

# RENAULT

## Technical Note6003A

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**X70, and PA6 or PK5 or PK6, and RENAULT -  
X83, and PA6 or PK5 or PK6, and RENAULT -  
X65, and PK6 - X66, and PK6 - X73, and PK6 -  
X74, and PK6 - X81, and PK6**

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### **PA6 - PK5 - PK6 manual gearboxes**

**CLIO II - LAGUNA II - VEL SATIS - AVANTIME - ESPACE III -  
TRAFIC II - MASTER II**

### **PA6 - PK5 - PK6 gearbox renovation**

**This note cancels and replaces MR PK5 - PK6 gearboxes dated  
February 2001**

### **Edition 5**

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FEBRUARY 2006

Edition Anglaise

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"The repair methods given by the manufacturer in this document are based on the technical specifications current when it was prepared.

The methods may be modified as a result of changes introduced by the manufacturer in the production of the various component units and accessories from which his vehicles are constructed."

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# PA6 - PK5 - PK6 manual gearboxes

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# MANUAL GEARBOX

## Manual gearbox: Precautions for repair

# 21A

X65, and 5 SPEED MANUAL GBOX or 6 SPEED MANUAL GBOX – X66, and 5 SPEED MANUAL GBOX or 6 SPEED MANUAL GBOX – X70, and 5 SPEED MANUAL GBOX or 6 SPEED MANUAL GBOX – X73, and 6 SPEED MANUAL GBOX – X74, and 5 SPEED MANUAL GBOX or 6 SPEED MANUAL GBOX – X81, and 6 SPEED MANUAL GBOX – X83, and 5 SPEED MANUAL GBOX or 6 SPEED MANUAL GBOX

### SAFETY

#### General information

This method provides information which will allow you to:

- acquire good knowledge of the component on which you will be working,
- benefit from the best repair conditions,
- obtain optimum component operation and meet customer requirements,
- optimise component repair time.

It is worth taking the time to read this method as you will gain time later on during the repairs.

#### *a - General recommendations*

Observe basic principles of vehicle repair.

The quality of repair depends first and foremost on the care exercised by the person in carrying it out.

Carry out the operation on the component on a clean working area.

To ensure good repair:

- use the recommended consumables (see **Vehicle: Parts and ingredients for the repairwork**),
- use the recommended tools,
- observe the tightening torques,
- observe the recommendations for parts that should always be replaced after removal, refitting or replacement operations,
- clean and degrease the sections to be bonded, to ensure they bond correctly.

#### WARNING

To ensure proper sealing, the gasket surfaces must be clean, dry and not greasy (avoid any finger marks).

#### WARNING

Do not scrape the joint faces of the aluminium, any damage caused to the joint face will result in a risk of leaks.

Use professional products and apply them with care, for example do not apply too much sealing paste to the sealing surface to prevent damaging the component.

#### WARNING

Applying excess sealant could cause it to be squeezed out when parts are tightened. A mixture of sealant and fluid may cause damage to some components.

Observe the chronological order of the steps:

- remove the component,
- clean the component before repairing,
- remove the part(s) concerned
- check the part(s) removed,
- replace faulty part(s) with new part(s),
- perform the necessary adjustments and/or settings so that the component operates correctly,
- observe the tightening torques.

#### Note:

Ensure you use the correct type of bearing for the gearbox. There are three types of bearing for different gearbox suffixes (**NTN - SNR - TIMKEN**). They are not interchangeable.

#### Note:

Ensure sure that the parts removed match up and ensure that they are refitted in the correct order.

#### *b - Special tooling*

Use suitable tools which are in good condition (use of « multi-purpose » tools, such as adjustable pliers, etc., should be avoided wherever possible).

For good quality repairs and for working in safe conditions, use only special tooling.

#### *c - Safety*

Equipment risks:

- The "Note" heading used in the description of the method indicates that particular care should be taken for the operation described.

# MANUAL GEARBOX

## Manual gearbox: Precautions for repair

# 21A

X65, and 5 SPEED MANUAL GBOX or 6 SPEED MANUAL GBOX – X66, and 5 SPEED MANUAL GBOX or 6 SPEED MANUAL GBOX – X70, and 5 SPEED MANUAL GBOX or 6 SPEED MANUAL GBOX – X73, and 6 SPEED MANUAL GBOX – X74, and 5 SPEED MANUAL GBOX or 6 SPEED MANUAL GBOX – X81, and 6 SPEED MANUAL GBOX – X83, and 5 SPEED MANUAL GBOX or 6 SPEED MANUAL GBOX

- The "Important" heading used in the description of the method indicates that there is a risk of damage to the component.

Working safely:

- The "Warning" heading used in the description of the method indicates that particular care should be taken for the operation described and that there is a human risk,
- use supports and adopt a correct posture when performing heavy work or raising loads,
- check that the working area is clean and tidy during the operation,
- use personal protection (gloves, goggles, work shoes, masks, skin protection, etc.),
- do not use harmful products in unventilated rooms,
- do not ingest any chemicals (brake fluid, coolant, etc.).

