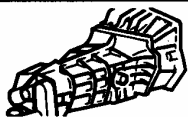


## CONTENTS

	Pages		
	B.Vi.352	B.Vi.365	B.Vi.395
SPECIFICATIONS	2	8	14
GEARBOX	20	24	24
- Removing - Refitting			
COMPLETE OVERHAUL	25	53	53
- Dismantling			
- Re-assembling			
- Adjustments			
SPEEDOMETER DRIVE HOUSING	90	91	91
- Removing - Refitting			
GEARSHIFT CONTROL	93	93	93
- Removing			
- Adjusting link control			
- Overhauling			
- Refitting			



## SPECIFICATIONS



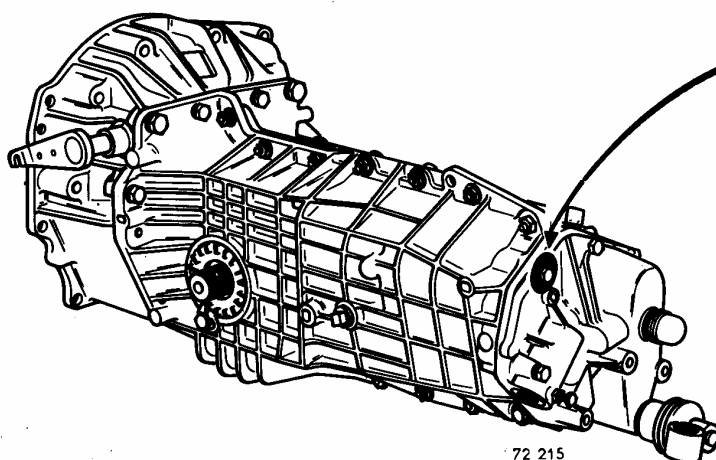
### Type 352 Gearbox

The above gearbox is fitted to :

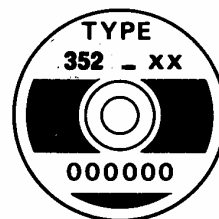
R.1300

R.1302 - R.1312 - R.1322.

The type, suffix and fabrication number are stamped on a plate at the end of the gearbox.



72 215

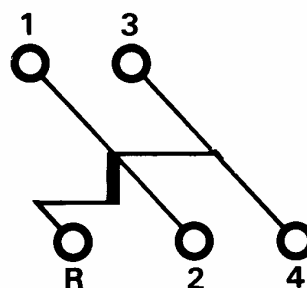


74 008

Four synchronised forward speeds :

1st - 2nd : Renault synchro

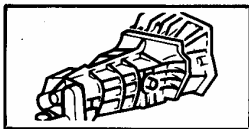
3rd - 4th : Borg-Warner synchro



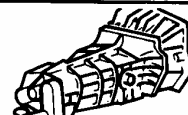
74904

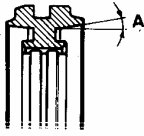
OIL :

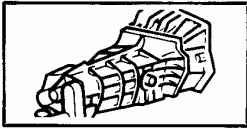
Grade	API GL 4 or API GL 5	Quantity 2 litres (3½ Imp. pts)	Viscosity.	SAE 80 for hot and temperate countries or SAE 75 for cold countries
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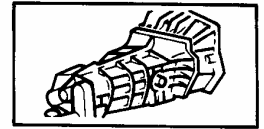
# TYPE 352 GEARBOX



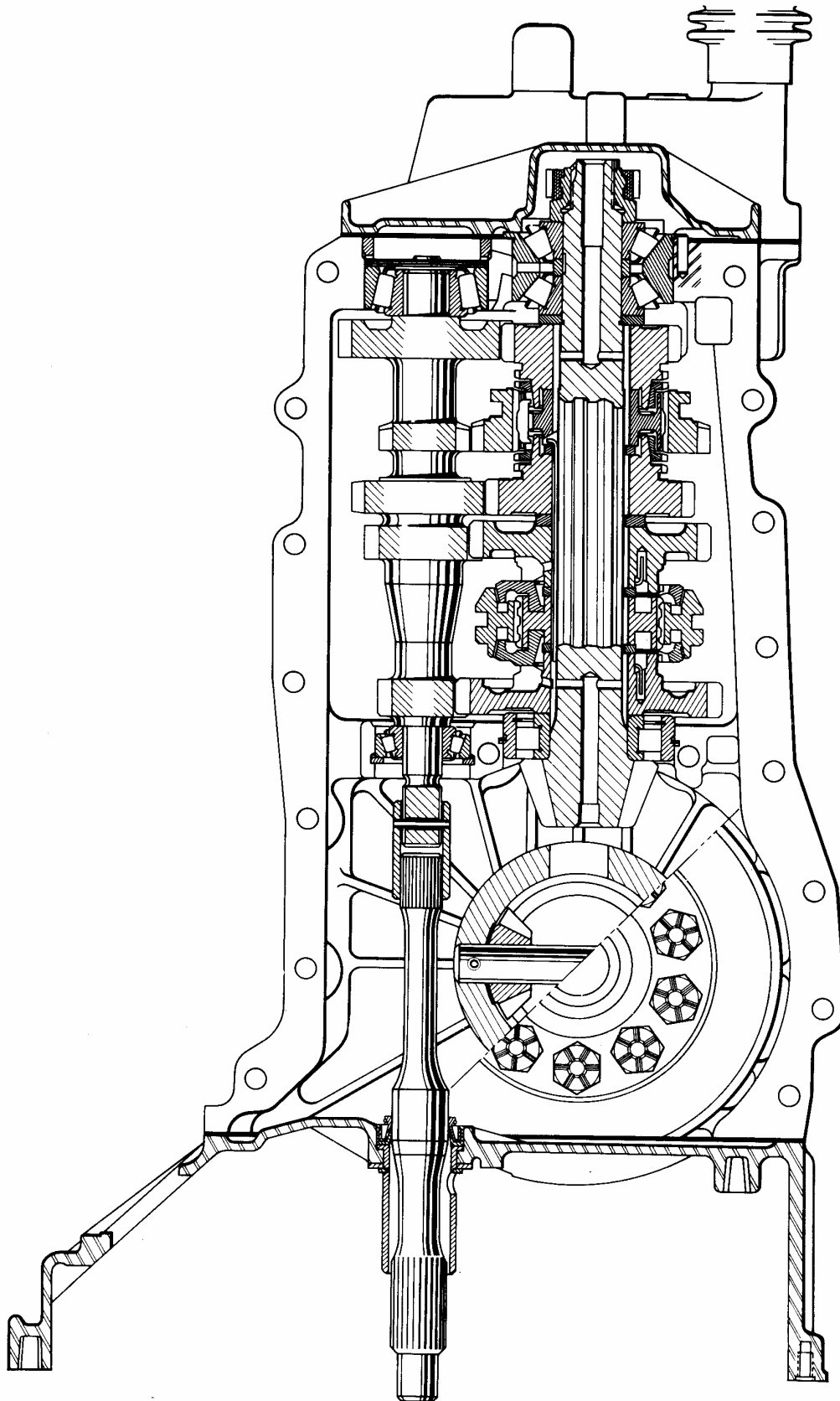
Vehicle type	Suffix	Reduction ratios	Final drive						Special features
			C.W. & P.	Speedo	Normal roads	Poor roads	L.H.D.	R.H.D.	
R. 1302 R. 1312 R. 1322	11	1st (13 x 47) 3,61 2nd (19 x 43) 2,26	9 X 32	6 X 12	X	X	X		
R. 1300	12	3rd (25 x 37) 1,48 4th (31 x 32) 1,03	9 X 34	6 X 13	X	X	X		
R. 1302 R. 1312 R. 1322	13	Rev. (13 x 40) 3,08	9 X 32	6 X 12	X	X		X	
R. 1302 R. 1312 R. 1322	31		9 X 32	6 X 12	X	X	X		 76697.1 Moving cones and sliding gears with angle (A) 6°40' instead of 9°
R. 1300	32		9 X 34	6 X 13	X	X	X	X	
R. 1302 R. 1312 R. 1322	33	1st (11 x 38) 3,46 2nd (17 x 38) 2,24 3rd (23 x 34) 1,48	9 X 32	6 X 12	X	X		X	
R. 1302 R. 1312 R. 1322	50	4th (28 x 29) 1.04 Rev. (12 x 37) 3.08	9 X 32	6 X 12	X	X	X		
R. 1300	51		9 X 34	6 X 13	X	X	X	X	
R. 1312 R. 1322	52		9 X 32	6 X 12	X	X		X	
R. 1302 R. 1312 R. 1322	55		9 X 32	6 X 12	X	X	X		
R. 1300	56		9 X 34	6 X 13	X	X	X	X	
R. 1302 R. 1312 R. 1322	57		9 X 32	6 X 12	X	X		X	
		1st (11 x 42) 3,82 2nd (17 x 38) 2,24 3rd (23 x 34) 1,48 4th (28 x 29) 1.04							
R. 1302 R. 1302 R. 1312 R. 1322	61		9 X 32	6 X 12	X	X	X		
R. 1300	62		9 X 34	6 X 13	X	X	X	X	
R. 1302 R. 1312 R. 1322	63		9 X 32	6 X 12	X	X		X	
R. 1302 R. 1312 R. 1322	64		9 X 32	6 X 12	X	X	X		P.A.S.
R. 1300	65		9 X 34	6 X 13	X	X	X		



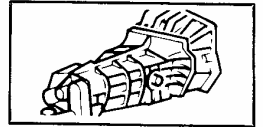
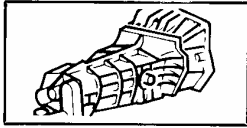
SECTIONS



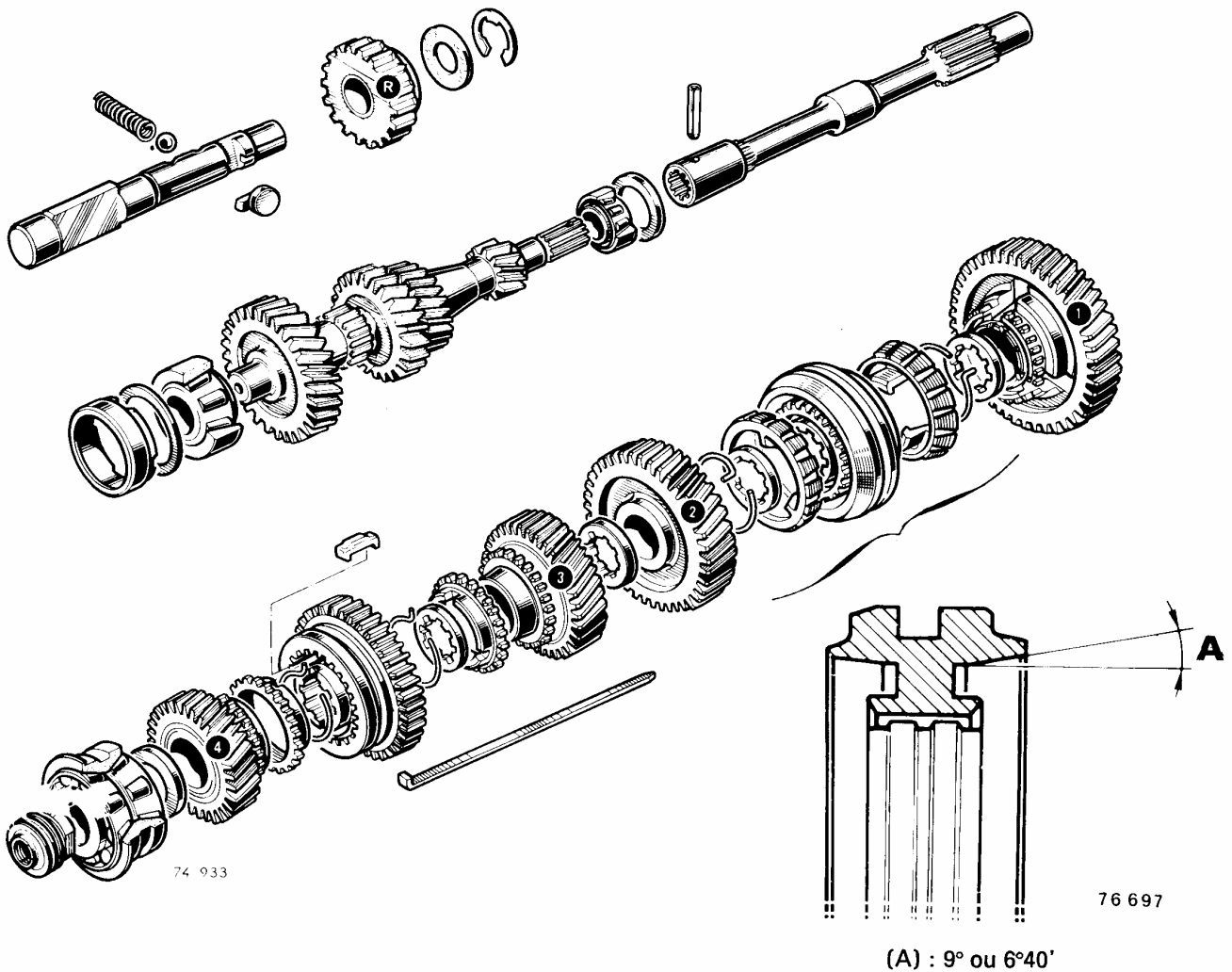
TYPE 352 GEARBOX



74 414



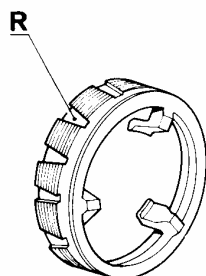
TYPE 352 GEARBOX



### IDENTIFICATION OF MOVING CONES

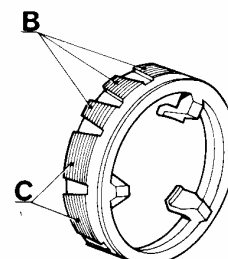
Cone with angle (A) = 9°

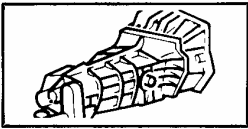
Non-machined surfaces are bronze in colour.  
15 equal and equidistant grooves (R).



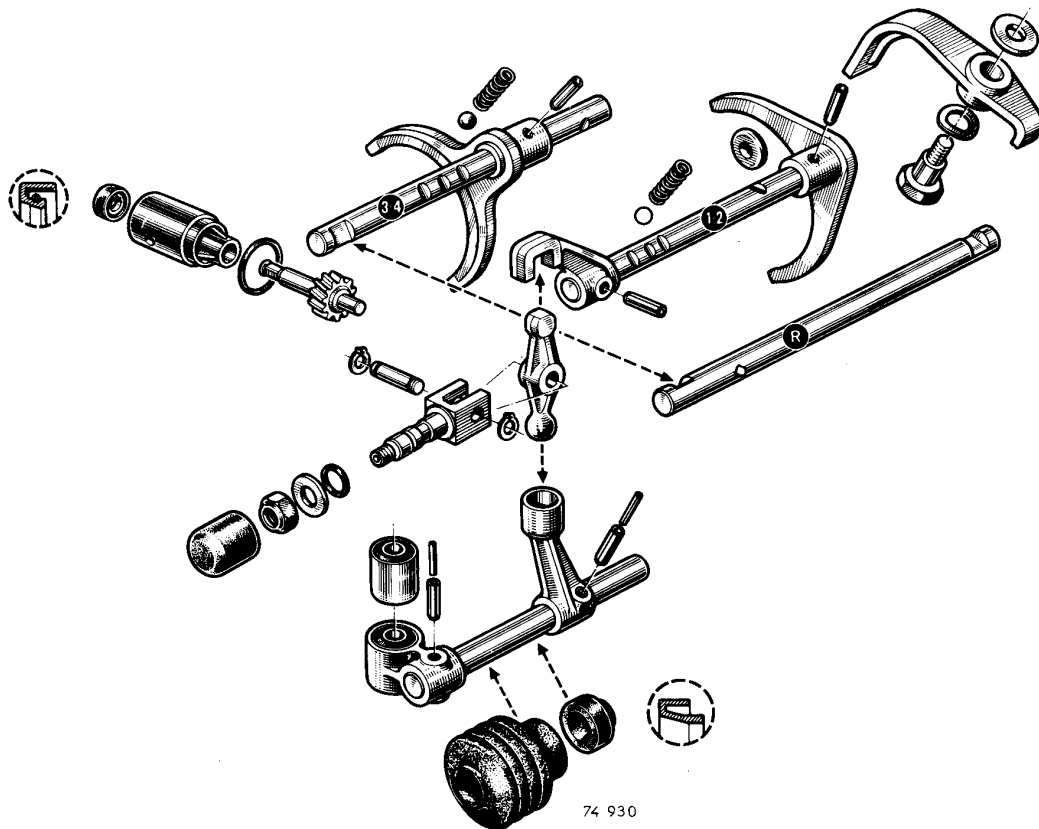
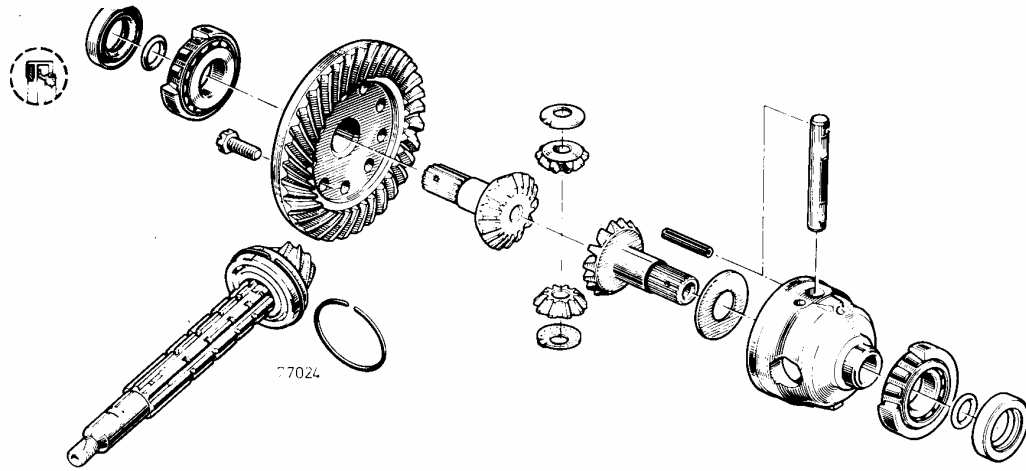
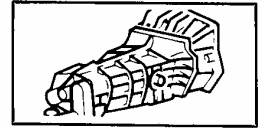
Cone with angle (A) = 6°40'

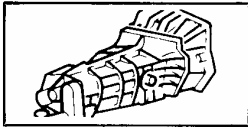
Non-machined surfaces are copper in colour.  
Friction faces are divided up as follows :  
- 3 small (B)  
- then 2 larger (C).



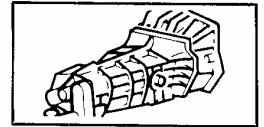


TYPE 352 GEARBOX





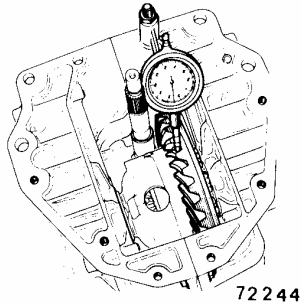
## ADJUSTMENTS



### TYPE 352 GEARBOX

Pinion protrusion

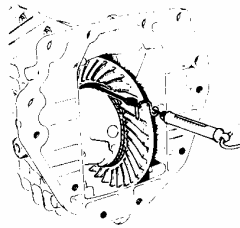
#### Backlash



72 244

0,12 mm to 0,25 mm  
(.0047 to .010")

#### Differential bearings



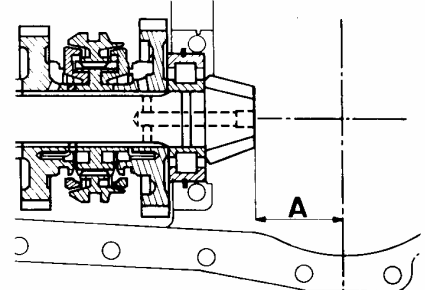
72 253

Re-used  
bearings

free-turning  
without play

New bearings

Preload :  
1 to 3 da N  
(2 to 7 lbs)



65 083 .1

59 mm (2.323")

## TIGHTENING TORQUES

### HALF-HOUSING BOLTS

Diameter	7 mm	2 to 2,5 m. da N (15 to 19 lb/ft)
	8 mm	3 m. da N (22 1/2 lb/ft)

REAR COVER BOLTS : 1,2 m. da N (8 1/2 lb/ft)

### CLUTCH HOUSING BOLTS :

Diameter	8 mm	2,4 m. da N (18 lb/ft)
	10 mm	3,5 m. da N (26 lb/ft)

REVERSE GEAR SELECTOR BOLT : 2,8 m. da N (21 lb/ft)

CROWN WHEEL FIXING BOLTS : 9 to 11 m. da N (67 to 82 1/2 lb/ft)

SPEEDOMETER WORM NUT ON SECONDARY SHAFT : 10 to 12 m. da N (75 to 90 lb/ft)

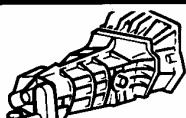
### MATERIAL

Use for :

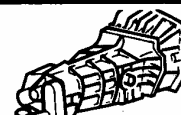
Molykote BR 2 grease Sunwheel splines

Perfect-Seal

Half-casing joint faces  
Differential nut threads  
Clutch bearing gasket  
Rear cover gasket



# SPECIFICATIONS

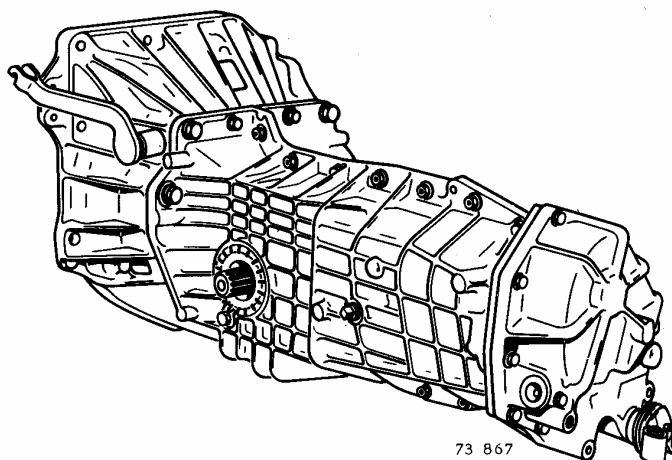


## TYPE 365 GEARBOX

The above gearbox is fitted to :

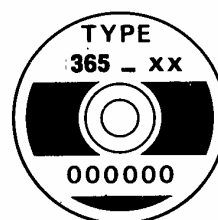
R.1313 - R.1323

R.1317 - R.1327.



73 867

The type, suffix and fabrication number are stamped on a plate at the end of the gearbox.

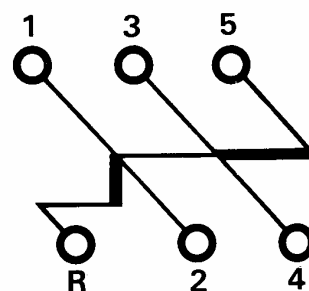


74 008

Five synchronised forward speeds :

1st - 2nd : Renault synchro.

3rd - 4th - 5th : Borg-Warner synchro.



74 067

OIL :

Grade API GL 4  
or  
API GL 5

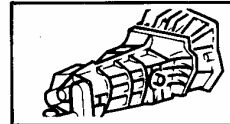
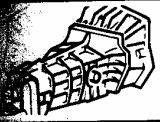
Quantity 2 litres (3½ Imp.pts.)

