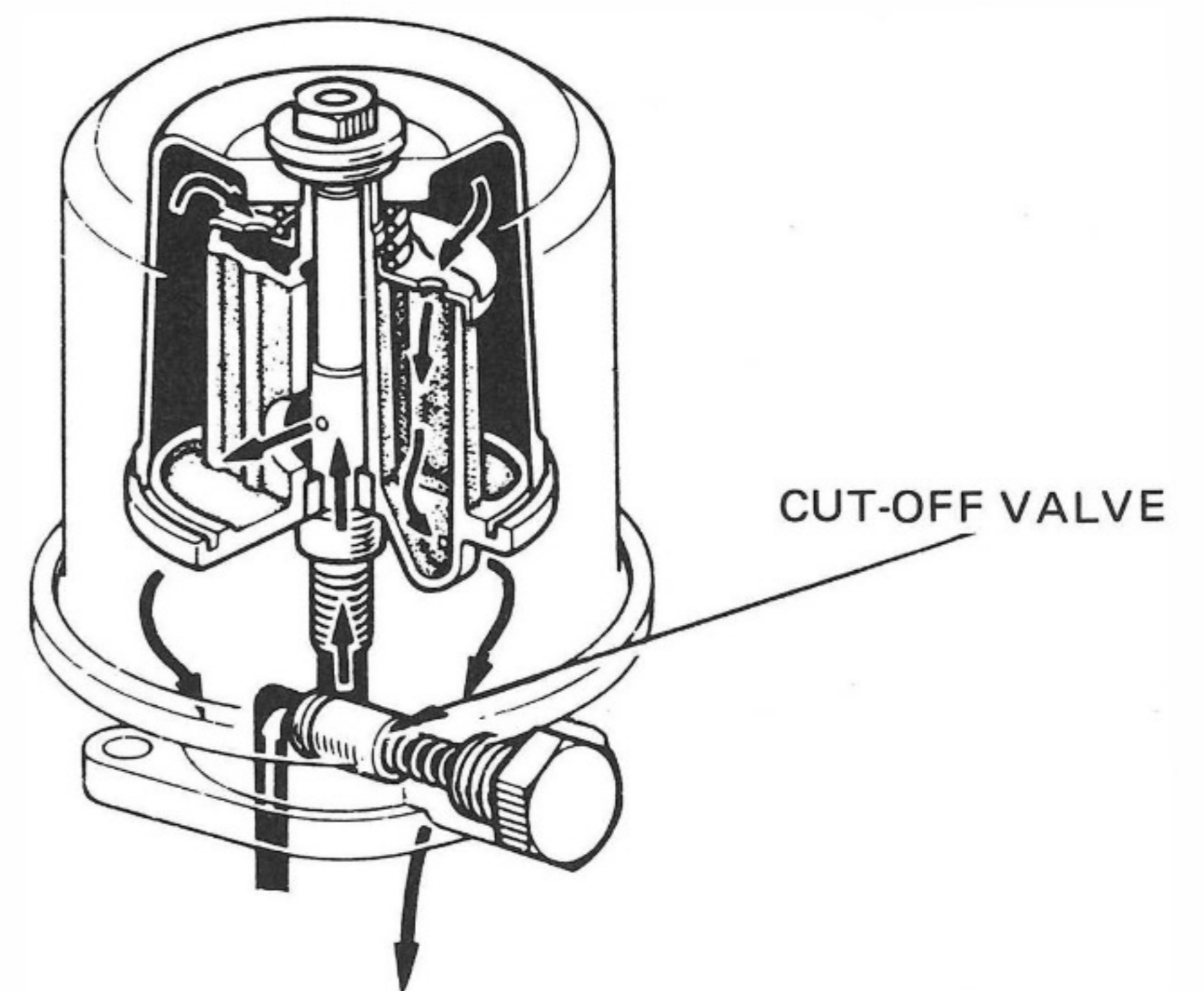
# ENGINE

## ● 2H ENGINE

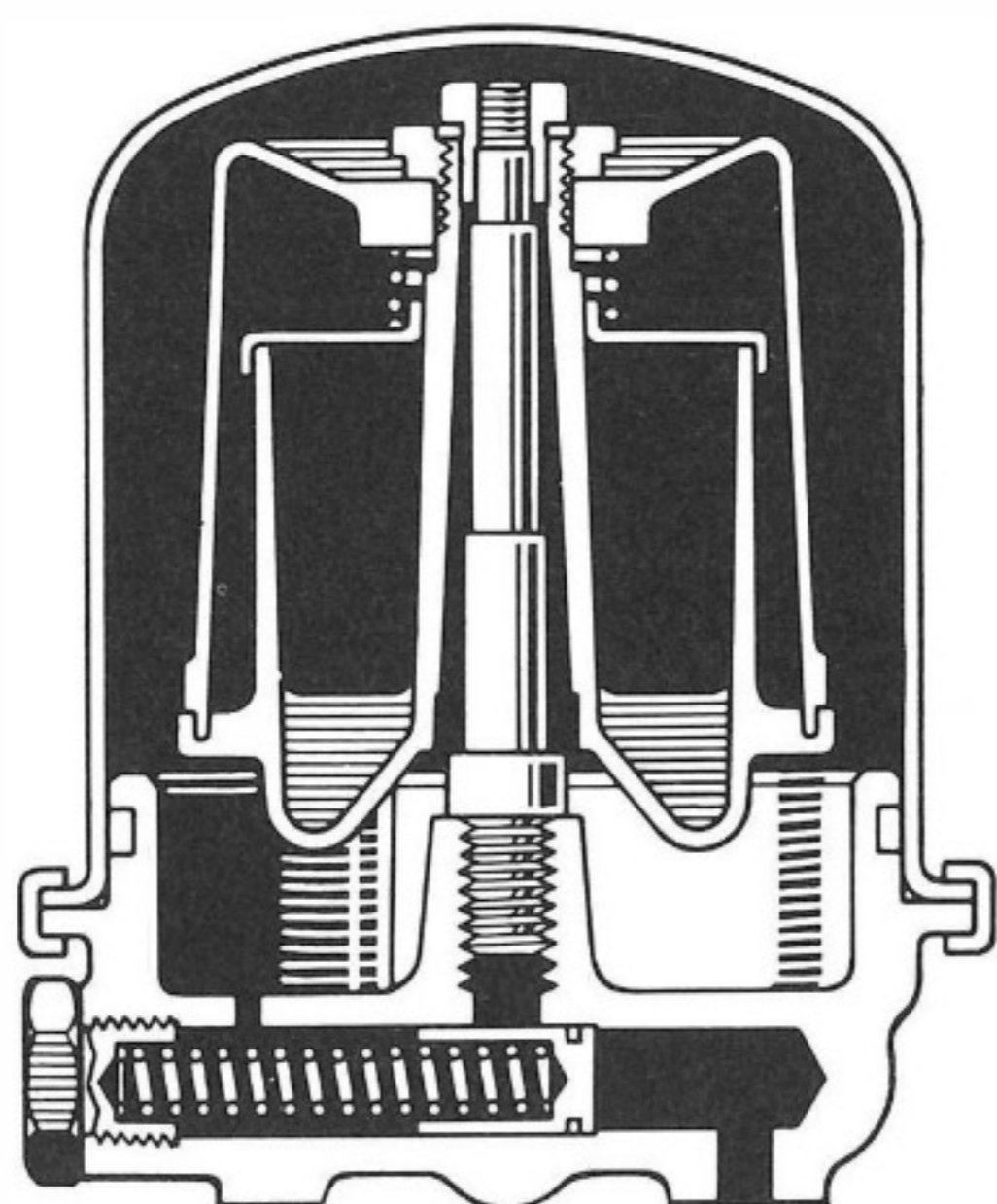
### 6. CENTRIFUGAL OIL FILTER



COMPONENTS



OPERATION



CUTAWAY VIEW

The centrifugal filter is composed of a cover, rotor body, support, spring, rotor cover, etc. Pressurized oil from the oil pump flows first into the filter bracket and then through the center of the spindle by way of the cut-off valve. The oil forced into the rotor body is discharged through the nozzles and the reaction force occurring thereby causes the rotor body to turn.

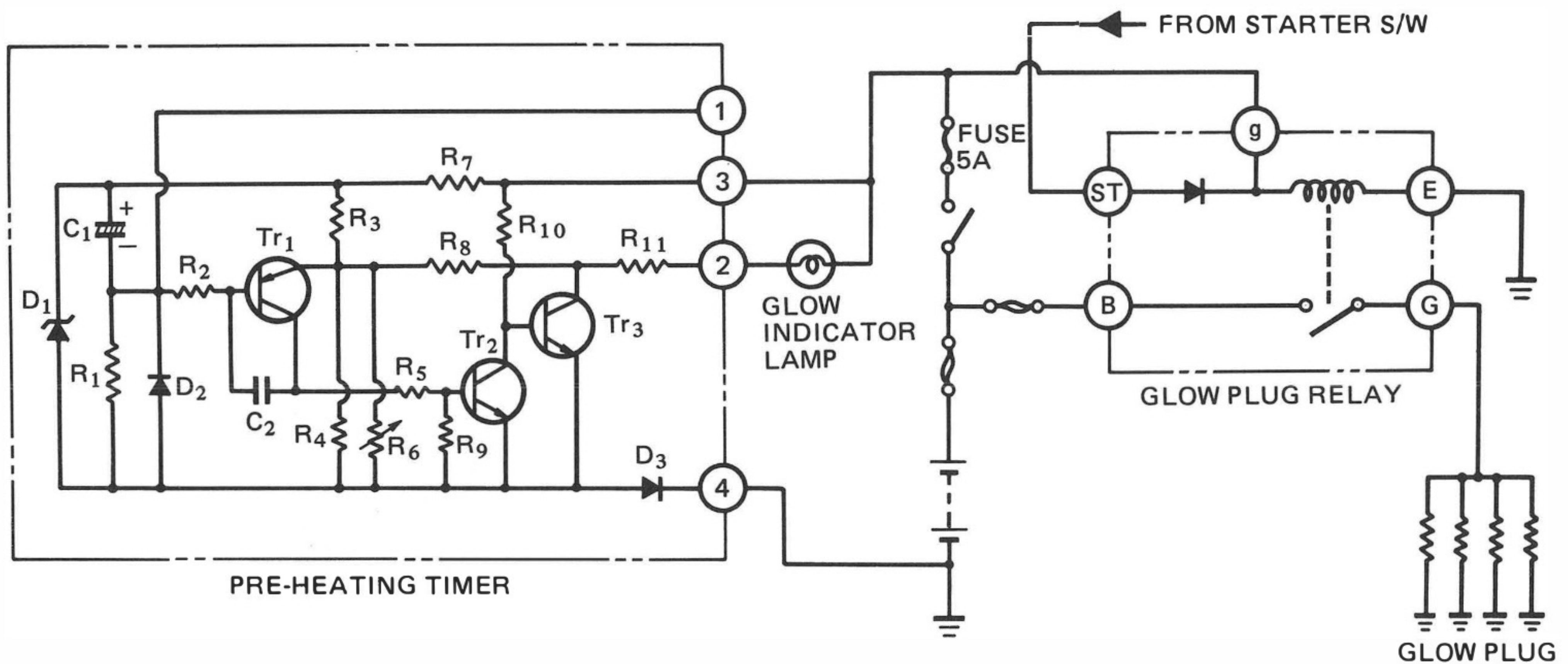
Due to the centrifugal force occurring by the rotor body rotation, oil is slung against the inner surface of the rotor cover which is machined with numerous grooves. As the impurities in the oil accumulate in these grooves, clean oil returns to the oil pan through the filter bracket.

# ENGINE ELECTRICAL

## ● PREHEATING SYSTEM

### ENGINE ELECTRICAL

#### PREHEATING SYSTEM



PRE-HEATING CIRCUIT

A preheating timer (optional on HJ & BJ) has been employed for glow plug control. The glow indicator is in the combination meter.

#### OPERATION

- (1) The preheating timer controls the glow duration to about 17 seconds, during which time the glow indicator lamp is on.
- (2) The glow indicator lamp goes out to inform completion of combustion chamber preheating.

— Note —

*There are two types of glow indication mechanisms; a timer type and a glow plug controller type. As the glow plug resistance for each is not the same, these are not interchangeable.*

# ENGINE ELECTRICAL

## ● STUDY CORNER

### STUDY CORNER

# POWER TRAIN

## ● CLUTCH ● TRANSMISSION AND TRANSFER

### POWER TRAIN

#### CLUTCH

##### 1. CLUTCH HOUSING

Engine mountings have been changed from four point to three point support type and the clutch housing shape has been changed accordingly.

##### 2. CLUTCH COVER

To reduce weight and lighten clutch pedal force, a diaphragm type clutch has been adopted on 3B and 2H diesel engines.

##### 3. CLUTCH RELEASE FORK AND RELEASE BEARING HUB

To improve durability, induction hardening has been employed to the contact surface.

##### 4. CLUTCH DISC

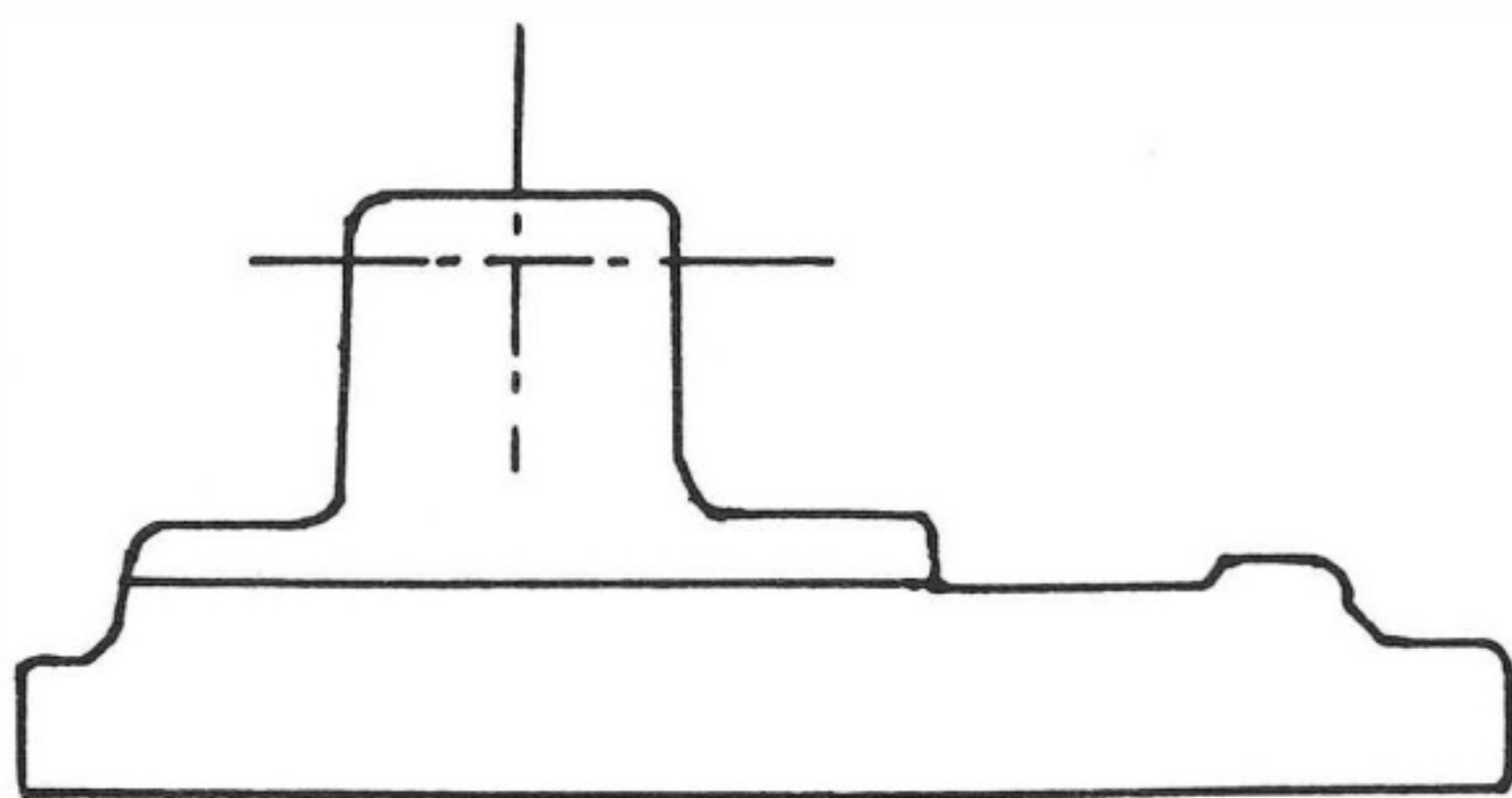
To improve durability, the clutch disc diameter on the 3B engine has been enlarged to 260mm.

#### TRANSMISSION AND TRANSFER

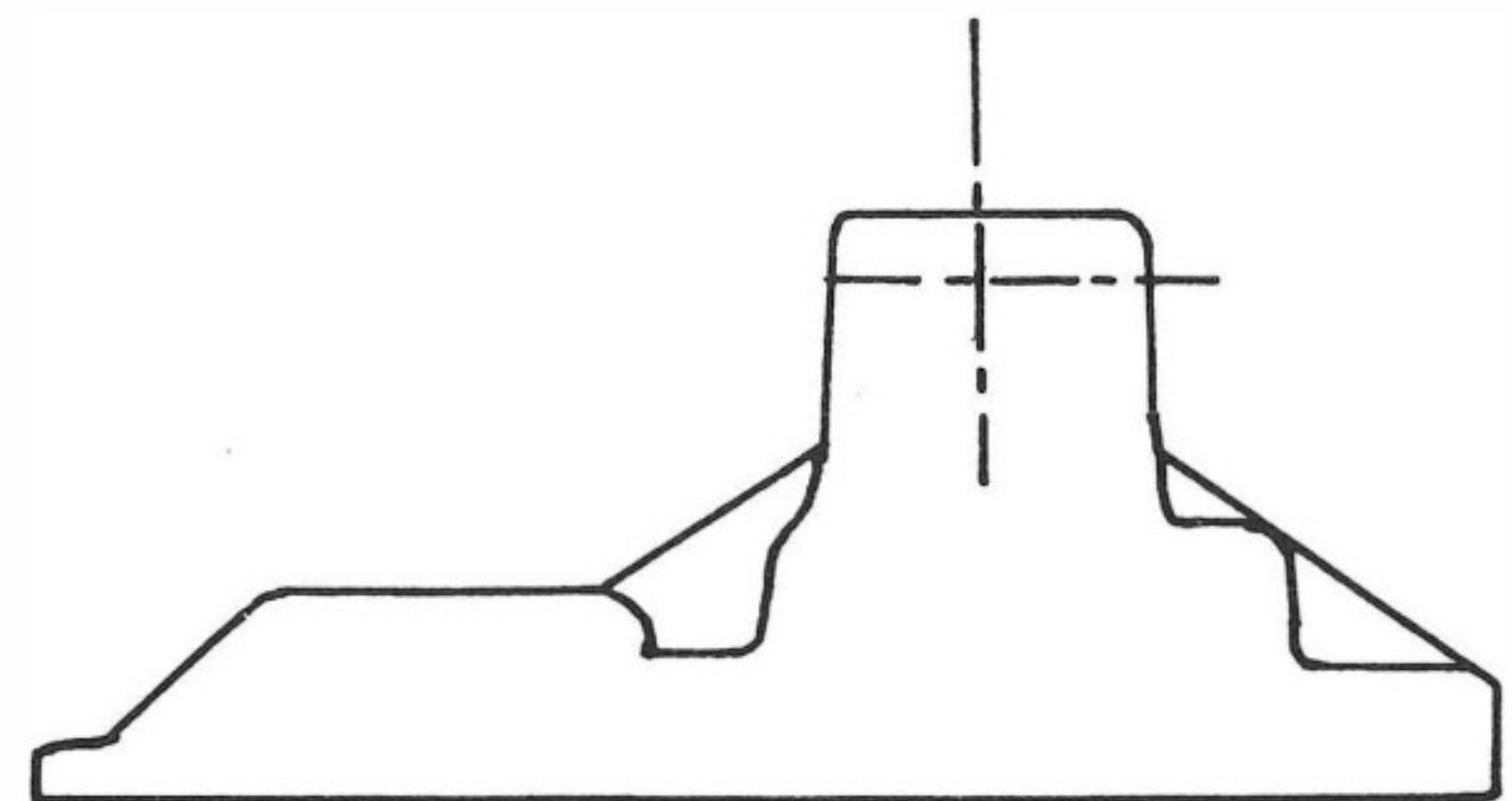
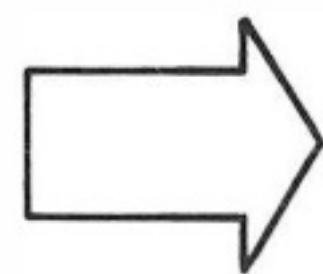
##### 1. TRANSMISSION CASE COVER

The transmission case cover and shift lever retainer have been integrated, and the material has been changed from cast iron to aluminum die cast.

The shift lever position has been relocated 90mm to the rear to avoid interference with the instrument panel during shifting.



PREVIOUS



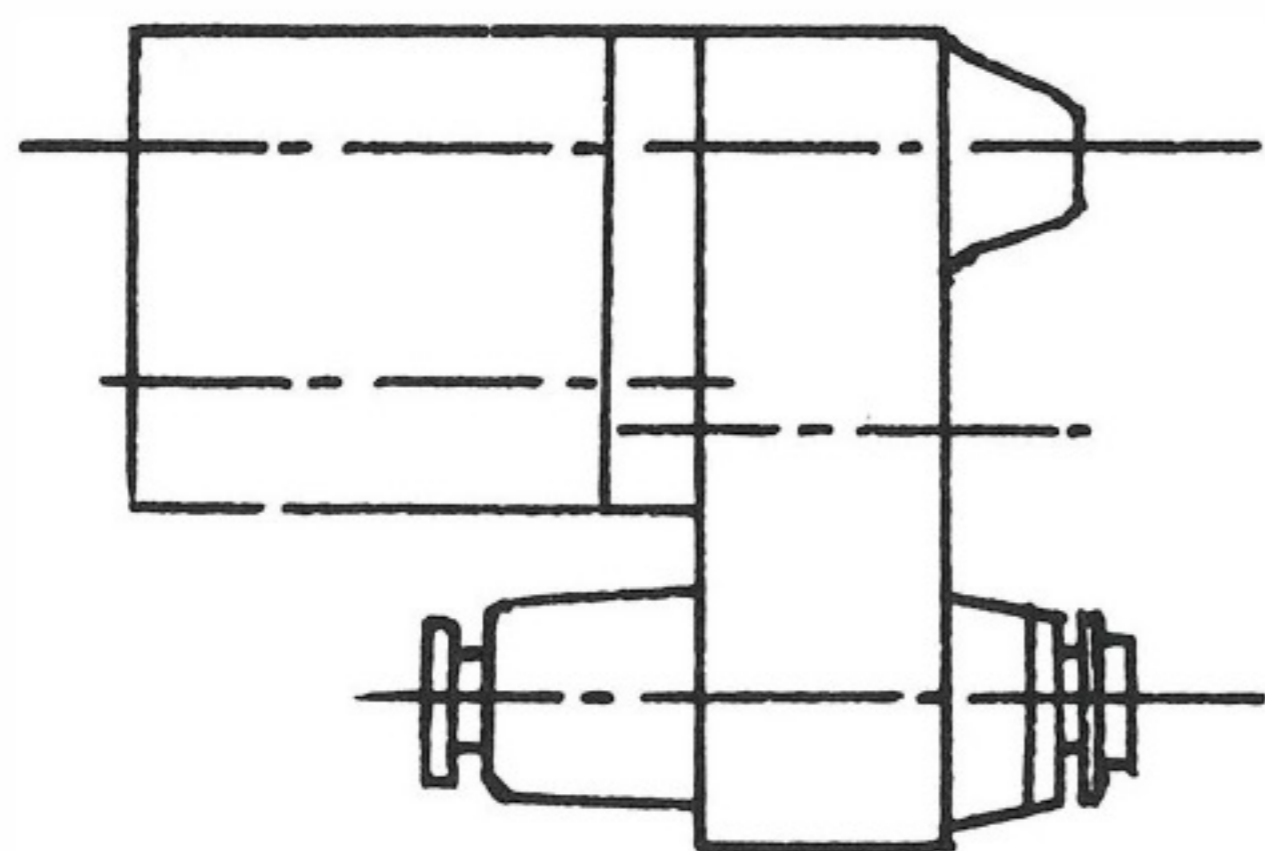
NEW

# POWER TRAIN

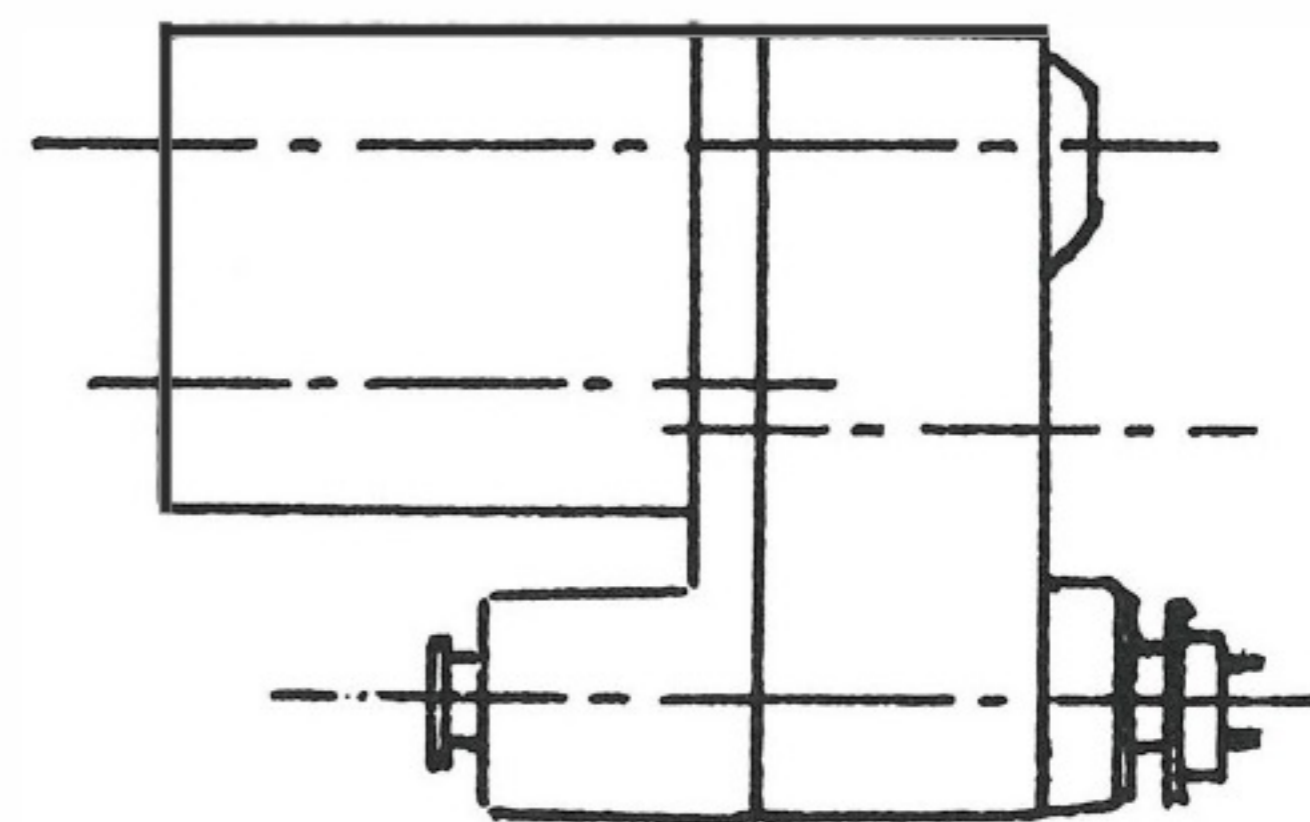
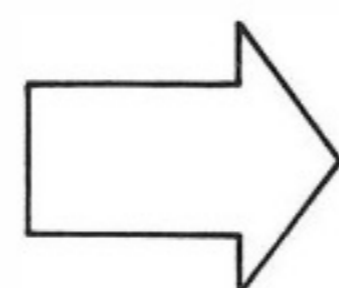
## ● TRANSMISSION AND TRANSFER

### 2. TRANSFER CASE

The transfer case has been newly designed.