Respecting the environment:

- sort waste according to its particular qualities,
- do not burn discarded products (tyres, etc.).

### **d - Conclusion**

Respecting the recommended methods will guarantee the best performance and reliability of the component.

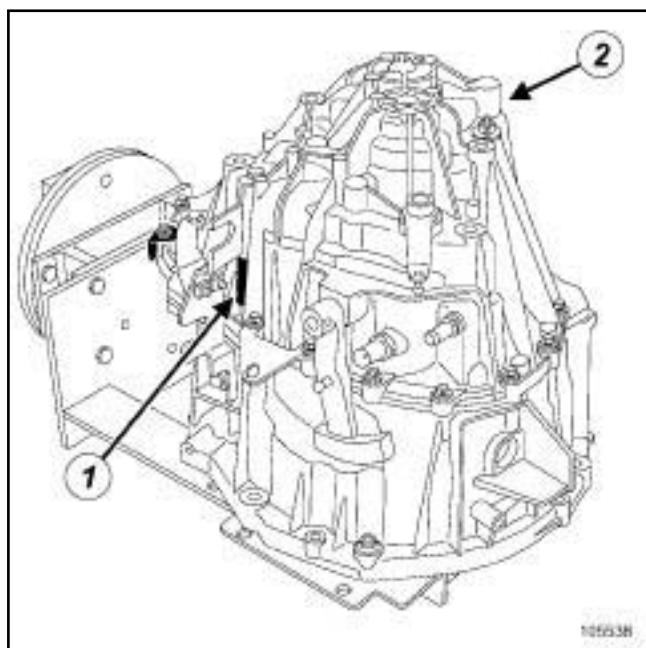
# MANUAL GEARBOX

## Manual gearbox: Specifications

# 21A

X70 – X83 – X65 – X66 – X73 – X74 – X81

### I - IDENTIFICATION



- (1) Identification label  
(2) Etching.

### II - GEAR RATIOS

#### PA6 gearbox

Suffix	1st	2nd	3rd	4th	5th	6th	Final drive	Reverse gear	Tachometer
001	11/43	19/40	31/43	41/40	41/31	47/28	16/67	17/38	none
002	11/46	17/38	31/41	40/39	38/29	47/30	16/67	29/42	27/47
003	11/46	17/38	31/41	40/39	38/29	47/30	16/71	29/42	27/47
004	11/46	17/38	31/41	40/39	38/29	47/30	16/67	29/42	none
005	11/46	17/38	31/41	40/39	38/29	47/30	16/71	29/42	none
006	11/43	19/40	31/43	41/40	41/31	47/28	16/67	29/42	none

#### PK5 gearbox

Suffix	1st	2nd	3rd	4th	5th	6th	Final drive	Reverse gear	Tachometer
003	11/51	17/42	21/32	39/43	39/34		16/67	27/47	24/19
004	11/46	17/38	31/43	41/37	41/29		16/71	27/47	24/19
005	11/46	17/38	31/43	41/37	41/29		16/67	27/47	Mechanical
006	11/46	17/38	31/43	41/37	41/29		16/71	27/47	Mechanical
007	11/46	17/38	31/43	41/37	41/29		16/67	27/47	24/19

# MANUAL GEARBOX

## Manual gearbox: Specifications

# 21A

X70 – X83 – X65 – X66 – X73 – X74 – X81

Suffix	1st	2nd	3rd	4th	5th	6th	Final drive	Reverse gear	Tacho-meter
008	11/46	17/38	31/43	41/37	41/29		16/71	27/47	24/18
009	11/46	17/38	31/43	41/37	41/29		16/71	27/47	23/17
010	11/51	17/42	21/32	39/43	39/34		15/73	27/47	23/17
011	11/51	17/38	31/43	41/40	41/31		16/67	27/47	24/18
012	11/46	17/38	31/43	41/37	41/29		16/71	27/47	24/19
013	11/51	17/38	31/43	41/40	41/31		16/67	27/47	24/18
013	11/51	17/38	31/43	41/40	41/31		16/67	27/47	24/18
014	11/46	17/38	31/43	41/37	41/29		16/67	27/47	24/19
015	11/46	17/38	31/43	41/37	41/29		16/71	27/47	24/18
016	11/46	17/38	31/43	41/37	41/29		16/67	27/47	23/17
017	11/46	17/38	31/43	41/37	41/29		16/71	27/47	23/17
018	11/46	17/38	31/43	41/37	41/29		16/71	27/47	23/17
019	11/51	17/38	31/43	41/40	41/31		16/67	27/47	24/18
020	11/46	17/38	31/43	41/37	41/29		16/67	27/47	none
021	11/46	17/38	31/43	41/37	41/29		16/71	27/47	none
022	11/46	17/38	31/43	41/37	41/29		16/71	27/47	none
023	11/46	17/38	31/43	41/37	41/29		16/71	27/47	none