Viscosity

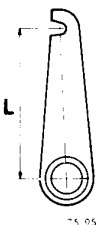
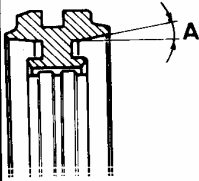
SAE 80 for hot and temp countries

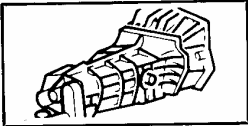
SAE 75 for cold countries





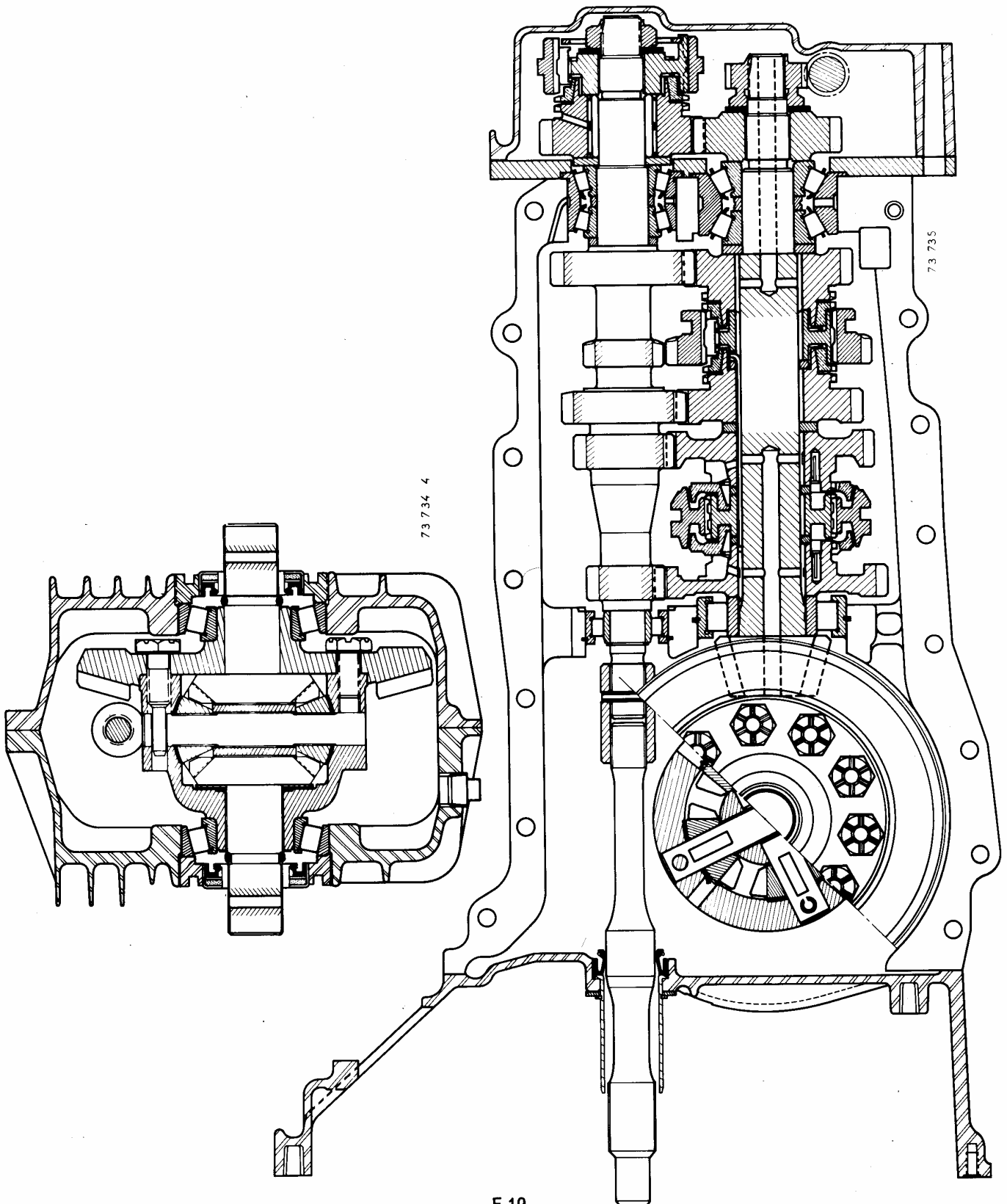
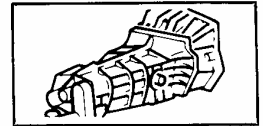
# TYPE 365 GEARBOX

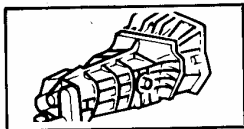
Vehicle type	Suffix	Reduction ratios	Final drive		Equipment			Steering		Special features
			C.W.&P.	Speedo	Normal roads	Poor roads	Spec. Vers.	L.H.D.	R.H.D.	
R1313	00				X	X	X	X		13 mm dia. shift control
R1313	02				X	X	X	X		
R1313	03	1st (13 x 47)3,61			X	X	X		X	
R1323		2nd (18 x 42)2,33								
R1313	04	3rd (23 x 37)1,60			X	X	X	X		Non-adjustable crown wheel and pinion  76697.1
R1323		4th (28 x 34)1,21								
R1313	05	5th (31 x 29)0,93			X	X	X	X		Clutch lever L=80mm (3 1/8")
R1313	06	Rev. (12 x 37)3,08							X	
R1313	07		9 x 34	9 x 19	X	X	X	X		Moving cones and sliding gears with angle (A) 6° 40' instead of 9°
R1323										
R1317	33	1st (11 x 38)3,46			X	X	X	X		Clutch lever L=105mm (4 1/8")
R1327		2nd (17 x 38)2,24								
R1317	34	3rd (23 x 37)1,60			X	X	X		X	Link shift control
R1327		4th (28 x 34) 1,21								
R1317	35	5th (31 x 29)0,93			X	X	X	X		
R1327		Rev. (12 x 37)3,08								



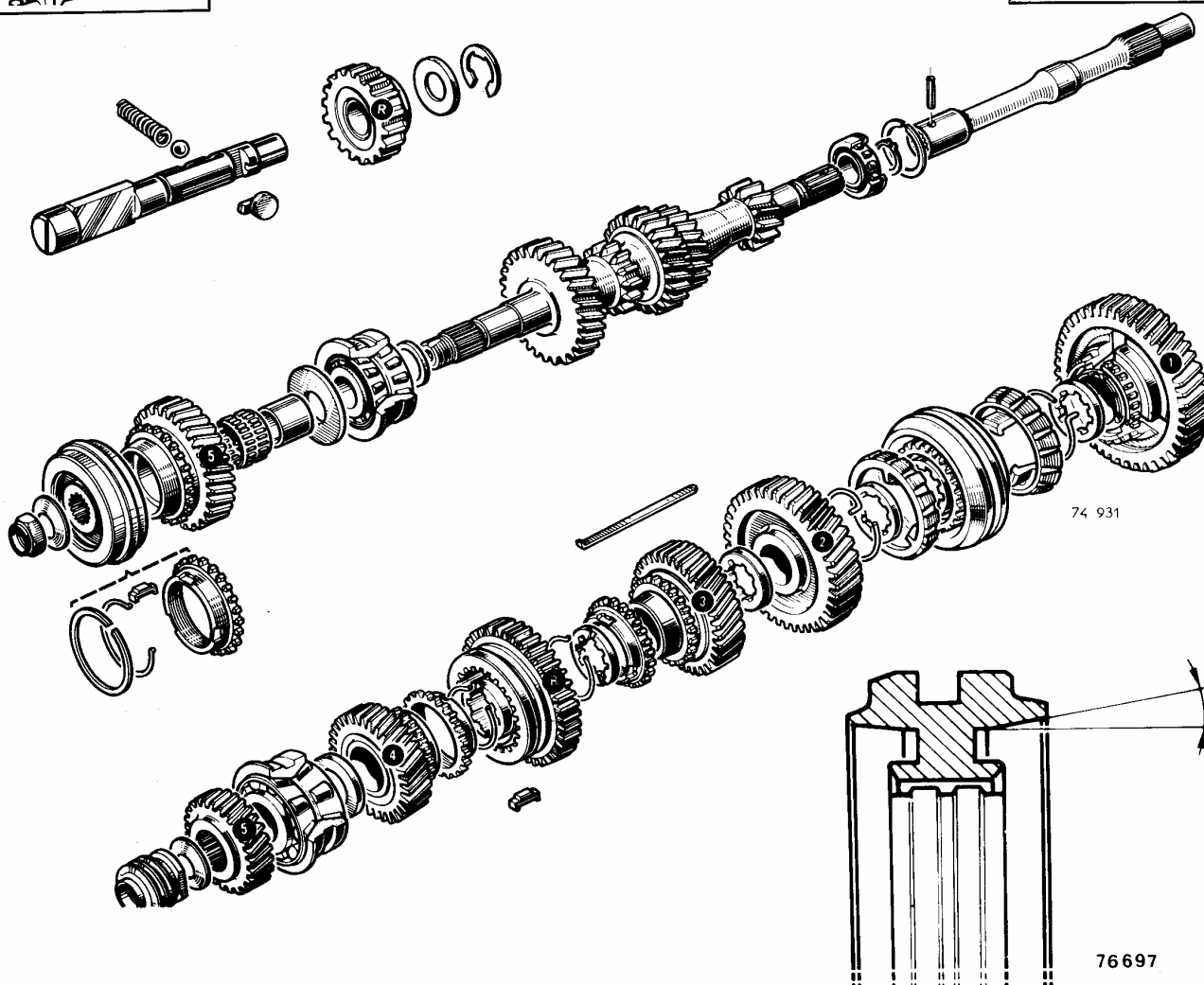
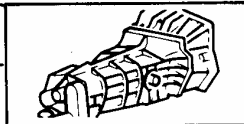
TYPE 365 GEARBOX

SECTIONS





# TYPE 365 GEARBOX



Angle (A) :  $9^{\circ}$  or  $6^{\circ}40'$

## IDENTIFICATION OF MOVING CONES

Cone with angle (A) =  $9^{\circ}$

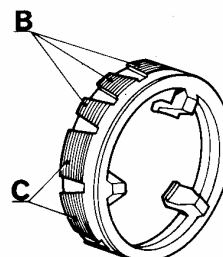
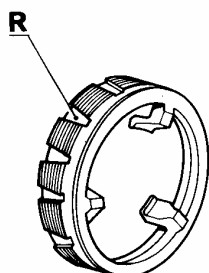
Non-machined surfaces are bronze in colour.  
15 equal and equidistant grooves (R).

Cone with angle (A) =  $6^{\circ}40'$

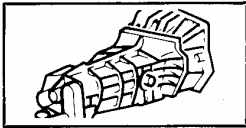
Non-machined surfaces are copper in colour.

Friction faces are divided up as follows :

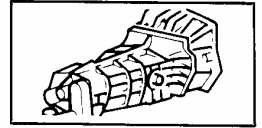
- 3 small (B)
- then 3 large (C).



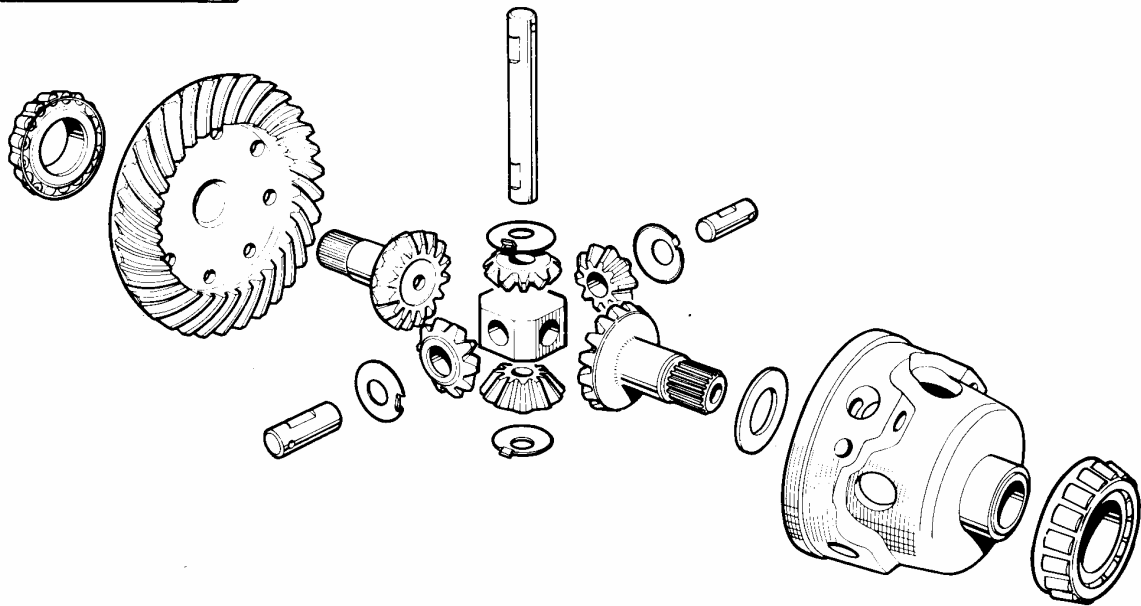
77023



# Differential

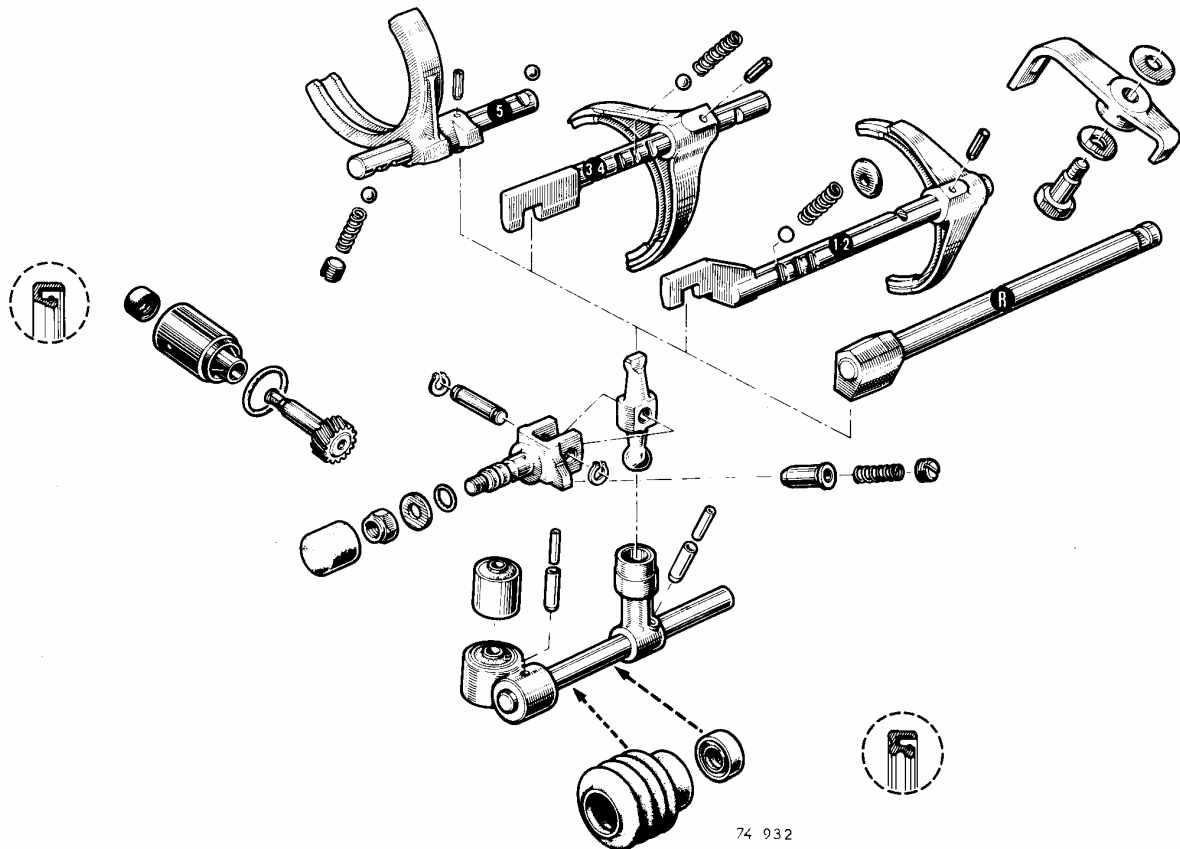


## TYPE 365 GEARBOX

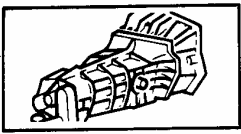


61 637 .1

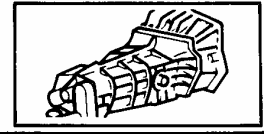
## Shaft control - 1st model



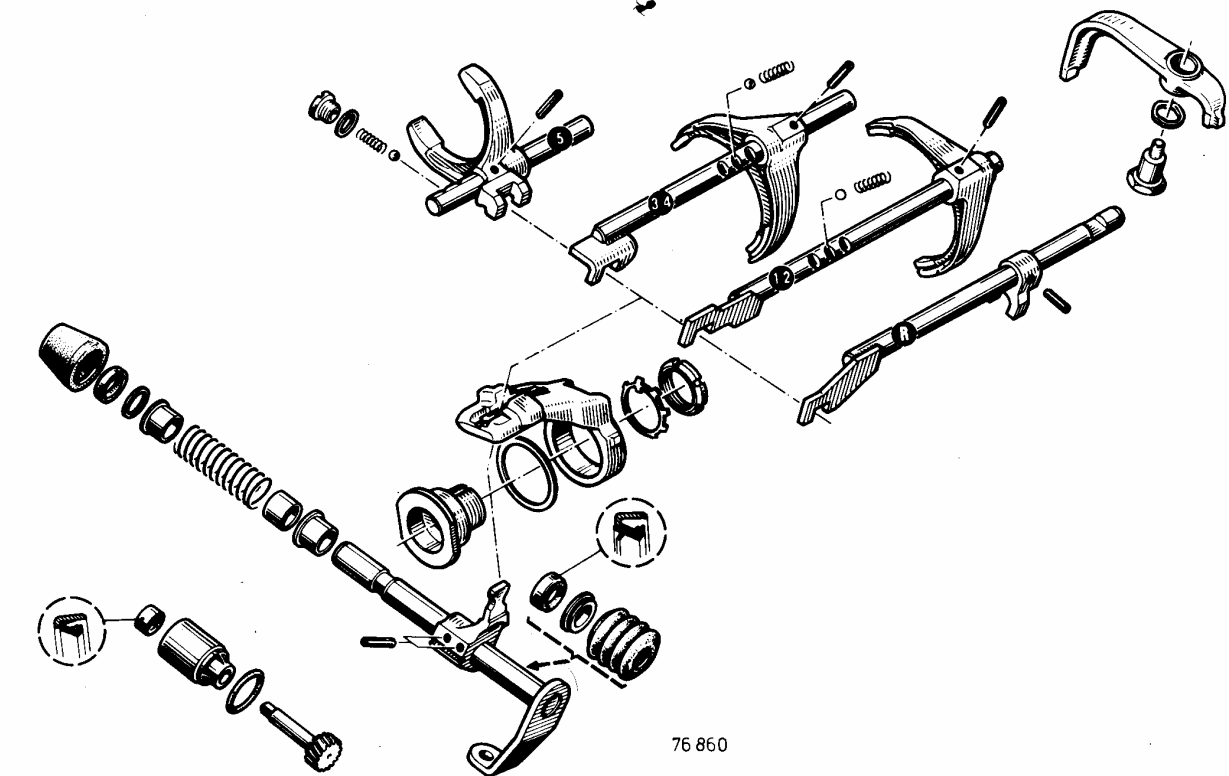
74 932



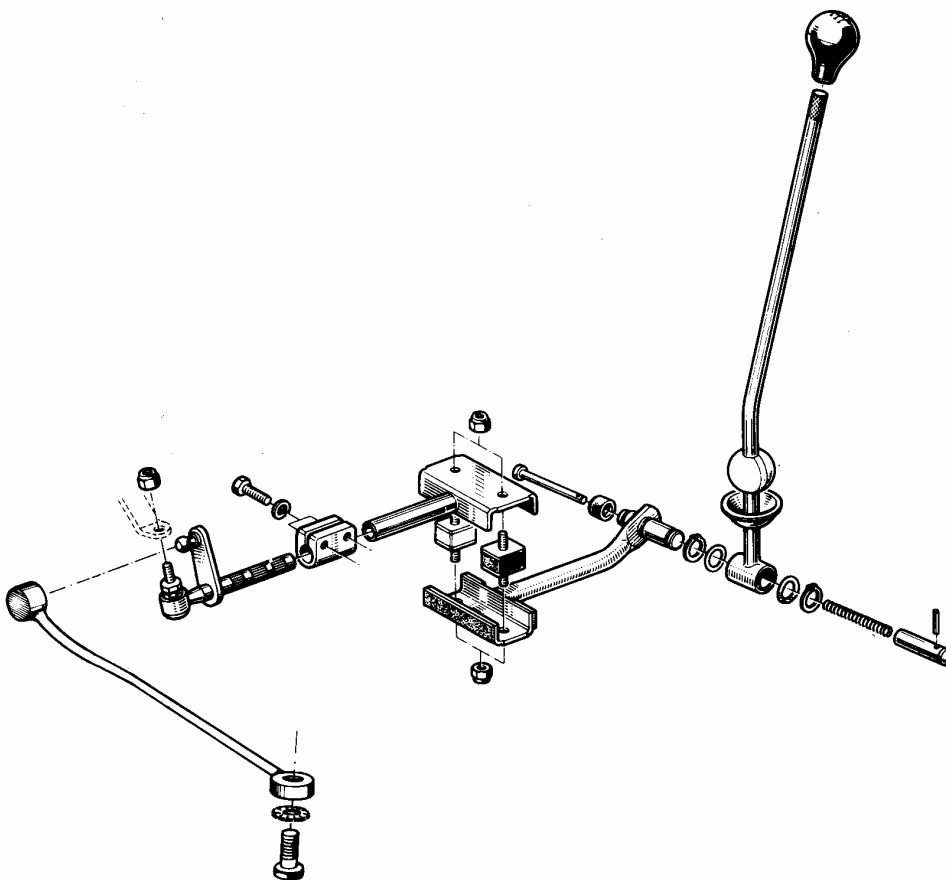
Link shift control



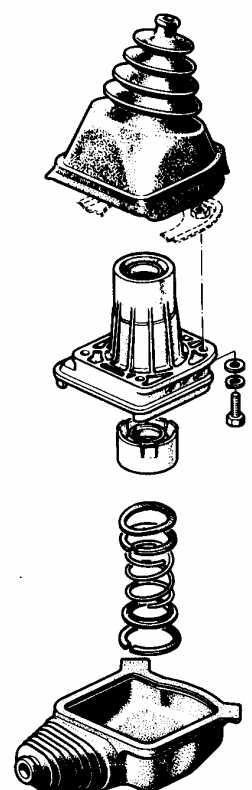
TYPE 365 GEARBOX



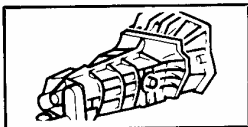
76 860



76 861



76 862

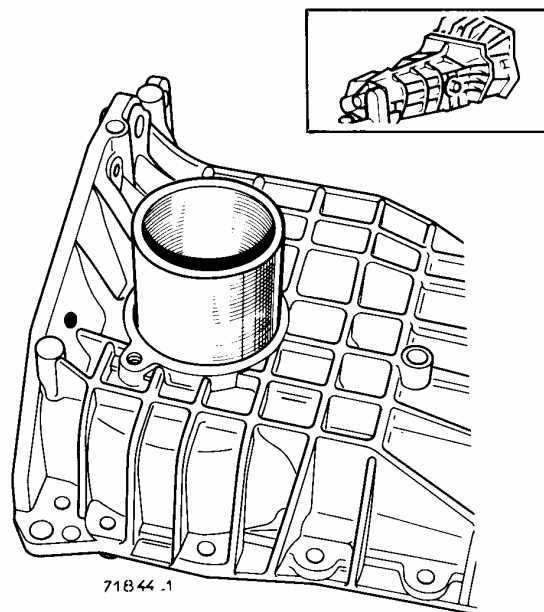


## TYPE 352 GEARBOX

Half-casings :

Drive out the bearing track rings using a piece of tube.