PREVIOUS



NEW

### 3. SHIFT LEVER

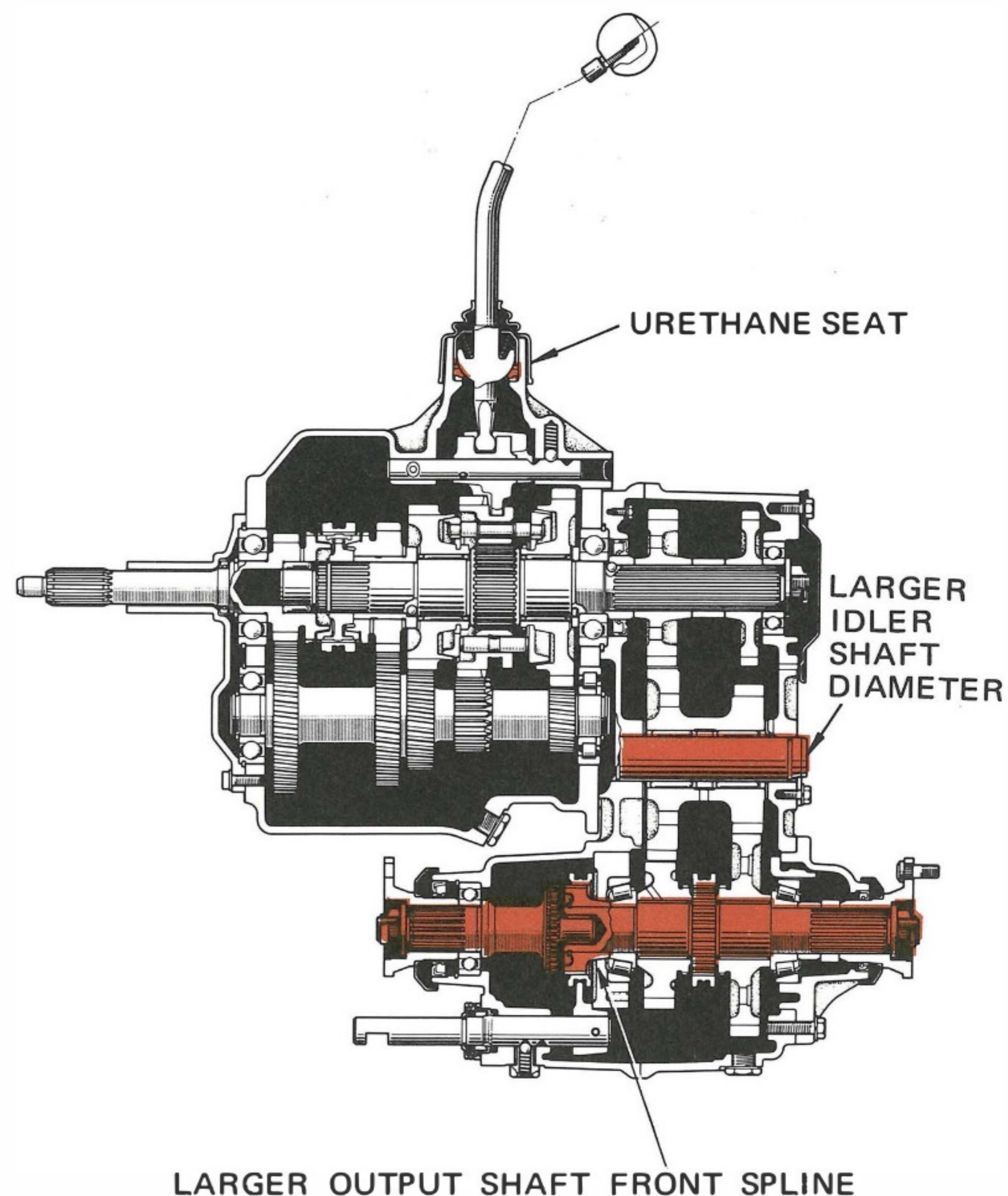
The shift lever seat is made of urethane for the prevention of vibration noise.

### 4. TRANSFER IDLER BEARING

The diameter of the idler shaft has been increased from 25.4mm to 34mm, and the needle bearing diameter has been increased accordingly.

### 5. OUTPUT SHAFT FRONT SPLINE

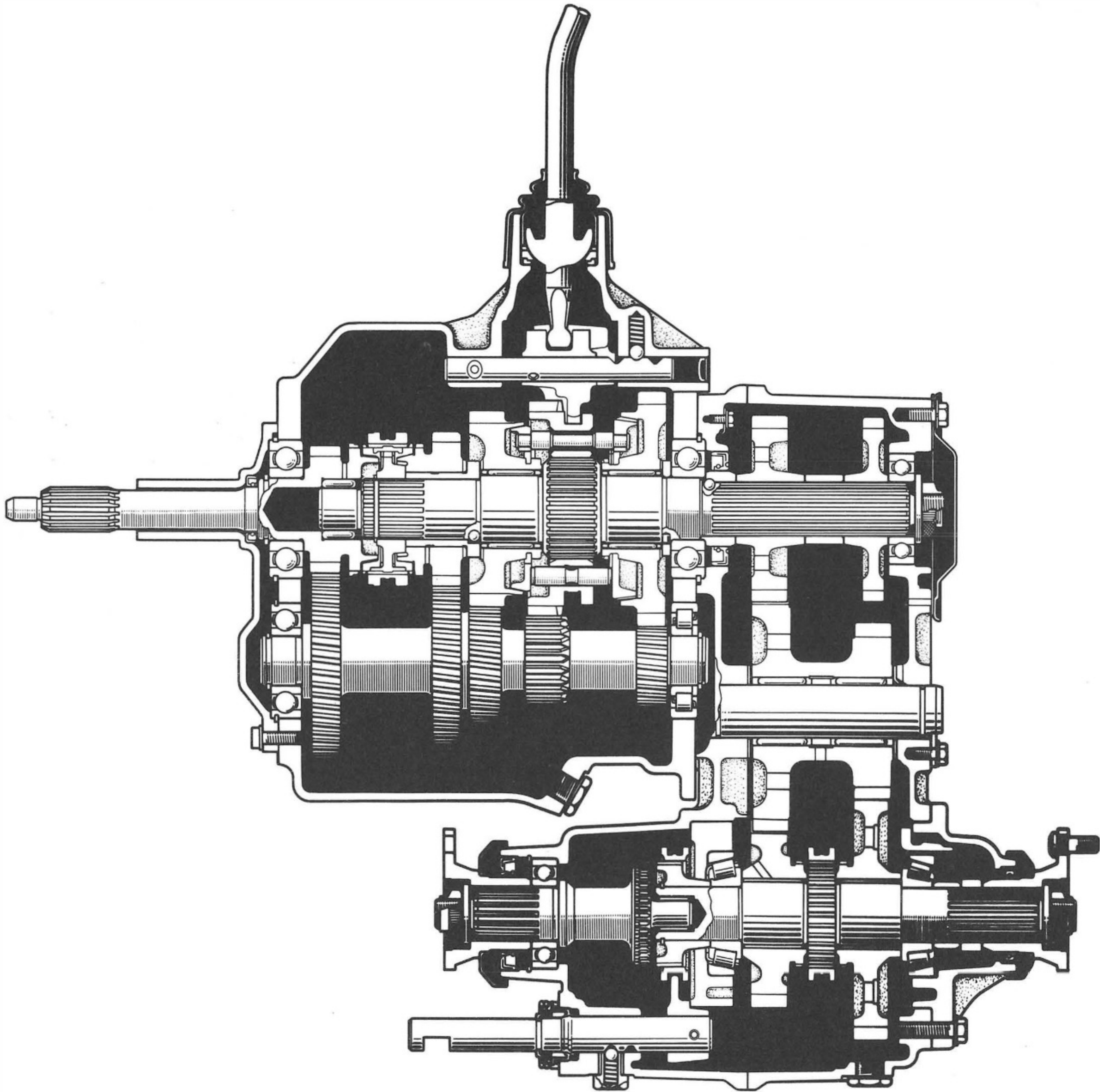
The diameter of the output shaft front spline has been increased from 34.6mm to 69.5mm.



# POWER TRAIN

## ● TRANSMISSION AND TRANSFER

### 6. CUTAWAY VIEW



### 7. GEAR RATIO

		H41		H42	
		New	Previous	New	Previous
TRANSMISSION	1st	4.843	4.925	3.555	←
	2nd	2.619	2.643	2.292	←
	3rd	1.516	1.519	1.410	←
	4th	1.000	←	←	←
	Reverse	4.843	4.925	4.271	←
TRANSFER	High	1.000	1.000	1.000	←
	Low	1.961	1.959	2.277	1.959

# POWER TRAIN

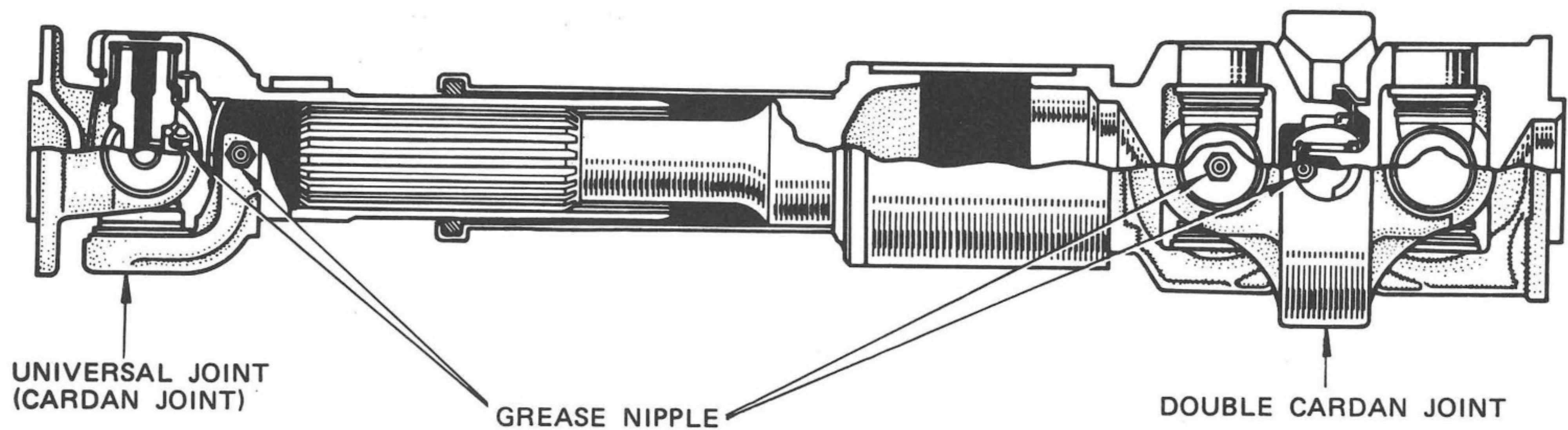
## ● PROPELLER SHAFT

### PROPELLER SHAFT

#### 1. FRONT PROPELLER SHAFT

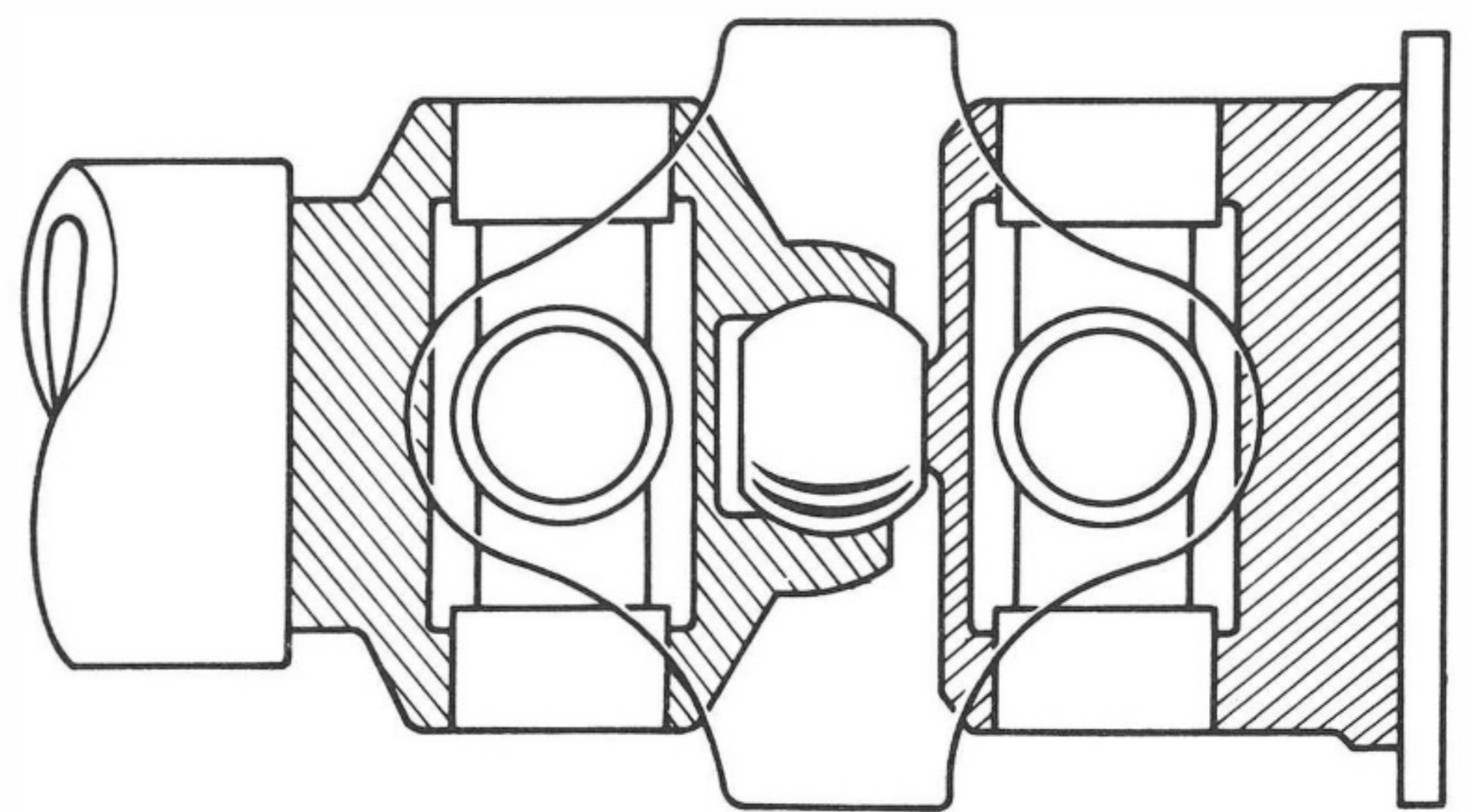
To reduce vibration and noise, a double Cardan joint has been adopted on the front

propeller shaft. The joints are equipped with grease nipples for lubrication.



#### 2. DOUBLE CARDAN JOINT

The double Cardan joint is constructed of two universal joints (Cardan joints) connected by a center yoke and equipped with a centering ball for support of the center. When the axis is at a certain angle, the center yoke runs at a non-constant speed but this is cancelled out by the other joint so that a constant speed can be maintained. Compared with the non-constant speed universal joint (Cardan joint), this type is very efficient for reducing vibration and noise.



— Note —

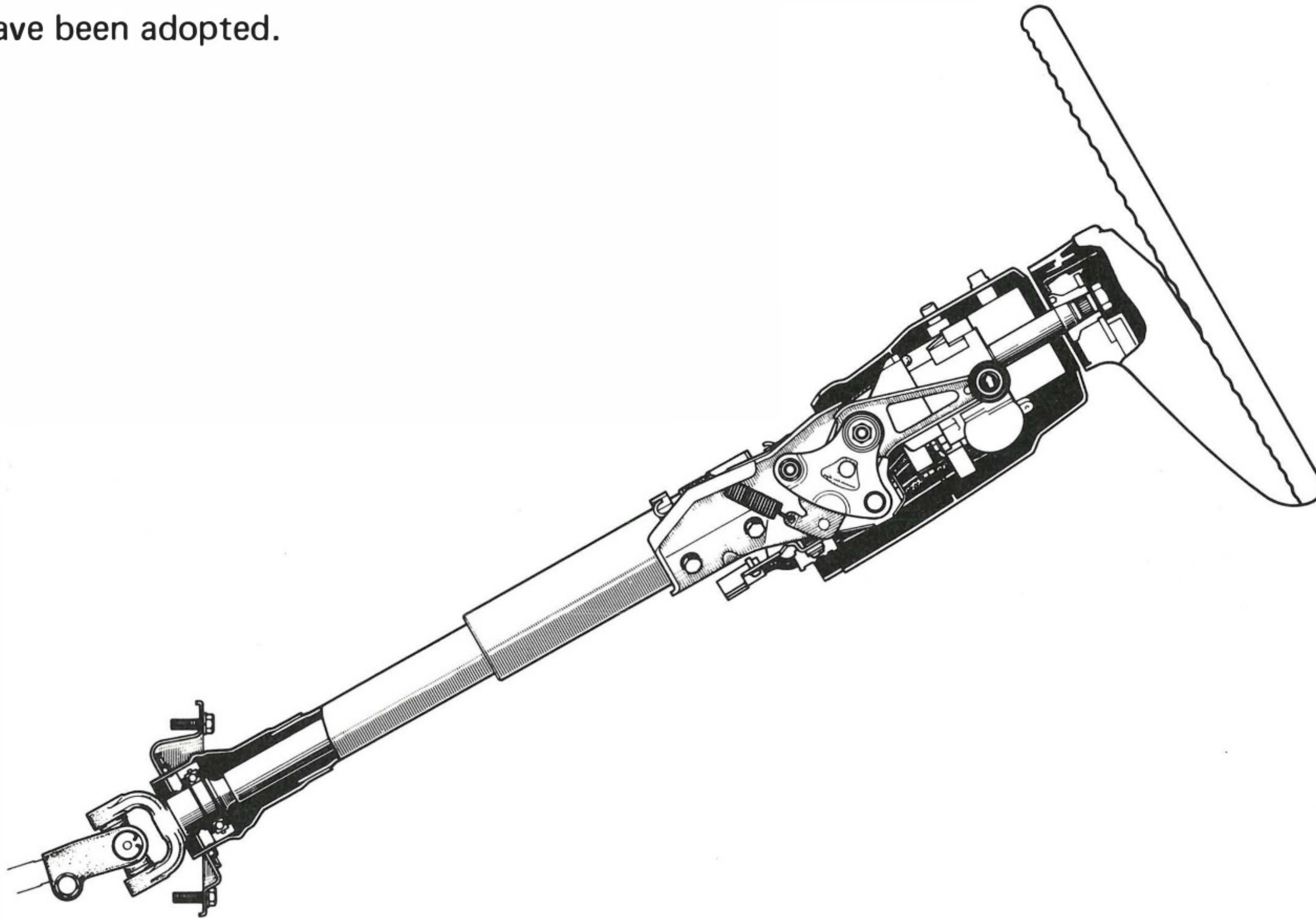
*The double Cardan joint is a non-disassembly type. If troubles occur with the spider, the propeller shaft must be replaced as an assembly.*

# STEERING

## ● BALL-TYPE COLLAPSIBLE STEERING

### STEERING

An energy-absorbing steering and tilt steering mechanism have been adopted.