### PK6 gearbox

Suffix	1st	2nd	3rd	4th	5th	6th	Final drive	Reverse gear	Tacho-meter
001	11/43	19/40	31/43	41/40	41/31	47/30	19/64	27/47	none
002	11/43	19/40	31/43	41/40	41/31	47/30	19/64	27/47	none
003	11/43	19/40	29/43	39/43	39/35	41/31	17/64	27/47	none
004	11/43	19/40	31/43	41/40	41/31	47/30	17/64	27/47	none
004	11/43	19/40	31/43	41/40	41/31	47/30	17/64	27/47	none
005	11/43	19/40	31/43	41/40	41/31	47/30	17/64	27/47	none
007	11/43	19/40	31/43	41/40	41:31	47/28	16/67	27/47	24/18
008	11/51	17/38	31/43	41/40	41/31	47/30	16/67	27/47	24/18
009	11/43	19/40	31/43	41/40	41/31	47/30	15/73	27/47	24/18

# MANUAL GEARBOX

## Manual gearbox: Specifications

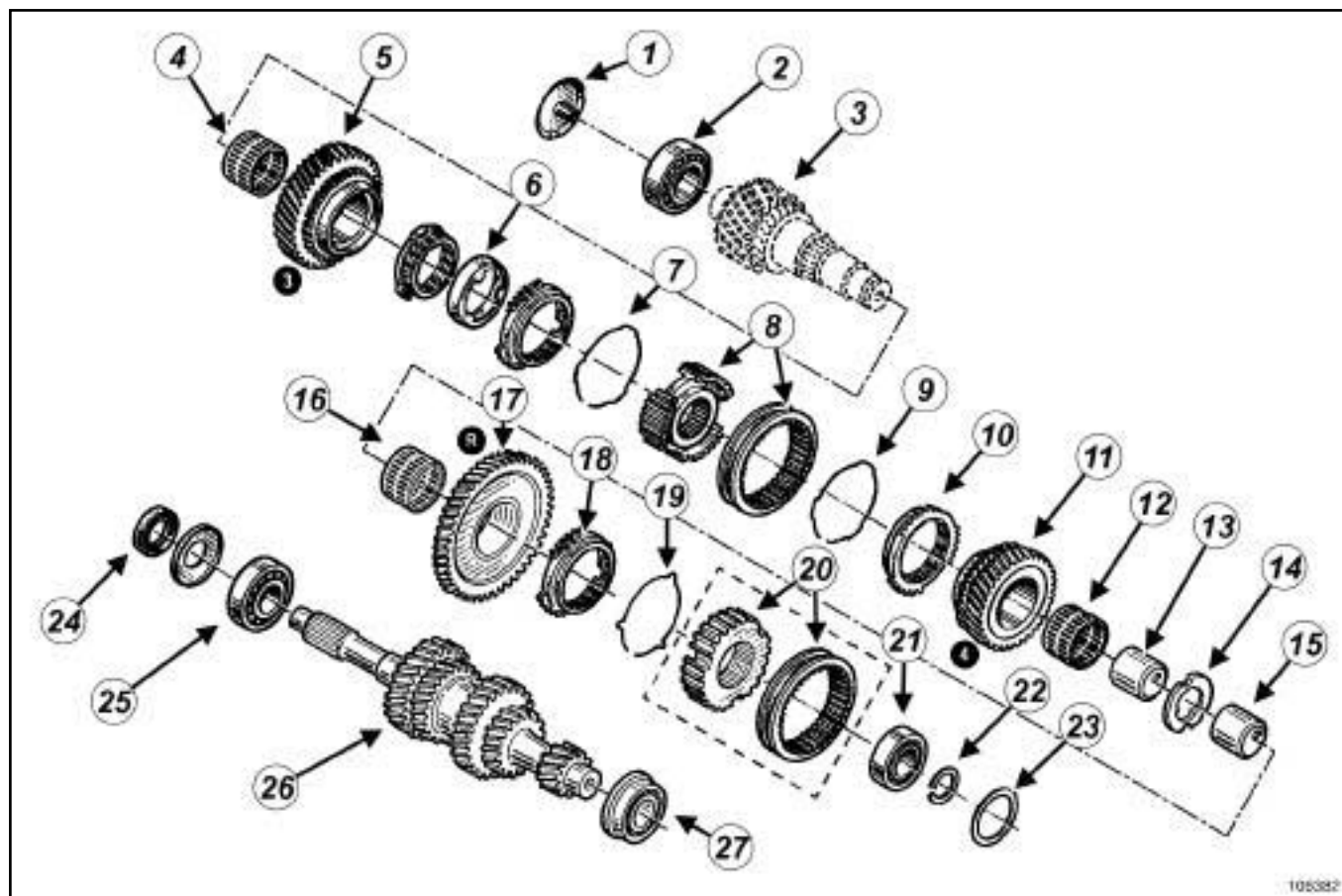
# 21A

X70 – X83 – X65 – X66 – X73 – X74 – X81

Suffix	1st	2nd	3rd	4th	5th	6th	Final drive	Reverse gear	Tacho-meter
010	11/43	19/40	29/43	39/43	39/35	41/32	16/71	27/47	none
011	11/43	19/40	31/43	41/40	41/31	47/30	16/67	27/47	none
012	11/43	19/40	29/43	39/43	39/35	41/31	17/64	27/47	none
013	11/43	19/40	29/43	39/43	39/45	41/31	16/67	27/47	none
014	11/43	19/40	31/43	41/40	41/31	47/30	21/74	27/47	none
015	11/43	19/40	29/43	39/43	39/35	41/31	17/64	27/47	none
016	11/51	19/40	29/43	39/43	39/35	41/31	17/64	27/47	none
017	13/40	21/40	31/43	39/43	39/35	41/31	16/67	27/47	none
018	11/43	19/40	31/43	41/40	41/31	47/30	19/64	27/47	none
019	11/46	17/38	31/43	41/40	41/31	47/30	16/67	27/47	23/17
020	11/46	17/38	31/43	41/40	41/31	47/30	16/71	27/47	23/17
021	11/51	17/38	31/43	41/40	41/31	47/30	16/67	27/47	24/18
022	11/43	19/40	31/43	41/40	41/31	47/30	15/73	27/47	24/18
023	11/51	17/38	31/43	41/40	41/31	47/30	16/71	27/47	24/18
024	11/43	19/40	31/43	41/40	41/31	47/28	16/67	27/47	24/18