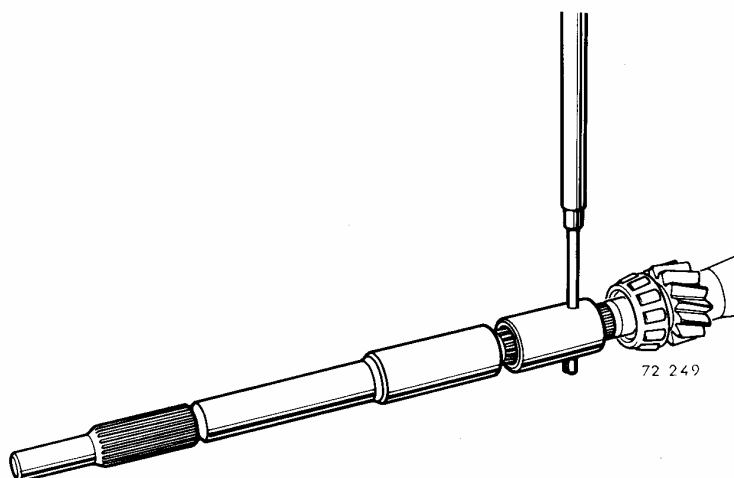
Remove the adjusting nut oil seals.



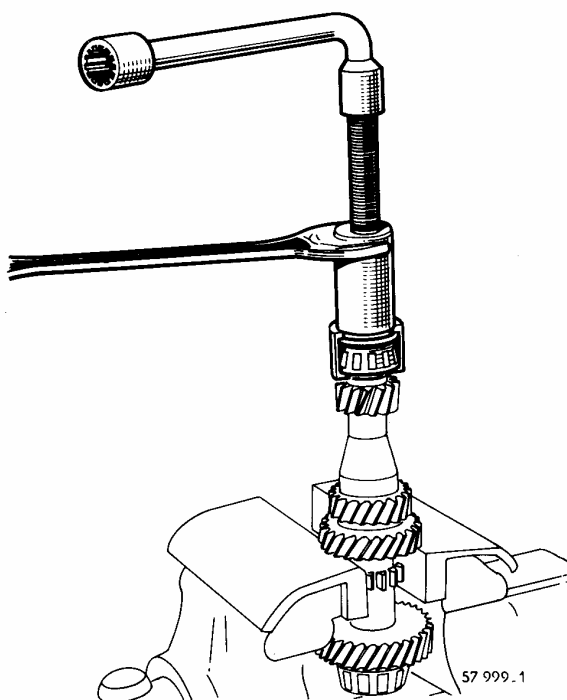
Primary shaft :

Remove the bearing track rings and adjusting washers.

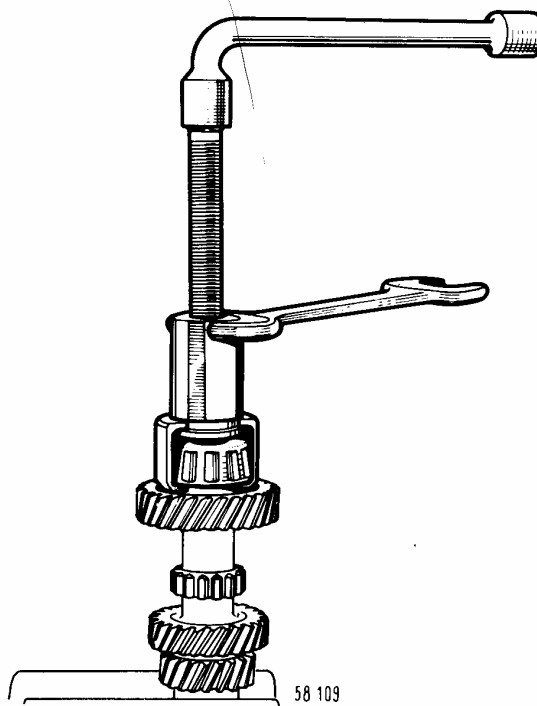
Separate the clutch shaft and primary shaft by punching out the rollpin using drift B. Vi. 39.

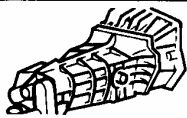


Extract the bearing on the differential side using extractor B. Vi. 22-01 fitted with shell B. Vi. 41.

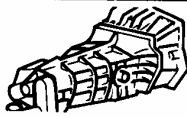


Extract the second bearing using extractor B. Vi. 22-01 fitted with shell B. Vi. 47.





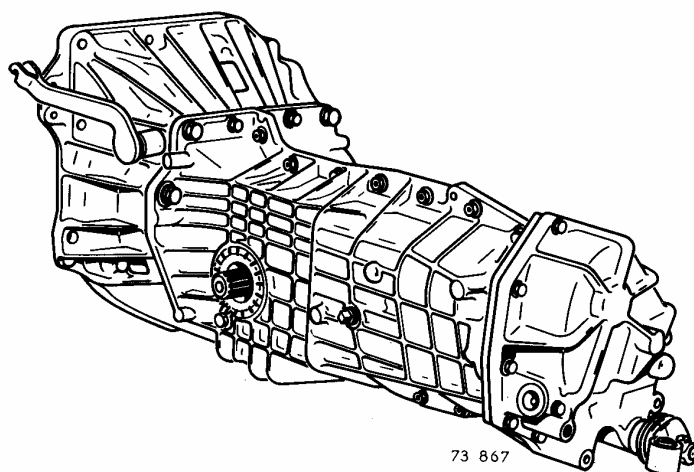
SPECIFICATIONS



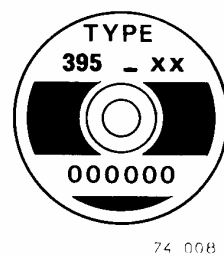
TYPE 395 GEARBOX

The above gearbox is fitted to :

R.1318 - R.1328.

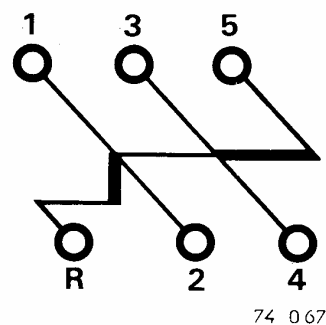


The type, suffix and fabrication number are stamped on a plate at the end of the gearbox.



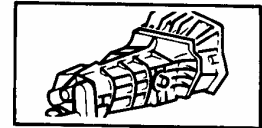
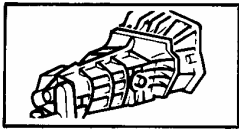
Five synchronised journal speeds :

- 1st - 2nd : Renault synchros.
- 3rd - 4th - 5th : Borg-Warner synchros.



OIL :

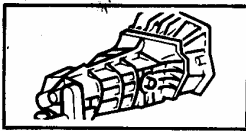
Grade	API GL 4 or API GL 5	Quantity 2 litres (3½ Imp.pts.)	Viscosity	SAE 80 for hot and temperate countries SAE 75 for cold countries
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TYPE 395 GEARBOX

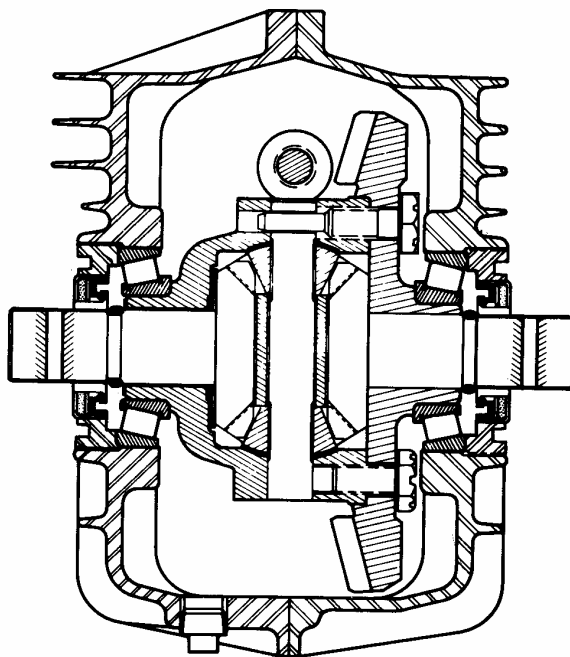
Vehicle type	Suffix	Reduction ratios	Final drive		Equipment		Steering		Special features
			C.W. & P.	Speedo	Normal roads	Poor roads	L.H.D.	R.H.D.	
R.1318	04				X		X		
R.1328									
R.1318	05	1st (11 x 42) 3,82			X		X		P.A.S.
R.1328		2nd(17 x 38) 2,24							
			9 x 34	9 x 19					
R.1318	06	3rd(23 x 34) 1,48			X			X	
R.1328		4th(28 x 29) 1,04							
		5th(36 x 31) 0,86							
R.1318	07					X	X		
R.1328		Rev.(12 x 37) 3,08							
R.1318	08					X		X	
R.1328									
R.1318	09					X	X		P.A.S.
R.1328									



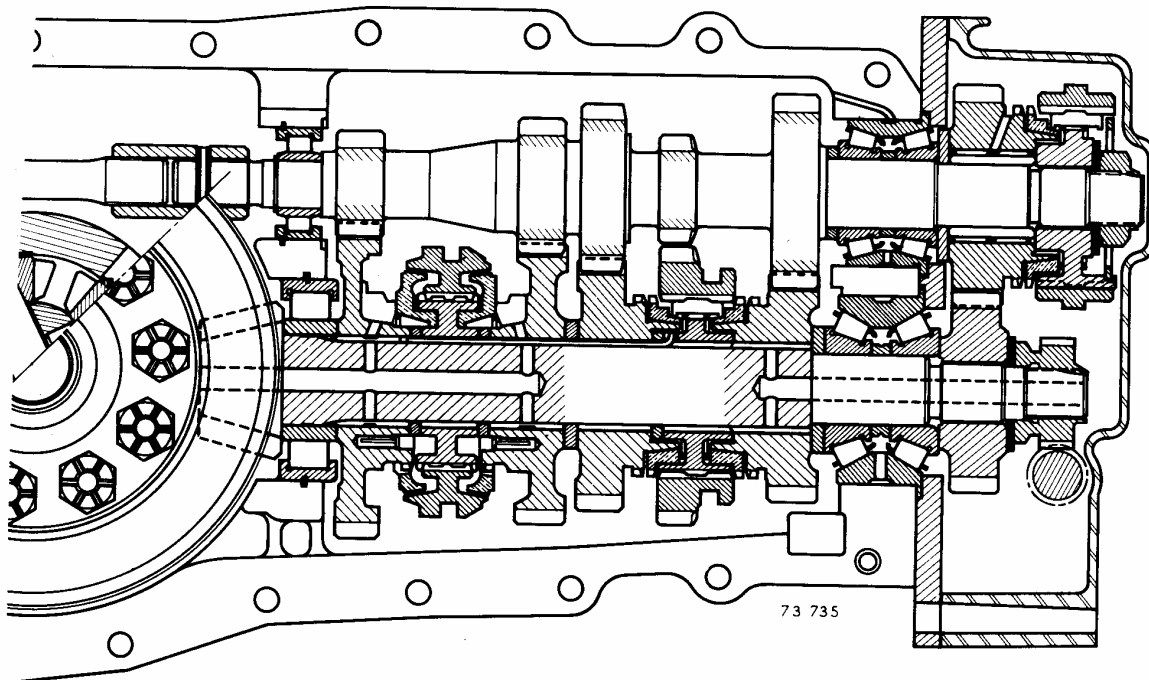


TYPE 395 GEARBOX

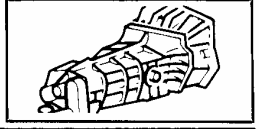
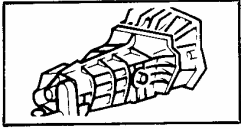
SECTIONS



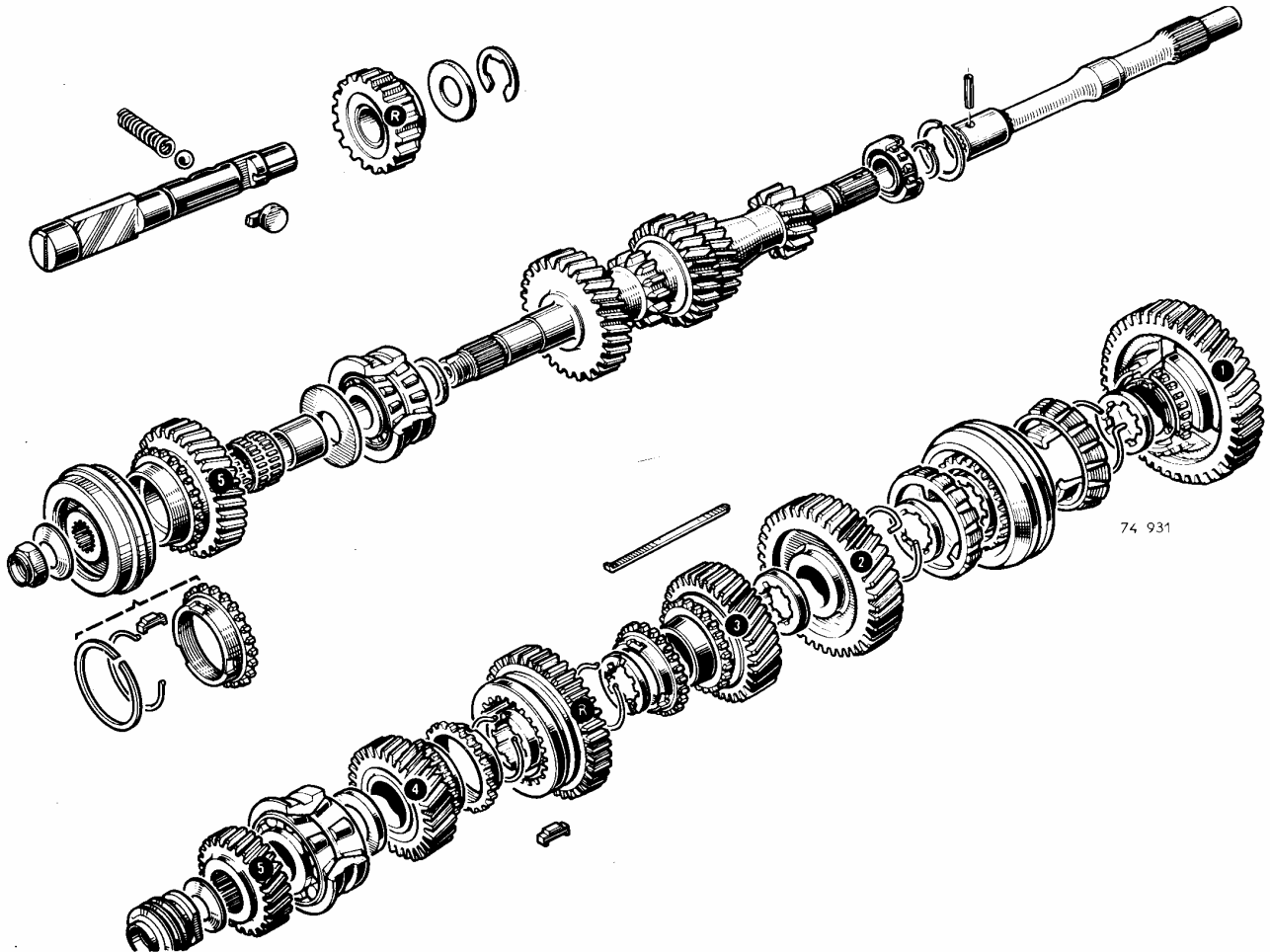
73 734 4

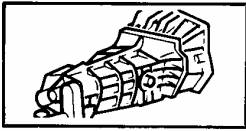


73 735

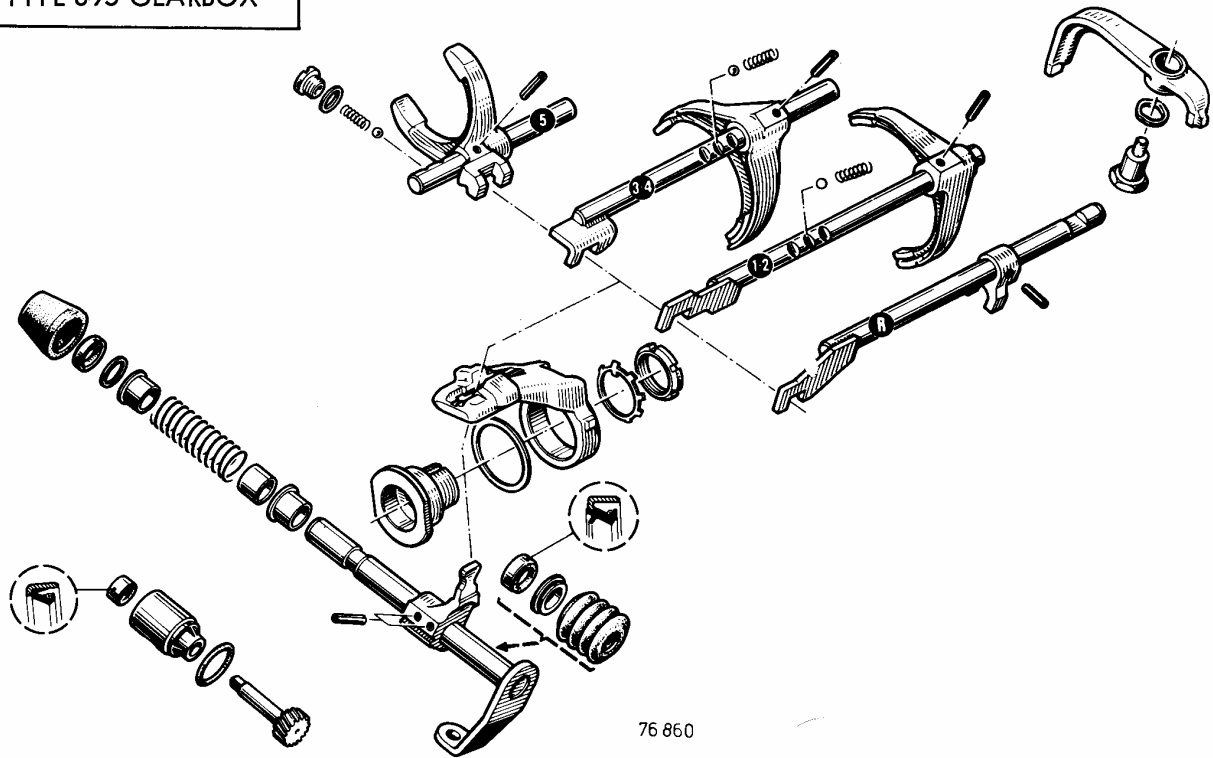
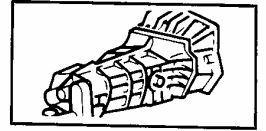


TYPE 395 GEARBOX

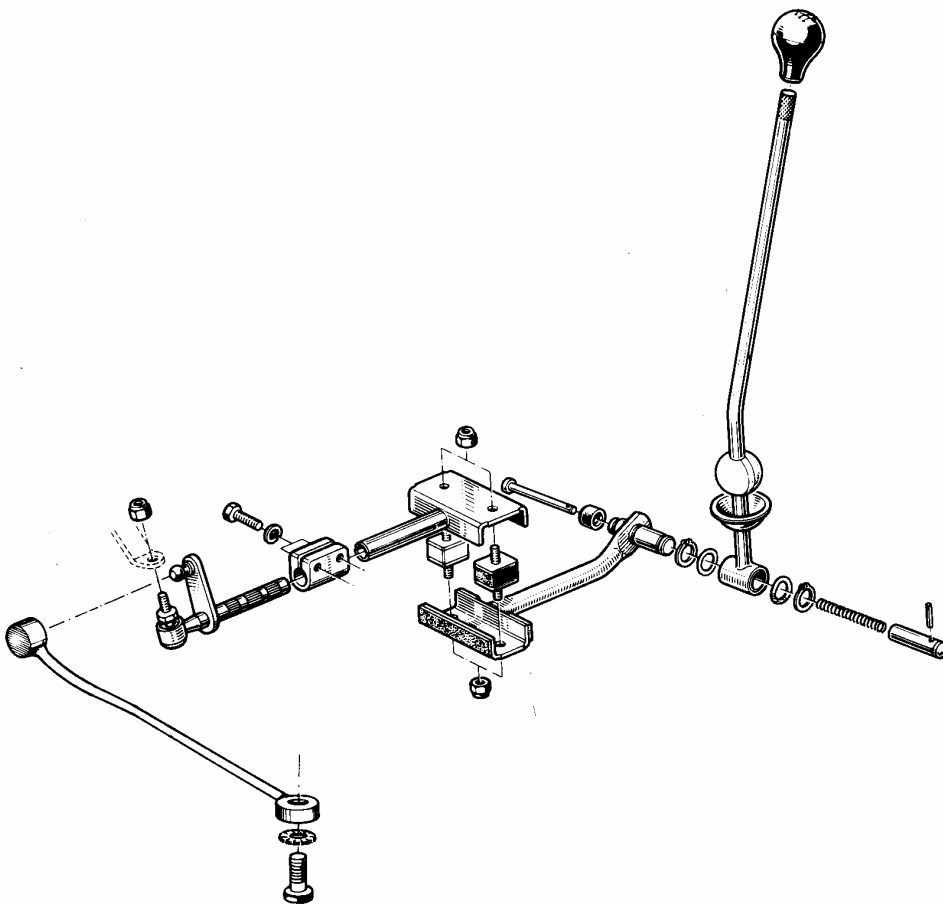




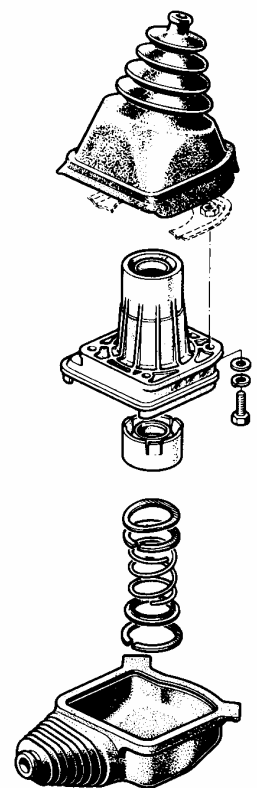
TYPE 395 GEARBOX



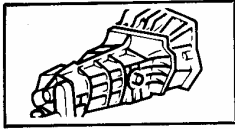
76 860



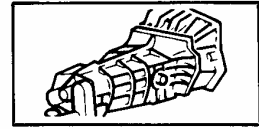
76 861



76 862

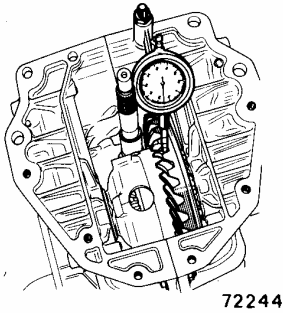


## ADJUSTMENTS



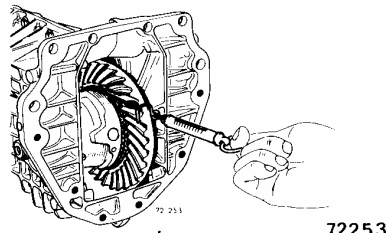
### TYPE 365-395 GEARBOXES

#### Backlash



**0,12 mm à 0,25 mm**  
(.0047 to .010")

#### Differential bearings



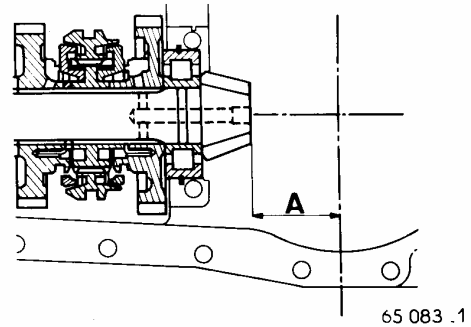
Re-used  
bearings

free-turning  
without play

New bearings

Preload  
(2 to 7 lbs)

#### Pinion protrusion



**59 mm (2.323")**

## TIGHTENING TORQUES

### HALF-HOUSING BOLTS :

Diameter	7 mm	<b>2 à 2,5 m da N</b> (15 to 19 lb/ft)
	8 mm	<b>3 m da N</b> (22 1/2 lb/ft)

### REAR COVER BOLTS :

**1,2 m da N** (8 1/2 lb/ft)

### CLUTCH HOUSING BOLTS :

Diameter	8 mm	<b>2,4 m da N</b> (18 lb/ft)
	10 mm	<b>3,5 m da N</b> (26 lb/ft)

### REVERSE GEAR SELECTOR BOLT :

**2,8 m da N** (21 lb/ft)

### CROWN WHEEL FIXING BOLTS :

**9 à 11 m da N** (67 to 82 1/2 lb/ft)

### SPEEDOMETER WORM NUT ON SECONDARY SHAFT :




**10 à 12 m da N** (75 to 90 lb/ft)

### PRIMARY SHAFT NUT :

**10 à 12 m da N** (75 to 90 lb/ft)

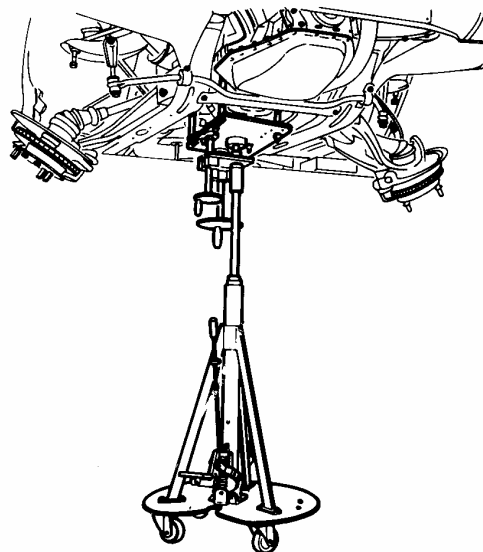
## MATERIAL

	Use for :
Molykote BR 2 grease	Sunwheel splines
Perfect-Seal	Half-casing joint faces Differential nut threads Clutch bearing gasket Rear cover gasket

	<div>GEARBOX</div>		
	Codes 2004-2005	Removing - Refitting	
TYPE 395 GEARBOX			

The gearbox can be removed :

- with the engine
- on its own, using the DESVIL 701 ST jack fitted with two pins located on the reversing lamps switch side.