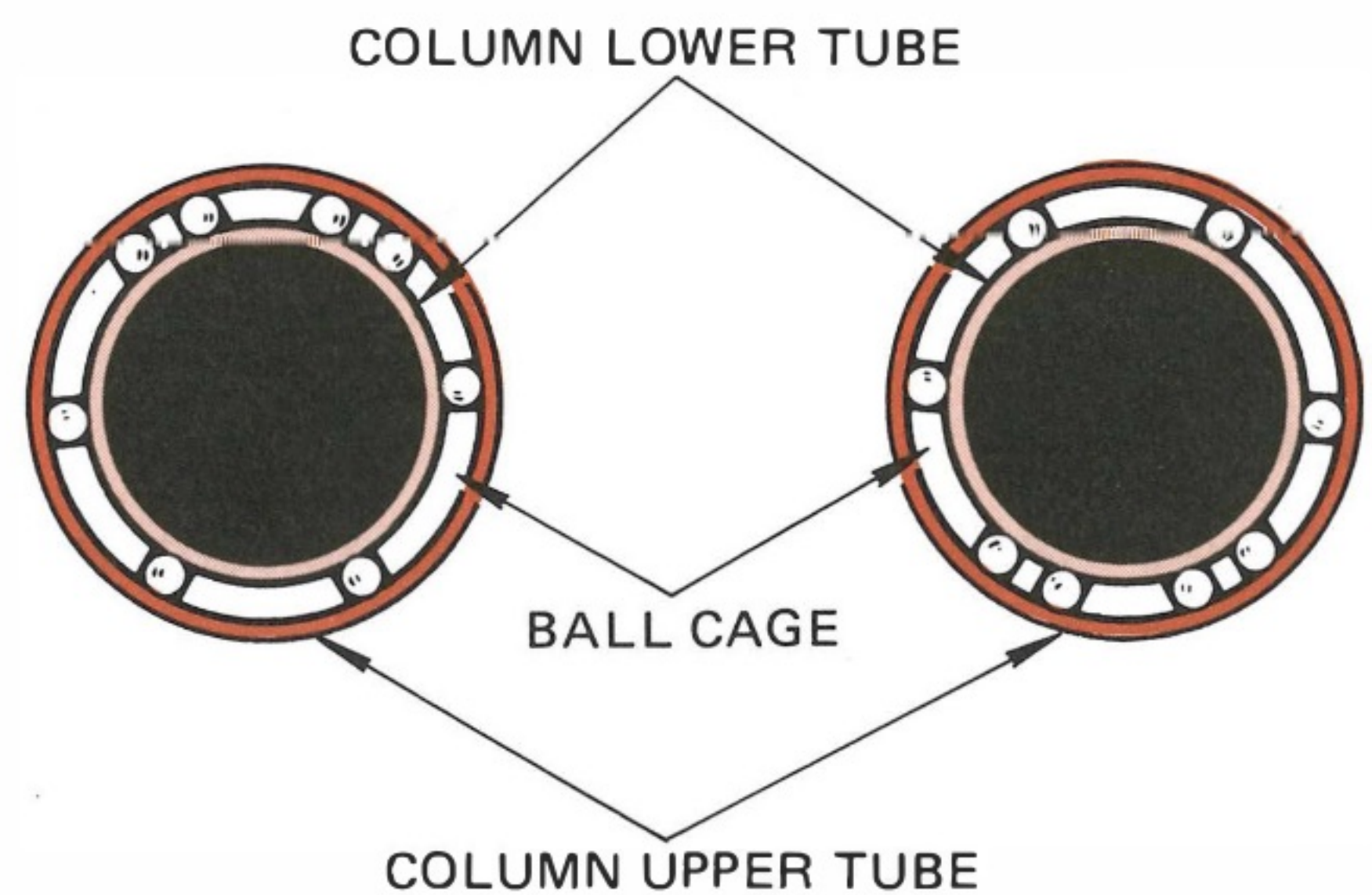
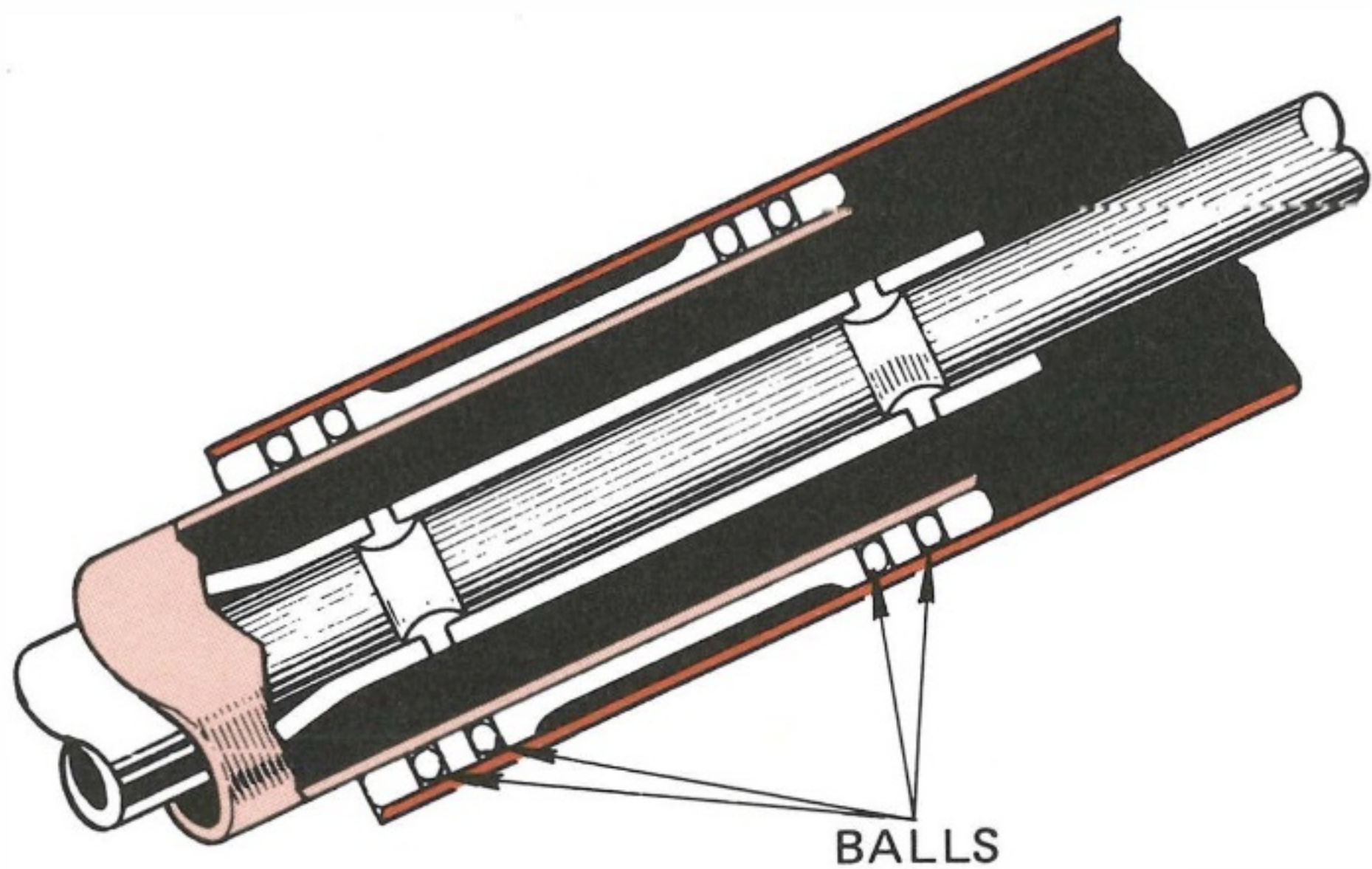


CUTAWAY VIEW

### BALL-TYPE COLLAPSIBLE STEERING

The steering column consists of upper and lower tubes jointed together by four rows of ball

bearings (32 balls in total) which are pressed into position.



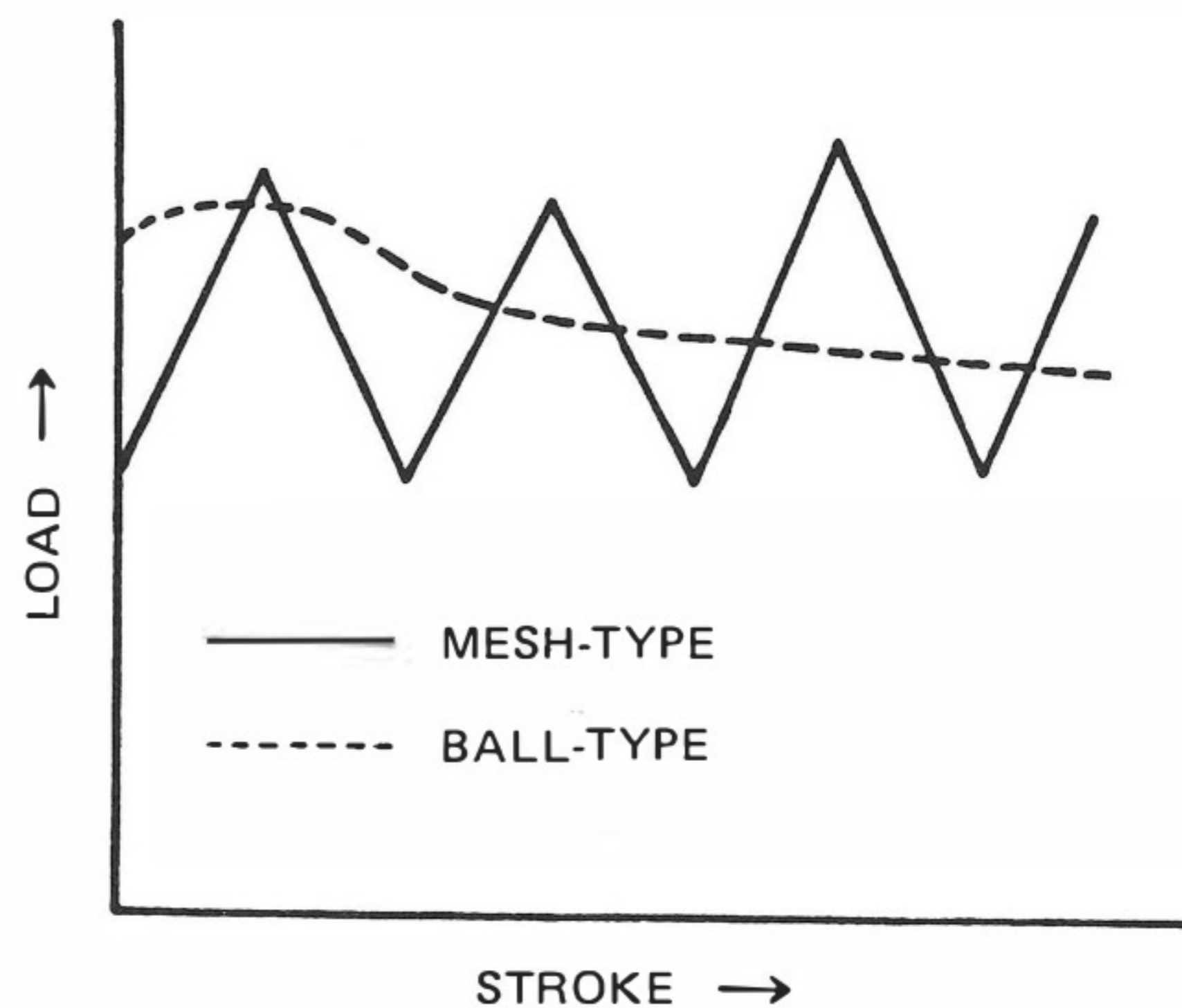
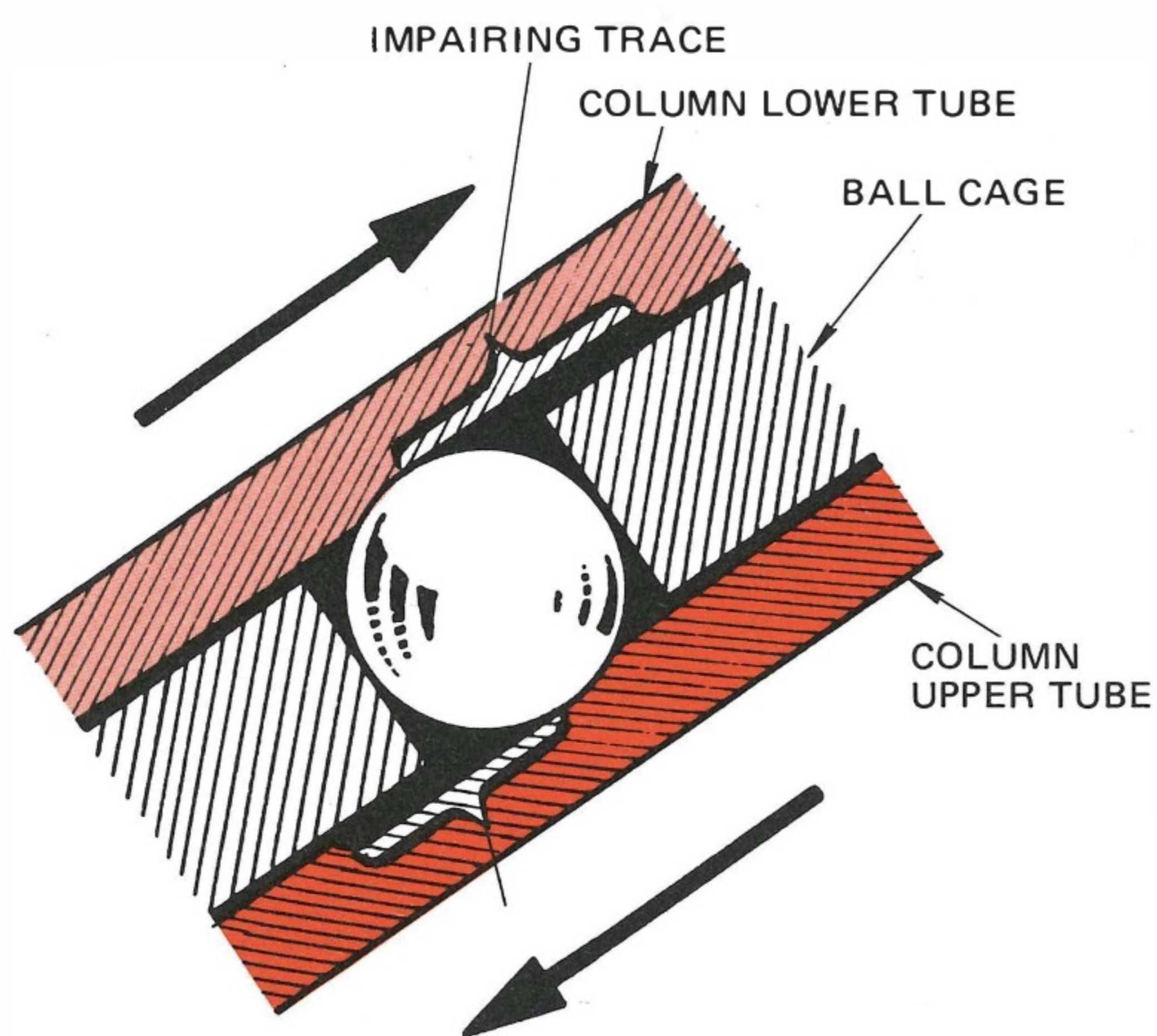
# STEERING

## ● BALL-TYPE COLLAPSIBLE STEERING ● TILT STEERING

During impact, the column tubes tend to telescope and the balls roll impairing the upper and lower tube surfaces. This resistance absorbs the impact energy.

Energy absorption is stable because the only contact between the upper and lower tubes and the

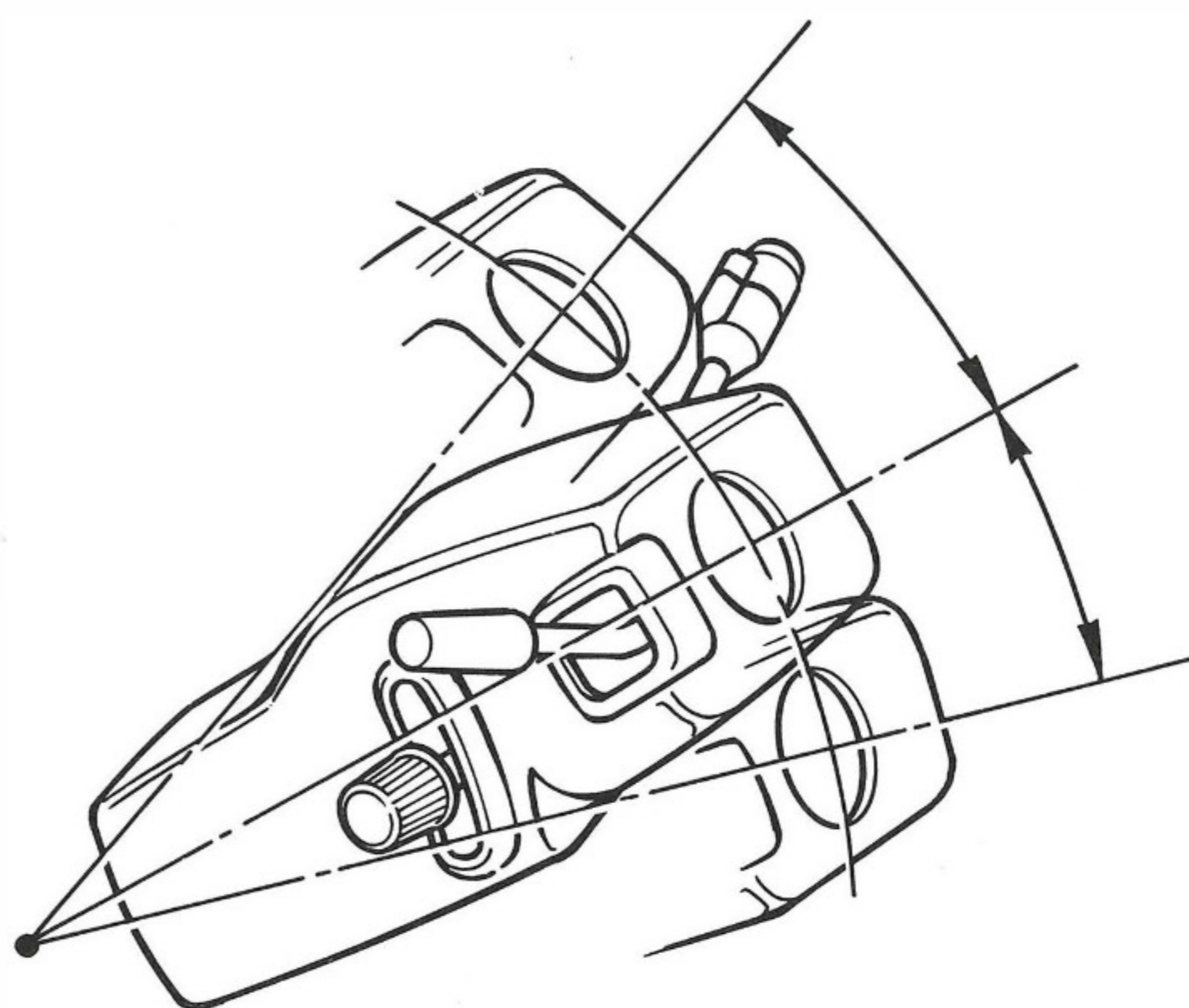
balls is the impairing motion. The four rows of balls are arranged in two different ways. As shown in figure, the upper and lower are each arranged differently to allow them to travel on separate paths.



ENERGY-ABSORBING CHARACTERISTIC

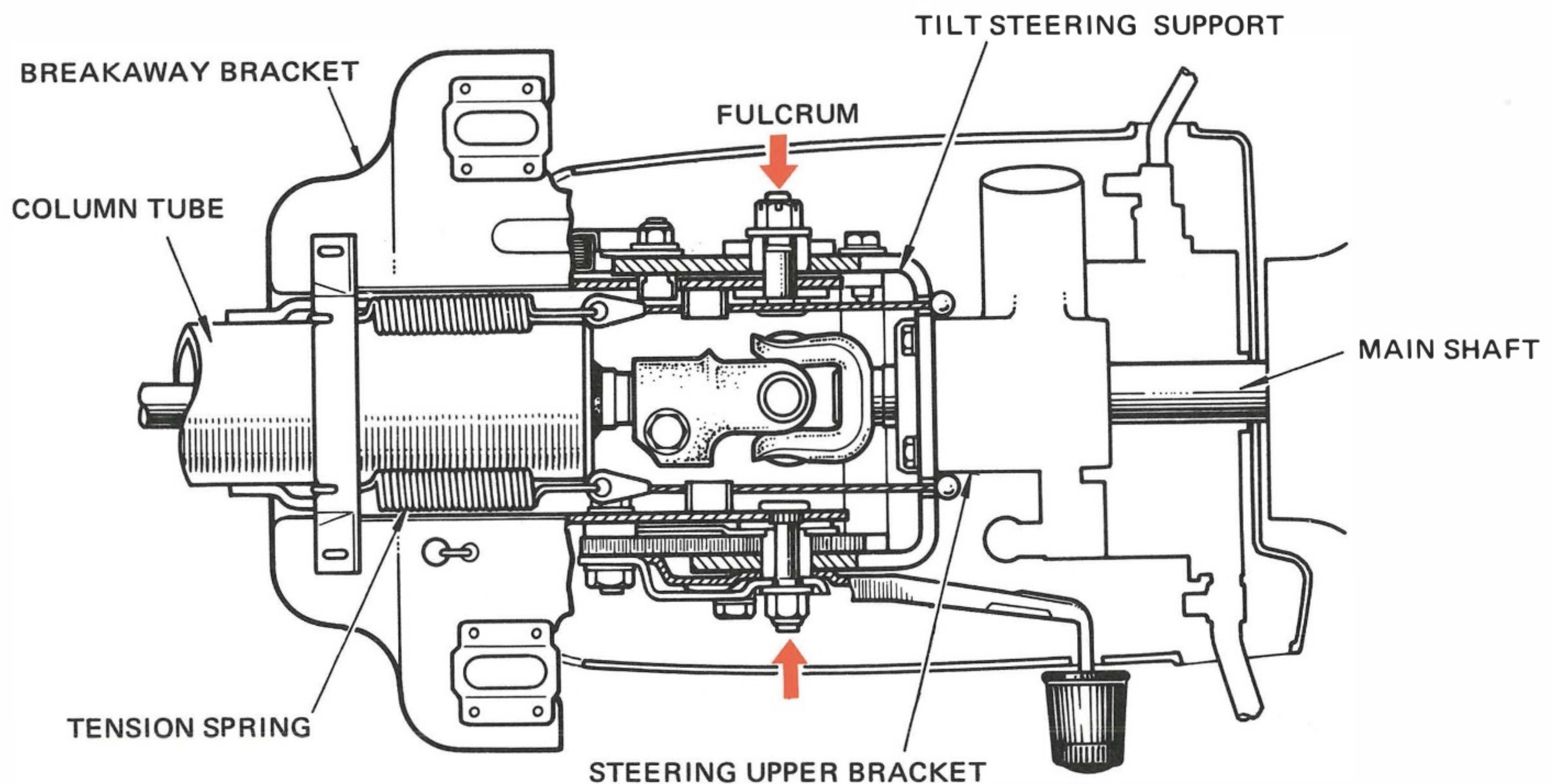
## TILT STEERING

The tilt steering column consists of a steering main shaft with a universal joint just below the instrument panel, an adjusting mechanism and a locking mechanism. There are six different steering wheel positions and the steering wheel is capable of being adjusted  $11^\circ$  upward (3 positions) and  $7^\circ 20''$  downward (2 positions) from the standard position.



# STEERING

## ● TILT STEERING



TILT STEERING COMPONENTS

### 1. CONSTRUCTION

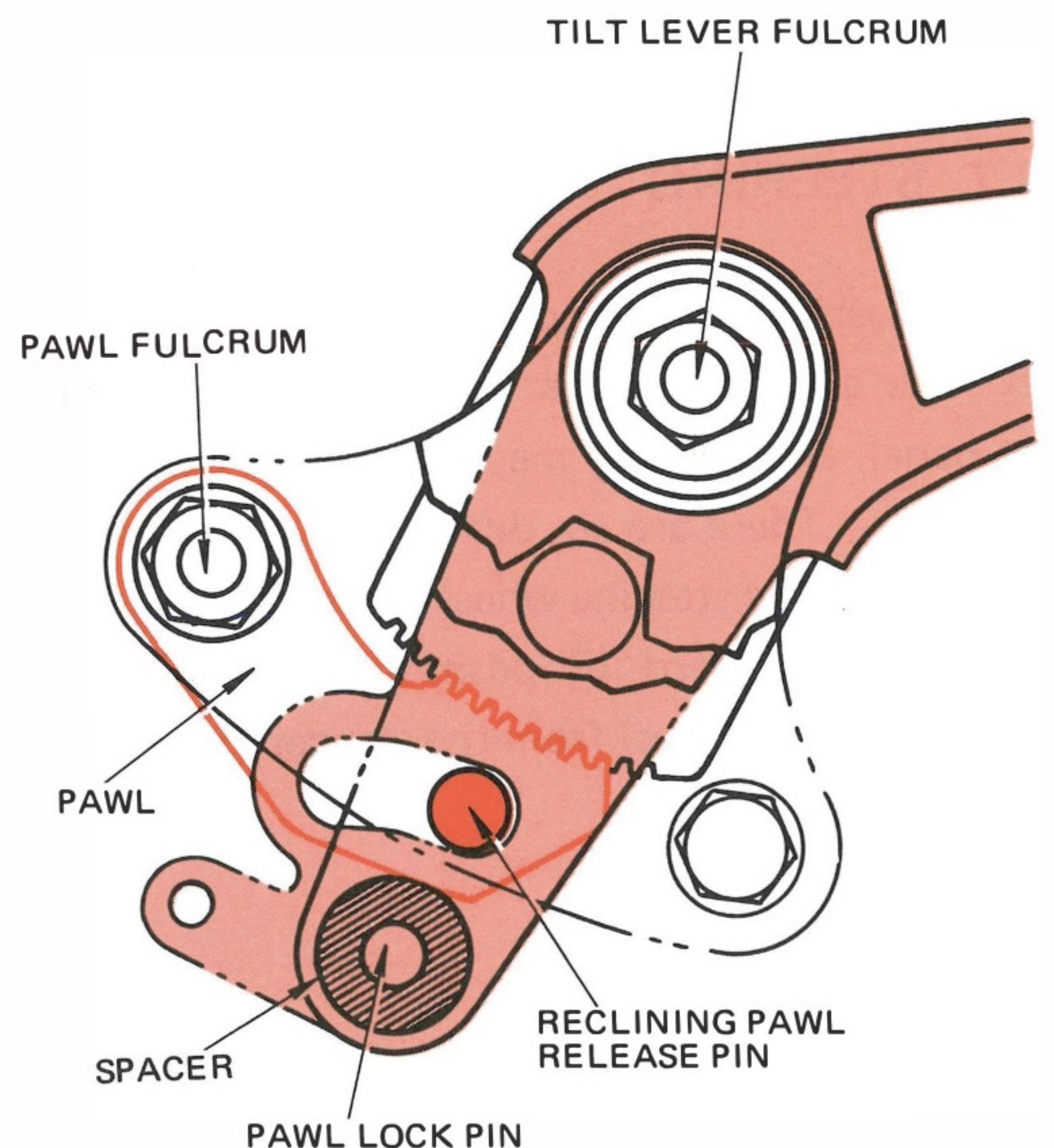
The breakaway bracket is installed with bolts to the steering column tube. The tilt steering support is installed with bolts to the breakaway bracket and tilts up and down with two bolts as the fulcrum. The steering upper bracket is installed with bolts to the tilt steering support

and the steering main shaft is installed to the upper bracket through the bearing. Tension springs are installed between the tilt steering support and breakaway bracket. Spring tension continuously pulls the main shaft upward.