025	11/51	17/38	31/43	41/40	41/31	47/30	16/67	27/47	none
026	11/43	19/40	31/43	41/40	41/31	47/30	15/73	27/47	none
027	11/43	19/40	31/43	41/40	41/31	47/28	16/67	27/47	none
028	11/43	19/40	31/43	41/40	41/31	47/28	16/67	27/47	24/18
029	11/46	17/38	31/43	41/40	41/31	47/30	16/67	27/47	none
030	11/46	17/38	31/43	41/40	41/31	47/30	16/71	27/47	none
031	11/51	17/38	31/43	41/40	41/31	47/30	16/71	27/47	none
032	11/43	19/40	31/43	41/40	41/31	47/30	21/74	27/47	none

## Manual gearbox: List and location of components

X70 – X83 – X65 – X66 – X73 – X74 – X81



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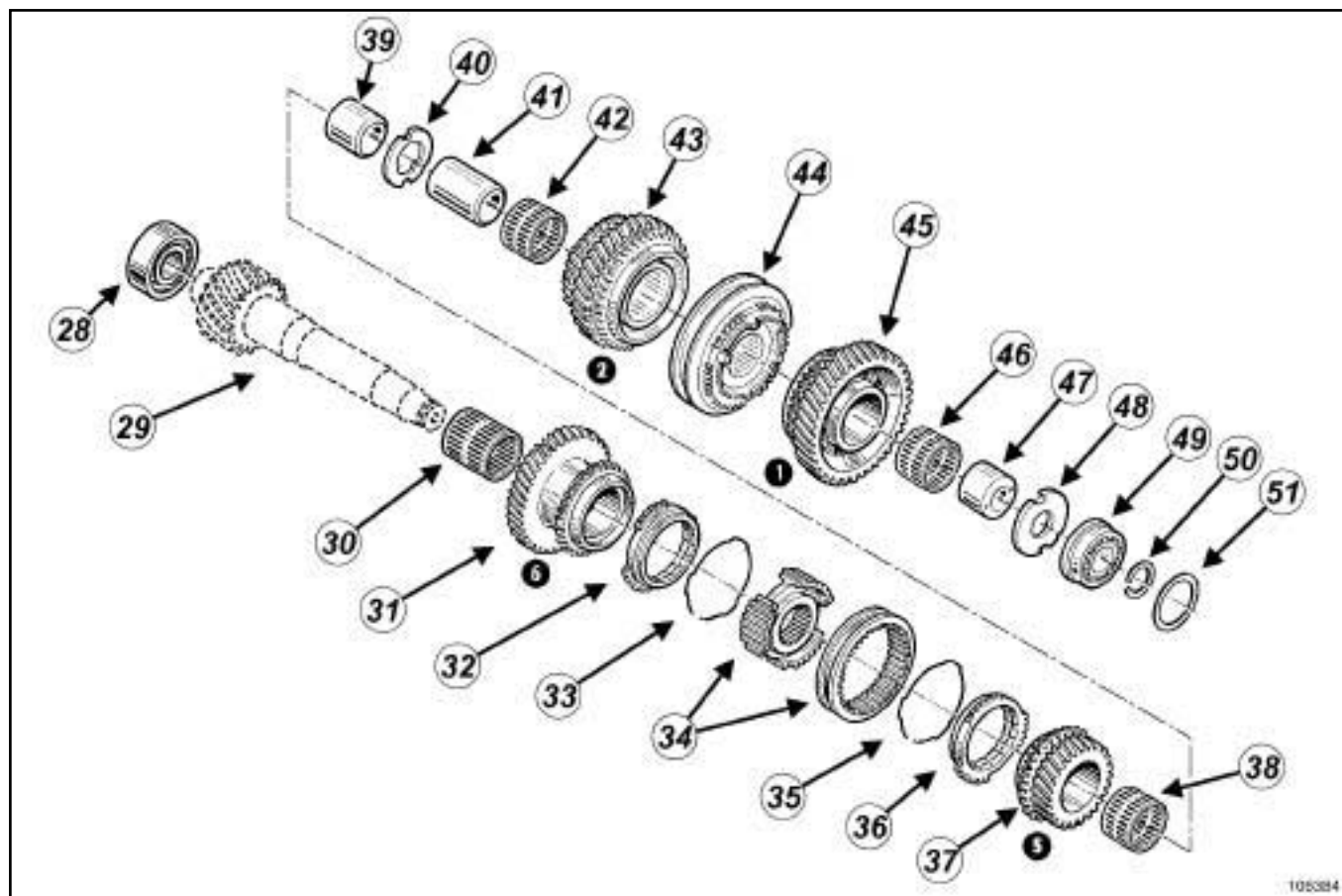
- |      |                                    |
|------|------------------------------------|
| (1)  | Oil deflector                      |
| (2)  | Bearing                            |
| (3)  | Short output shaft                 |
| (4)  | Needle bearing                     |
| (5)  | Third gear sprocket                |
| (6)  | Triple cone synchronisation        |
| (7)  | Synchronising spring               |
| (8)  | Third-fourth gear synchroniser hub |
| (9)  | Synchronising spring               |
| (10) | Synchromesh ring                   |
| (11) | Fourth gear sprocket               |
| (12) | Needle bearing                     |
| (13) | Sprocket supporting ring           |
| (14) | Splined washer                     |
| (15) | Sprocket supporting ring           |
| (16) | Needle bearing                     |
| (17) | Reverse gear sprocket              |
| (18) | Synchromesh ring                   |
| (19) | Synchronising spring               |