74 783

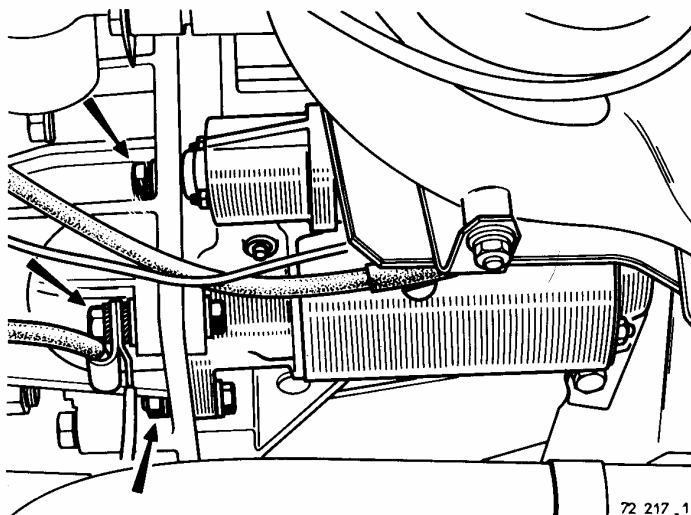
## REMOVING

Disconnect battery ; remove it and its bracket.

Remove the three starter fixing bolts and withdraw the starter from its location.

Disconnect the clutch cable and remove its bracket.

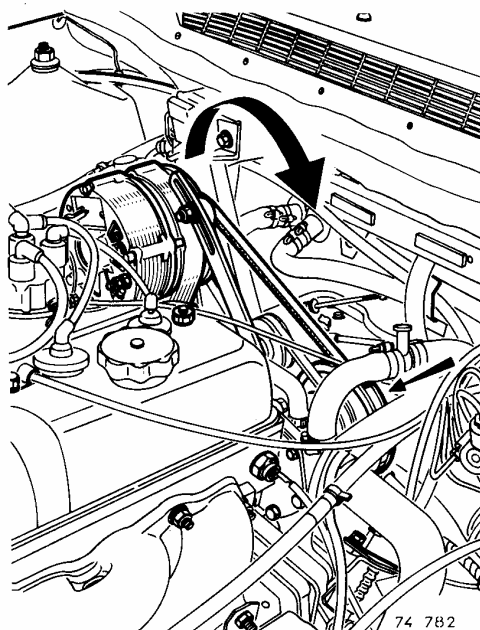
Disconnect the downpipe at the manifold.



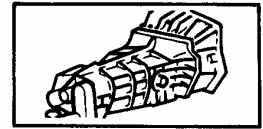
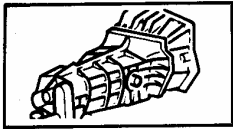
72 217 \_1

On the 807 engine :

- remove camshaft and water pump pulleys
- partly unscrew the alternator mountings and tilt it over towards the centre of the vehicle then retighten it.



74 782

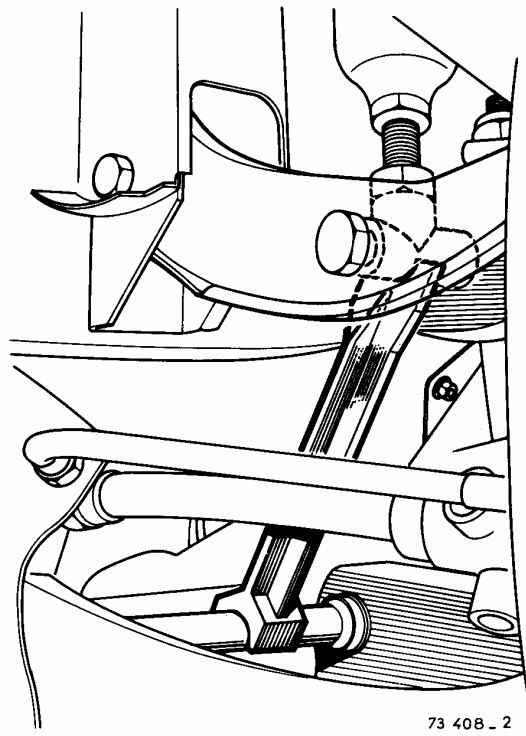


# TYPE 395 GEARBOX

Insert spacer legs T.Av.509 between the shock absorber bottom mounting pins and lower suspension arm pivot pins.

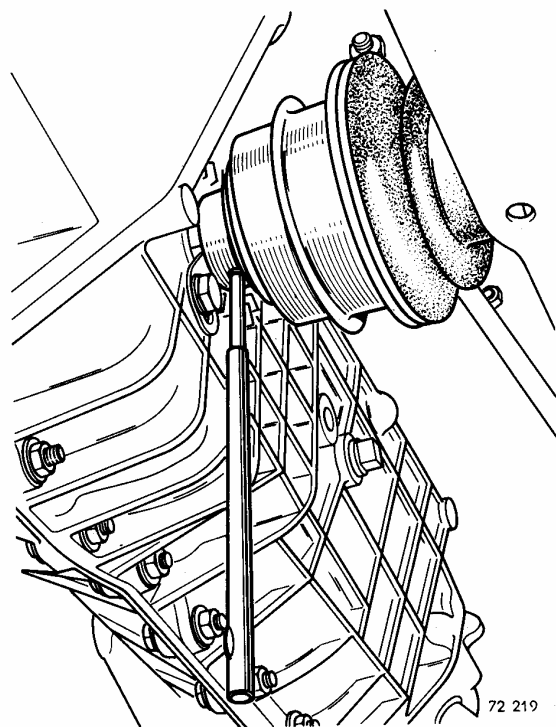
Place the front of the vehicle on stands, checking that spacer legs T.Av.509 remain in position.

Drain the gearbox using wrench : B.Vi.380-01 or Mot.593.

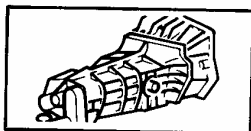


73 408 - 2

Punch out the rollpins securing the drive shafts to the sunwheels : drift B.Vi.31-01.



72 219



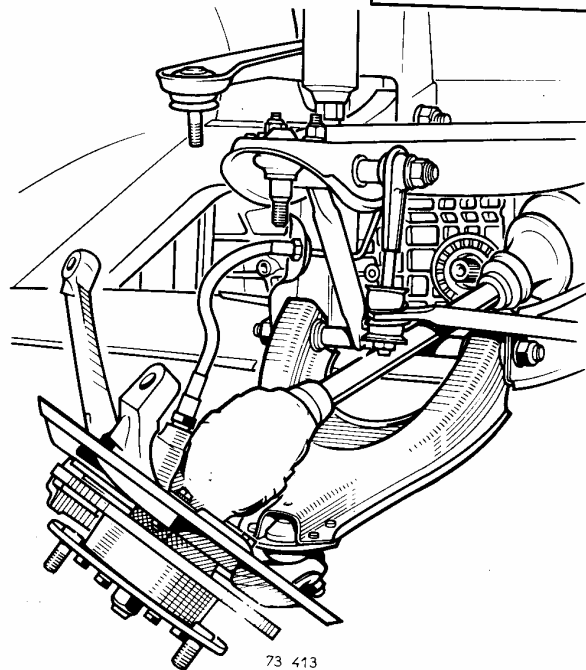
## TYPE 352 GEARBOX

Using extractor T.Av.476, free :

- the steering arm ball joint
- and upper suspension arm ball joint.

Tilt the stub axle carrier withdrawing the drive shaft from the sunwheel at the same time.

Carry out the same procedure on the other half-axle.

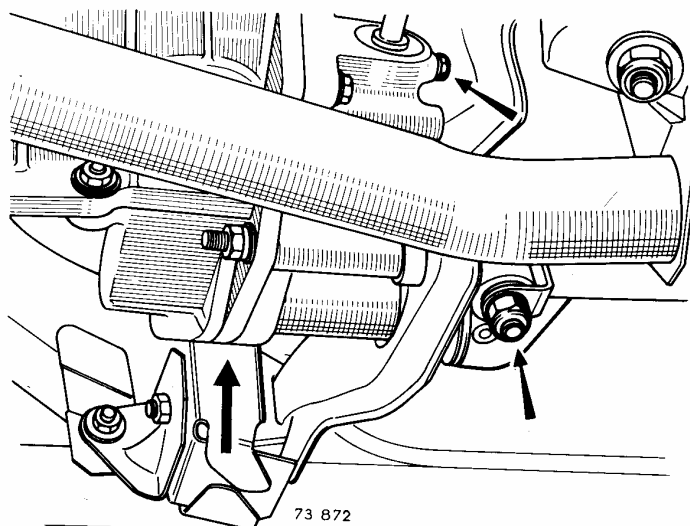


Disconnect :

- the speedometer cable
- gearshift control
- and reversing lamps feed wires.

Remove the gearbox crossmember (take the weight of the rear of the gearbox with a jack).

Remove the engine reaction rod or bracket on the steering box crossmember.

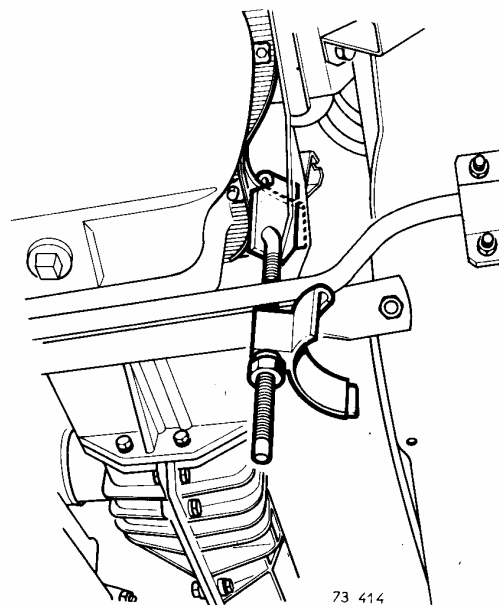


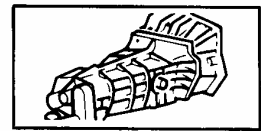
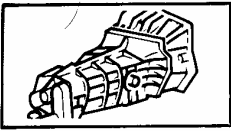
Remove :

- the clutch shield
- and engine-gearbox fixing bolts.

Tilt the engine-gearbox assembly using spring compressor Sus.21.

Remove the gearbox taking care not to catch the clutch mechanism.



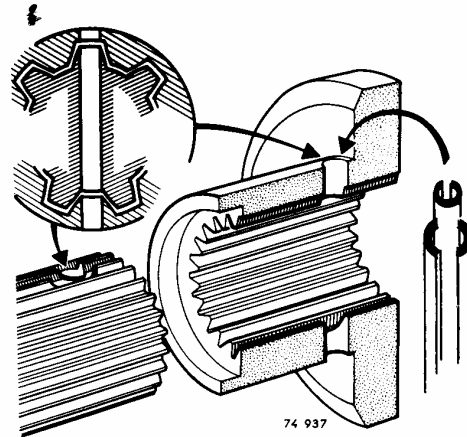


## TYPE 352 GEARBOX

### REFITTING

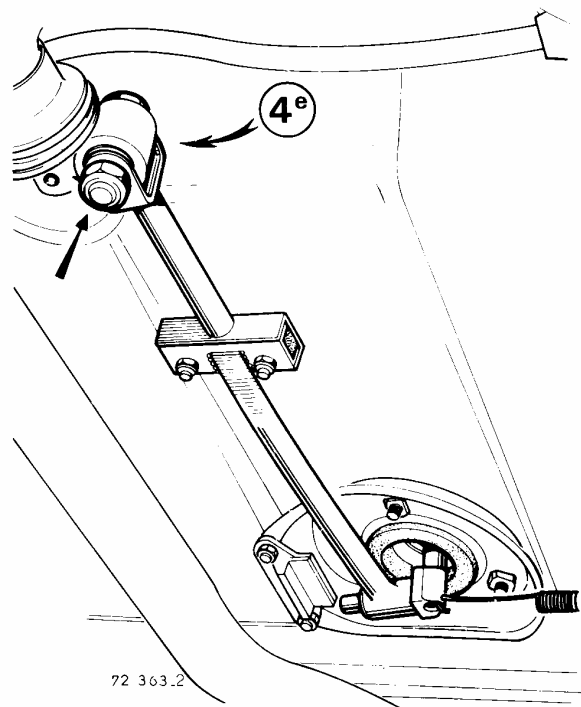
Carry out the removing operations in reverse order, paying attention to the following points :

- Lightly lubricate the clutch shaft splines and sunwheel splines with Molykote BR 2 grease.
- Line up the drive shafts in relation to their respective sunwheels and slide them in.
- Use elbow drift B.Vi.31-01 to line up the rollpin holes.
- Apply Rhodorsil CAF 4 to seal the rollpin ends.

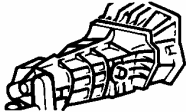
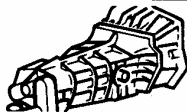


- select 4th speed and tighten the gearshift control link bolt without holding the shift lever.
- adjust the clutch operating clearance : 2 to 3 mm (5/64 to 1/8") (at end of lever).
- Fill the gearbox with oil.

Check shift lever operation.





	<div>Removing-Refitting</div> <div>Code 2007</div>	
365 and 395 GEARBOXES		

The removing and refitting operations for both the above gearboxes are identical to those for the 352 gearbox fitted to the 807 engine, with the exception of the shift control mechanism.

The ball joints must on no account be separated from their seats which would damage the component.

## REMOVING

Proceed as follows :

- remove the reaction rod bolt on the sidemember.
- remove the shift control ball joint nut.
- disconnect the shift control link at the silentbloc.

## REFITTING

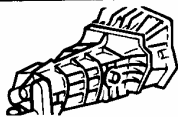
Carry out the removing operations in reverse order.

Tightening torques in m.da N :

- Reaction member bolt on sidemember 1,5 (11 lb/ft)
- silentbloc nuts 0,6 (4 1/2 lb/ft)
- shift ball joint nut 1,5 (11 lb/ft)
- clamp bolt 2 (15 lb/ft)

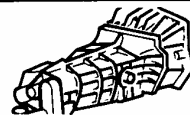
Adjusting the selector mechanism

Refer to the chapter "Adjusting link control".



## COMPLETE OVERHAUL

Codes 2008 - 2009

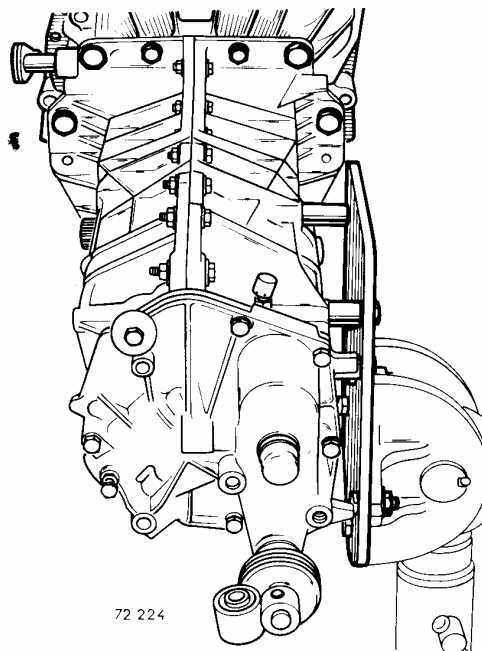


### TYPE 352 GEARBOX

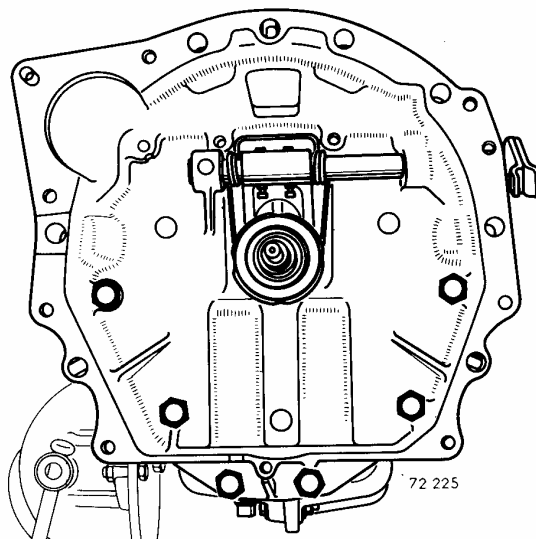
#### DISMANTLING

If necessary, remove the reversing lights switch.

Attach the gearbox to support B.Vi.240 which can be fitted to either the adjustable stand or bench stand.

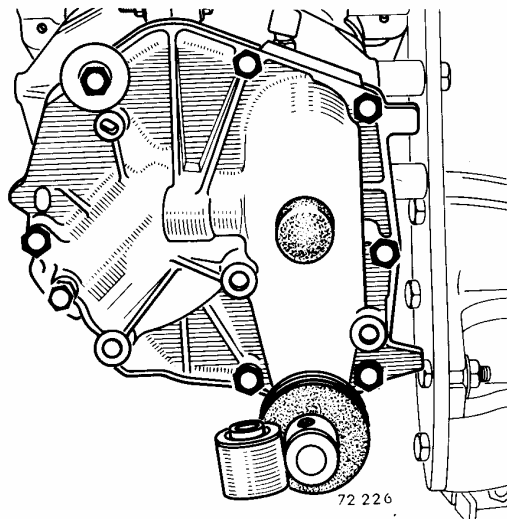


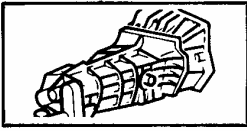
Unscrew the clutch housing securing bolts and remove the housing.



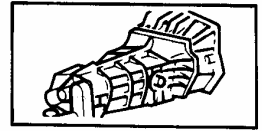
Unscrew the bolts securing the rear cover and remove it.

Take out the distance washer and bearing adjusting shims on the primary shaft.



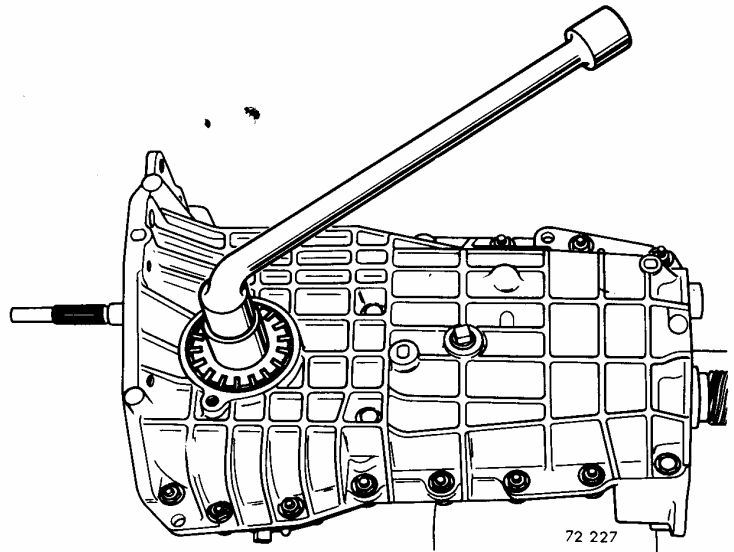


## TYPE 352 GEARBOX



Remove the lockwashers on the differential adjusting ring nuts.

Unlock and unscrew ring nuts using wrench B.Vi. 377.

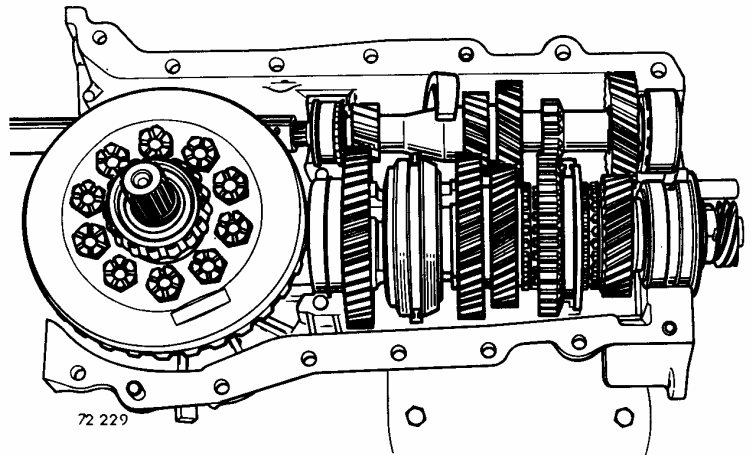


72 227

Unscrew the half-casing assembly bolts and separate them.

Remove :

- differential;
- secondary gear train and stop peg from the outer track ring on the double taper roller bearing;
- and primary shaft.