### 2. OPERATION

(1) As shown in the figure, the reclining pawl release pin, installed to the steering pawl, moves within the gourd-shaped hole of the tilt lever.

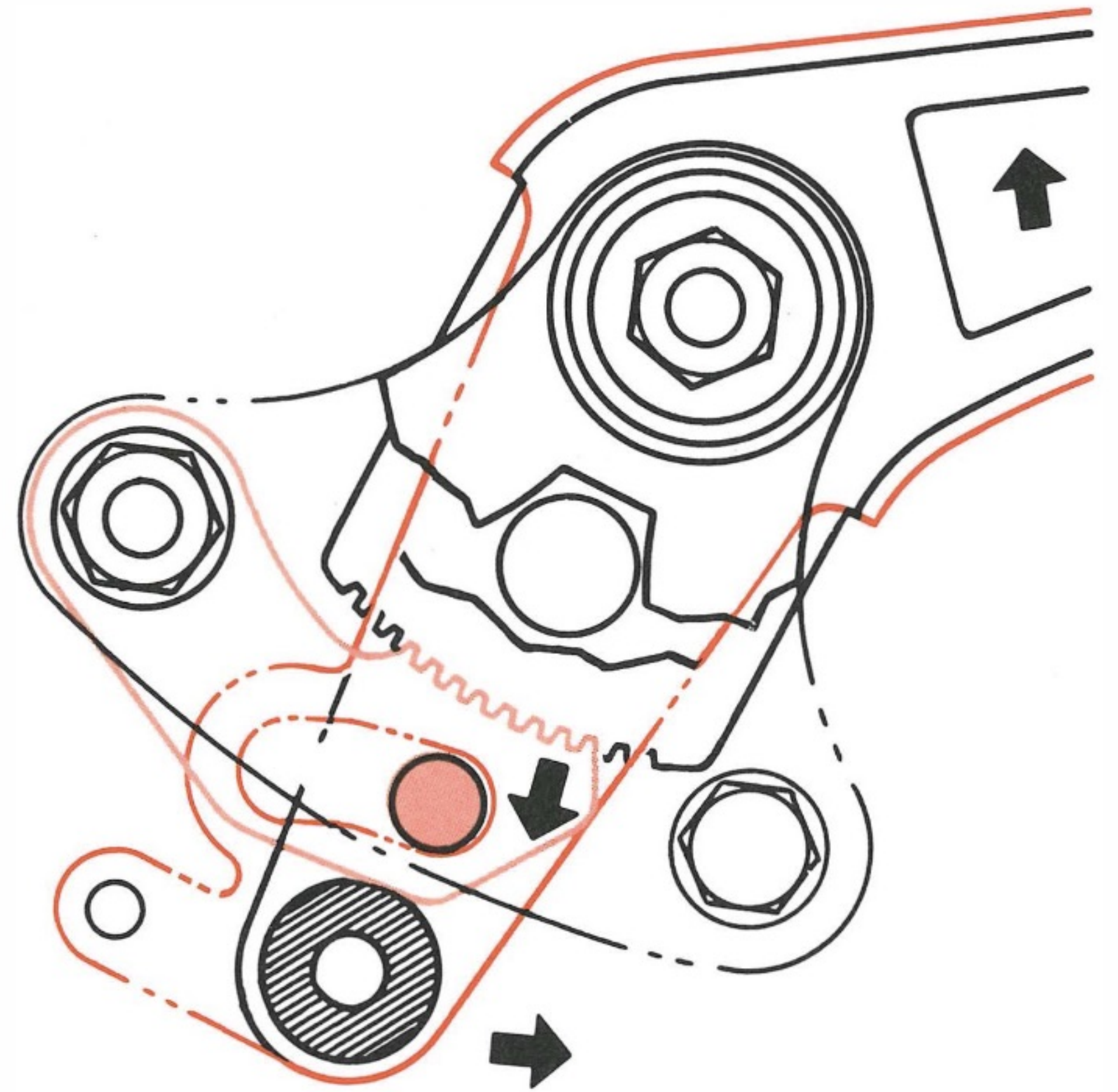
There is a pawl lock pin secured to the tilt lever end through a spacer. As the spacer pushes the back of the pawl by means of the lever tension spring, the pawl and ratchet mesh together without any play.



# STEERING

## ● TILT STEERING

- (2) When the tilt lever is lifted, the spacer at the end of the lever no longer pushes against the pawl. At this time, the reclining release pawl pin slides within the lever guide hole, and the meshing between the pawl and ratchet is released. When the tilt lever is released, it returns by spring tension. The spacer will again push against the back of the pawl to engage the pawl and ratchet.



# BRAKES

● FRONT BRAKES ● REAR BRAKES

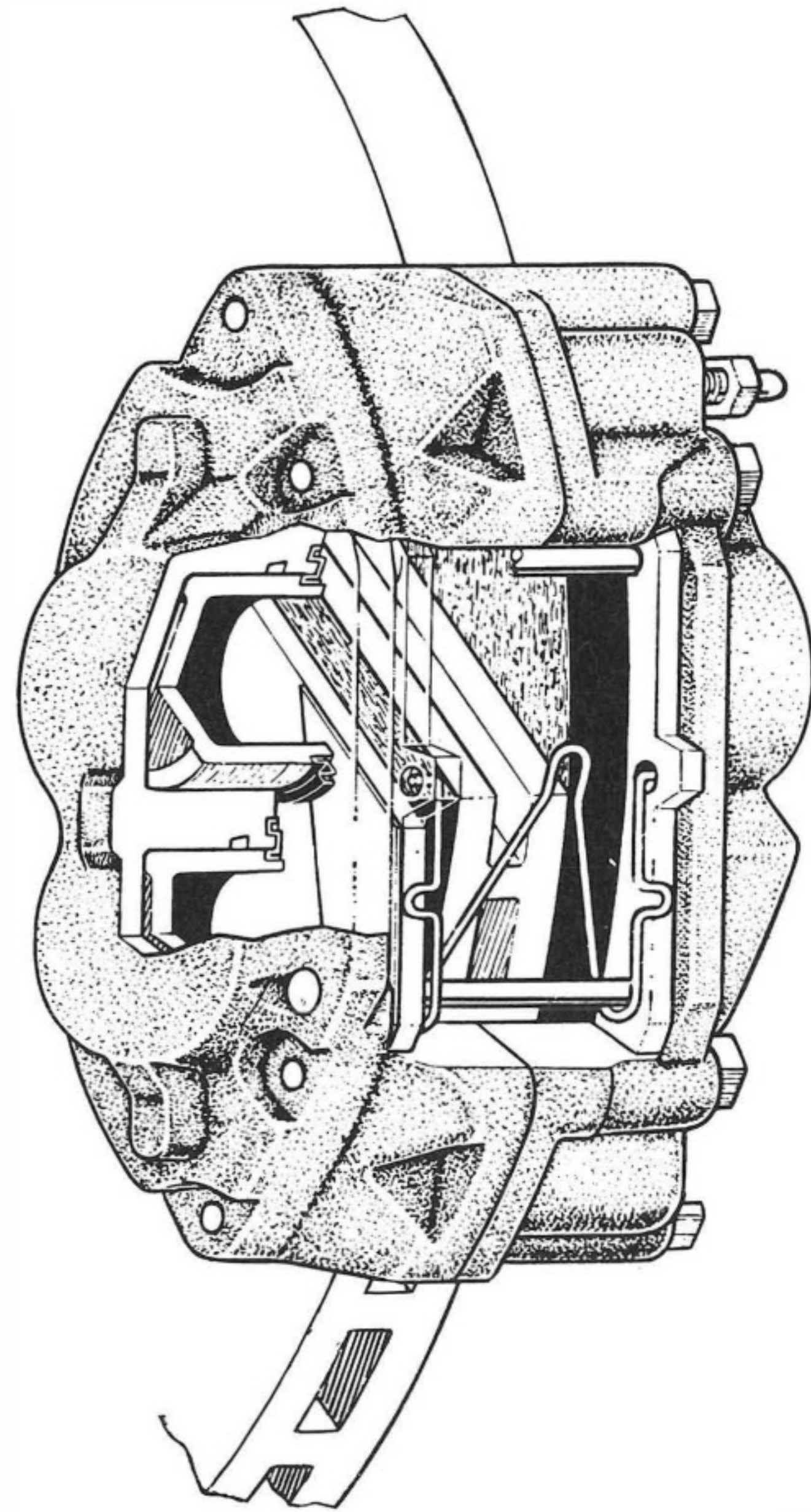
## BRAKES

### FRONT BRAKES

The front disc brake consists of 4 pistons (2 opposing) with pads of a larger contact surface.

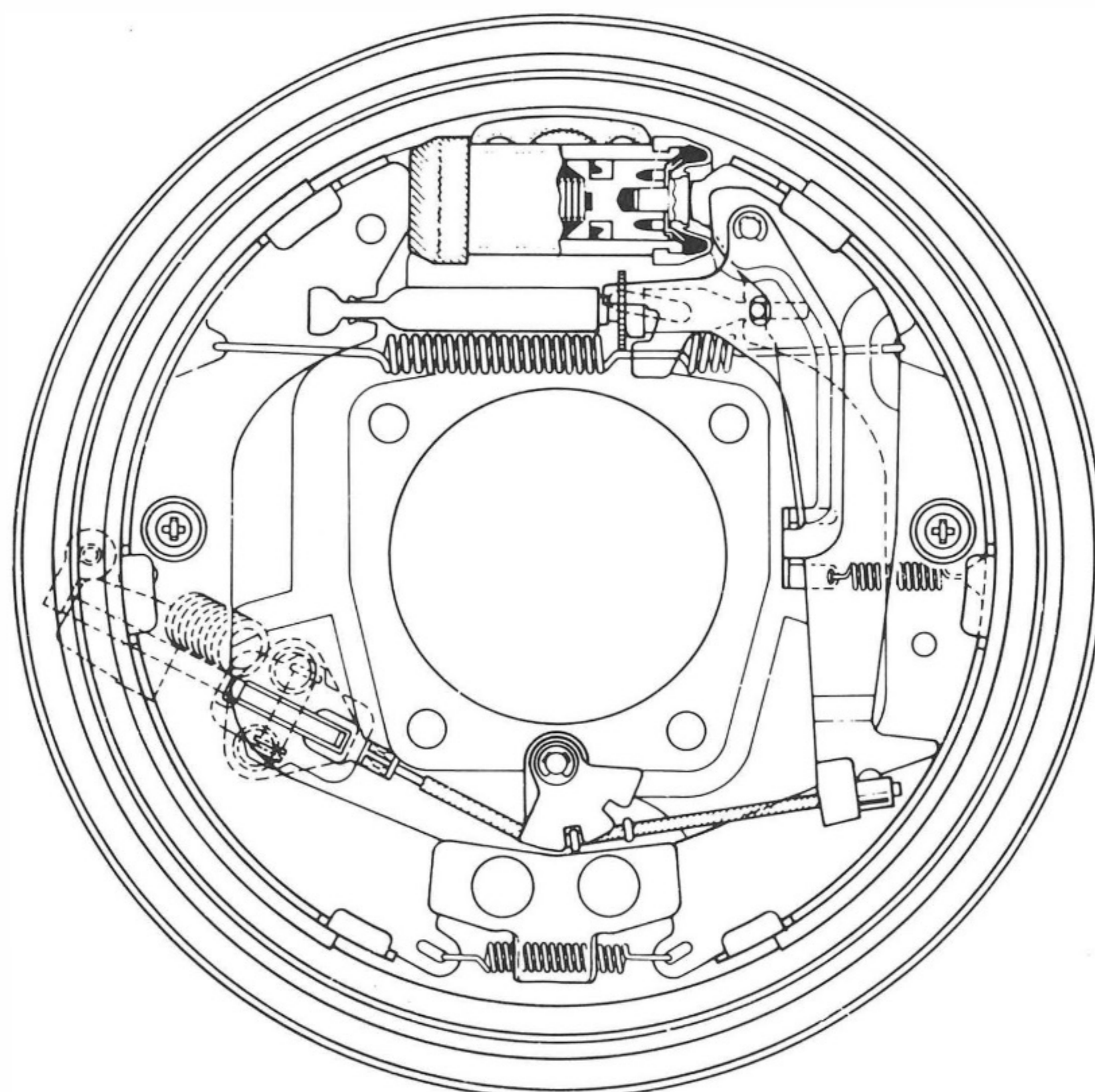
A ventilated type disc has been adopted for better cooling efficiency.

A dust cover with an air scoop (air inlet) has been adopted for disc cooling on all models for Europe.



### REAR BRAKES

The leading and trailing shoe type has been adopted with an incorporated parking brake and auto-adjuster mechanism.

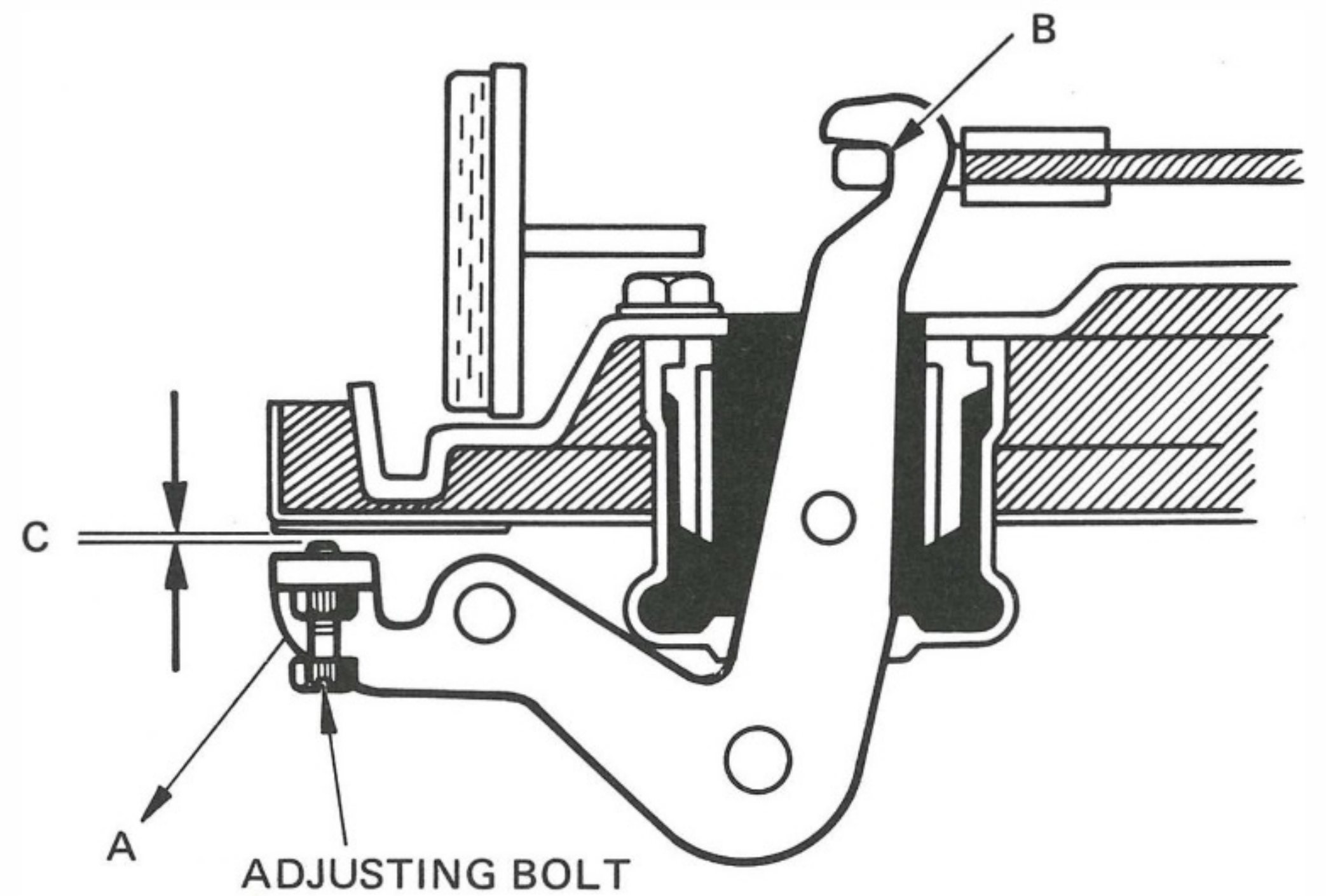


# BRAKES

## ● AUTO-ADJUSTER ● PROPORTIONING AND BYPASS VALVE

### AUTO ADJUSTER

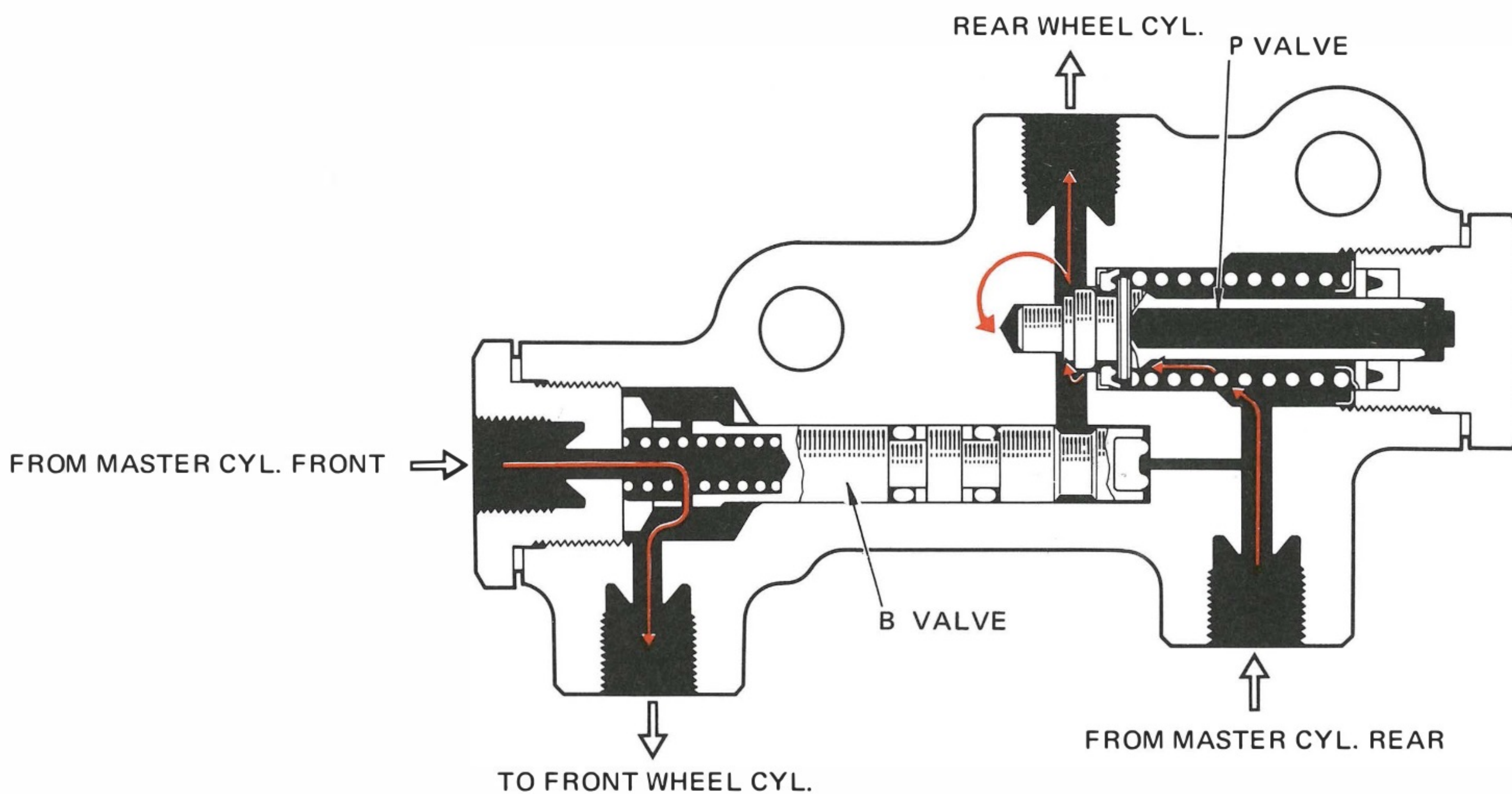
The auto-adjuster is a mechanism which automatically adjusts the clearance when the parking brake lever is pulled. To adjust, lightly pull the bell crank in direction A until there is no slack at part B. In this condition, turn the adjusting bolt so that dimension C will be 0.4 – 0.8mm (0.016 – 0.032 in). After adjustment, lock the adjusting bolt with the lock nut.



### PROPORTIONING AND BYPASS VALVE (P & B VALVE)

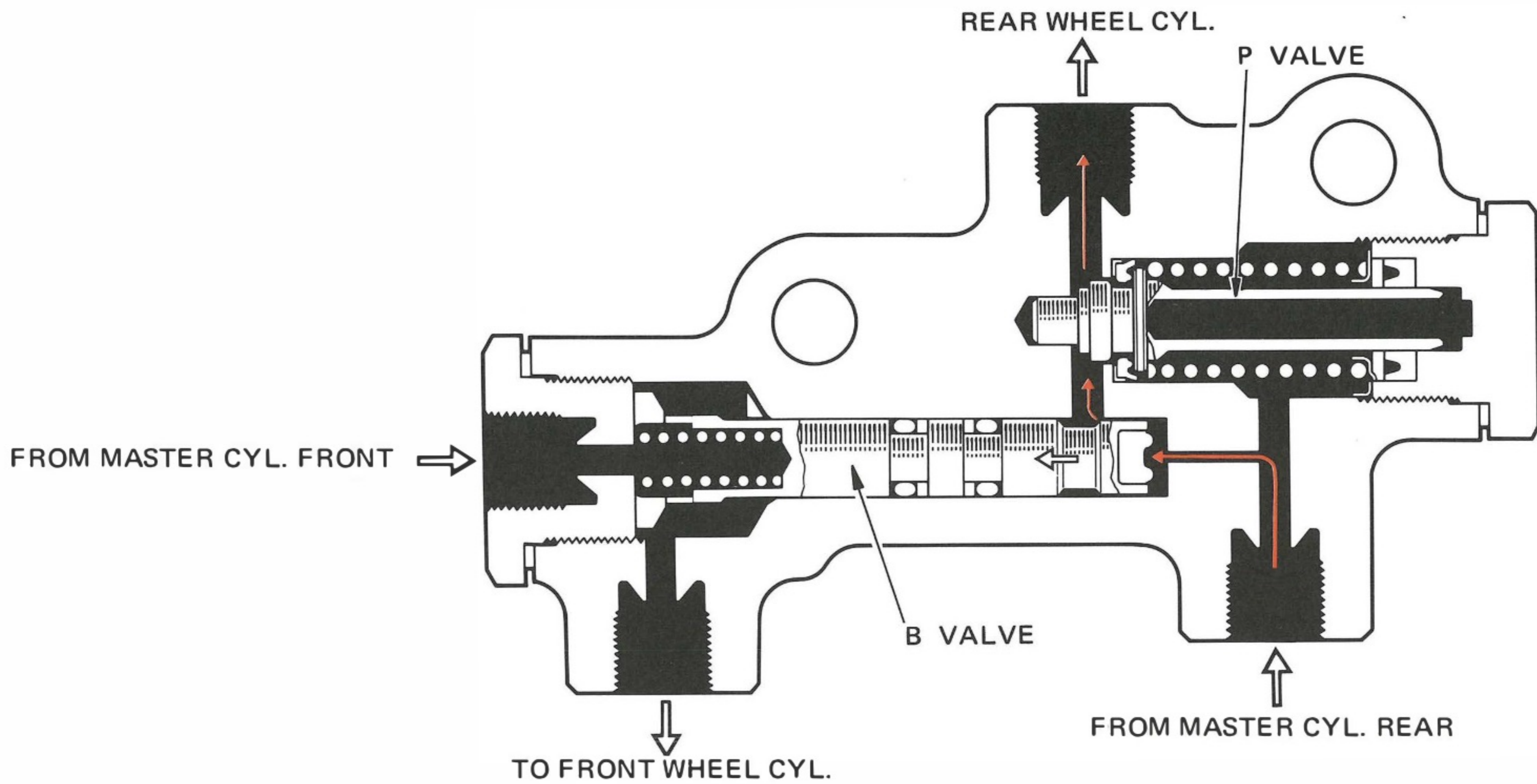
The proportioning and bypass valve (P & B valve) has been adopted on models equipped with disc brakes.