- |      |                               |
|------|-------------------------------|
| (20) | Reverse gear synchroniser hub |
| (21) | Bearing                       |
| (22) | Circlip                       |
| (23) | Adjusting shim                |
| (24) | Input shaft inlet seal        |
| (25) | Bearing                       |
| (26) | Primary shaft                 |
| (27) | Bearing                       |



## Manual gearbox: List and location of components

X70 – X83 – X65 – X66 – X73 – X74 – X81



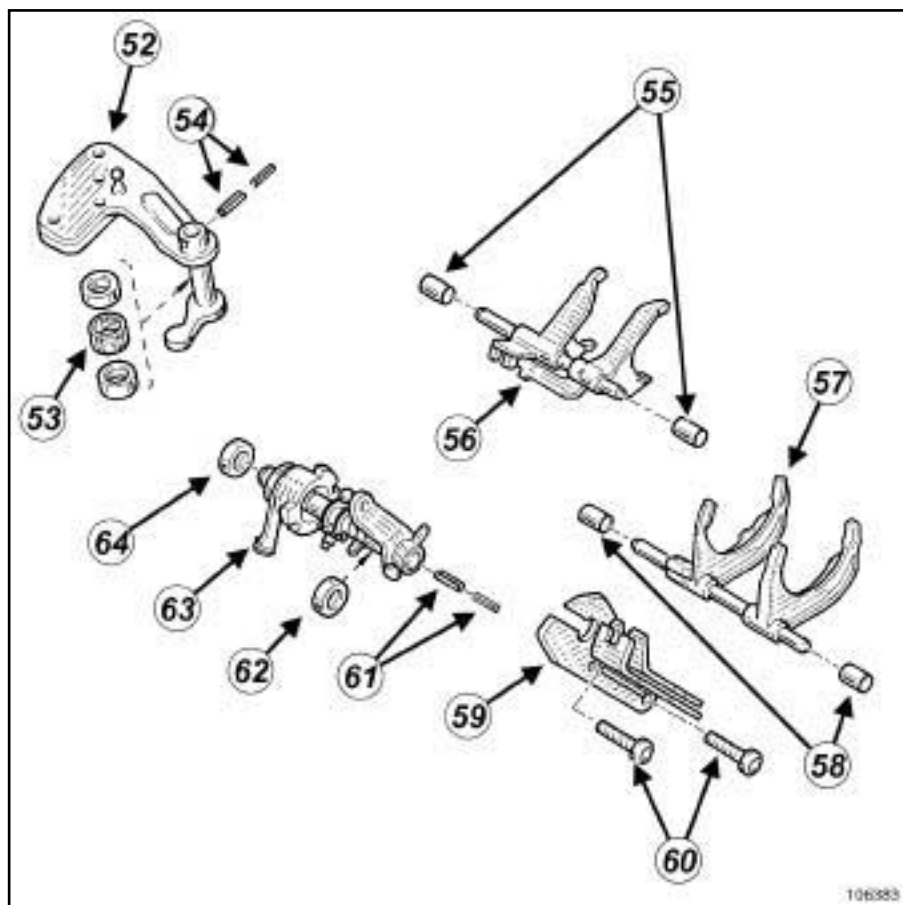
106384

- (28) Bearing
- (29) Long output shaft
- (30) Needle bearing
- (31) Sixth gear sprocket
- (32) Synchromesh ring
- (33) Synchronising spring
- (34) Fifth-sixth gear synchroniser hub
- (35) Synchronising spring
- (36) Synchromesh ring
- (37) Fifth gear sprocket
- (38) Needle bearing
- (39) Sprocket supporting ring
- (40) Splined washer
- (41) Sprocket supporting ring
- (42) Needle bearing
- (43) Second gear sprocket
- (44) First-second gear synchroniser hub
- (45) First gear sprocket

- (46) Needle bearing
- (47) Sprocket supporting ring
- (48) Splined washer
- (49) Bearing
- (50) Circlip
- (51) Adjusting shim

## Manual gearbox: List and location of components

X70 – X83 – X65 – X66 – X73 – X74 – X81



106383

- |   |  |
|---|--|
| <p>(52)</p> <p>(53)</p> <p>(54)</p> <p>(55)</p> <p>(56)</p> <p>(57)</p> <p>(58)</p> <p>(59)</p> <p>(60)</p> <p>(61)</p> <p>(62)</p> <p>(63)</p> <p>(64)</p> | <p>Gear selector lever and shaft</p> <p>Selector shaft rings</p> <p>Retaining pins</p> <p>Selector fork shaft</p> <p>Third-fourth and reverse gear fork</p> <p>First-second and fifth-sixth gear fork</p> <p>Selector fork shaft bush</p> <p>Control reverse switch</p> <p>Control reverse switch bolt</p> <p>Retaining pins</p> <p>Internal control shaft ring</p> <p>Selector module</p> <p>Internal control shaft rings</p> |
|---|--|

# MANUAL GEARBOX

## Manual gearbox: Standard exchange

# 21A

X70 – X83 – X65 – X66 – X73 – X74 – X81

### I - OPERATION FOR REMOVAL OF PART CONCERNED

- ☐ Remove the manual gearbox (see **Manual gearbox: Removal - Refitting**) .

### II - PREPARATION FOR RETURNING THE OLD GEARBOX

- ☐ Drain the residual oil from the old gearbox.