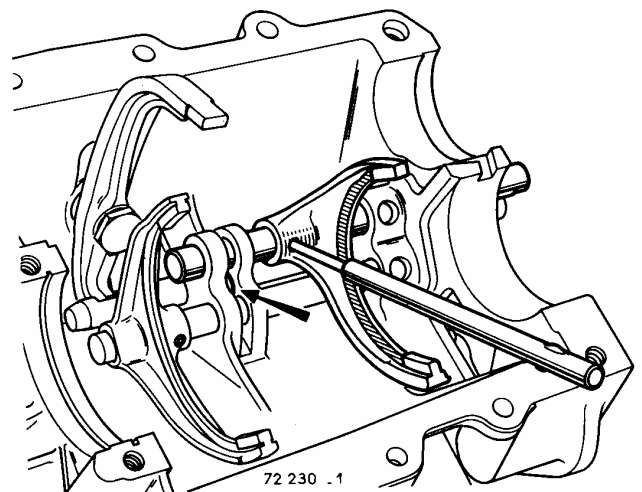
72 229

Gear shift control :

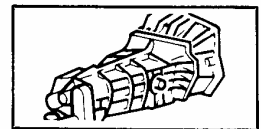
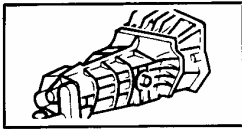
Using drift B.Vi. 31-01 punch the roll pin out of the 3rd - 4th gear selector fork.

Withdraw selector shaft and fork (catch and retain the ball and locking spring).

Remove the locking disc between the selector shafts.



72 230 .1



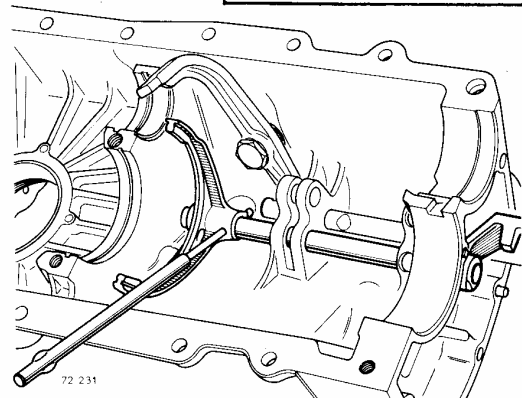
# TYPE 352 GEARBOX

Select 1st gear.

Draw the reverse gear selector shaft back towards the gearshift control end as far as possible.

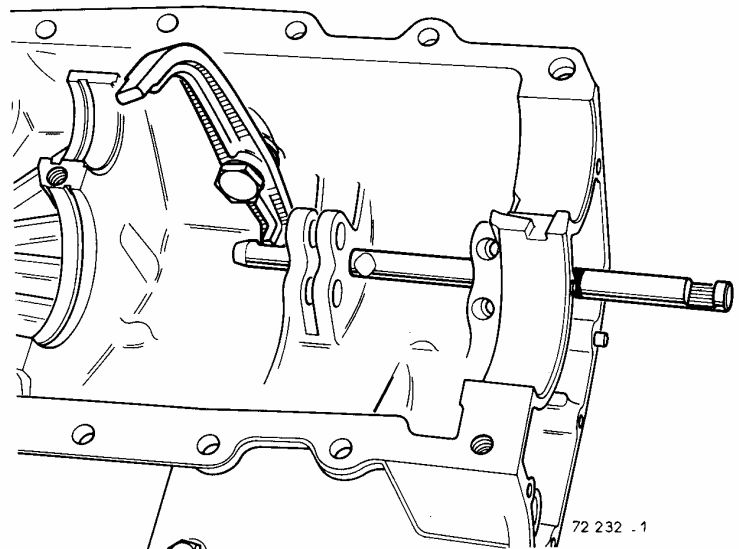
Using drift B.Vi.31-01, punch the rollpin out of the 1st - 2nd gear selector fork.

Withdraw selector shaft and fork. (Catch and retain the ball and locking spring).



Remove:

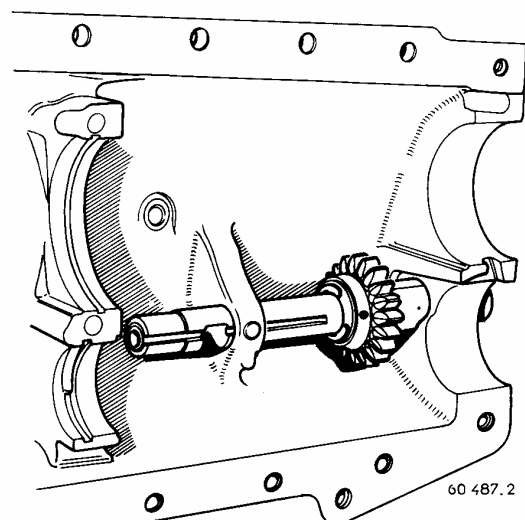
- the reverse gear selector
- and reverse gear shaft.

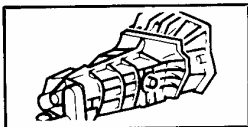


Reverse gearwheel:

Remove the circlip holding the gearwheel and withdraw:

- the shaft, gearwheel, friction washer and sleeve (catch and retain the ball and locking spring).



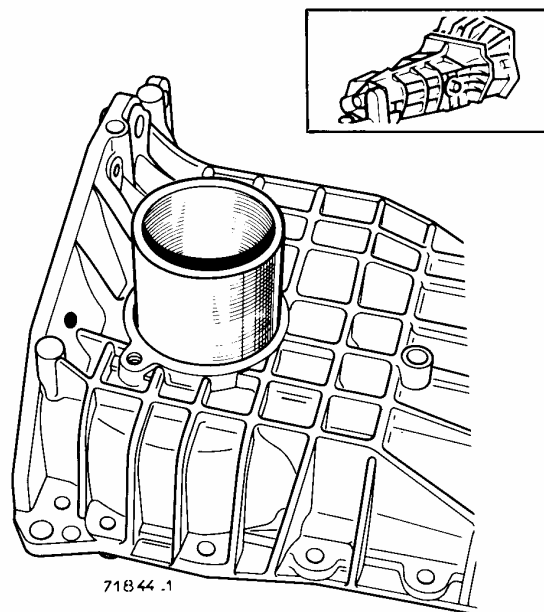


## TYPE 352 GEARBOX

Half-casings :

Drive out the bearing track rings using a piece of tube.

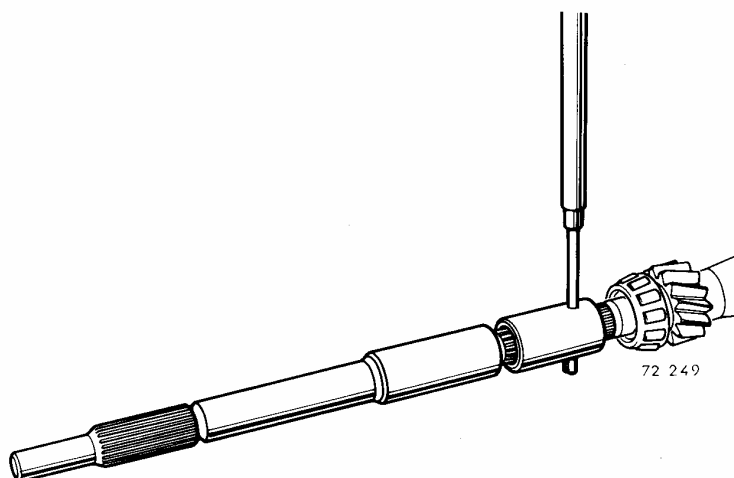
Remove the adjusting nut oil seals.



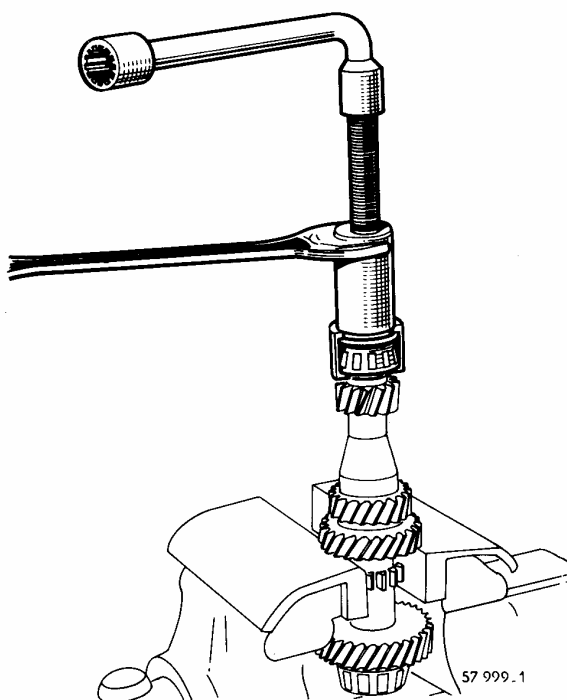
Primary shaft :

Remove the bearing track rings and adjusting washers.

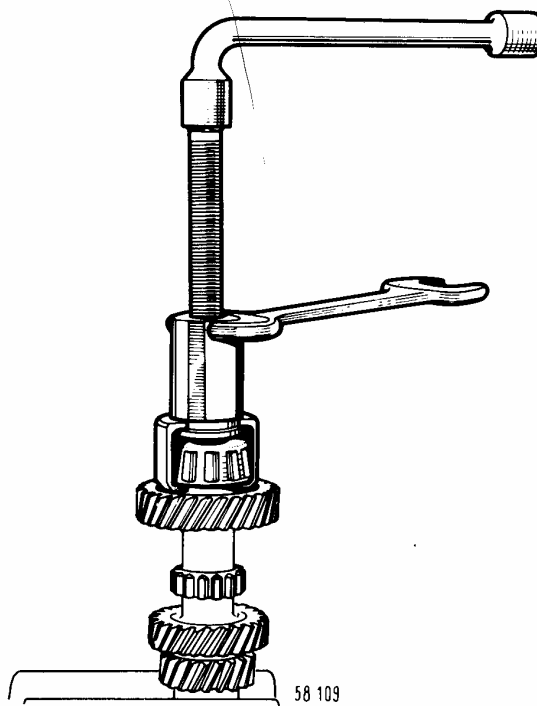
Separate the clutch shaft and primary shaft by punching out the rollpin using drift B. Vi. 39.

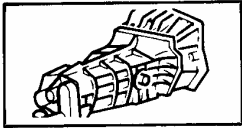


Extract the bearing on the differential side using extractor B. Vi. 22-01 fitted with shell B. Vi. 41.

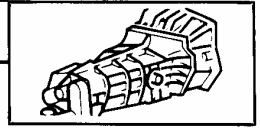


Extract the second bearing using extractor B. Vi. 22-01 fitted with shell B. Vi. 47.





## TYPE 352 GEARBOX



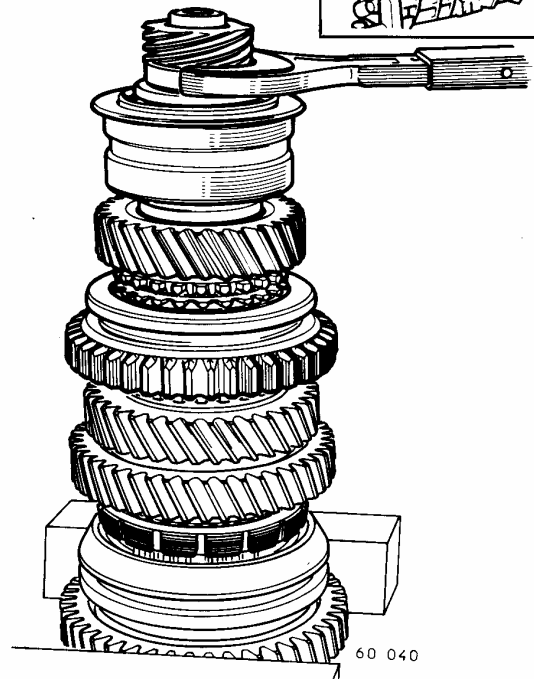
Secondary shaft ::

Place the shaft in a vice, holding it by the 1st speed gear.

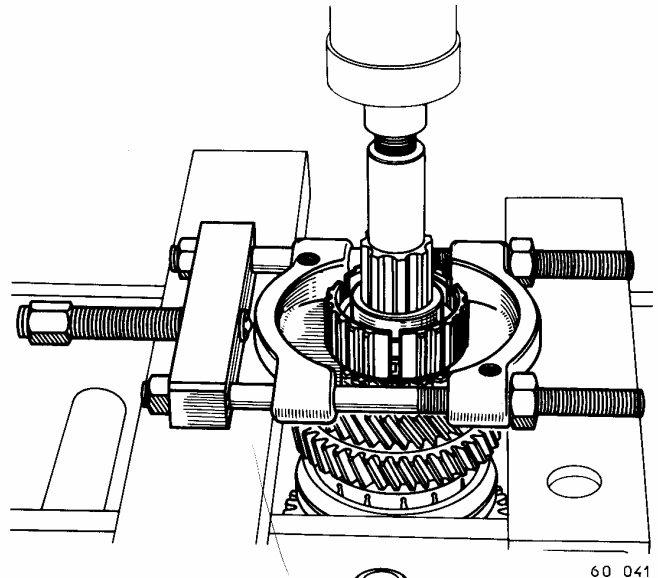
Select 1st speed, unlock the speedometer drive worm and unscrew using wrench B.Vi.204.

Remove :

- the double taper roller bearing
- final drive pinion protrusion setting washer
- 4th speed gear and ring
- and 3rd and 4th speed synchro sliding gear and the keys (mark the position of the sliding gear in relation to the hub).

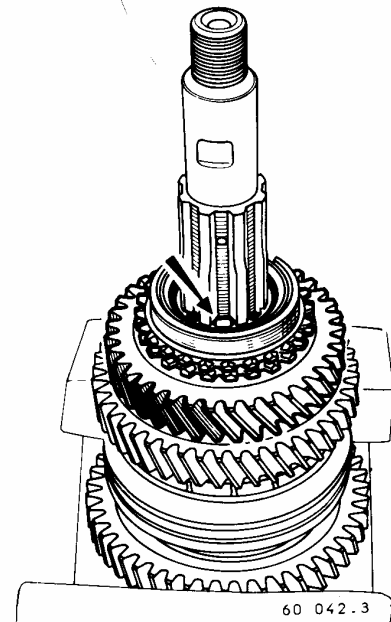


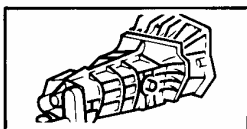
Extract the 3rd - 4th speed synchro hub in a press using extractor T.Ar.65.



Remove :

- the retaining key for the gearwheel stop washers
- the 3rd speed gear stop washer
- the 3rd speed gear and its ring.

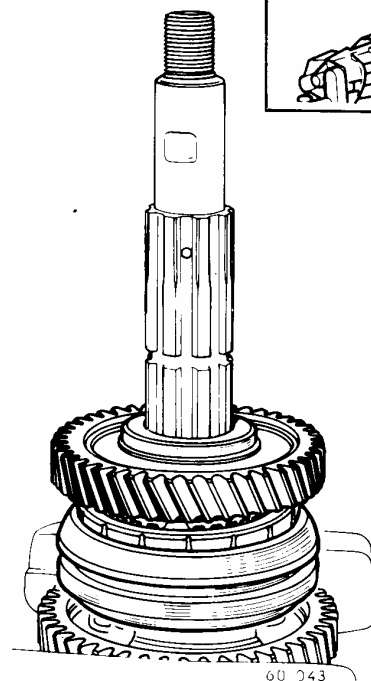




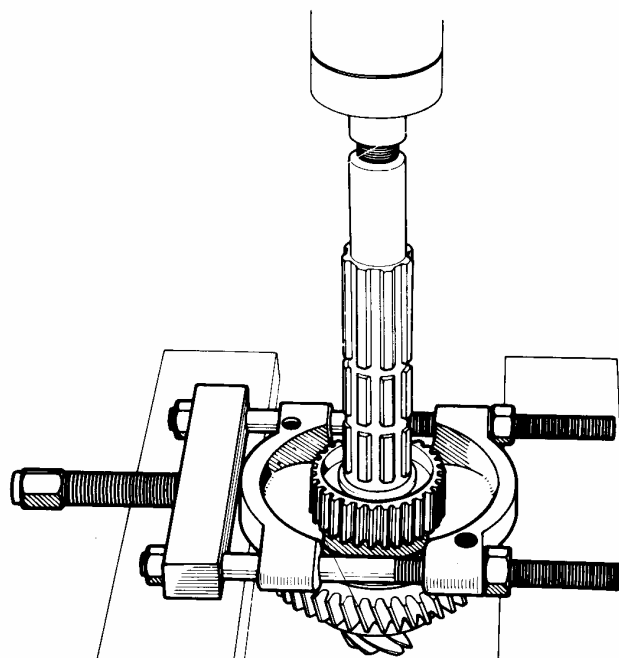
## TYPE 352 GEARBOX

Remove:

- the 2nd speed gear stop washer
- 2nd speed gear and its ring
- the 1st - 2nd speed synchro sliding gear (mark its position in relation to hub)
- and 1st - 2nd speed synchro hub stop washer.

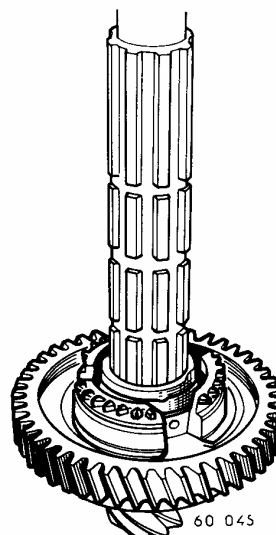


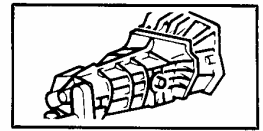
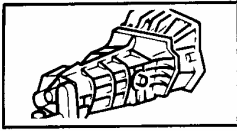
Extract the 1st - 2nd speed synchro hub in a press using extractor T.Ar.65.



Remove:

- the 1st speed synchro ring
- 1st speed gear stop washer
- and 1st speed gear.

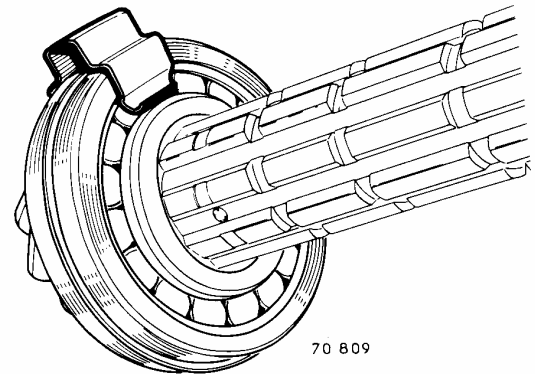




# TYPE 352 GEARBOX

Fit the bearing outer track ring retaining clip to prevent the rollers from falling out: the clip is supplied with new crown wheel and pinion sets.

This bearing cannot be changed as the bearing inner track ring is bonded to the final drive.



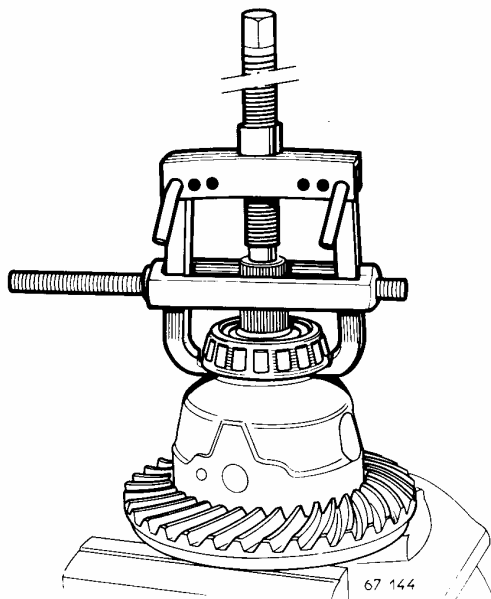
70 809

## Differential:

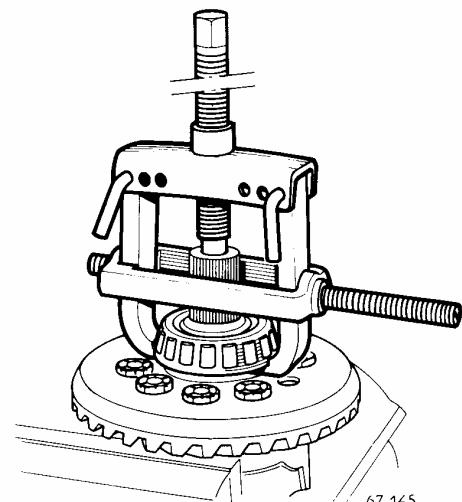
Remove two diametrically opposite crown wheel fixing bolts.

Extract the bearings:

Using tool B.Vi.28-01 fitted with jaws B.Vi.48.



67 144

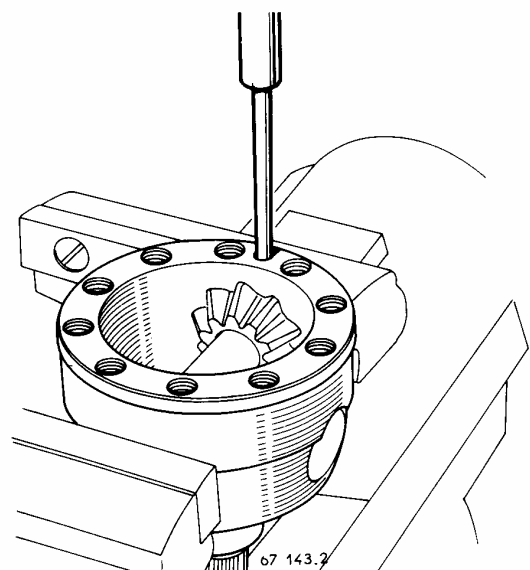


67 145

Remove the bolts securing the crown wheel to the differential housing (self-locking bolts which cannot be re-used).

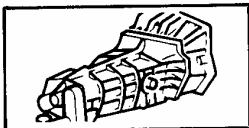
Punch out the rollpin retaining the planet wheel shaft using drift B.Vi.31-01.

Separate the various parts.

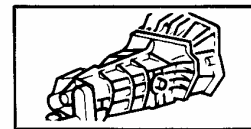


67 143.2





## TYPE 352 GEARBOX



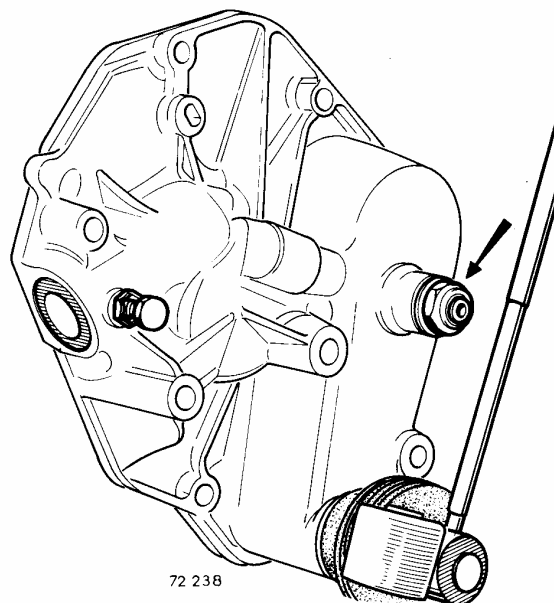
### Rear cover

#### Extract:

- the speedometer drive gear sleeve and 'O' ring seal
- speedometer drive gear
- rubber cap protecting the rocking lever shaft
- and rocking lever shaft nut and washer

Punch out the rollpin holding the control shaft using drift B.Vi.344 end fitting.

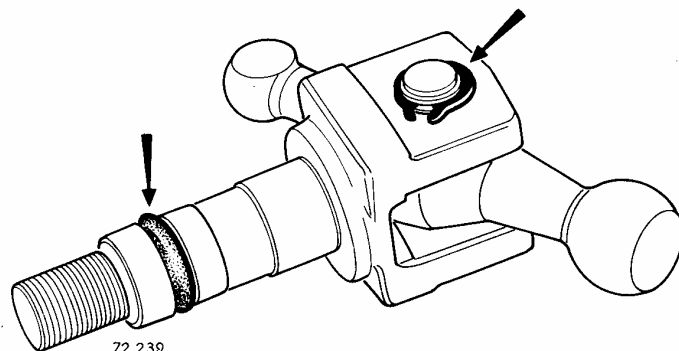
Take out the various parts.