### CONSTRUCTION AND OPERATION



# BRAKES

● PROPORTIONING AND BYPASS VALVE ● LOAD SENSING PROPORTIONING VALVE



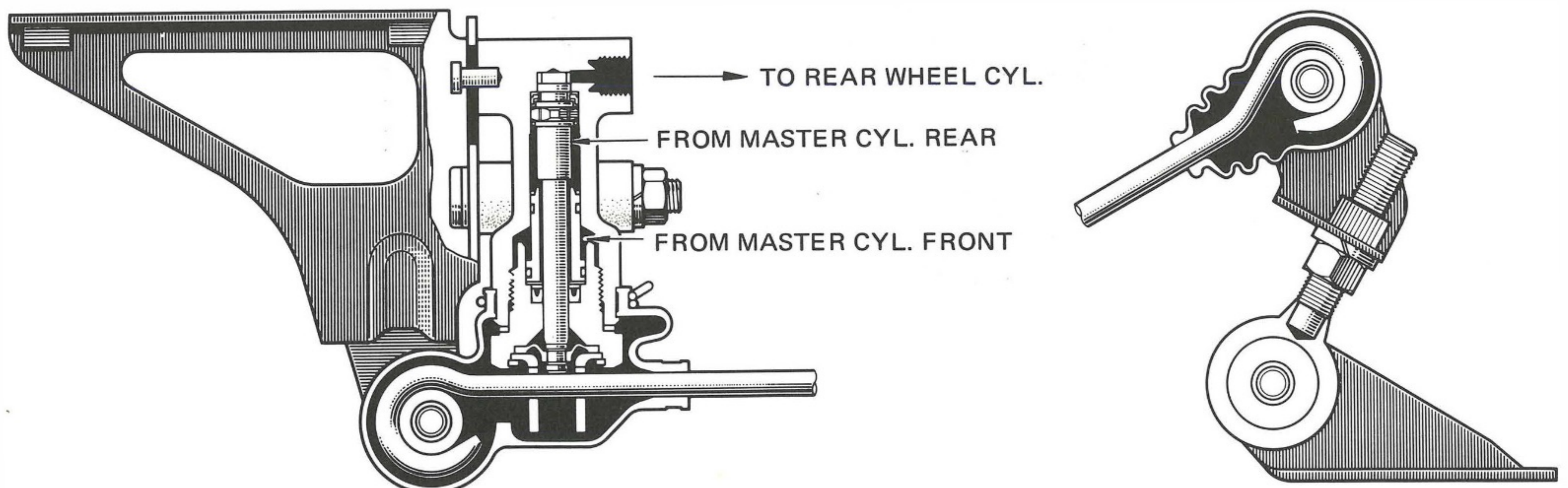
The fluid pressure from the front of the master cylinder is applied to the left side of the B valve. If leakage or damage occurred in the front brake system, there is no fluid pressure so the B valve is forced to the left by the rear master cylinder pressure. Thus, the passage to the rear wheel cylinder is open and fluid bypasses the P valve and flows directly to the rear wheel cylinder.

The P valve is placed in the line to the rear brake system, the rear brakes alone could not provide sufficient braking force if leakage or damage occurred in the front brake system.

Therefore, with the B valve, in event of a fluid leak in the front brake system, fluid from the rear of the master cylinder is sent, under pressure, to the rear wheel cylinder, bypassing the P valve.

## LOAD SENSING PROPORTIONING VALVE (LSPV)

A Load Sensing Proportioning Valve along with the P & B valve has been adopted on all models for Europe.



# BRAKES

## ● BRAKE BOOSTER

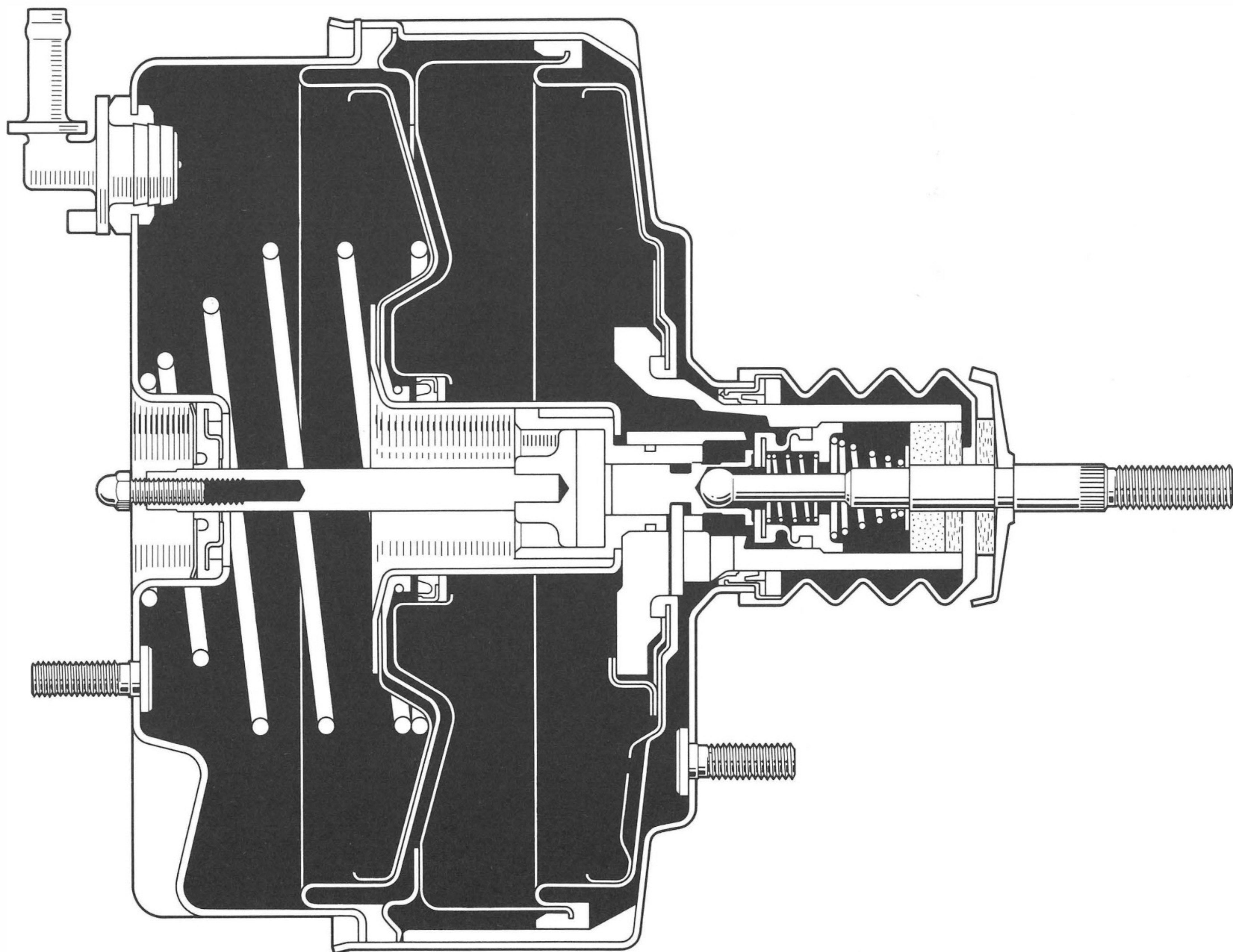
### BRAKE BOOSTER

A brake booster has been adopted as standard equipment, with a 7.5" single, 9.0" single and 7.5" tandem boosters.

#### 1. TANDEM BRAKE BOOSTER

As a tandem brake booster utilizes, in 2 steps, the difference between atmospheric pressure and vacuum, despite its smaller size, it can produce a greater power assist in comparison

with a single booster. For instance, the power assist value of a 7.5" tandem type brake booster is equal to that of a 10.5" single booster.



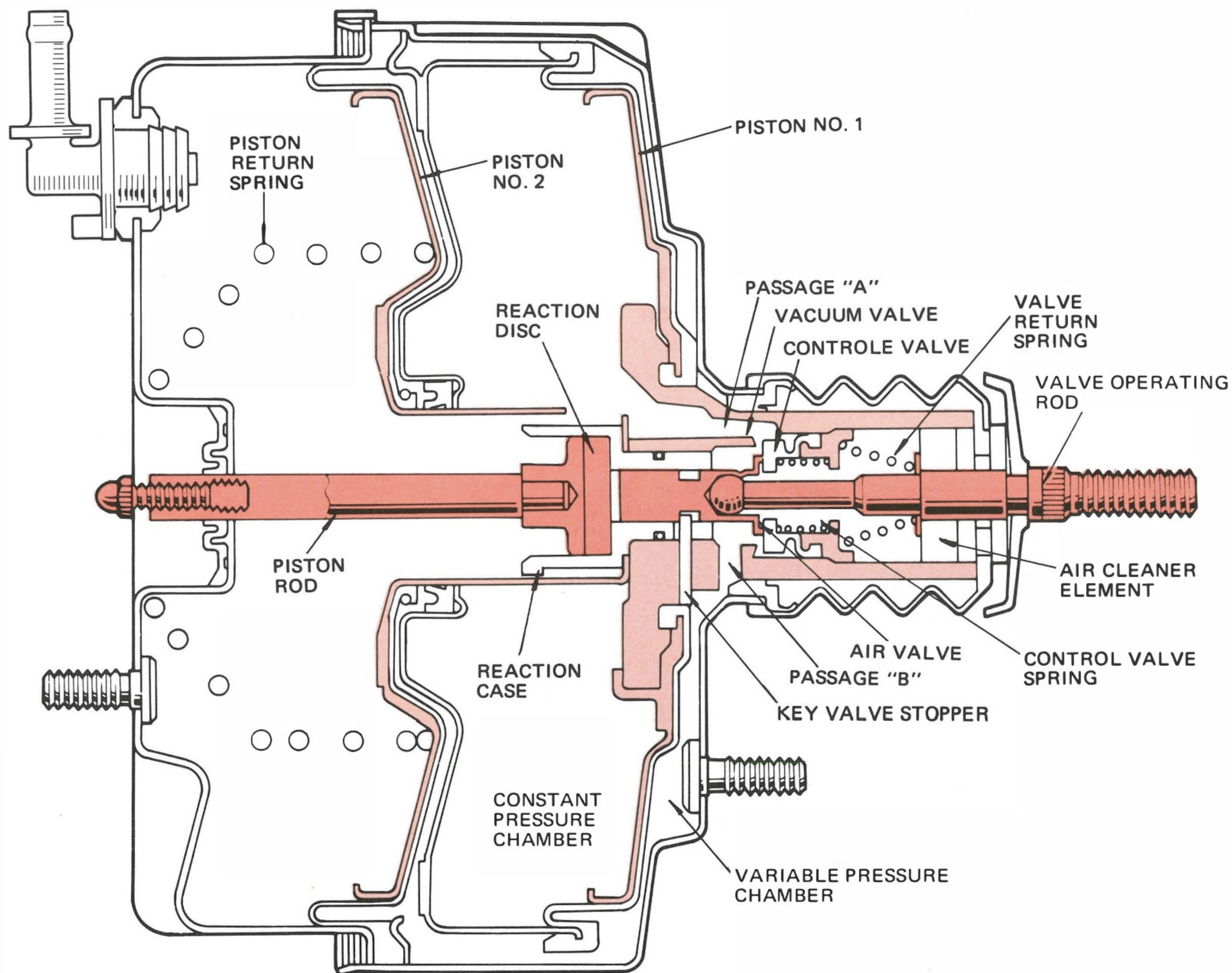
CUTAWAY VIEW

# BRAKES

## ● BRAKE BOOSTER

### 2. TANDEM BRAKE BOOSTER OPERATION

#### (1) RELEASED POSITION



The air valve is making contact with the control valve so that atmospheric air, flowing through the air cleaner element, is blocked off by the control valve and cannot enter the booster. The valve return spring pushes the valve operating rod toward the right and the air valve, which is caulked to the valve operating rod, is pulled toward the right until it makes contact with the key valve stopper.

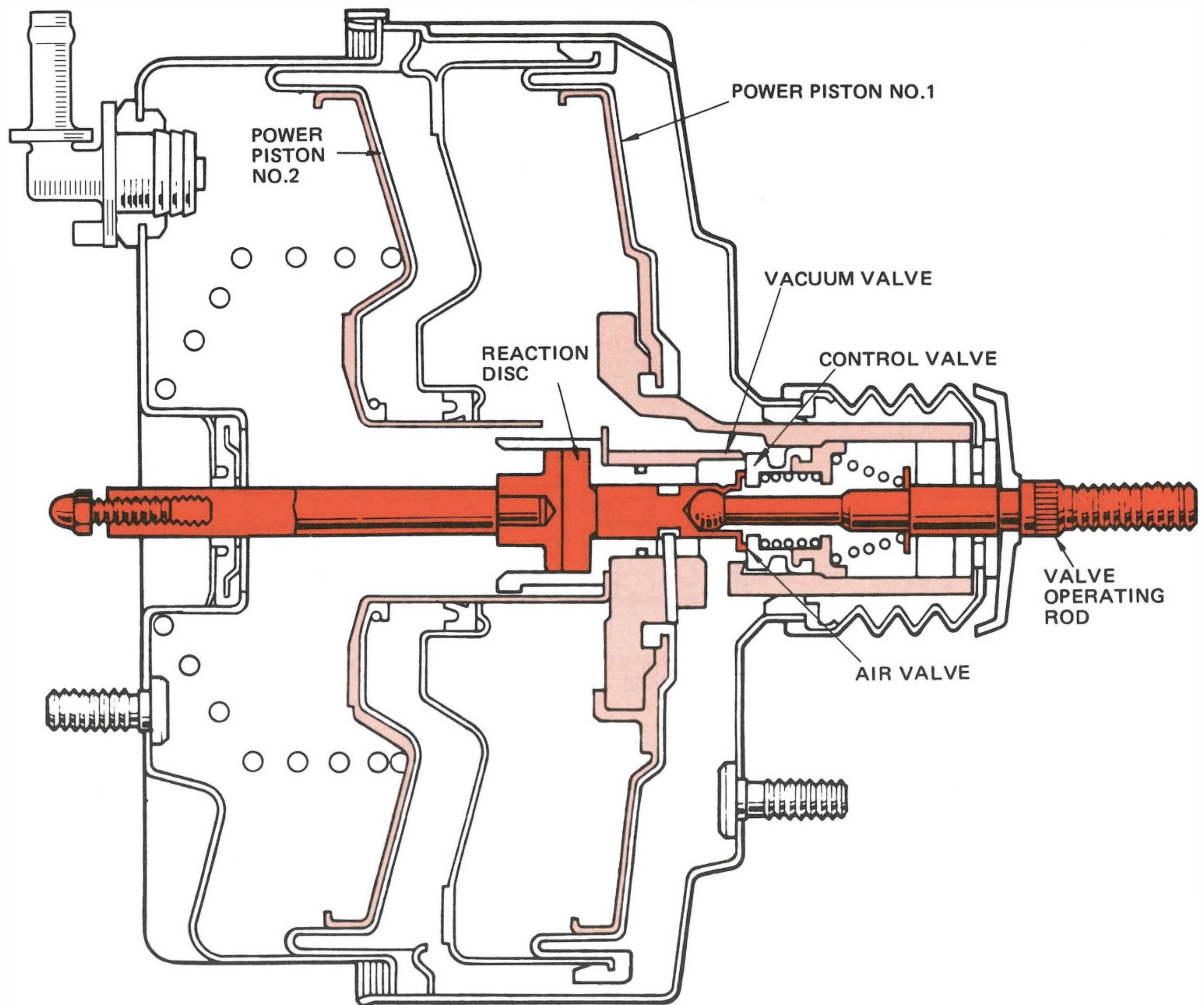
For this reason, the vacuum valve and control valve are separated so that there is continuity between passages A and B. Consequently, there is also open passage between the constant pressure chamber and variable pressure chamber, and no pressure difference exists between them. The piston is pushed toward the right by piston return spring tension.



# BRAKES

## ● BRAKE BOOSTER

### (3) HOLDING POSITION



By depressing the brake pedal, the force applied on the air valve through the valve operating rod and the force on the power piston, resulting from the pressure difference (between the constant pressure chamber and variable pressure chamber) will push the reaction disc. At the same time, a reaction

force is transmitted back to the reaction disc. When both opposing forces are balanced, the control valve is making contact with the air valve and vacuum valve. As a result, power piston is held stationary until the brake pedal is depressed further.

# BRAKES

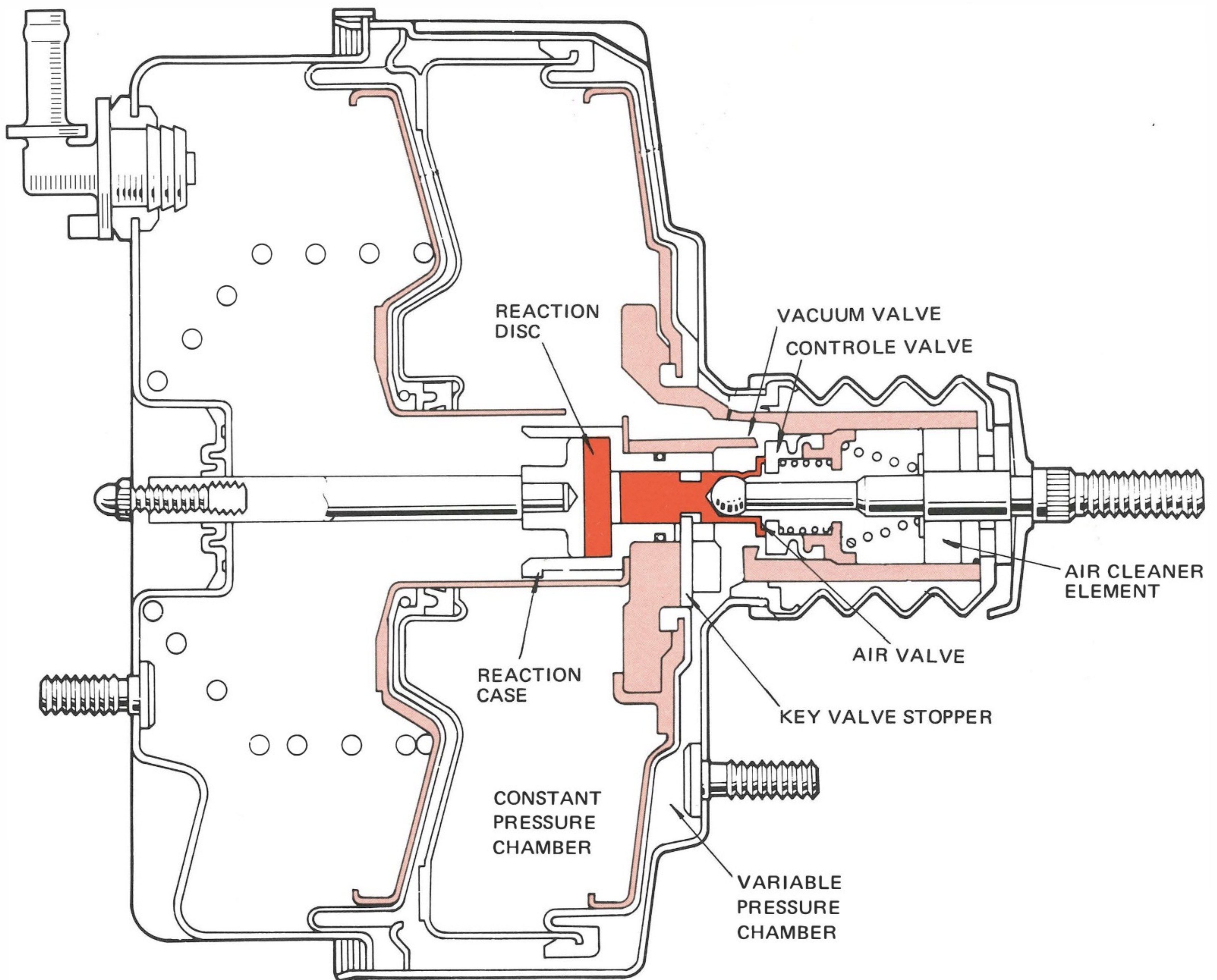
## ● BRAKE BOOSTER

### 3. JUMPING MECHANISM

The jumping mechanism provides greater braking effort with less pedal pressure, and

creates a better "braking feel" during the initial braking stage.

#### (1) TANDEM BOOSTER



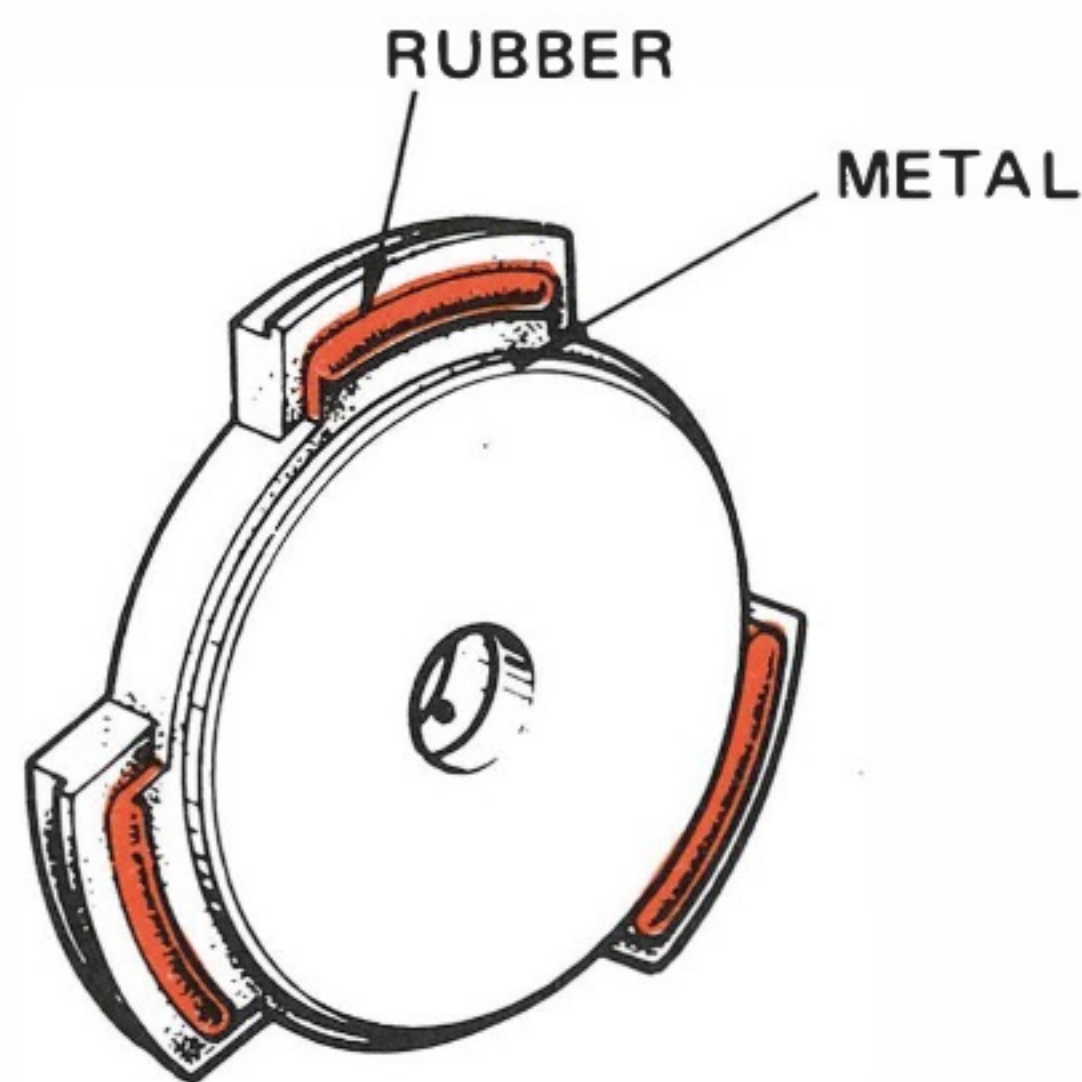
During the initial braking stage, due to a clearance between the reaction disc and air valve, booster output force is produced up to a certain point regardless of the force on the pushrod. In other words, the instant the vacuum valve closes and the air valve opens, power pistons No.1 and 2 move to the left, producing a booster output force regardless of the amount of force on the pushrod.

Consequently, there is little reaction force on the operating rod. At the termination of the "jumping" action, the reaction disc and air valve are in contact with each other, and the force on the valve operating rod is transmitted to the reaction disc, through the air valve. Therefore, the force applied on the piston rod at this time is the sum of the valve operating rod and piston forces.