- ☐ Clean the manual gearbox using the **SURFACE CLEANER** (see **Vehicle: Parts and ingredients for the repairwork**) (04B, Consumables - Products).
- ☐ Remove the following parts from the old gearbox (see **21A, Manual gearbox, Mechanism cover: Removal - Refitting**, page 21A-15) :
  - the reverse gear switch,
  - the centring pins,
  - the control cable mounting.
- ☐ Remove the blanking cover caps from the standard gearbox to put them on the old gearbox.
- ☐ Secure the old gearbox on the base plate under the same conditions as the standard replacement gearbox.

### III - REFITTING OPERATION FOR PART CONCERNED

☐

#### WARNING

Failure to observe the following procedure could cause irreparable damage to the manual gearbox.]

- ☐ Take the necessary precautions for refitting the gearbox (see **21A, Manual gearbox, Manual gearbox: Precautions for repair**, page 21A-1)
- ☐ Refit on the standard replacement gearbox (see **21A, Manual gearbox, Mechanism cover: Removal - Refitting**, page 21A-15) :
  - the reverse gear switch,
  - the control cable mounting.
- ☐ Torque tighten (see **21A, Manual gearbox, Mechanism cover: Removal - Refitting**, page 21A-15) :
  - the reverse gear switch,
  - the control mounting.
- ☐ Check that the centring dowels are in place.

- ☐ Prefill the hydraulic stop using a syringe in order to facilitate bleeding.
- ☐ Refit the manual gearbox (see **Manual gearbox: Removal - Refitting**) .
- ☐ Fill the gearbox (see **Manual gearbox oil: Draining - Refilling**) .
- ☐

#### Note:

Refitting the driveshafts requires special care, so it is essential to consult the procedure.

- ☐ Refit the driveshafts (see **Front right-hand wheel driveshaft: Removal - Refitting**) and (see **Front left-hand wheel driveshaft: Removal - Refitting**) .

X70 – X83 – X65 – X66 – X73 – X74 – X81

### IMPORTANT

To avoid all risk of damage to the systems, apply the safety and cleanliness instructions and operation recommendations before carrying out any repair (see **21A, Manual gearbox, Manual gearbox: Precautions for repair**, page 21A-1) .

## REMOVAL

### I - REPAIR PREPARATION OPERATION

- ☐ Remove the gearbox (see **Manual gearbox: Removal - Refitting**) .
- ☐ Position the gearbox on the component support (see **21A, Manual gearbox, Gearbox support equipment: Use**, page 21A-14) .