#### Remove:

- The rocking lever pivot shaft circlip and remove the shaft
- the 'O' ring seal from the shaft.

The seals, rollpins and self-locking bolts must be changed.

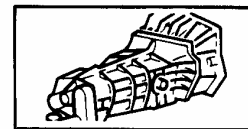
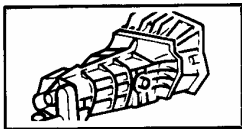


### RE-ASSEMBLING

#### Matched components:

- crown wheel and pinion
- final drive pinion shaft and synchro hubs

An electric oven with a temperature range of up to 250°C must be used for any operation involving the 1st - 2nd speed synchro hub when re-assembling.

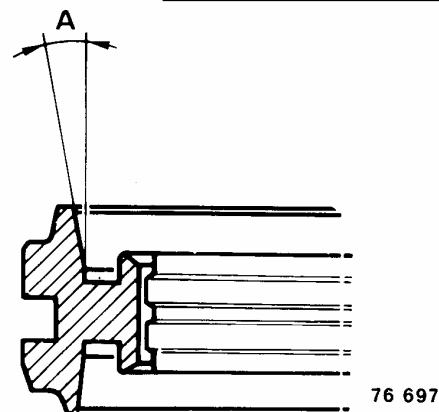


TYPE 352 GEARBOX

1st - 2nd synchro

Two types of mechanism :

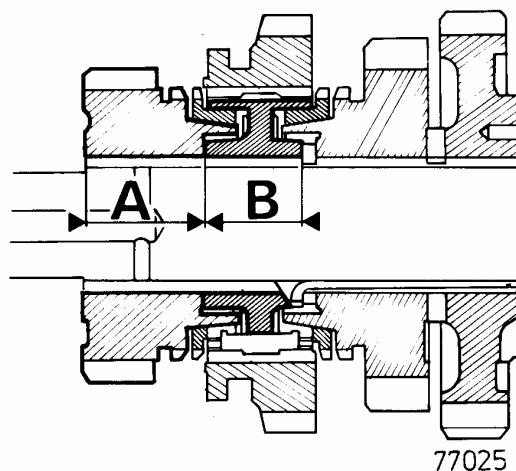
- sliding gear and synchro ring with angle (A) =  $9^{\circ}$
- sliding gear and synchro ring with angle (A) =  $6^{\circ}40'$ .



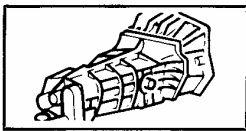
Components with (A) =  $9^{\circ}$  cannot be replaced by those having (A) =  $6^{\circ}40'$  and vice versa.

The 3rd - 4th synchro hub and 4th speed idler gear have been modified in the 352 gearbox from suffix 31.

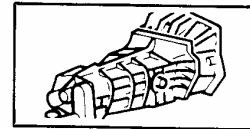
Make sure the matching is correct.



Identification	4th speed idler gear	3rd - 4th speed hub
Gearboxes pre-suffix 31	A = 27,5 mm (1.079")	B = 24 mm (.945")
Gearboxes - suffixes 31-32-33	A = 30 mm (1.181")	B = 21,6 mm (.850")



## TYPE 352 GEARBOX



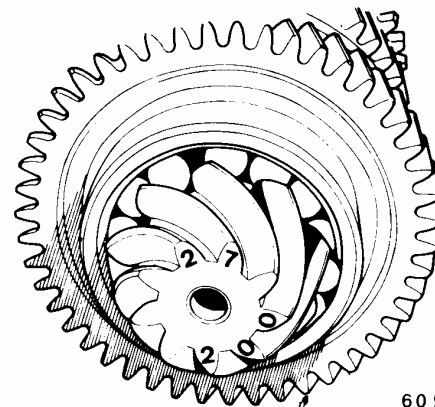
Secondary shaft:

- Matching of crown wheel and pinion.

The final drive pinion and crown wheel are lapped together during manufacture.

They may be used only as a matching pair.

Changing one part automatically involves changing the other also.

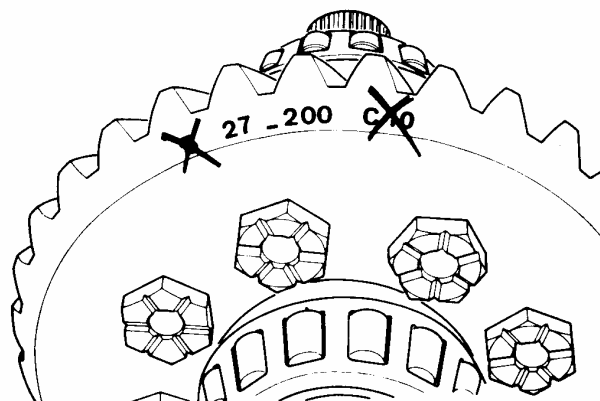


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A common reference mark is etched on the crown wheel and final drive pinion.

Example: 27-200 (27th pair machined on Day 200 of the year).

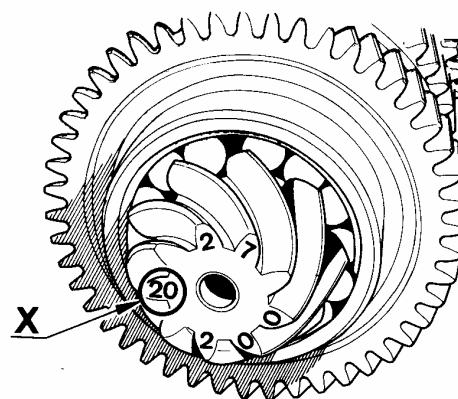
UNDER NO CIRCUMSTANCES MUST NOTICE BE TAKEN OF ANY OTHER MARKINGS ON THE CROWN WHEEL.



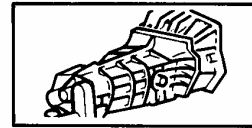
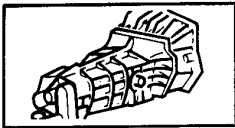
65 348-1

Exceptional case.

The final drive pinion may have an additional number engraved on its end face. This must be taken into account when adjusting pinion protrusion (see "Adjusting pinion protrusion").



60 553 - 1



## TYPE 352 GEARBOX

### Checking the parts :

The final drive pinion, crown wheel or roller bearing are worn :

The "hub-sliding gear" assemblies can be re-used.

Change the crown wheel and pinion, the latter being supplied with the bearing fitted.

The measurement of the splines on the new final drive pinion to be ordered must be determined so that correct matching with the re-used hubs can be obtained.

To do this, measure the old final drive pinion.

The "hub-sliding gear" assemblies are worn :  
the final drive pinion is serviceable.

Change the hub-sliding gear assemblies.

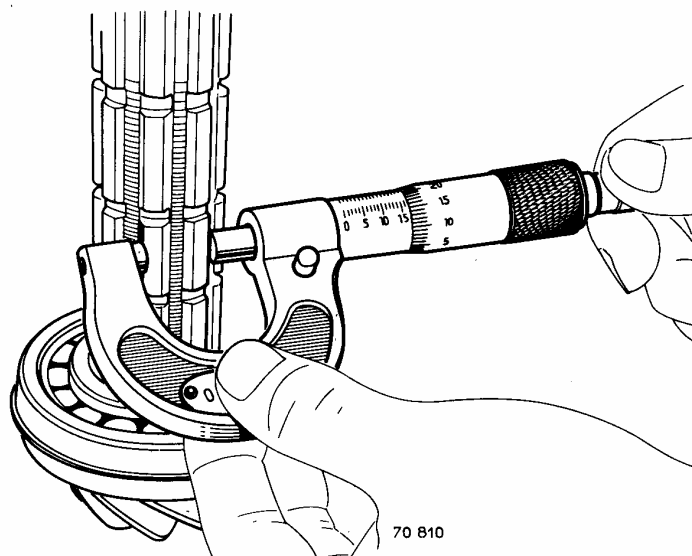
The measurement of the splines on the new synchro hubs to be ordered must be determined so that correct matching with the final drive pinion can be obtained.

To do this, measure the final drive pinion.

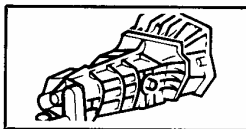
### Measuring the final drive pinion splines :

Measure across 2 adjacent splines with a micrometer.

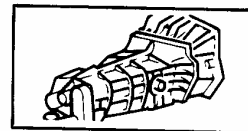
Take measurements over several pairs of splines and obtain an average reading.



70 810



## TYPE 352 GEARBOX



### Matching chart:

There are two different final drive pinion groups which correspond to two synchro hub groups.

The matching code consists of a dab of paint:

for the final drive pinion:

on the corresponding crown wheel, adjacent to the matching reference number.

for the synchro:

on the hub.

FINAL DRIVE PINION SIZE	Less than 16,63 mm (.6547")	16,63 mm or more
----------------------------	-----------------------------------	------------------------

FINAL DRIVE PINION COLOURS	Red-Blue	Yellow
-------------------------------	----------	--------

1st - 2nd SYNCHRO HUB COLOURS	Red- Yellow	White
----------------------------------	----------------	-------

3rd - 4th SYNCHRO HUB COLOURS	Blue White	Red
----------------------------------	---------------	-----

### Preparing synchros

The hub and sliding gear are matched.

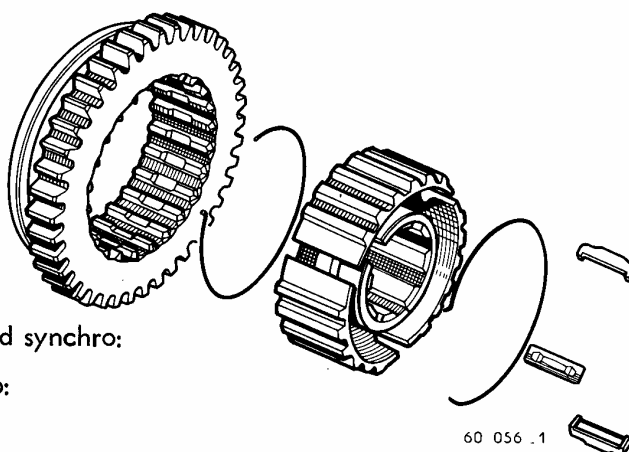
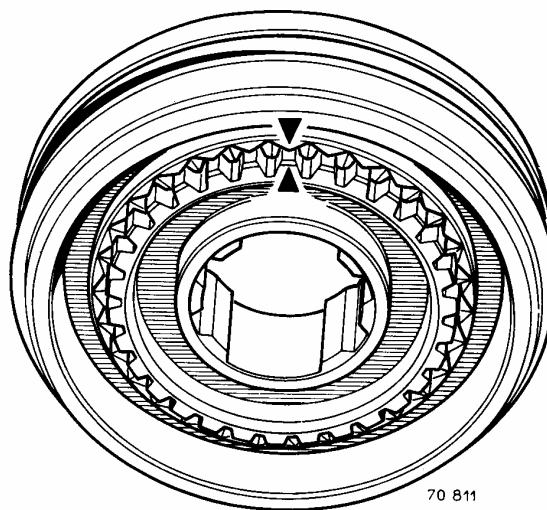
When a new synchro is concerned, mark both parts in relation to one another: for the 1st-2nd speed synchro make the mark on the sliding gear chamfer side so that it may be seen after assembling the hub.

Separate the two parts and clean them.

1st - 2nd speed synchro:

Raise the electric oven temperature to 120°C.

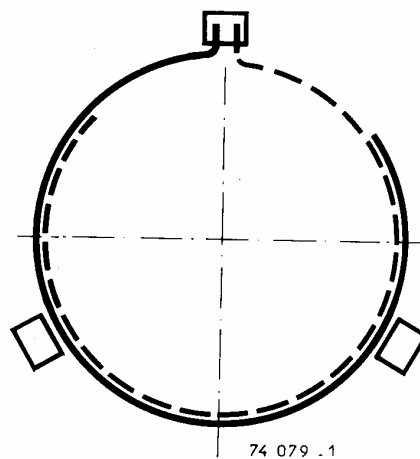
Place the hub inside and wait 15 minutes to ensure that the centre of the part has also reached 120°C.

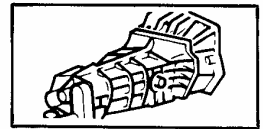
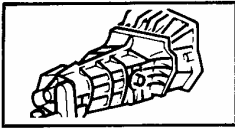


3rd - 4th speed synchro:

Fit on the hub:

- the 3 keys;
- 2 springs (see drawing);
- the sliding gear in the correct position: with the sliding gear groove on the opposite side to the notch on the hub and with the mark in line with that on the hub (marks made during dismantling).





# TYPE 352 GEARBOX

Re-assembling the secondary shaft :

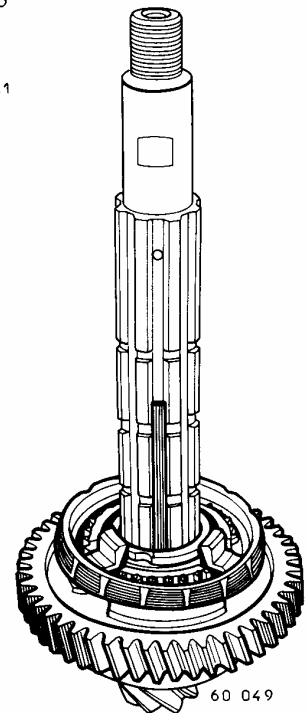
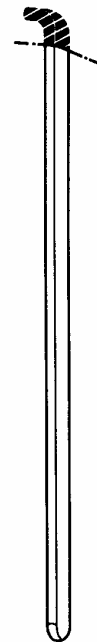
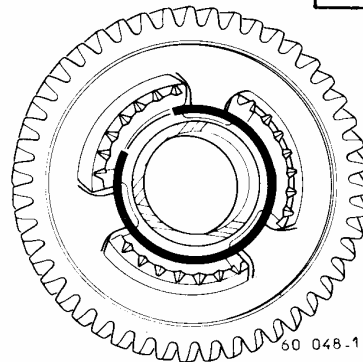
Fit the synchro spring onto the 1st speed gear, so that it covers the 3 slots.

Fit the following on the final drive pinion (with bearing in position) :

- the 1st speed gear and its ring
- 1st speed gear stop washer ; turn it and hold it with a dummy key (the latter can be made from a washer retaining key by removing the lug).

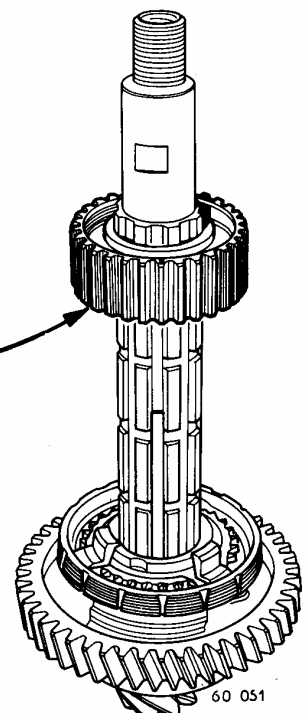
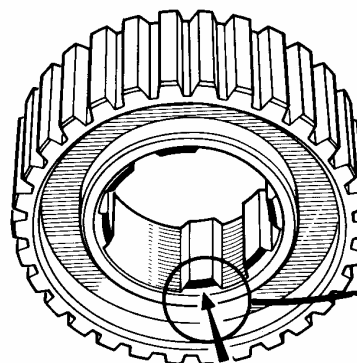
The dummy key must be fitted into one of the splines with an oil hole.

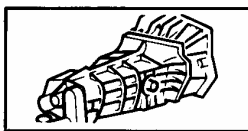
Remove the bearing outer track ring retaining clip.



Take the 1st - 2nd speed hub from the oven and fit it onto the final drive pinion in the correct position :

- with one of the unsplined sections opposite the dummy key.
- with its sliding gear matching mark facing towards the 2nd speed gear or spline chamfer (arrow) facing towards the 1st speed gear.





## TYPE 352 GEARBOX

Using the press, push the hub down until it just touches the stop washer : hold the synchro ring centrally, with the lugs below the level of the stop washer so as not to damage the spring.

Hold the press down a sufficient time to allow the hub to cool down. (cooling down may be speeded up using compressed air).

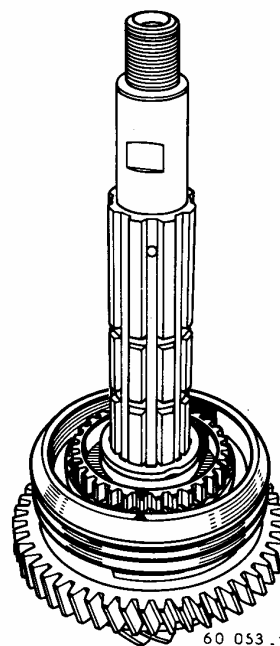
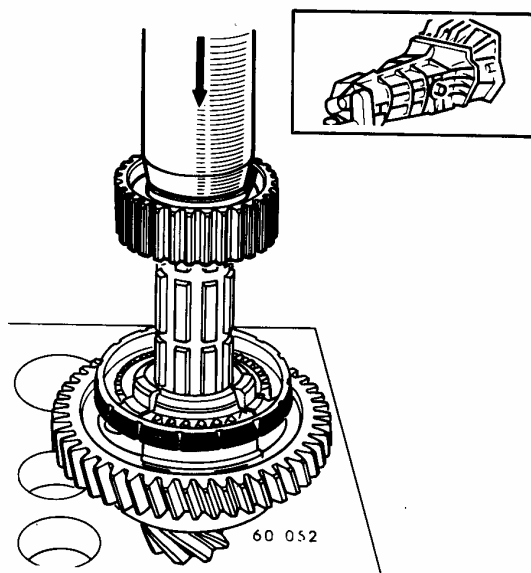
Release the press.

Remove the dummy key.

Fit the 1st - 2nd speed synchro sliding gear in position :

- with chamfer towards the 2nd speed gear
- with matching mark in line with that on the hub.

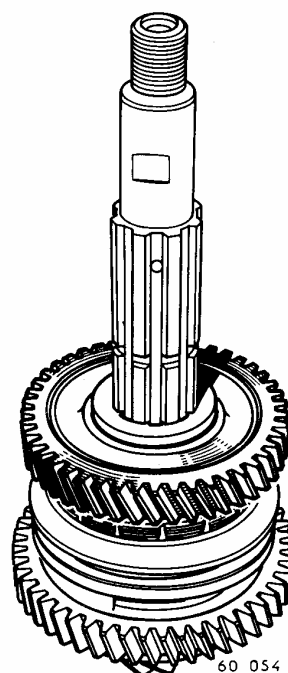
Fit the hub stop washer (turn it so as to align its splines with those on the final drive pinion).

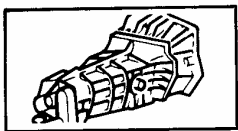


Fit the synchro spring onto the 2nd speed gear (in the same way as that on the 1st speed gear).

Fit the 2nd speed gear and its ring

Fit the gear stop washer (turn it to align its splines with those on the final drive pinion).





Fit the 3rd speed gear and its ring.

Fit the stop washer (turn it to align its splines with those on the final drive pinion).

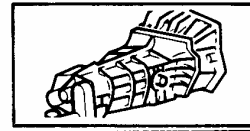
Fit the retaining key for the gear wheel stop washers in position (in one of the splines having an oil hole).

Using the press, fit the 3rd - 4th synchro until it just touches the 3rd speed gear stop washer : notch on hub facing towards the 3rd speed gear side and in line with the stop key.

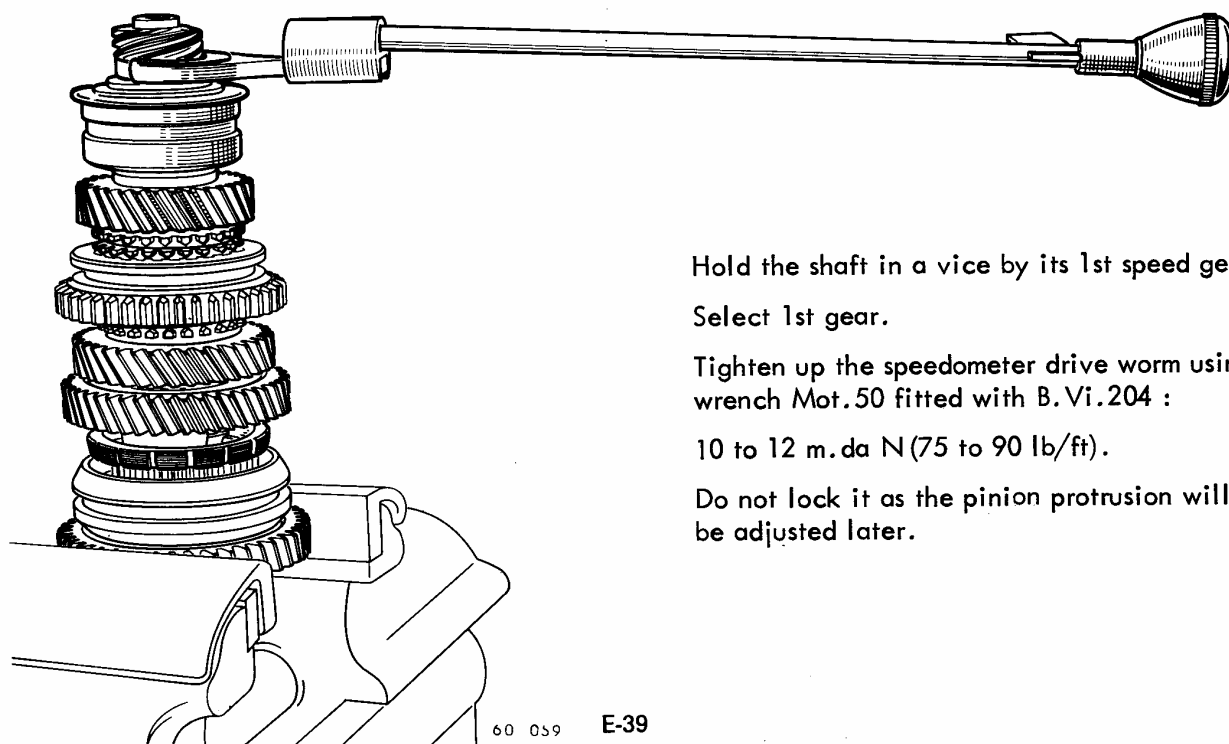
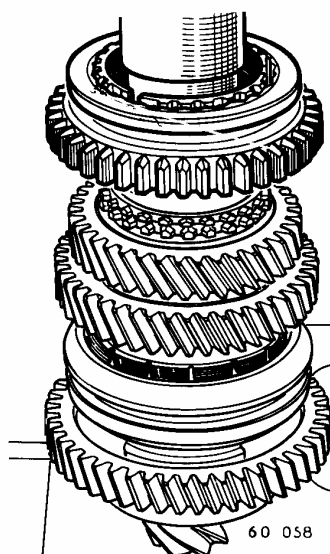
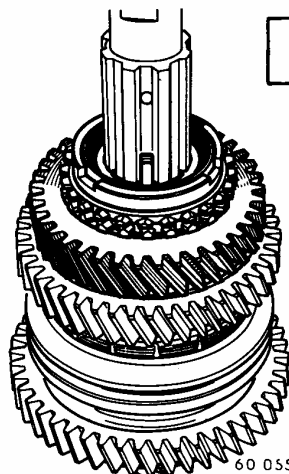
Make sure that the three notches on the synchro ring are in line with the 3 keys.

Fit :

- the 4th speed gear and its ring ;
- pinion protrusion adjusting washer (the one removed during dismantling).
- double taper roller bearing ;
- speedometer drive worm.



TYPE 352 GEARBOX



Hold the shaft in a vice by its 1st speed gear.

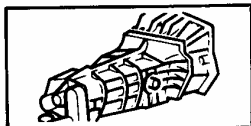
Select 1st gear.