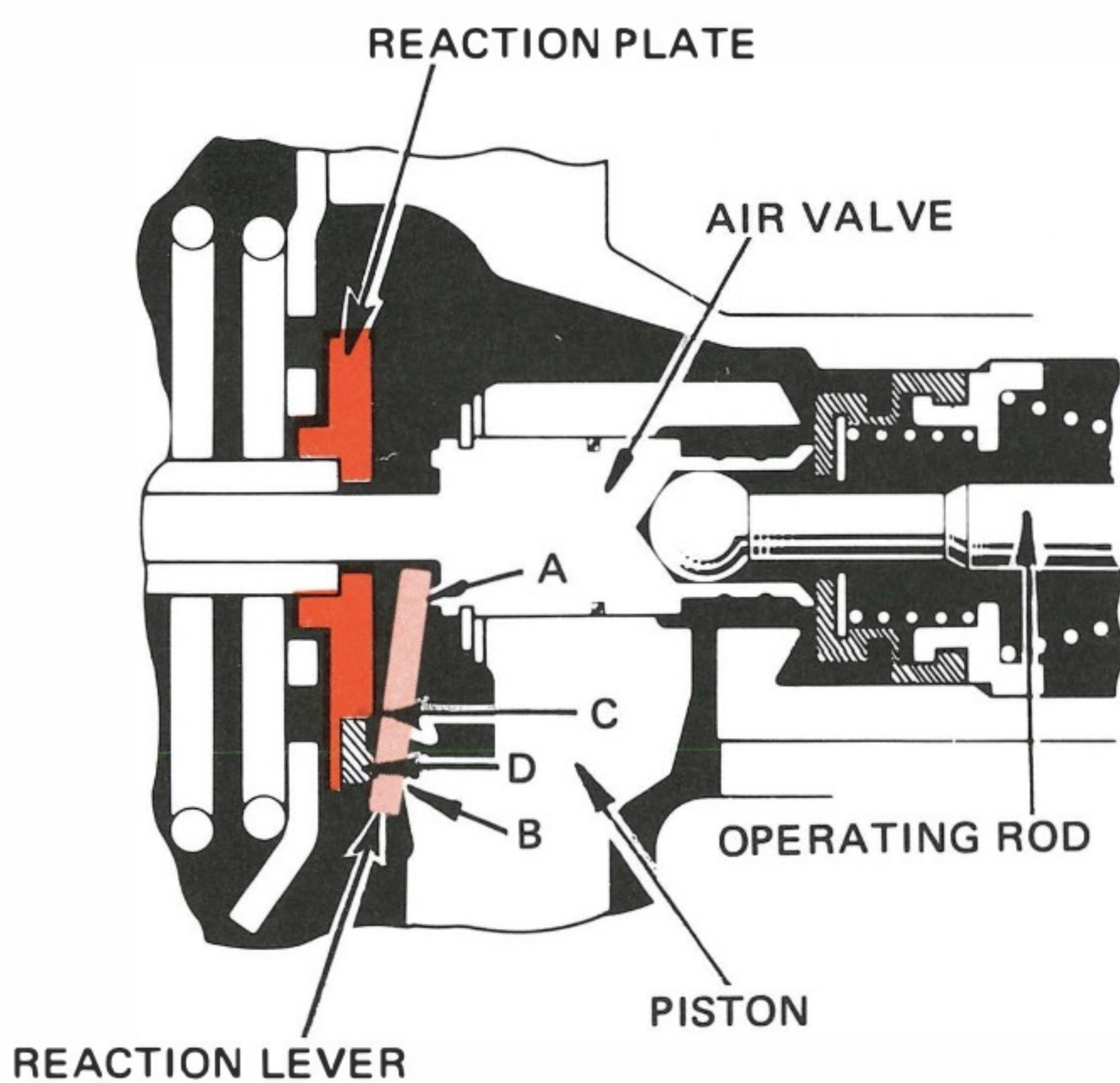
# BRAKES

## ● BRAKE BOOSTER

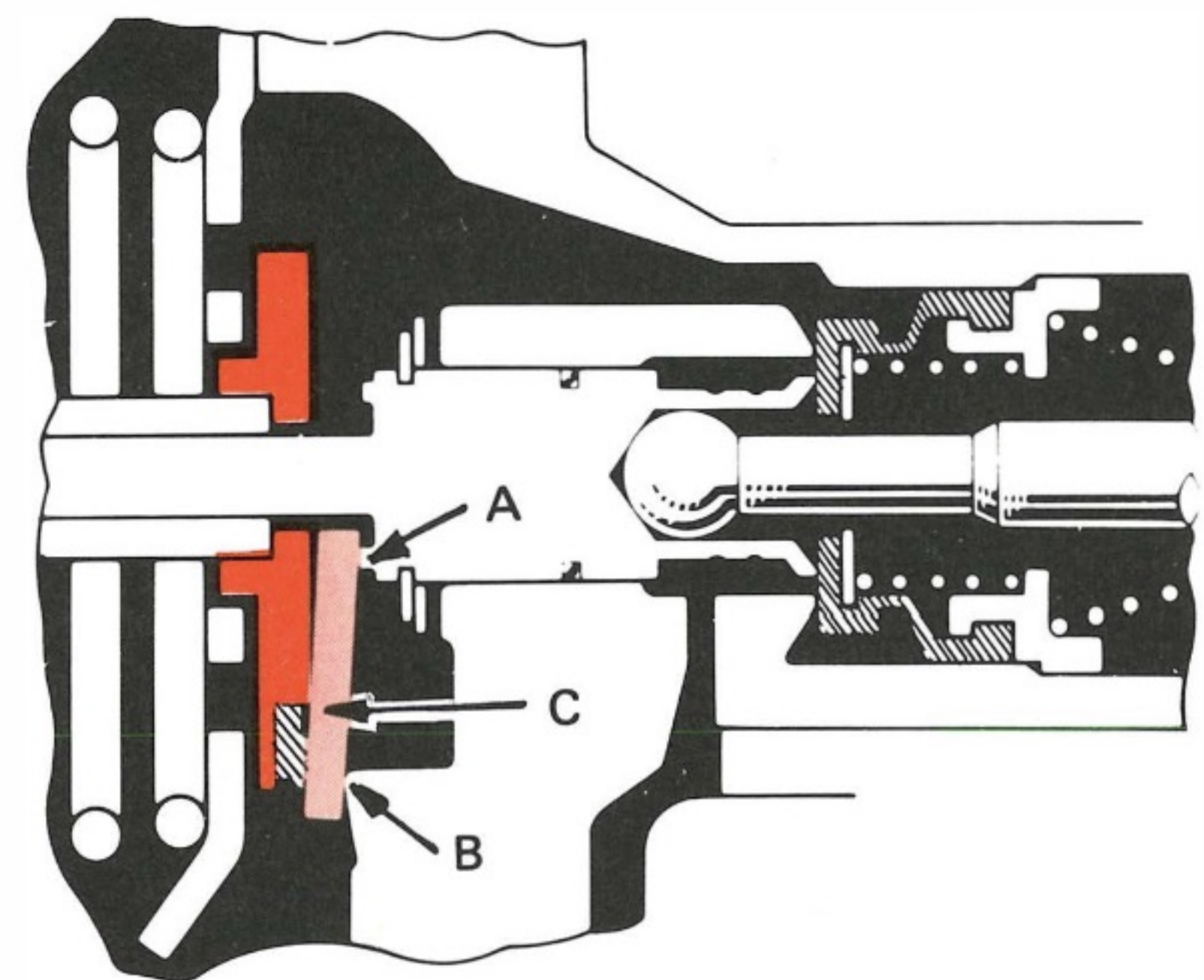
### (2) SINGLE BOOSTER



REACTION PLATE



RELEASED POSITION



APPLIED POSITION

The reaction lever is in contact with the air valve (A), piston (B) and reaction plate (D). During the initial braking stage, the reaction plate rubber makes contact with the reaction lever, enlarging the servo ratio. The rubber deflects proportionately to the increase in braking force and the metal portion (C) then makes contact with the reaction lever, resulting in a servo ratio the same as that of the conventional type brake booster.

The rubber also acts to absorb the shock.

As the piston continuously moves to the left, the reaction plate rubber deflects completely and the reaction lever makes contact with the reaction plate at point C. At this stage there is less servo ratio, compared with the initial braking stage, and the reaction force on the operating rod increases.

# BODY

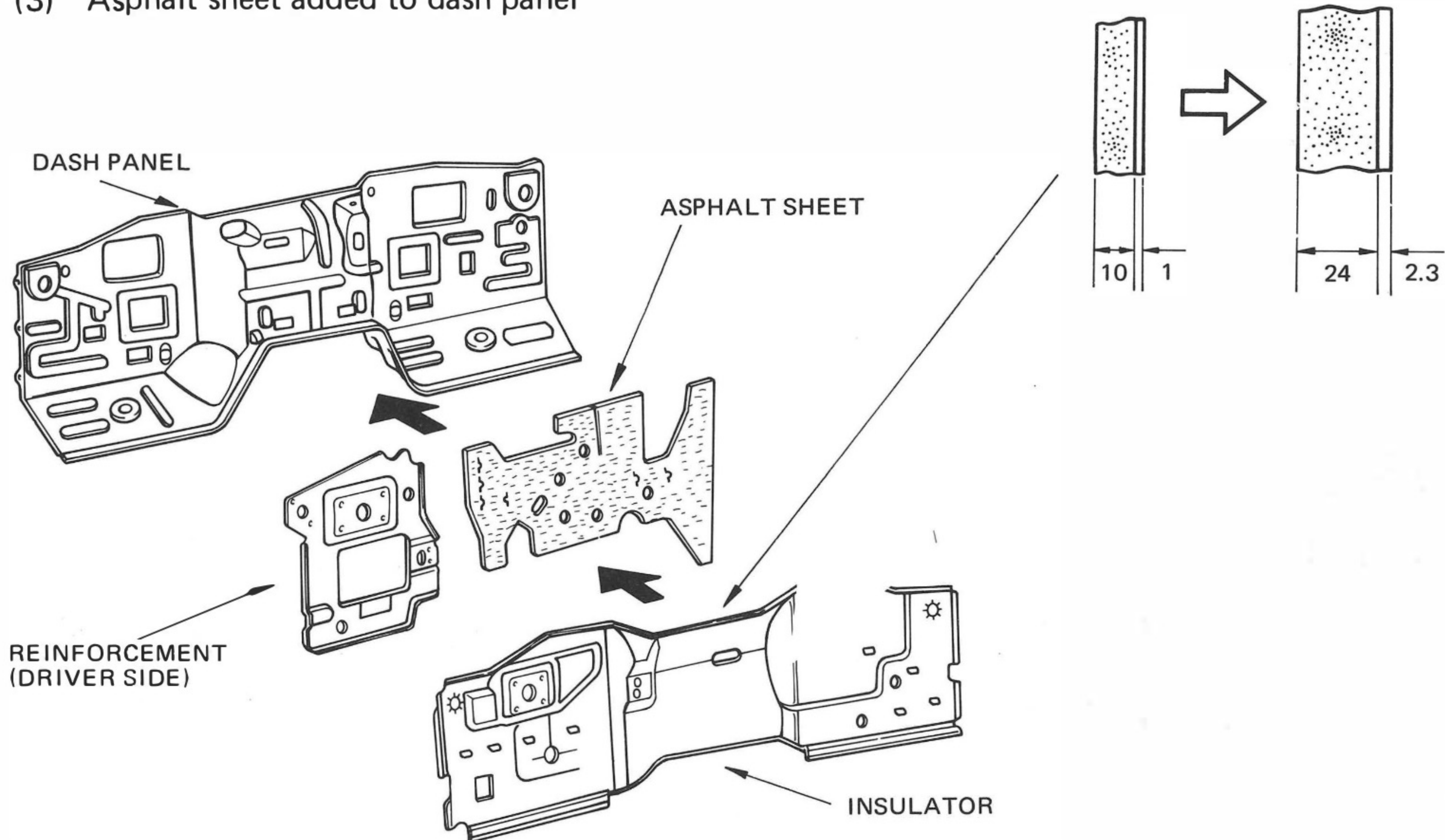
● NOISE REDUCTION

## BODY

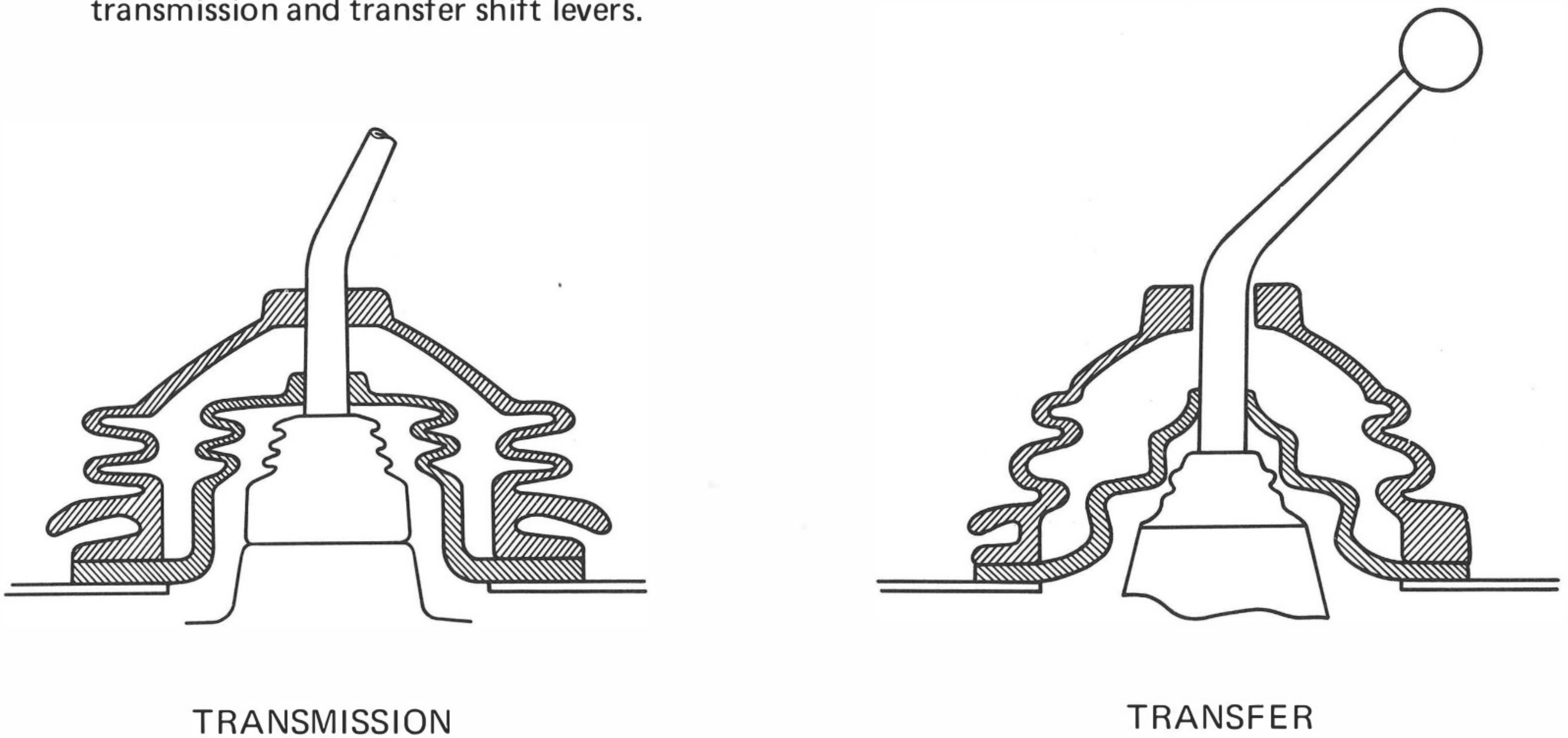
### NOISE REDUCTION

#### 1. COUNTERMEASURES AGAINST ENGINE NOISE

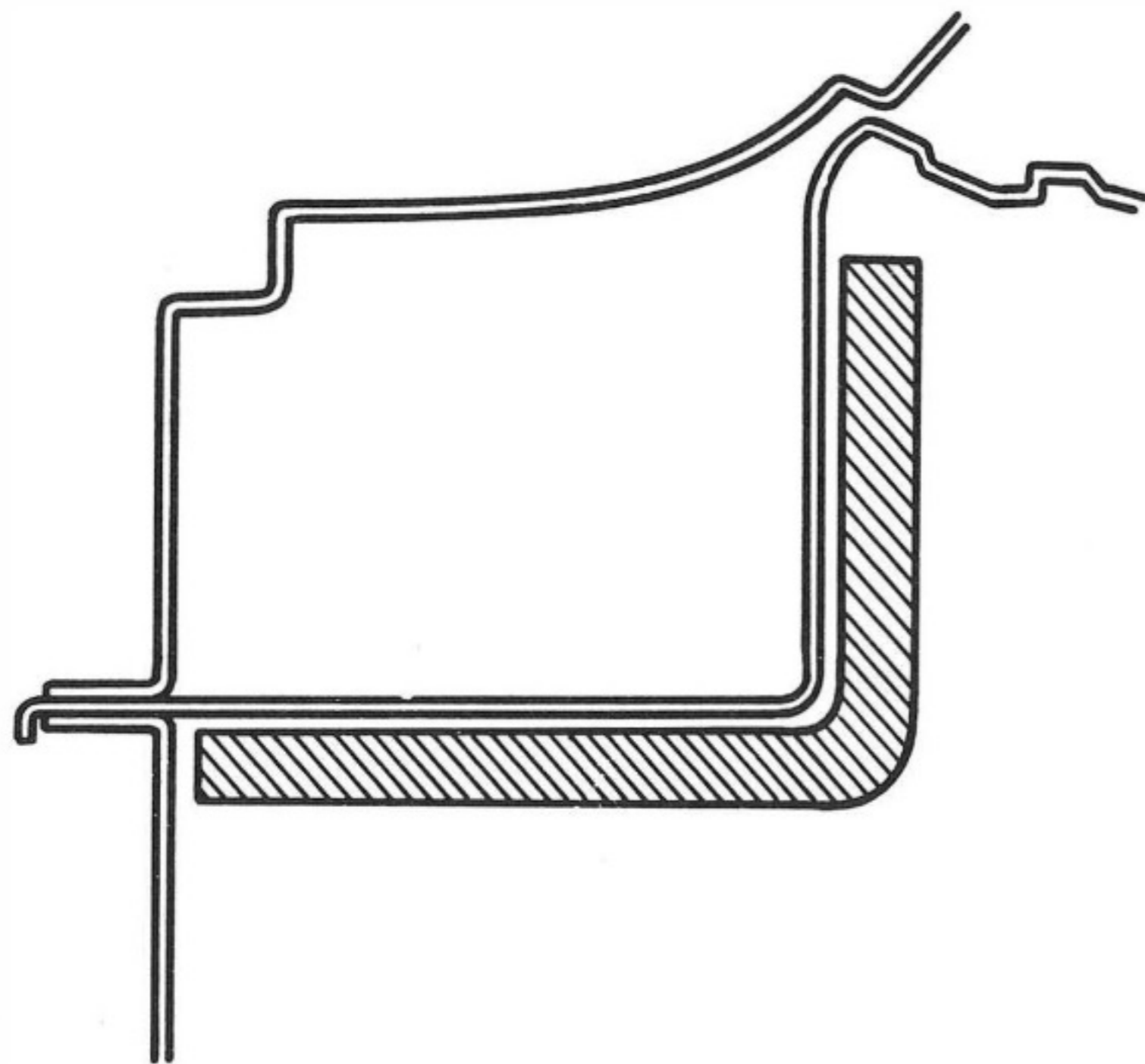
- (1) Greater dash panel rigidity
- (2) Modified dash panel insulator
- (3) Asphalt sheet added to dash panel



- (4) A double seal has been adopted for the transmission and transfer shift levers.



(5) Addition of a cowl insulator

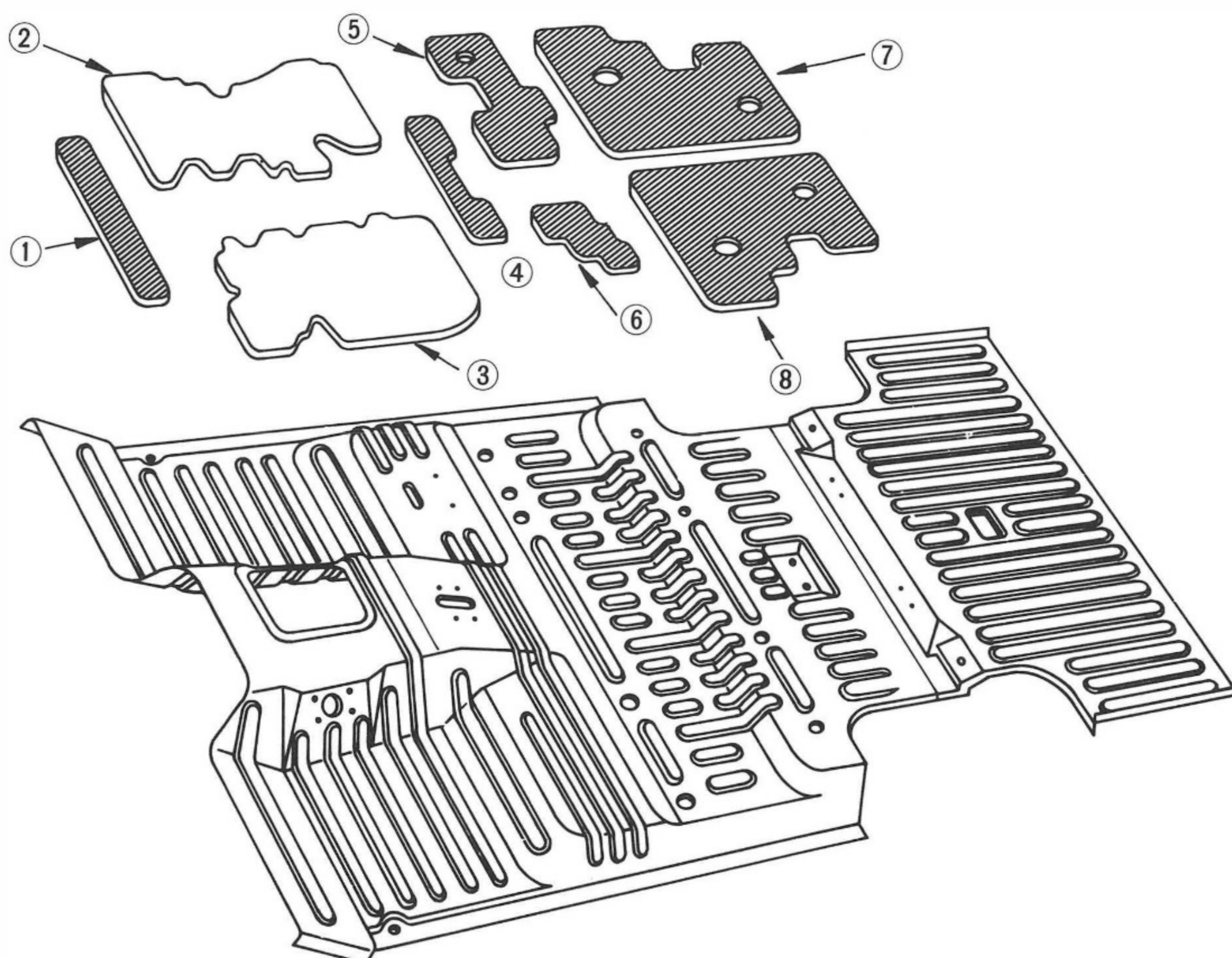


## 2. COUNTERMEASURES AGAINST INTERIOR NOISE

(1) Greater rigidity of the floor and body panels

Asphalt sheet thickness

	①	②	③	④	⑤	⑥	⑦	⑧
Wagon mm	3.0	3.0	3.0	3.0	1.5	1.5	1.5	1.5
Wagon G mm	4.5	4.5	4.5	4.5	3.0	3.0	3.0	3.0

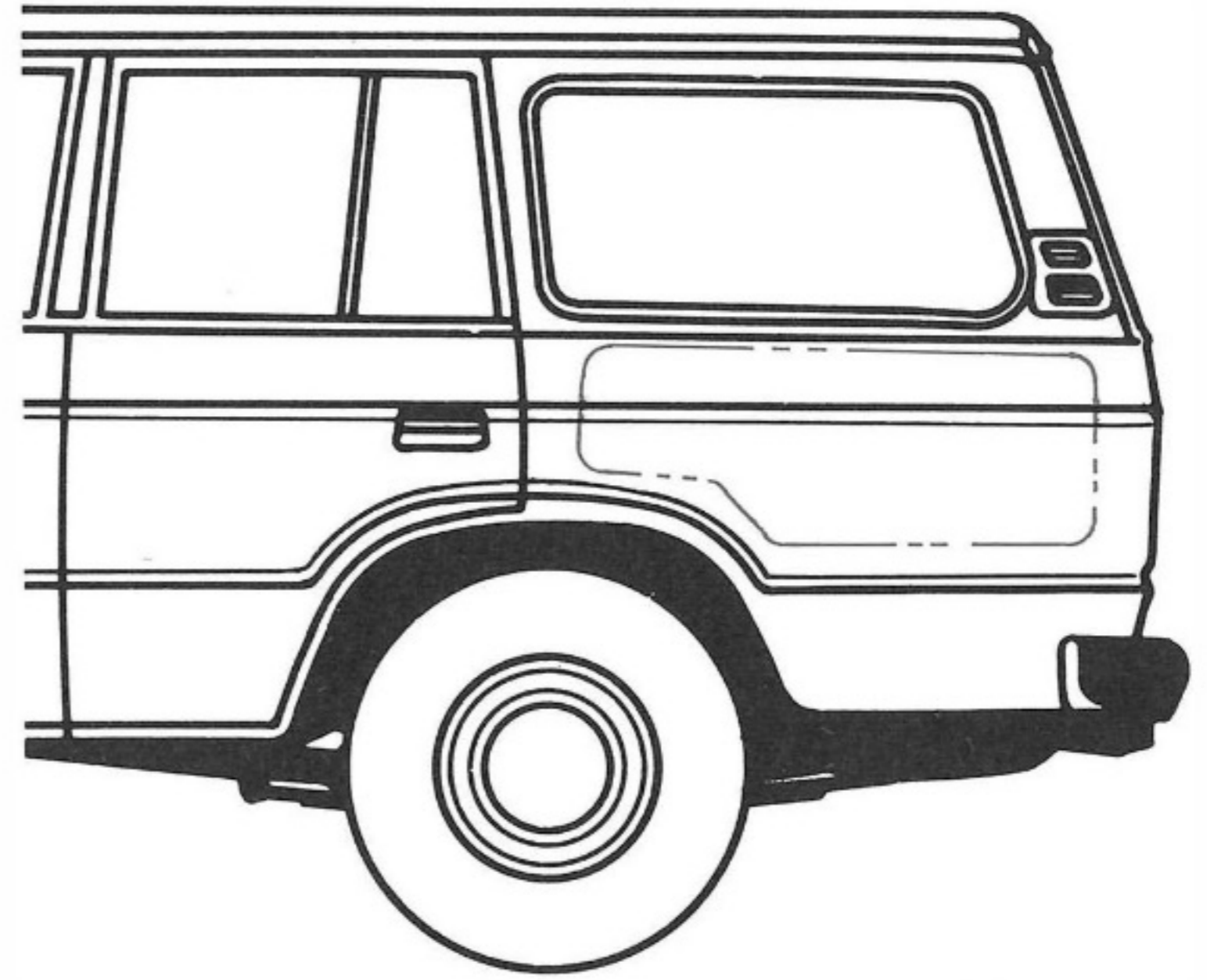


 ... Newly adopted parts.