### II - REMOVAL OPERATION

- ☐ Remove:
  - the mechanism housing (see **21A, Manual gearbox, Mechanism cover: Removal - Refitting**, page 21A-15) ,
  - the gearbox shafts (see **21A, Manual gearbox, Gearbox shaft: Removal - Refitting**, page 21A-20) ,
  - the differential (see **21A, Manual gearbox, Manual gearbox differential: Removal - Refitting**, page 21A-40) .

### III - REPAIR OPERATION

- ☐ Strip:
  - the input shaft (see **21A, Manual gearbox, Input shaft: Stripping - Rebuilding**, page 21A-24) ,
  - the output shafts (see **21A, Manual gearbox, Output shaft: Stripping - Rebuilding**, page 21A-26) .
- ☐ Remove:
  - the differential bearings (see **21A, Manual gearbox, Manual gearbox differential bearing: Removal - Refitting**, page 21A-42) ,
  - the bearings of the mechanism housing (see **21A, Manual gearbox, Pressure plate housing bearing: Removal - Refitting**, page 21A-18) ,
  - the bearings of the clutch housing (see **21A, Manual gearbox, Clutch housing bearing: Removal - Refitting**, page 21A-36) ,
  - the fork shaft rings (see **21A, Manual gearbox, Selector fork shaft ring: Removal - Refitting**, page 21A-38) .
- ☐ Use **SURFACE CLEANER** (see **Vehicle: Parts and ingredients for the repairwork**) to clean all of the removed parts.
- ☐ Check (see **21A, Manual gearbox, Manual gearbox: Check**, page 21A-12) :
  - the pinions (teeth, claws, friction cone, inner wall),
  - the synchroniser hubs,
  - the synchroniser rings,
  - the bearings.
- ☐ Replace worn or damaged parts.

## REFITTING

### I - REFITTING PREPARATION OPERATION

- ☐ Parts always to be replaced:
  - the differential outlet seals,
  - the input shaft output seal,
  - the clutch hydraulic slave cylinder,
  - the pins,
  - the circlips,
  - the selector shaft rings,
  - the fork shaft rings,
  - the selector shaft rings.

X70 – X83 – X65 – X66 – X73 – X74 – X81

### II - REFITTING OPERATION

#### ☐ Refit:

- the fork shaft rings (see **21A, Manual gearbox, Selector fork shaft ring: Removal - Refitting**, page **21A-38**) ,
- the bearings of the clutch housing (see **21A, Manual gearbox, Clutch housing bearing: Removal - Refitting**, page **21A-36**) ,
- the bearings of the mechanism housing (see **21A, Manual gearbox, Pressure plate housing bearing: Removal - Refitting**, page **21A-18**) ,
- the differential bearings (see **21A, Manual gearbox, Manual gearbox differential bearing: Removal - Refitting**, page **21A-42**) .

#### ☐ Rebuild:

- the output shafts (see **21A, Manual gearbox, Output shaft: Stripping - Rebuilding**, page **21A-26**) ,
- the input shaft (see **21A, Manual gearbox, Input shaft: Stripping - Rebuilding**, page **21A-24**) .

#### ☐ Refit:

- the differential (see **21A, Manual gearbox, Manual gearbox differential: Removal - Refitting**, page **21A-40**) ,
- the gearbox shafts (see **21A, Manual gearbox, Gearbox shaft: Removal - Refitting**, page **21A-20**) ,
- the mechanism housing (see **21A, Manual gearbox, Mechanism cover: Removal - Refitting**, page **21A-15**) .

### III - FINAL OPERATION

- ☐ Remove the gearbox from the component support (see **21A, Manual gearbox, Gearbox support equipment: Use**, page **21A-14**) .
- ☐ Refit the gearbox (see **Manual gearbox: Removal - Refitting**) .

# MANUAL GEARBOX

## Manual gearbox: Check

# 21A

X70 – X83 – X65 – X66 – X73 – X74 – X81

### IMPORTANT

To avoid all risk of damage to the systems, apply the safety and cleanliness instructions and operation recommendations before carrying out any repair (see **21A, Manual gearbox, Manual gearbox: Precautions for repair, page 21A-1**).

### I - PREPARATION OPERATION FOR CHECK

Remove the gearbox (see **Manual gearbox: Removal - Refitting**).

Position the gearbox on the component support (see **21A, Manual gearbox, Gearbox support equipment: Use, page 21A-14**).

Remove:

- the mechanism housing (see **21A, Manual gearbox, Mechanism cover: Removal - Refitting, page 21A-15**),
- the gearbox shafts (see **21A, Manual gearbox, Gearbox shaft: Removal - Refitting, page 21A-20**).