Tighten up the speedometer drive worm using wrench Mot.50 fitted with B.Vi.204 :

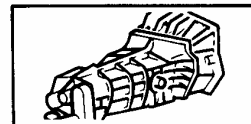
10 to 12 m.da N (75 to 90 lb/ft).

Do not lock it as the pinion protrusion will be adjusted later.





TYPE 352 GEARBOX



## Differential :

Fit the following into the differential housing :

- the bakelite impregnated washer with its oil groove facing the sunwheel : use the washer which is 1,96 to 2 mm (.077 to .079") thick.

The washer 2,03 to 2.07 mm (.080 to .082") thick will only be used when the play in the sunwheel and planet wheel meshing is excessive.

- one sunwheel (dip it in EP 80 oil).
- the planet wheels and thrust washers (with the locking tag in the hole in the housing).

Slide the planet wheel shaft in (line up the hole in the shaft with that in the housing). <sup>60550</sup>

Fit the rollpin in position : drive it about 5 mm (13/64") down inside the bearing using B.Vi.31-01.

Dip the second sunwheel in EP 80 oil and fit it in the crown wheel.

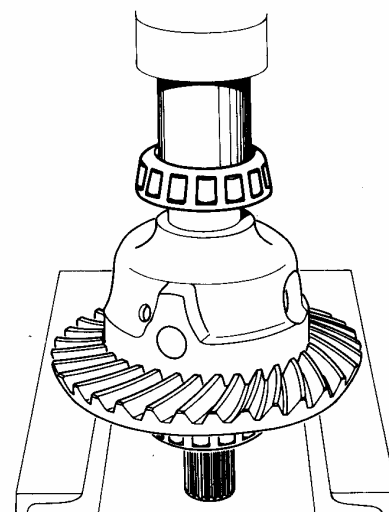
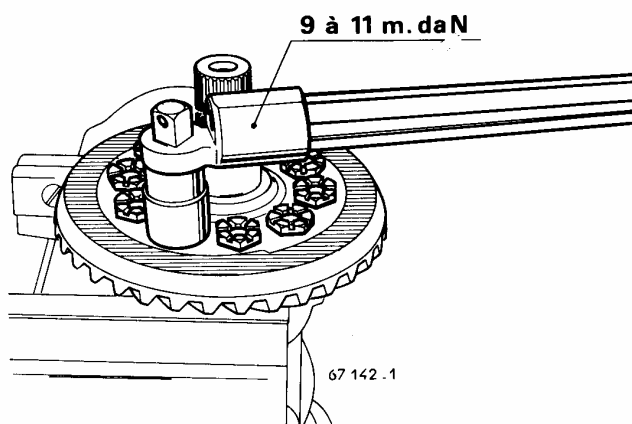
Assemble the crown wheel to the differential housing by means of new self-locking bolts.

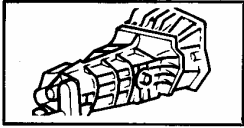
Torque tighten the bolts to 9 to 11 m.da N (67 to 82 1/2 lb/ft).

Fit the 'O' ring seals to the sunwheels.

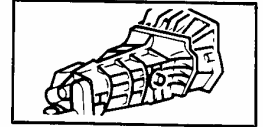
The differential may be slightly hard to turn after assembly.

Fit the bearings in position using the press.



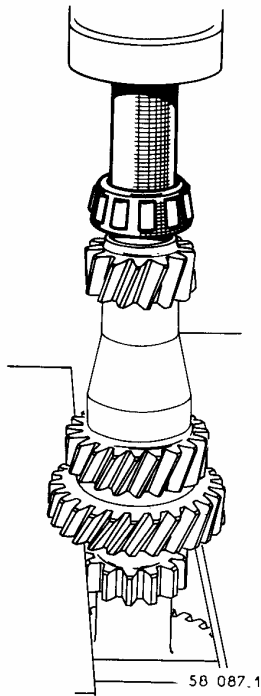


Primary shaft

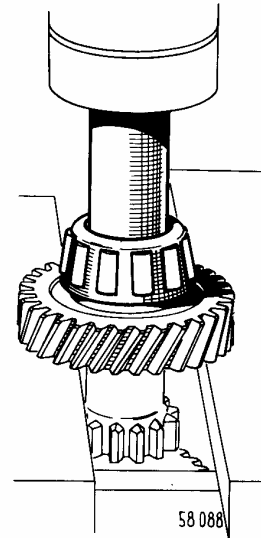


TYPE 352 GEARBOX

Fit both bearings using a press.



Differential nut



There are two types of oil seal and differential ring nut. It is preferable to fit the felt type oil seal.

1st assembly

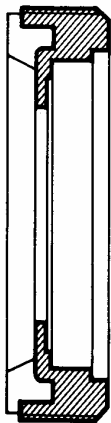
2nd assembly

Ring nut with feltless oil seal

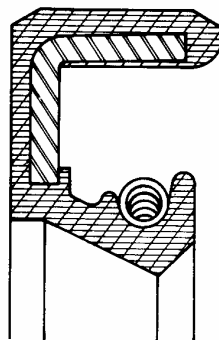
Feltless oil seal

Ring nut with felt oil seal

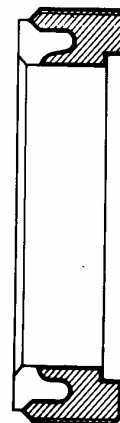
Felt oil seal



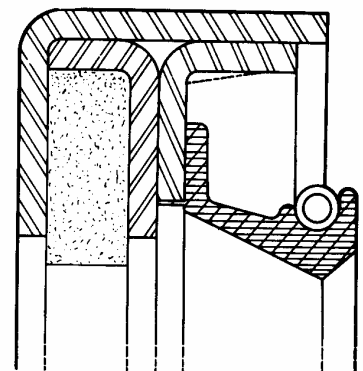
75 875



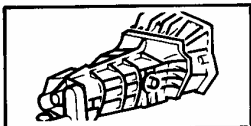
75 389



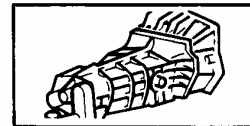
75 876



75 612



TYPE 353 GEARBOX



# Feltless oil seal (1st assembly)

The seal should be fully home against the ring nut shoulder.

## Felt oil seal (2nd assembly)

Fit the ring nut onto tool B.Vi.377.

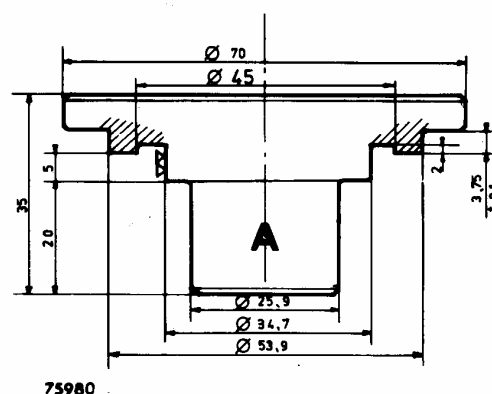
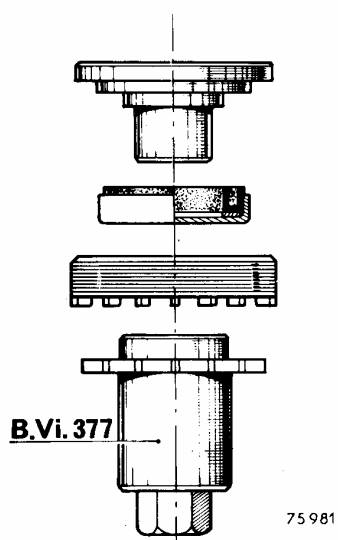
Place the oil seal on tool (A) : take care not to damage the lip.

Press the seal on : the shank on tool (A) entering the bore in tool B.Vi.377.

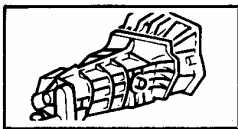
Remove the latter.

Press in until tool (A) butts on the ring nut face.

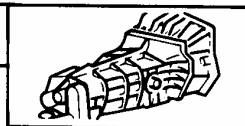
Tool (A) is to be made locally.



2 mm (.079")	5 mm (.197")
20 mm (.788")	25,9 mm (1.020")
45 mm (1.772")	35 mm (1.378")
70 mm (2.756")	53,9 mm (2.122")
3,75 mm $\pm$ 0,1 (.148 $\pm$ .004")	



## TYPE 352 GEARBOX



### ADJUSTMENTS

Before finally assembling the mechanism, the pinion protrusion, differential bearing pre-load and position of the primary shaft must be adjusted.

Crown wheel and pinion backlash and primary shaft endplay are adjusted during assembly

#### 1) - Pinion protrusion adjustment :

##### Final drive pinion position

The final drive pinion is in the correct position when its front face is distance (A) = 59 mm (2.323") from the centre of the crown wheel.

This position is obtained by placing a washer of suitable thickness between the double taper roller bearing and the shoulder on the secondary shaft.

##### Exceptional case :

In an exceptional case, dimension (A) may not be the pinion depth.

The difference (X) between the actual pinion depth and dimension (A) is then marked on the front face of the final drive pinion next to the matching reference number.

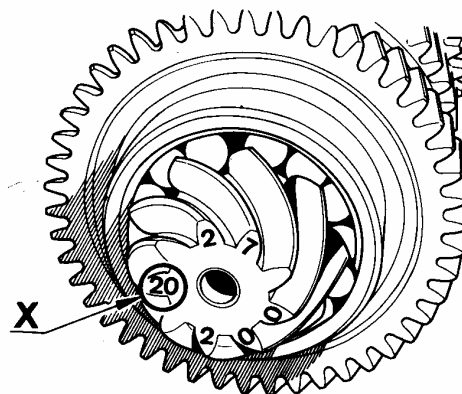
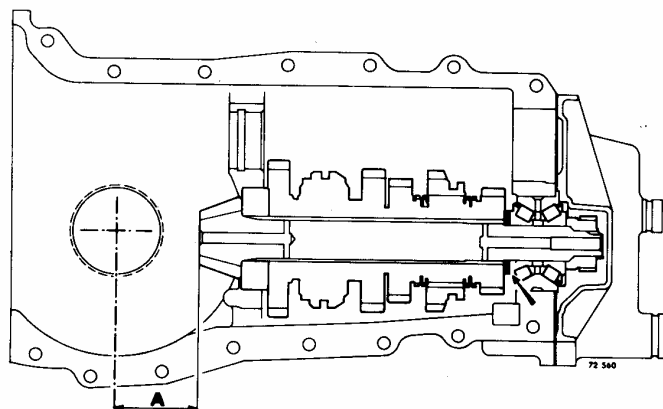
It is given in hundredths of a millimetre, for example 20.

The pinion protrusion is then equal to A + the difference given.

In the example given below it would be :

$$59 \text{ mm} + 0.20 \text{ mm} = 59,020 \text{ mm}$$

$$(2.323" + .008" = 2.331")$$

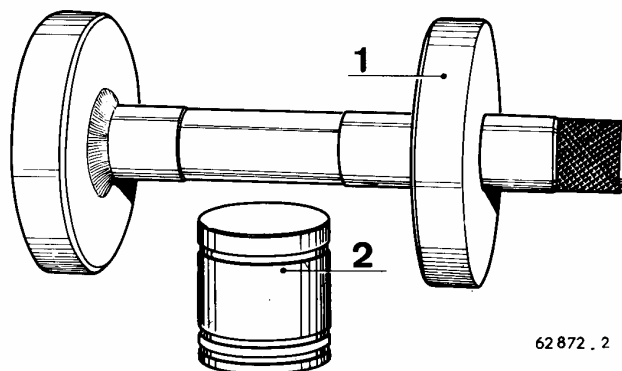


60553 - 1

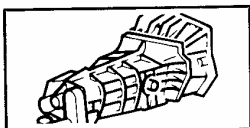
#### Checking pinion protrusion :

It is carried out using :

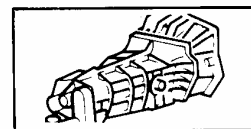
- mandrel (1) from tool B.Vi. 239-01, acting as the crown wheel centre.
- distance piece B.Vi.239-02 (2) 48,50 mm (1,907") high, which rests against the final drive pinion front face.



62872 - 2



## TYPE 352 GEARBOX

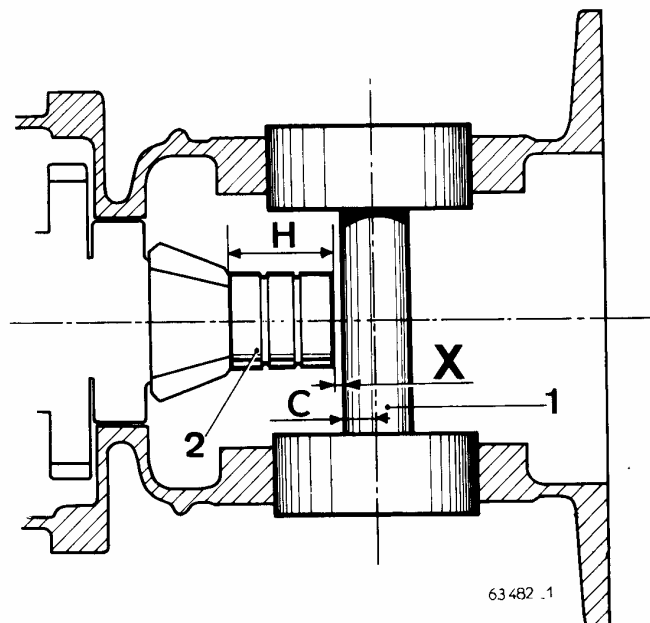


Height (H) of distance piece (2) 48,50 mm (1.909") plus radius (C) of mandrel shaft (1): 10 mm (.394") represents a dimension of:

$$48,50 \text{ mm} + 10 \text{ mm} = 58,50 \text{ mm} \\ (1.909" + .394" = 2.303")$$

Dimension X, measured between the distance piece and the mandrel shaft is then:

$$X = 59 \text{ mm} - 58,50 \text{ mm} = 0,50 \text{ mm} \\ (2.323 - 2.303 = 0.020")$$



Attach the R.H. half-casing to support B.Vi.240.

Fit the secondary shaft.

Fit the L.H. half-casing and attach it with a few bolts (do not tighten them).

Temporarily fit the rear cover in order to hold the double taper roller bearing track ring in position.

Tighten the half-casing securing bolts.

Fit mandrel (1) in position.

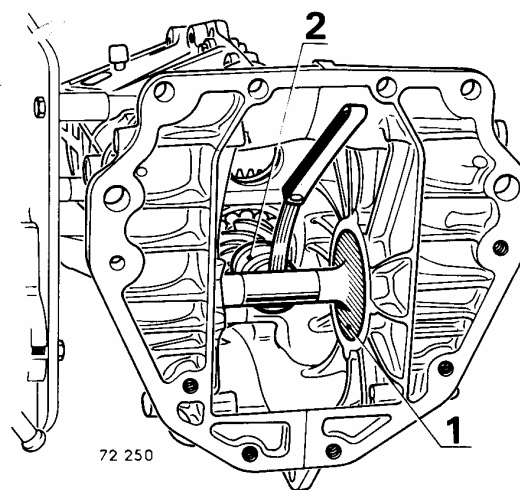
Place distance piece (2) up against the front face of the final drive pinion.

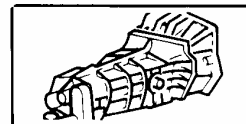
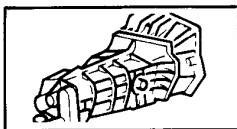
Measure dimension X between the distance piece and mandrel with feeler gauge.

- If the measurement obtained is less than nominal: replace the pinion protrusion adjusting washer by a thinner one.
- If the measurement obtained is greater than nominal:  
Replace the washer by a thicker one.  
Washers are obtainable in various thicknesses from 3,50 to 4,10 mm (.138 to .162") thick in steps of 5/100ths mm (.002").

Remove the checking tool, rear cover and L.H. half-casing having obtained the definite adjustment.

Lift out the secondary gear train and lock the speed-speedometer drive worm.

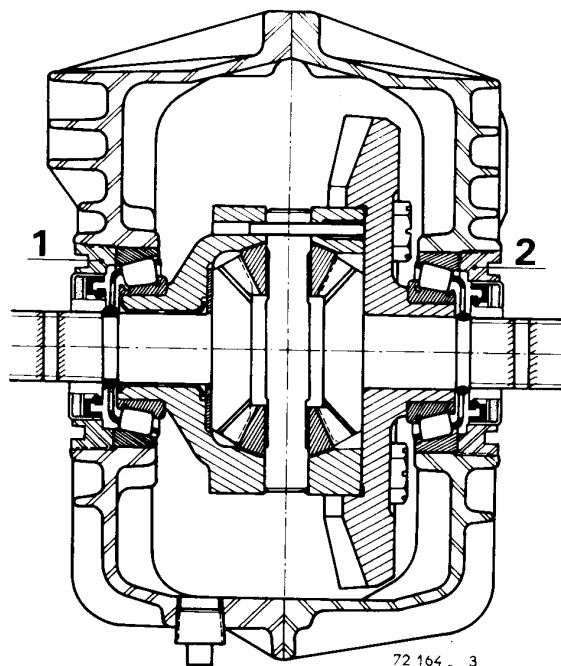




TYPE 352 GEARBOX

## 2) - Adjusting differential bearings.

Adjustment of the bearings is obtained by screwing or unscrewing ring nuts (1) and (2).



Fitting the differential ring nut oil seal

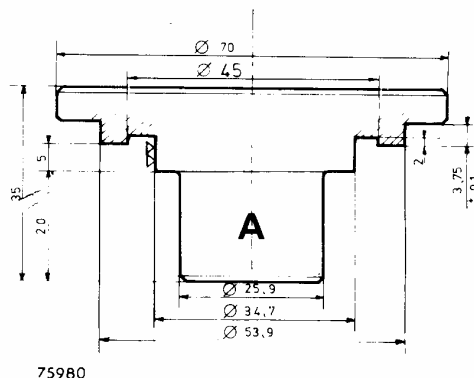
Fit the ring nut onto tool B.Vi.377.

Slide the seal onto (A): do not damage the seal lip.

Press the seal on: the tip of the tool (A) enters the bore in tool B.Vi.377. Remove the tool.

Press in until tool (A) is fully home.

Tool (A) is to be made locally.



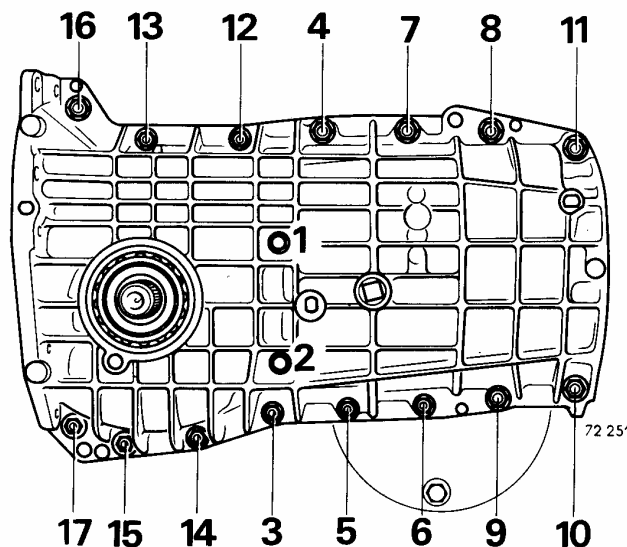
Fit the corresponding bearing track ring into each half-casing so that it is slightly below the inner face of the casing.

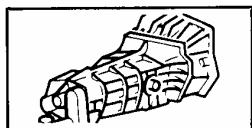
Fit the differential, together with its bearings, in the R.H. half-casing.

Fit the L.H. half-casing in position and secure it by all the bolts.

Torque tighten the bolts in the correct sequence with the torque wrench:

- 7 mm diameter bolts: 2 m.da N (15 lb/ft)
- 8 mm diameter bolts: 3 m.da N (22 1/2 lb/ft).





## TYPE 352 GEARBOX

Smear the threads on the ring nuts and in the casing with "Perfect-Seal".

Screw the adjusting ring nut in on each casing until it just touches the bearing track ring using wrench B.Vi.377.

There are then two possibilities:

Bearings which can be used again.

The differential should turn without play.

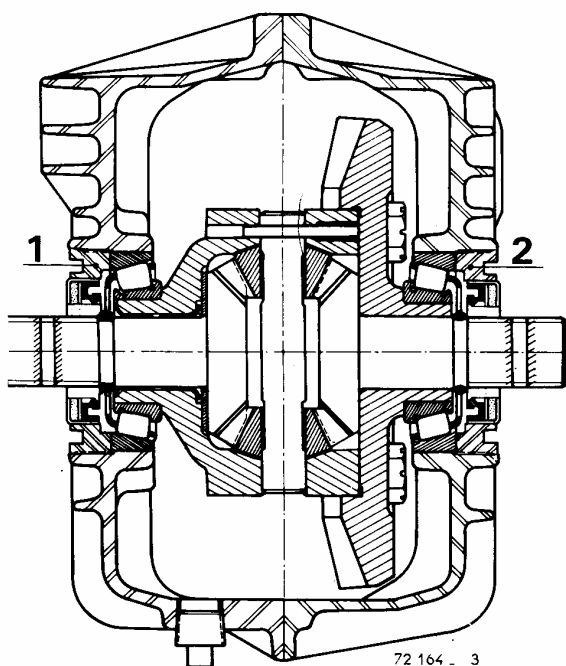
Continue to screw in the nuts, which has the effect of pushing the bearing track rings towards each other:

- take care to turn nut (1) on the differential bearing side slightly more so that more backlash than normal is obtained for final assembly.

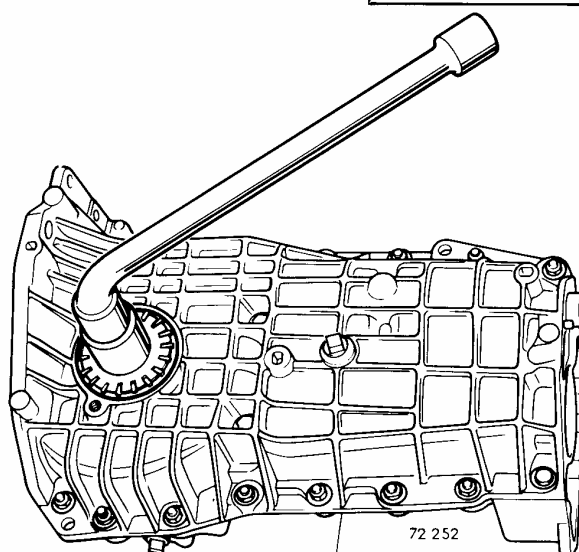
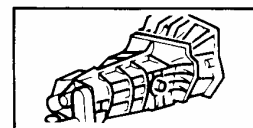
When the differential assembly shows no sign of play, stop screwing in the nuts.

This is the final adjustment.

Remove the L.H. half-casing and the differential.



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72 252

New bearings:

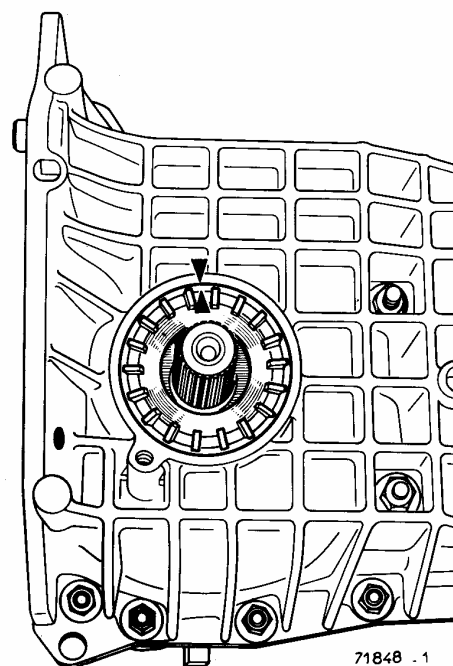
New bearings must be fitted with a preload.