# BODY

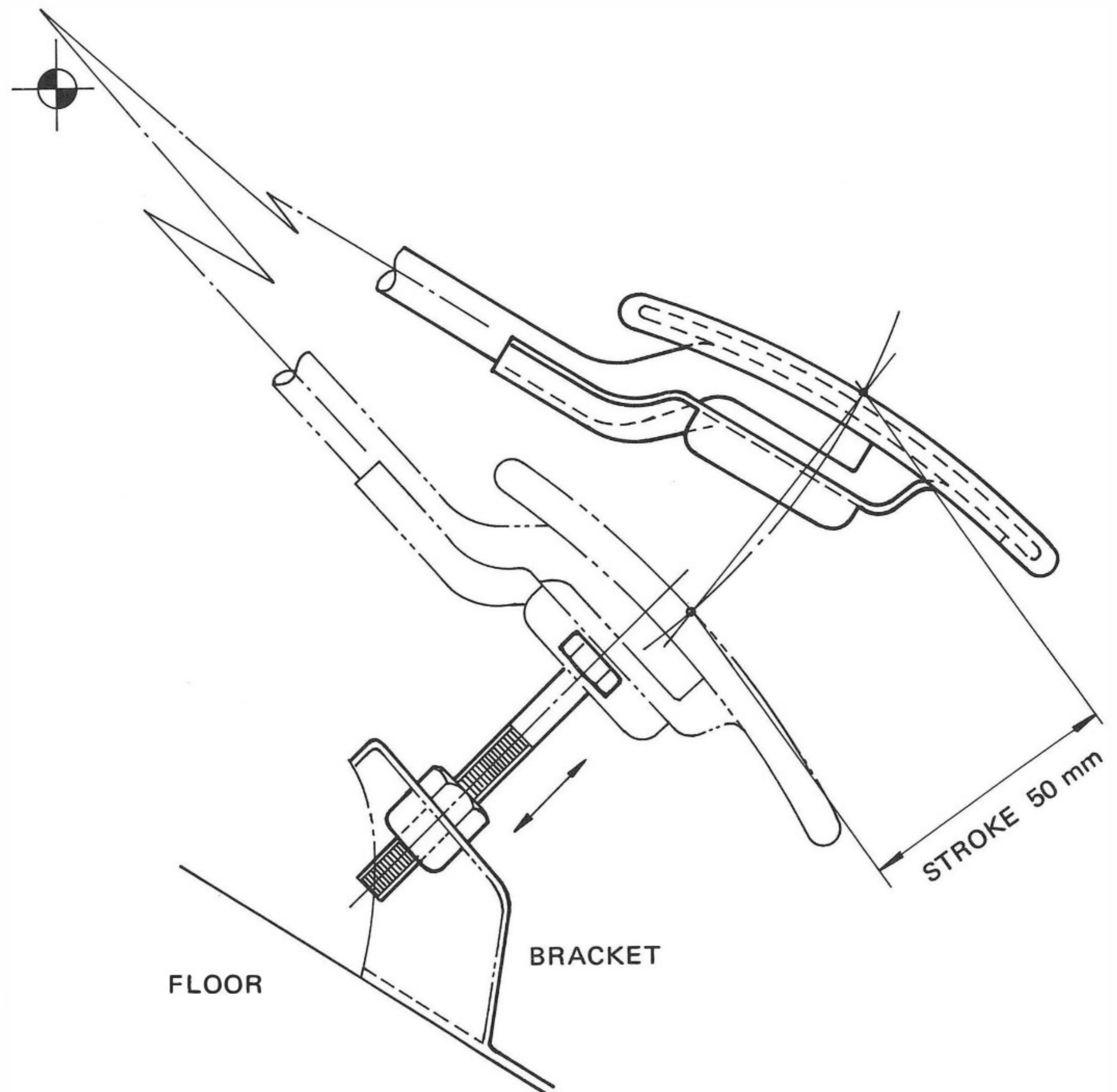
- NOISE REDUCTION
- ACCELERATOR PEDAL STOPPER

(2) The side and back panels of the rear seat have been reinforced by asphalt sheets.



## ACCELERATOR PEDAL STOPPER

This stopper is used for adjusting the accelerator pedal to the specified stroke.



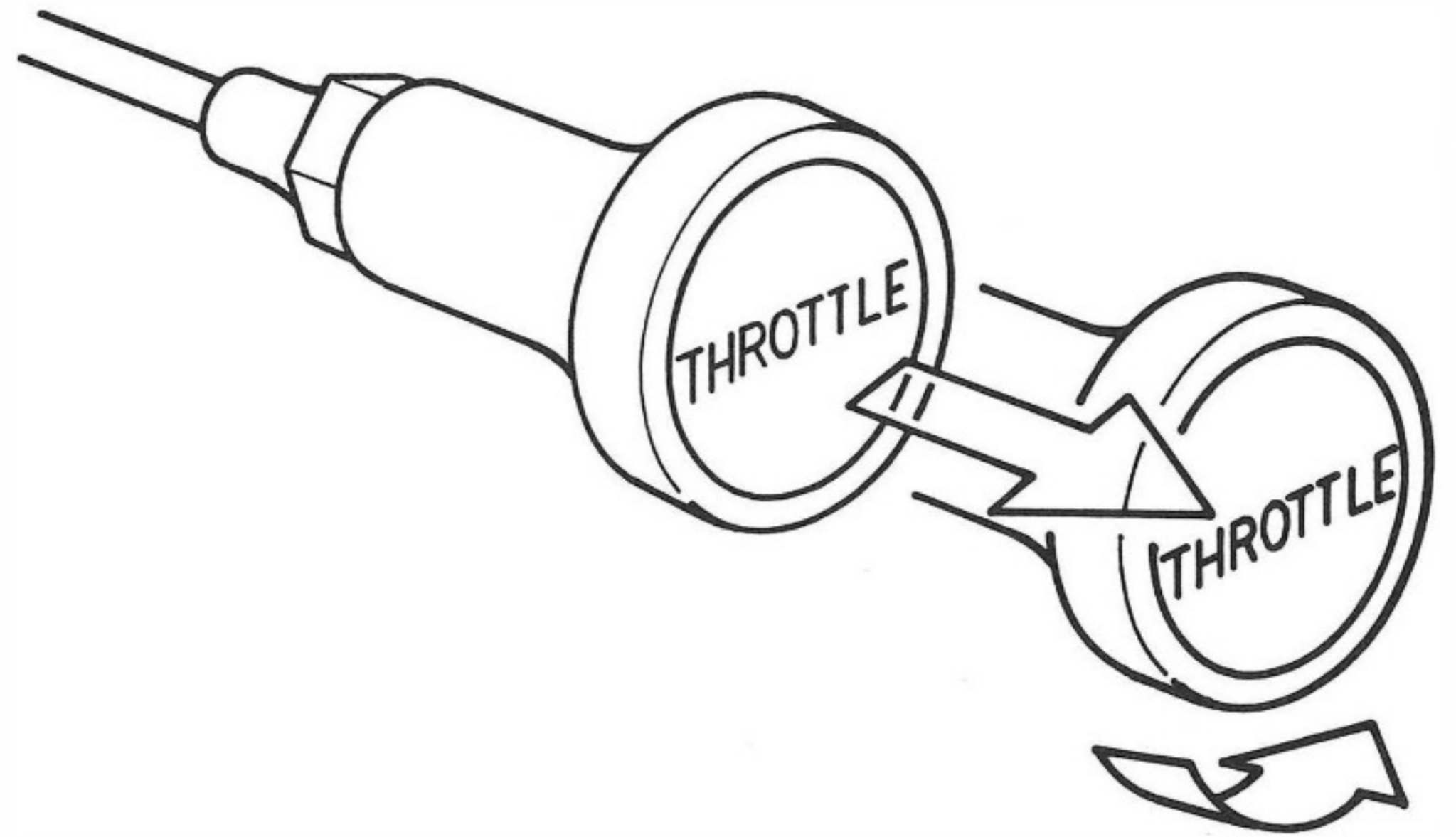
# BODY

- THROTTLE KNOB OPERATION
- RADIATOR SHUTTER

## THROTTLE KNOB OPERATION

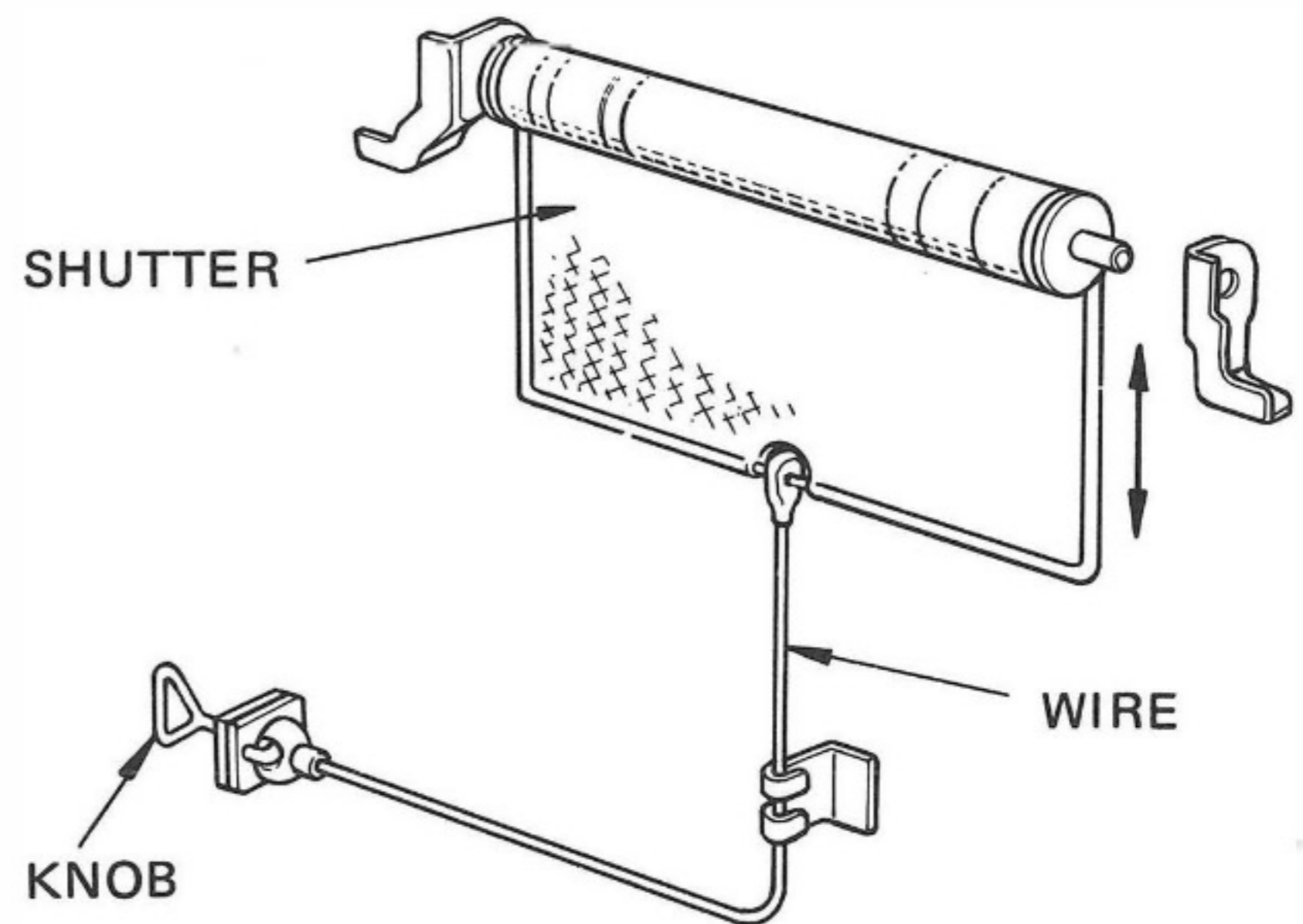
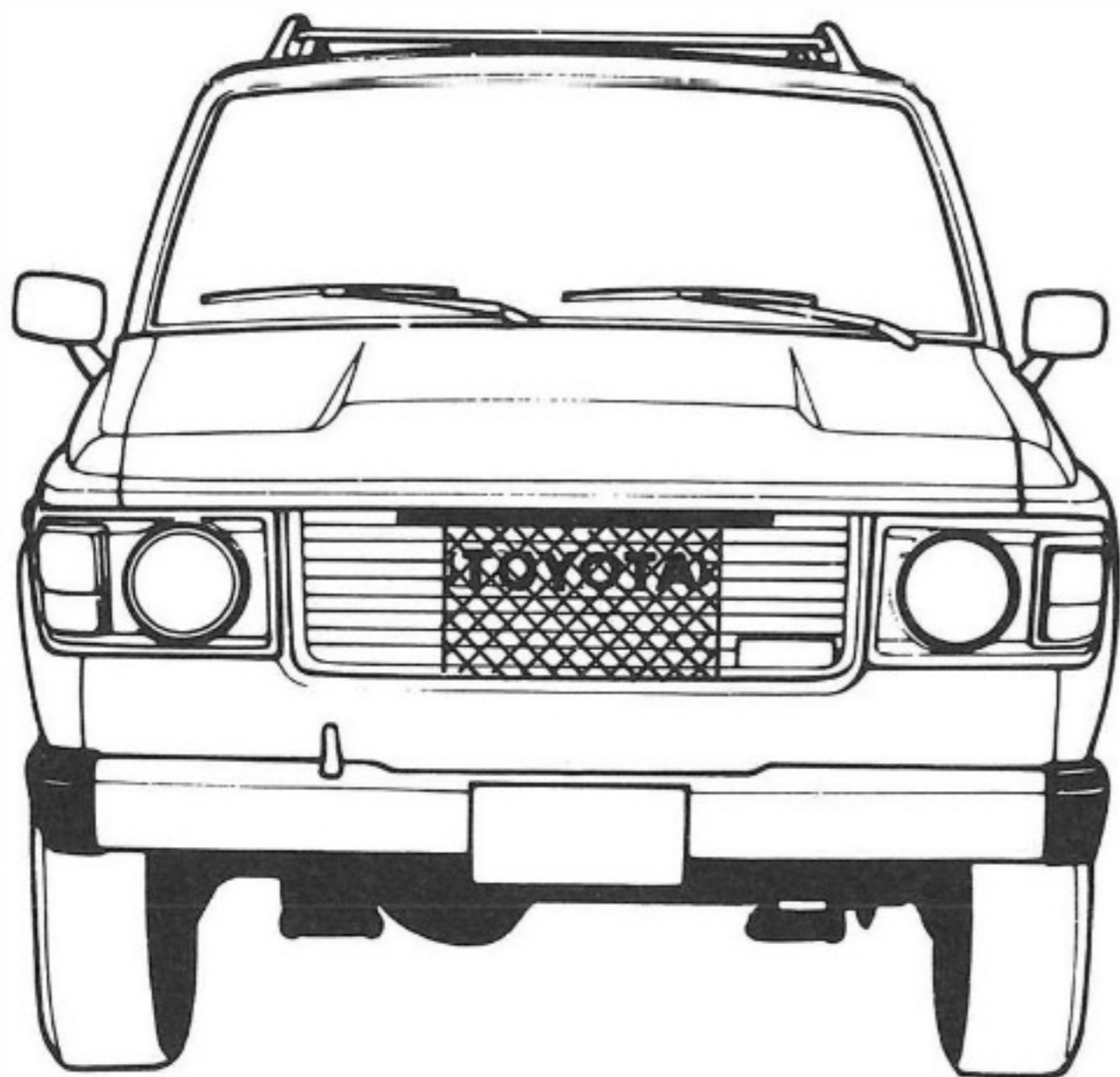
Pull to operate.

The knob automatically returns when turned counter-clockwise.



## RADIATOR SHUTTER

For improvement of heater performance in arctic climates, a curtain type radiator shutter has been adopted.



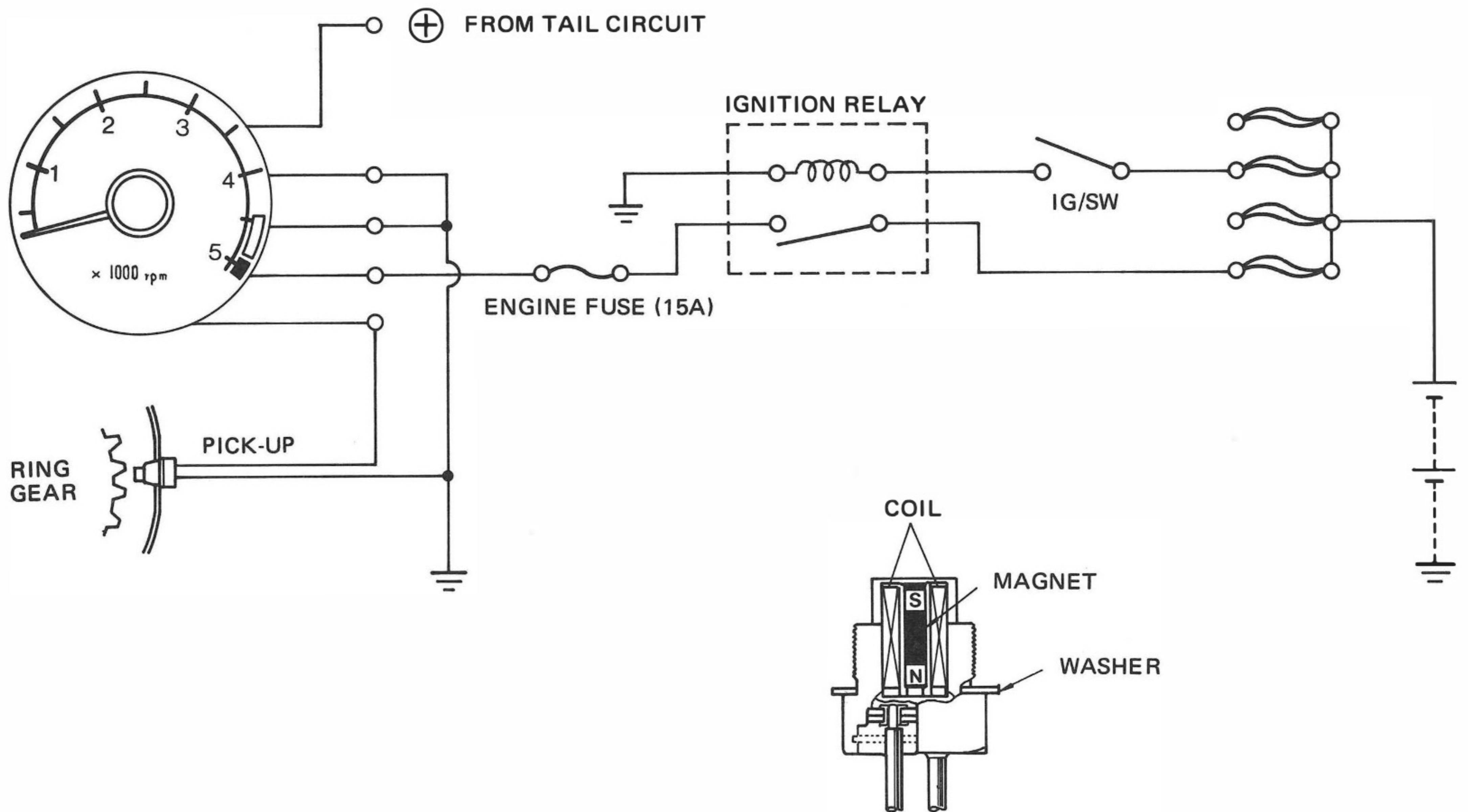
PULL KNOB FOR SELF WINDING

# BODY ELECTRICAL

## ● TACHOMETER

### BODY ELECTRICAL

#### TACHOMETER (WAGON G)



The pick-up is installed in the clutch housing and detects ring gear rpm.

As the ring gear rotates and each tooth passes by the pick-up, the magnetic field in the pick-up changes, producing AC voltage in the coil. This AC

output is amplified, rectified and changed to a pulse through the integral circuit in the tachometer. An ammeter in the tachometer receives this signal and moves the gauge needle to indicate the engine rpm.

# AIR CONDITIONING SYSTEM

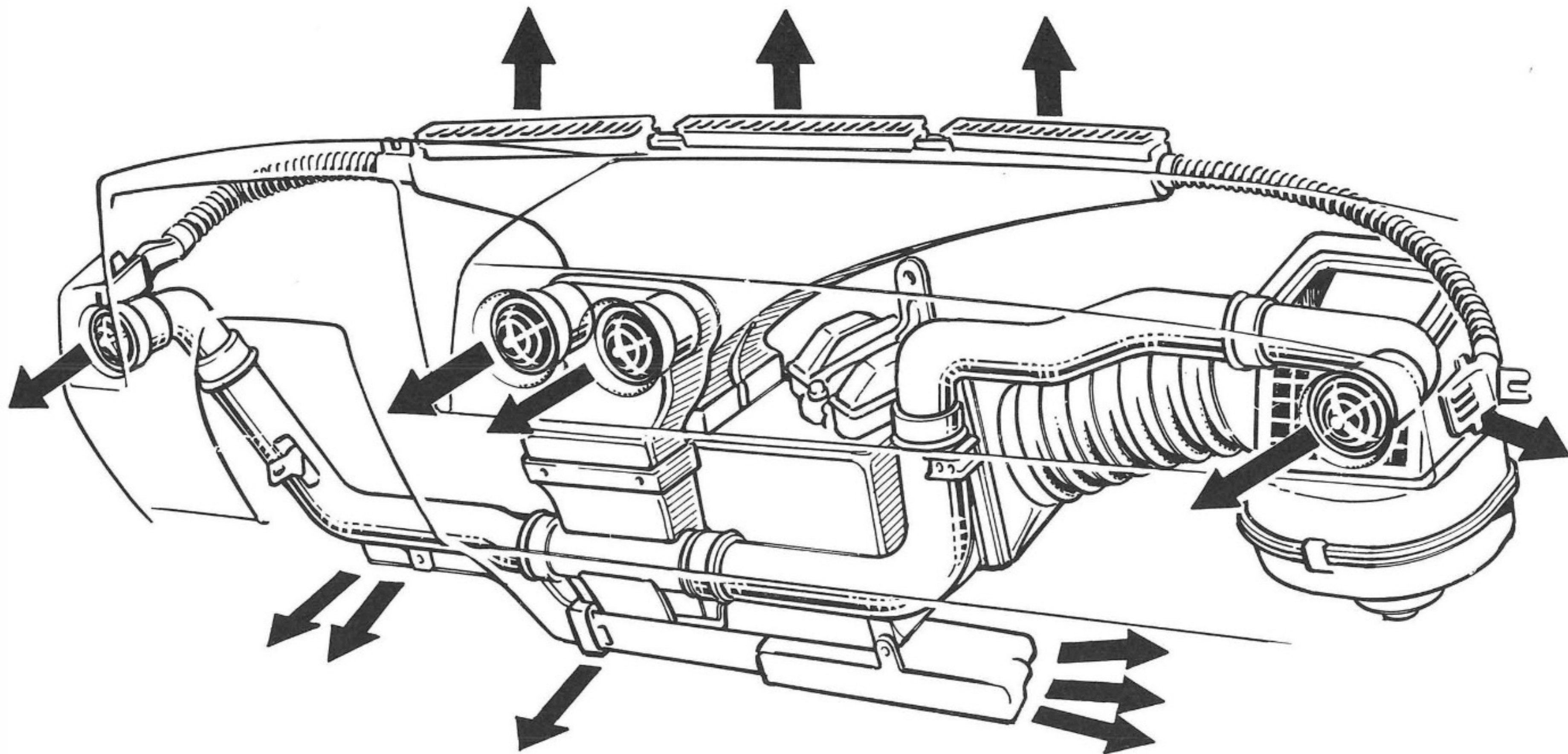
## ● HEATER AND AIR CONDITIONER

### AIR CONDITIONING SYSTEM

#### HEATER AND AIR CONDITIONER

An air-mix system has been adopted to facilitate temperature control and to enable all-season air conditioning.

The switches and control levers are centralized on the control panel for easier heater control. The rear heater has a separate control.



	60 Series		FJ55 Series	
	Heater	Air conditioner	Heater	Cooler
Temperature Control	Air Mix		Water Flow Control	
Capacity	3700Kcal/h	3800Kcal/h	4200Kcal/h	3400Kcal/h
Air Volume	320m <sup>3</sup> /h	370m <sup>3</sup> /h	340m <sup>3</sup> /h	300m <sup>3</sup> /h
Blower Motor	160W	160W	115W	115W
Fan dia.	140mm	140mm	130mm	130mm
Fan Speeds	4-speed	4-speed	3-speed	3-speed

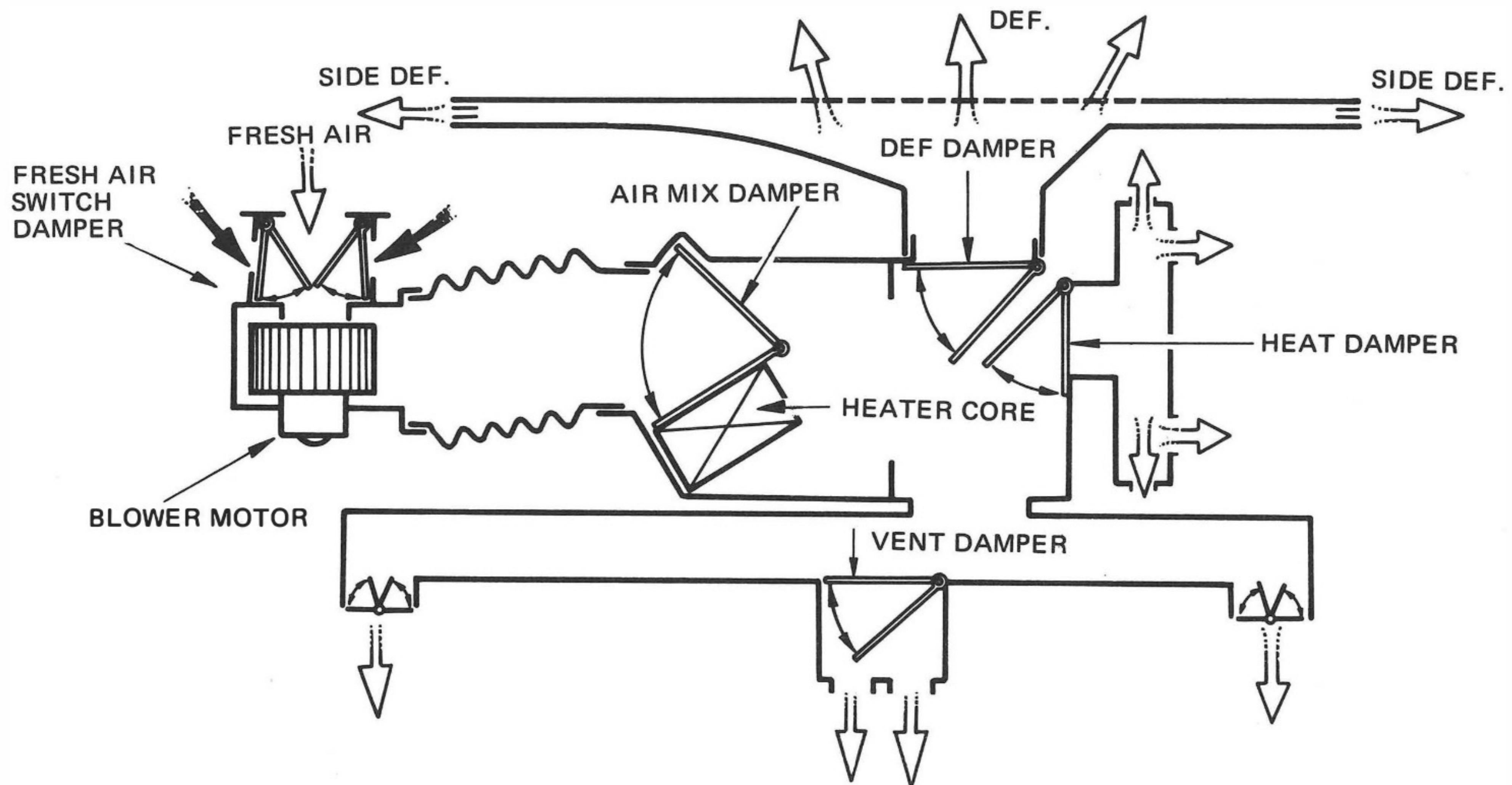
#### Rear Heater

	60 Series	FJ55 Series
Temperature Control		
Capacity	1700Kcal/h	1300Kcal/h
Air Volume	130m <sup>3</sup> /h	100m <sup>3</sup> /h
Blower Motor	25W	25W

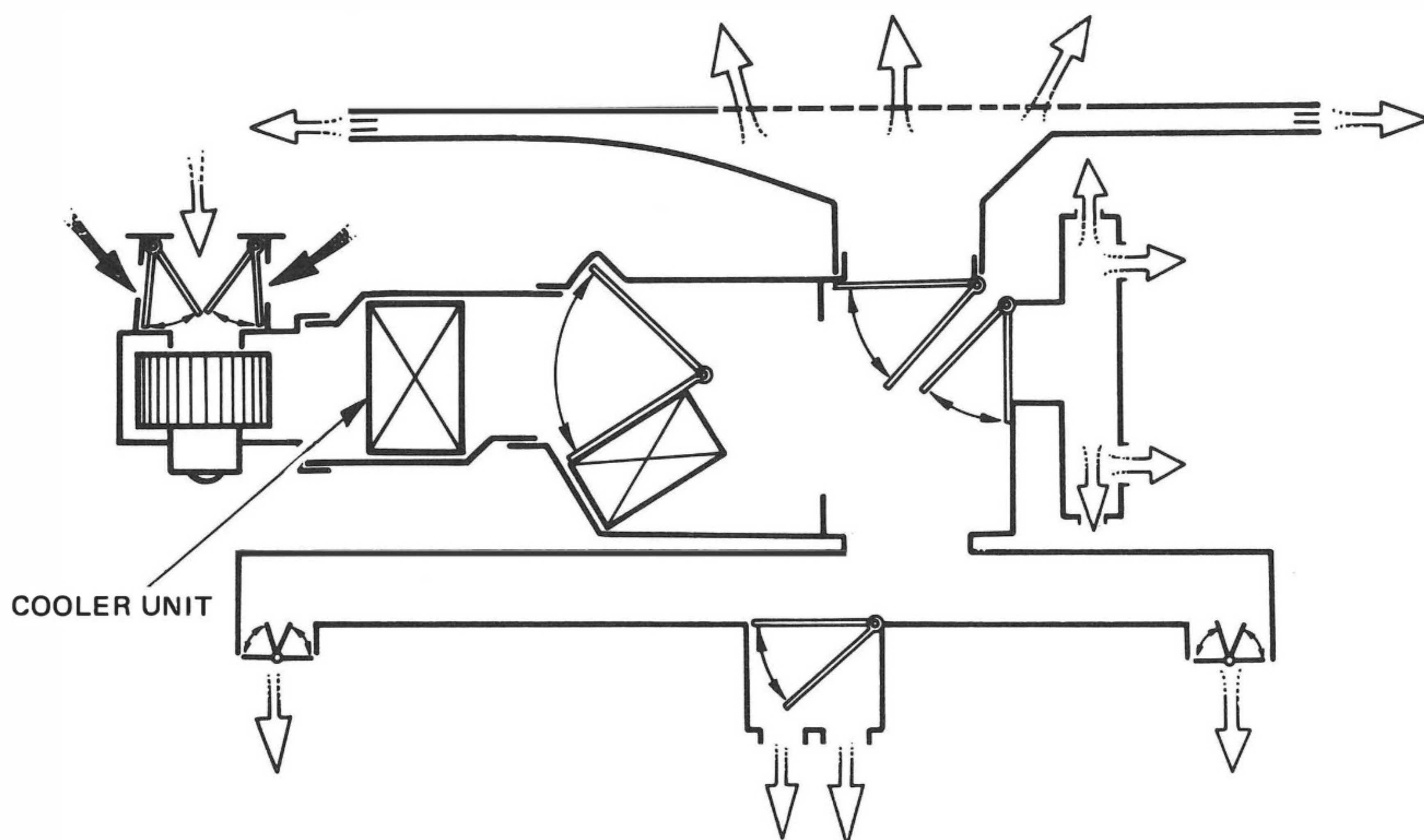
# AIR CONDITIONING SYSTEM

## ● HEATER AND AIR CONDITIONER CONSTRUCTION

### HEATER CONSTRUCTION



### AIR CONDITIONER CONSTRUCTION

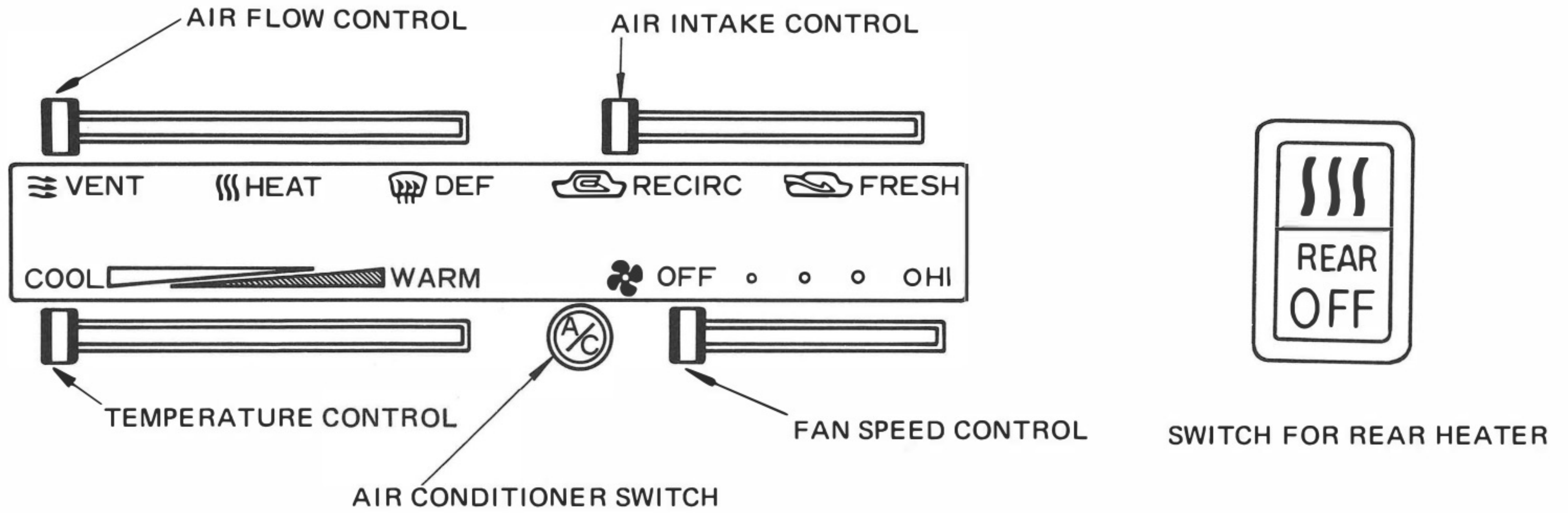


# AIR CONDITIONING SYSTEM

## ● HEATER CONTROL PANEL

### HEATER CONTROL PANEL

<R.H.D. MODEL>



<L.H.D. MODEL>  
(U.S.A. CANADA)



<L.H.D. MODEL>  
(GENERAL, EUROPE)



<R.H.D. MODEL>  
BOOST VENTILATOR ONLY



<L.H.D. MODEL>  
BOOST VENTILATOR ONLY

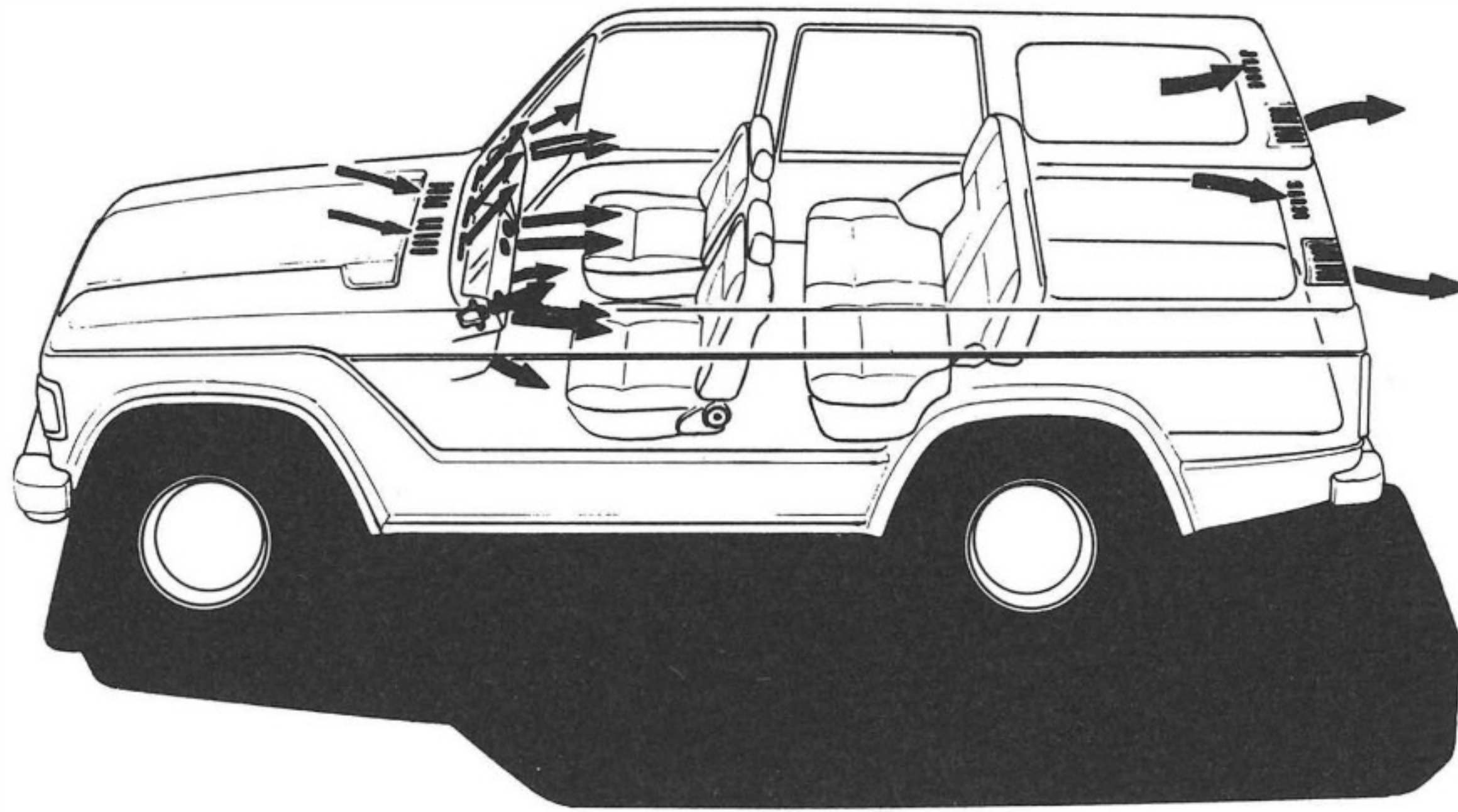


# AIR CONDITIONING SYSTEM

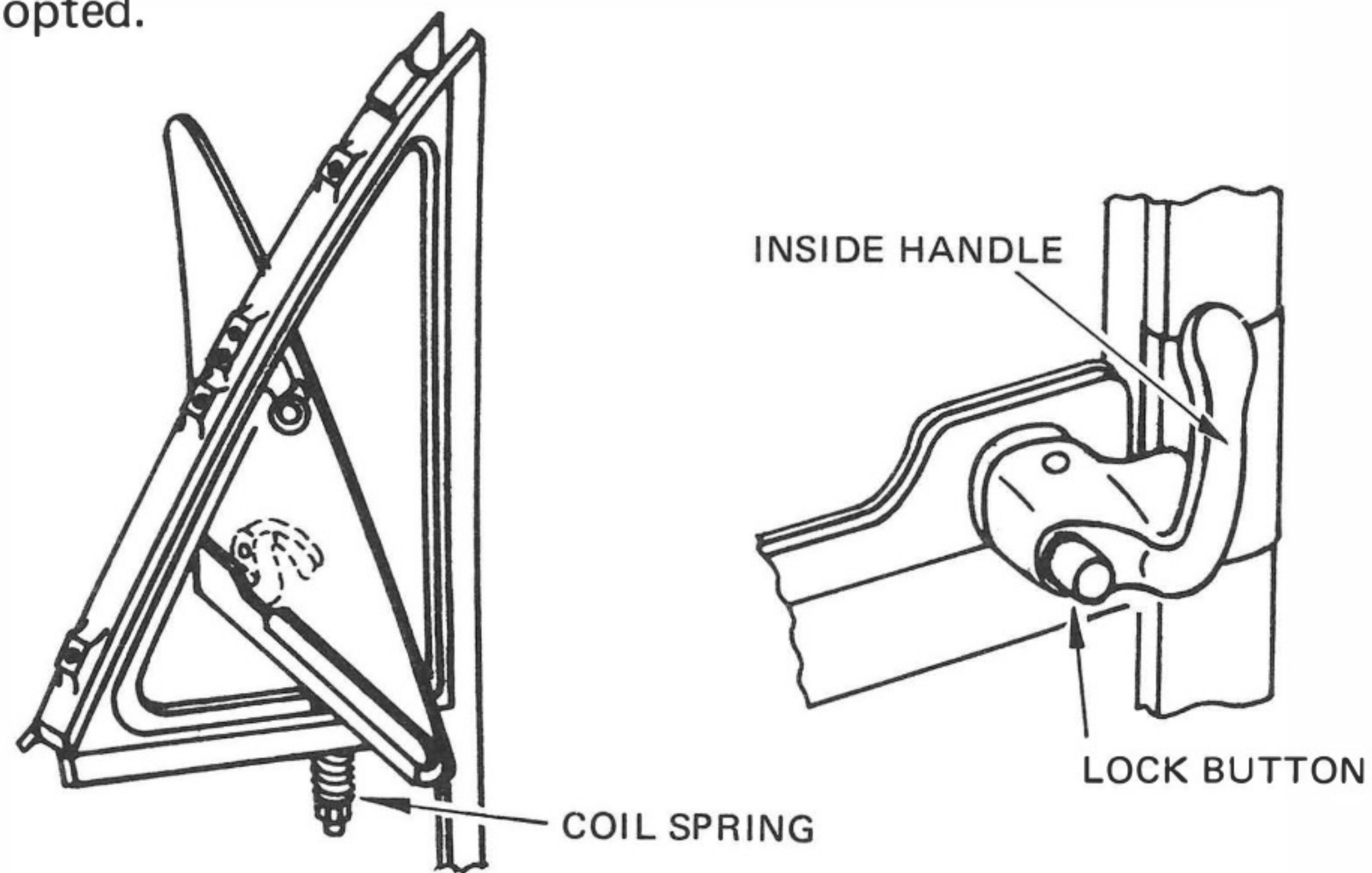
## ● VENTILATION SYSTEM

### VENTILATION SYSTEM

Fresh air is drawn into the passenger compartment from the upper portion of the cowl and vented out through the upper part of the rear pillar.

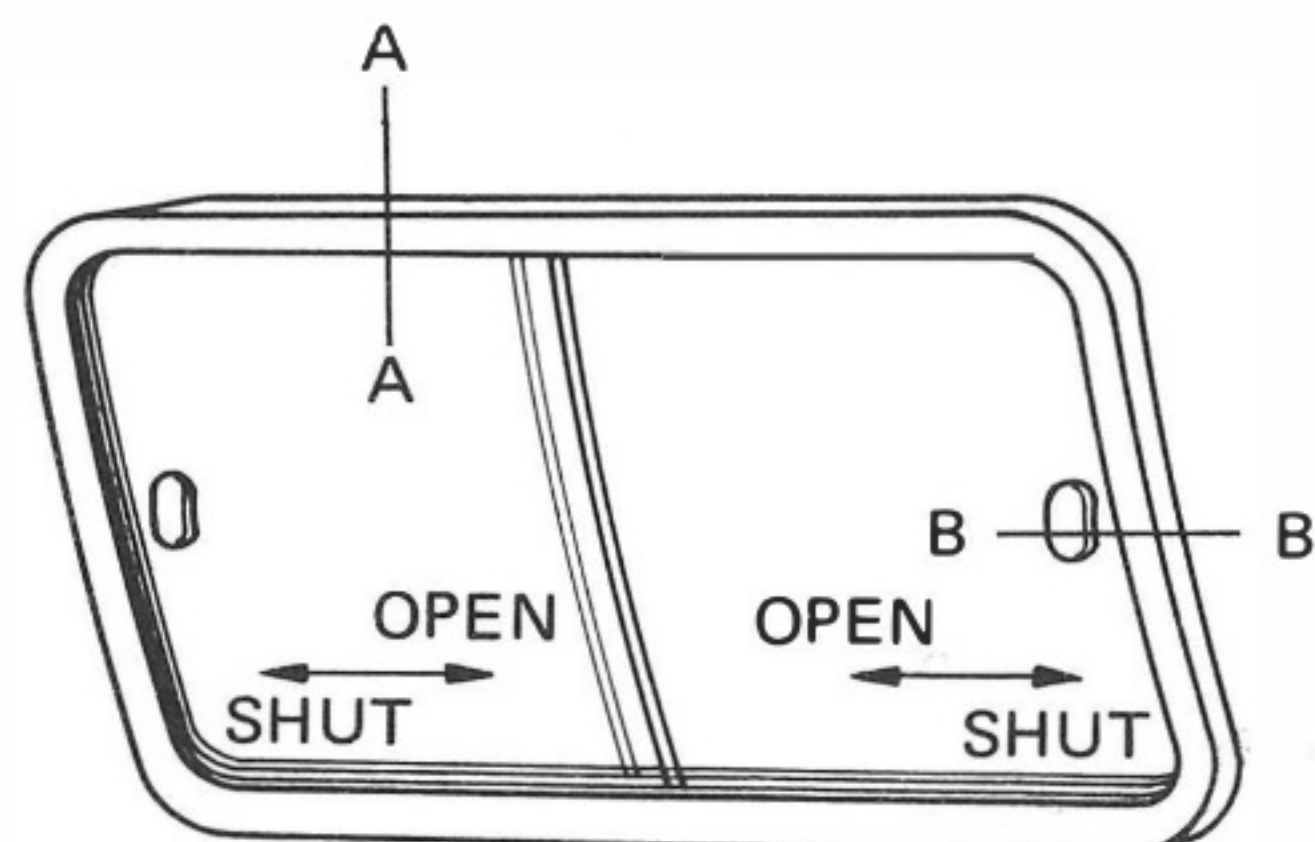
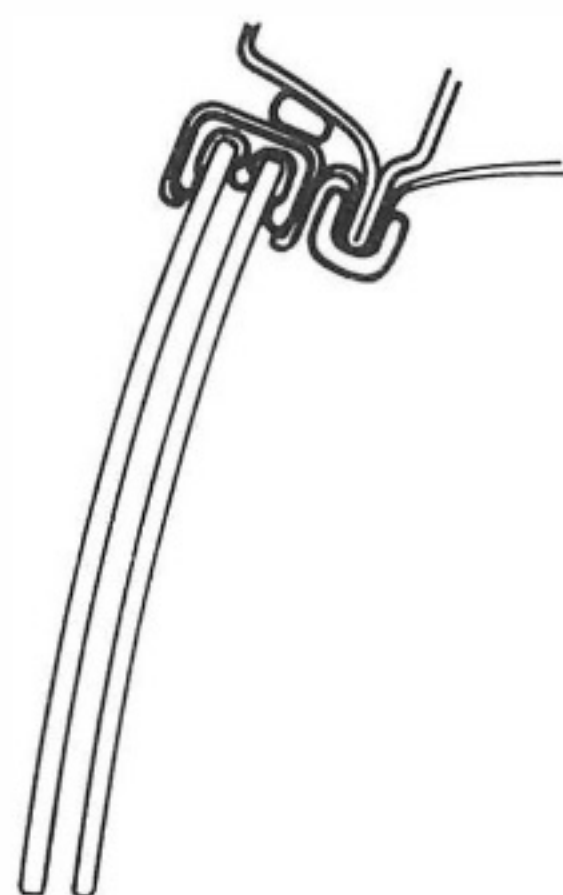


For improvement in ventilation effectiveness, the front door ventilation window and sliding rear windows have been newly adopted.

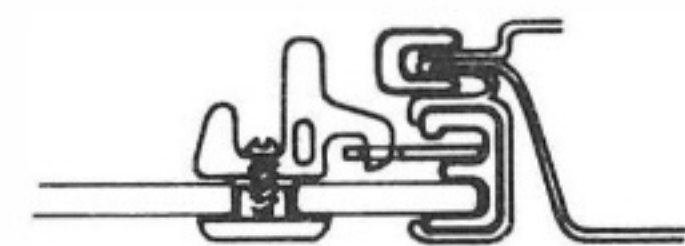


FRONT DOOR VENTILATION WINDOW

A-A SECTION



B-B SECTION



SLIDE TYPE REAR QUARTER WINDOW