Continue to screw in the nuts, which has the effect of pushing the bearing track rings towards each other:

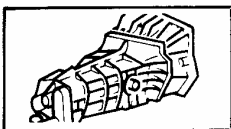
- take care to turn nut (1) on the differential housing side slightly more, so that more backlash than normal is obtained for final assembly.

When the differential becomes slightly hard to turn, stop screwing in the nuts.

Check the preload.



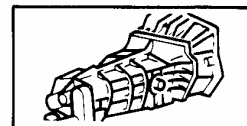
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### Checking preload:

Turn the differential several revolutions to settle the bearings.

Wrap a piece of string around the differential housing.



TYPE 352 GEARBOX

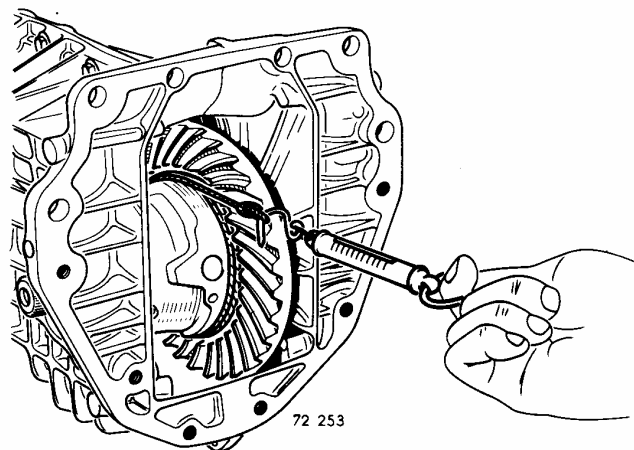
Pull on this string using a spring balance.

The differential should turn under a load of between 1 and 3 da.N (2 to 7 lbs.).

This load is the amount necessary to ensure a constant rotating movement of the differential.

If the adjustment is incorrect, screw in the nut by a small amount on the housing side and check the preload once again.

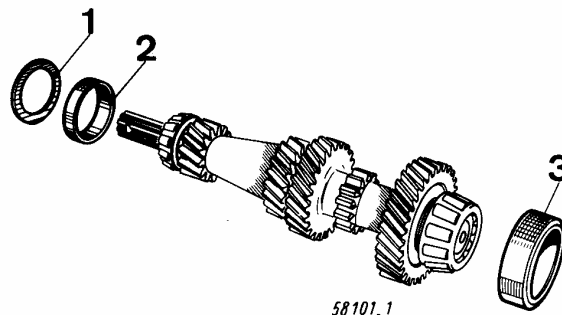
Remove the L.H. half-casing and the differential.



### 3) - Positioning the primary shaft:

Fit the following on the primary shaft:

- bearing track rings (2) and (3)
- adjusting washer (1) (removed during dismantling).

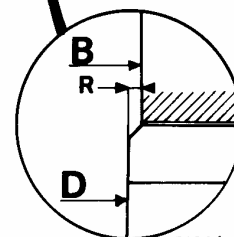
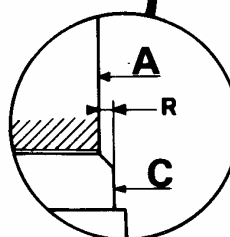
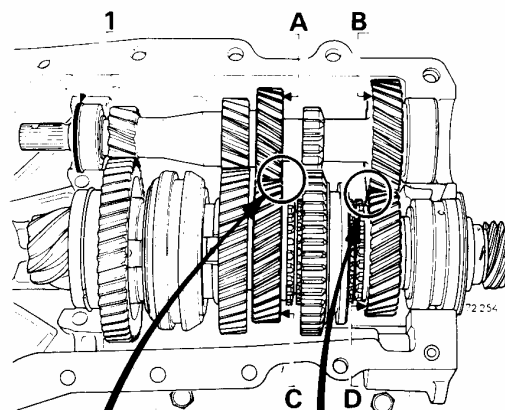


Fit the following into the R.H. half-casing:

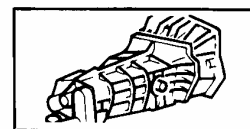
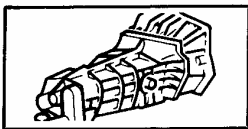
- the primary shaft
- and secondary shaft.

Position the primary shaft in relation to the secondary shaft. The step (R) must be equal for both sets of gears.

This position is obtained using washer (1): Washers are available in different thicknesses.





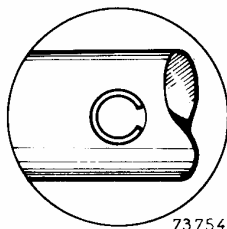


## TYPE 352 GEARBOX

### ROLLPIN POSITION

#### RE-ASSEMBLING

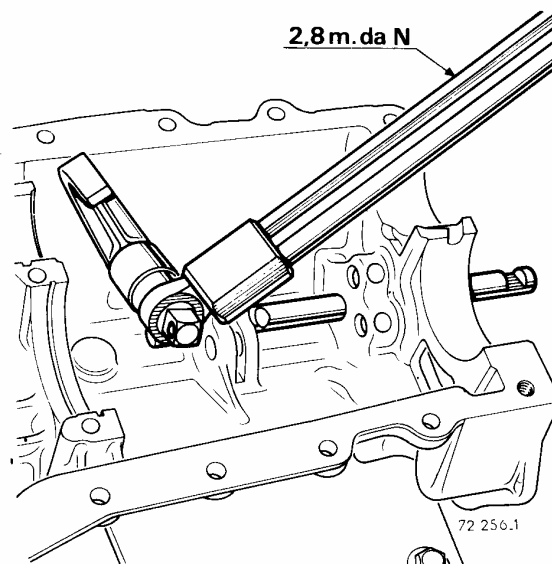
Fit the rollpin correctly when re-assembling, the slots must always face towards the rear cover.



Slide the reverse gear shaft in.

Fit the reverse gear selector, inserting its end in the slot in the reverse gear shaft.

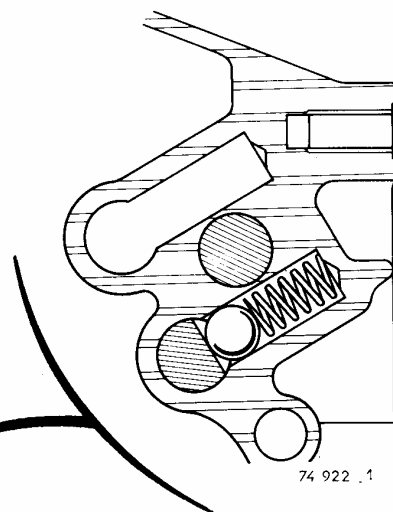
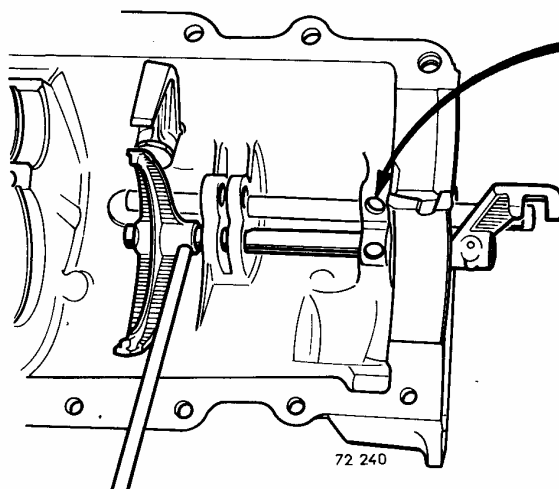
Torque tighten the pivot pin to 2,8 m.da N (21 lb/ft).

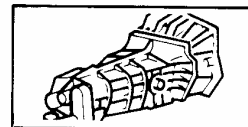
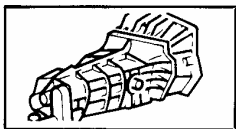


Fit the spring and locking ball for the 1st - 2nd speed selector shaft.

Slide the 1st - 2nd speed selector shaft in.

Position the 1st - 2nd speed selector fork (hub facing the control end) and fit the rollpin.





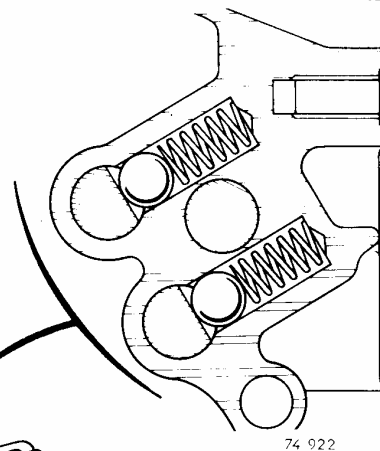
# TYPE 352 GEARBOX

Fit the locking disc between the shafts.

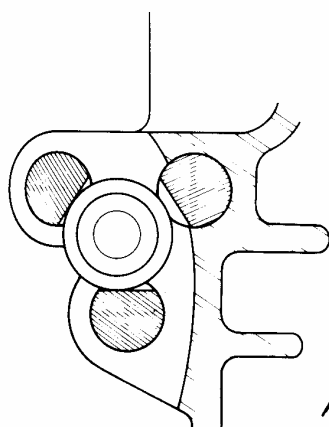
Fit the 3rd - 4th selector shaft locking ball and spring.

Insert the shaft and fit the selector fork, (hub facing differential).

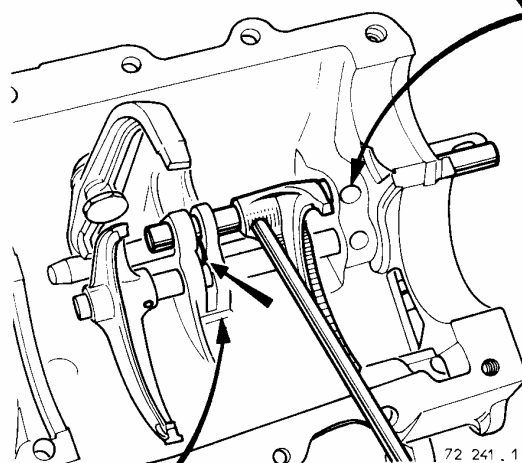
Rollpin the shaft.



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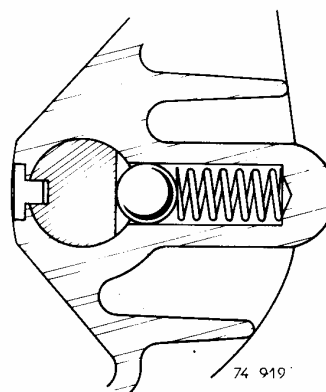


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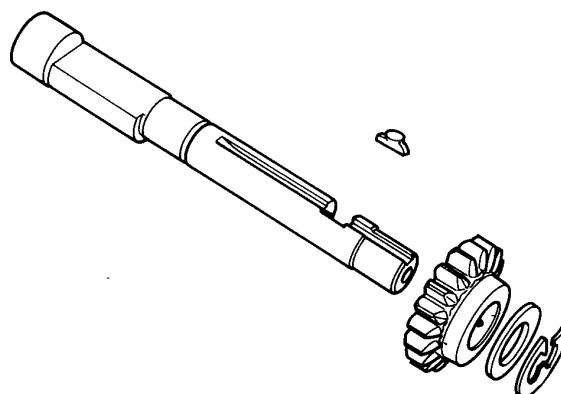
Reverse gear:

Fit into the L.H. half-housing:

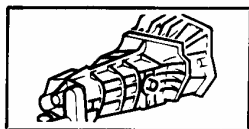
- the locking ball and spring.
- Engage the shaft and fit the gearwheel (hub facing differential) followed by the friction washer (bronze face facing gearwheel).
- Insert the guide from inside the bore and push the shaft fully in.
- Fit the gearwheel retaining circlip.



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## TYPE 352 GEARBOX

Rear cover :

Fit :

- felt (F) behind the bush (if housing has location for it)
- the control shaft oil seal.

Insert together :

- the assembled rocking lever and pivot shaft
- the finger and control shaft.

Fit the washer and tighten the pivot shaft nut ; fit the cover.

Fit the control shaft end fitting and rollpin it.

Fit the speedo drive gear, guide and 'O' ring.

Fit into the R.H. half-casing :

- the primary shaft
- secondary gear train and its lock peg
- and differential.

Smear the half-casing joint faces with "Perfect-Seal".

Offer up the L.H. half-casing : make sure that the end of the reverse gear selector fits into the slot in the reverse gear.

Fit the half-casing bolts :

do not tighten them at this stage.

## ADJUSTING PRIMARY SHAFT ENDPLAY :

Fit the adjusting washers (C) removed during dismantling and distance washer (E).

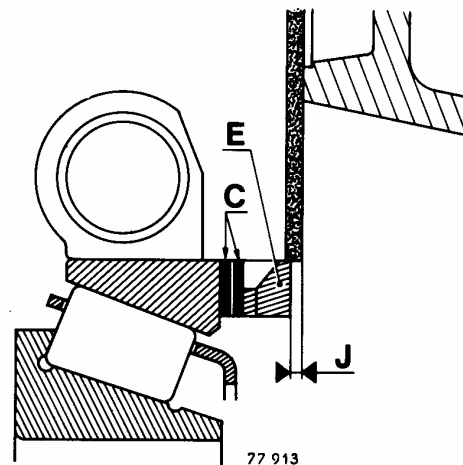
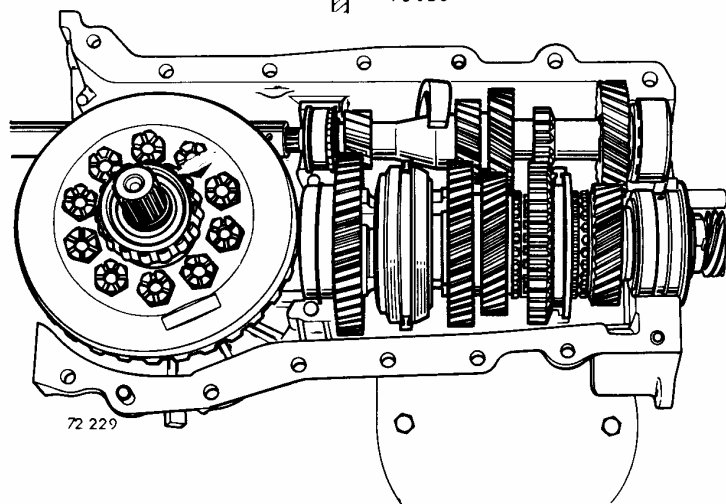
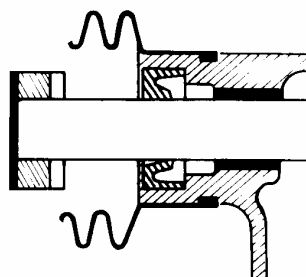
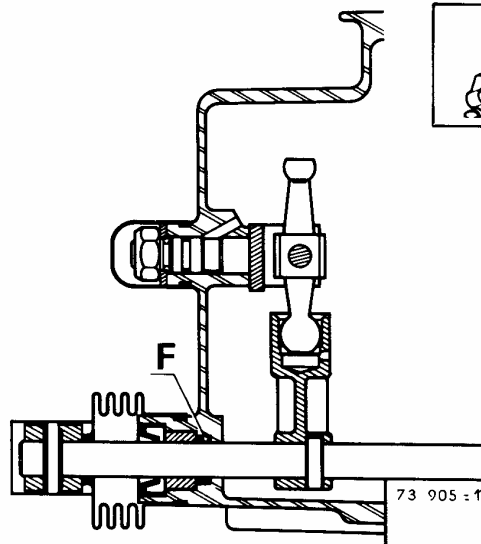
Tap distance washer (E) lightly with a piece of tube to settle the bearings.

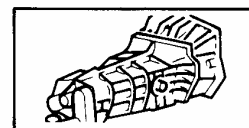
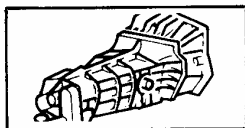
Fit the rear cover paper gasket.

Measure clearance (J) between the distance washer and the outer face of the paper gasket :

$$J = 0,02 \text{ to } 0,12 \text{ mm } (.001 \text{ to } .0047")$$

Increase or decrease the thickness of adjusting washer (C) if adjustment is incorrect, (use as few washers as possible).

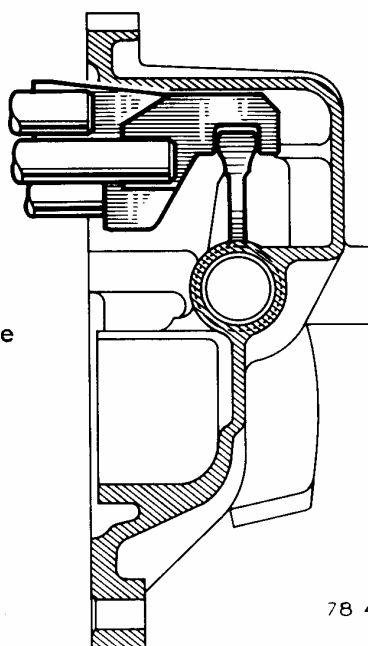




TYPE 352 GEARBOX

Fit the rear cover paper gasket with "Perfect-Seal".

Offer up the rear cover, engaging the end of the selector finger in the selector shaft slots.

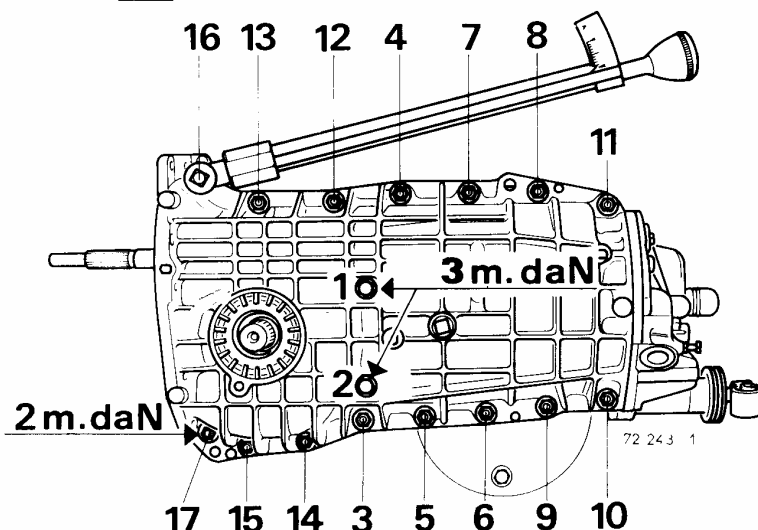


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Torque tighten the half-casing assembly bolts in the order shown here :

- 7 mm diameter bolts :  
  . 2 m.da N (15 lb/ft)
- 8 mm diameter bolts :  
  . 3 m.da N (21 lb/ft)

Finally tighten the rear cover bolts :  
  . 1,2 m.da N (8 lb/ft).

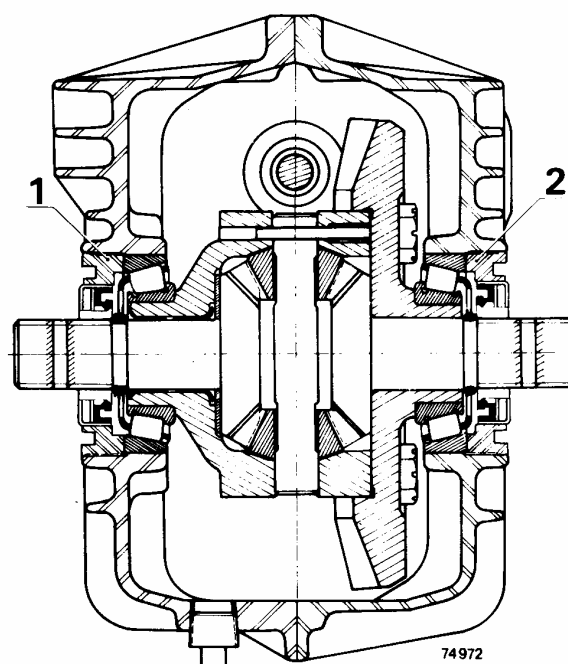


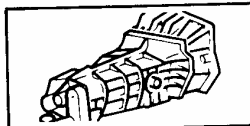
#### ADJUSTING THE CROWN WHEEL AND PINION BACKLASH :

The backlash is obtained by unscrewing ring nut (1) on the housing side, and screwing up the the other one (2) on the crown wheel side by the same amount.

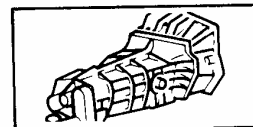
Feel the amount of backlash present by hand.

If it is really excessive, unscrew nut (1) on the housing side and screw up the other (2) on the crown wheel side so as to reduce the amount of backlash, before checking with a clock gauge.





## TYPE 352 GEARBOX

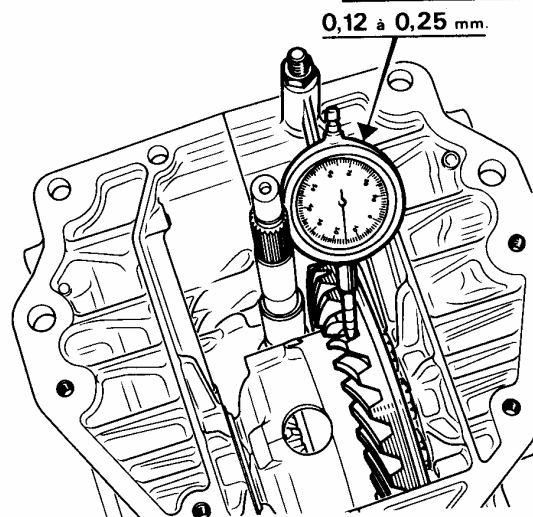


Then fit a clock gauge on the half-casing, with the pointer resting on a crown wheel tooth at right angles to its flank on its extreme outer edge.

Check the amount of backlash : it should lie between 0,12 and 0,25 mm (.0047 and .010").

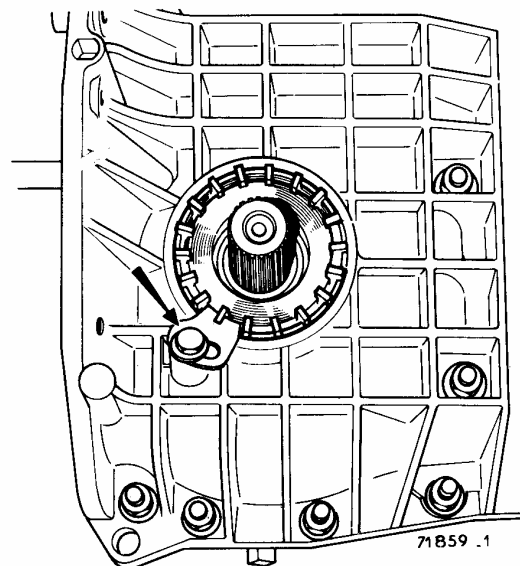
If it is excessive, unscrew ring nut (1) on the housing side and screw up the other (2) on the crown wheel side by the same amount.

If it is insufficient, unscrew ring nut (2) on the crown wheel side and screw up the other (1) one on the housing side by the same amount.



Lock the ring nuts with lockplates after the correct backlash has been obtained.

Then fit the clutch housing using tooling B.Vi.526 which consists of :



- a tube for fitting the oil seal in the clutch housing
- a tool (1) designed to protect the oil seal lip when the clutch shaft splines pass through.

Use a tube to fit the oil seal to the clutch housing.

Smear the clutch housing paper gasket with "Perfect-Seal".

Fit tool (1) inside the withdrawal pad guide so as to spread the oil seal lip.

Fit the clutch housing, sliding tool (1) on the clutch shaft at the same time.

Remove the tool.

Fit and tighten the clutch housing securing bolts.

Screw in the reversing lights switch.