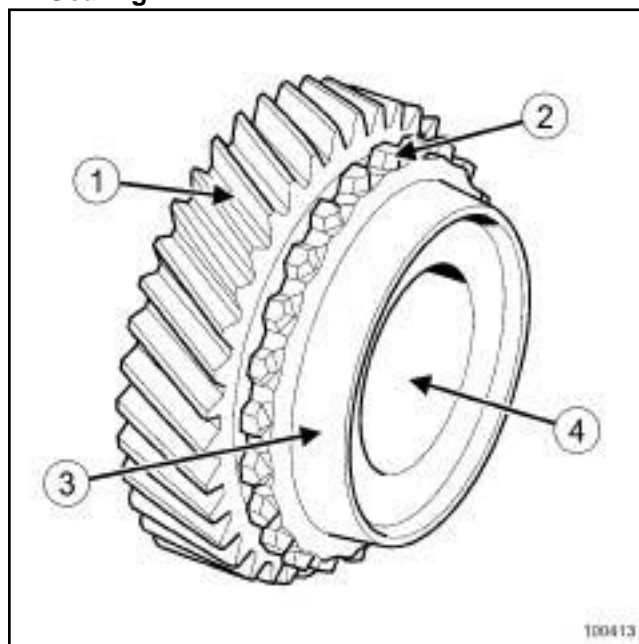
Strip:

- the input shaft (see **Primary shaft : Removal - Refitting**),
- the output shafts (see **Output shaft: Removal - Refitting**).

Before any checks, clean the parts concerned (see **21A, Manual gearbox, Manual gearbox: Precautions for repair, page 21A-1**).

### II - CHECK OPERATION

#### 1 - Gearing



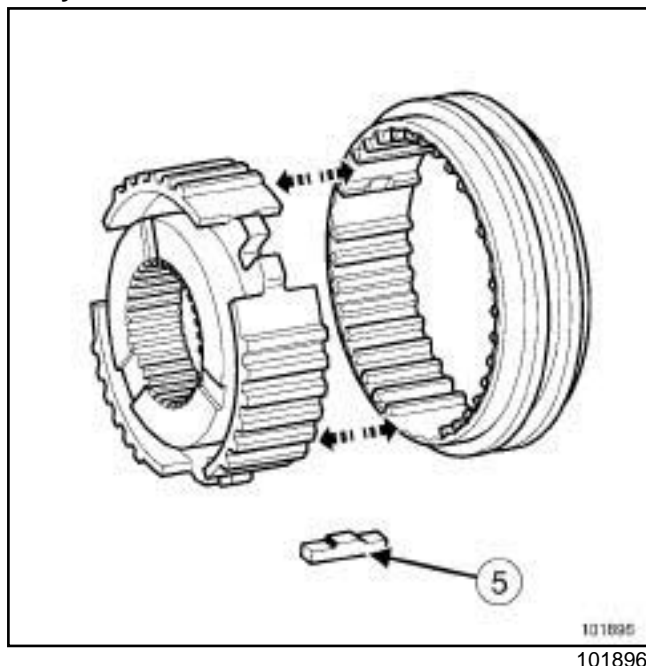
When checking, make sure that you pay particular attention to the appearance of the teeth, especially that of the chamfers and claws.

Check that:

- the teeth (1) are not broken or chipped,
- the claws (2) are not broken, chipped or worn,
- the friction cone (3) shows no scratches or blueness,
- the inner wall (4) shows no sign of sticking or wear.

X70 – X83 – X65 – X66 – X73 – X74 – X81

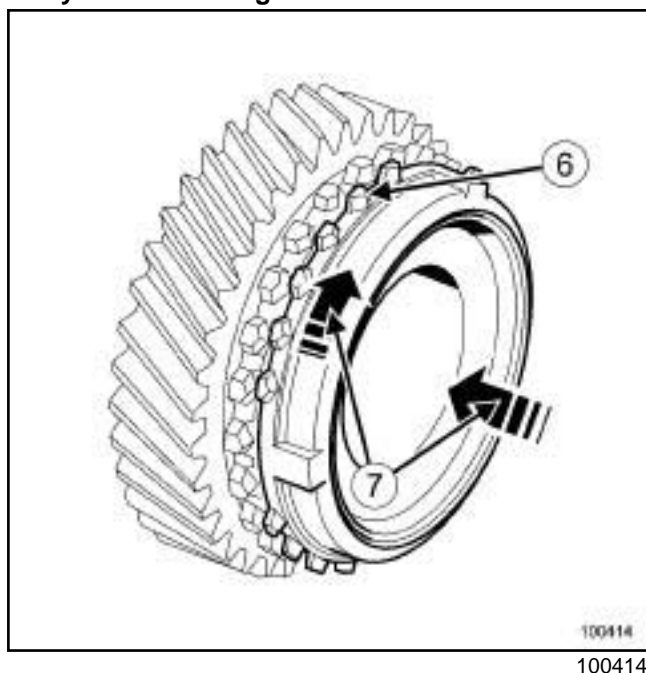
### 2 - Synchroniser hub



Check:

- the selector rod slides into the hub without any problem,
- that the collets (5) are in good condition.

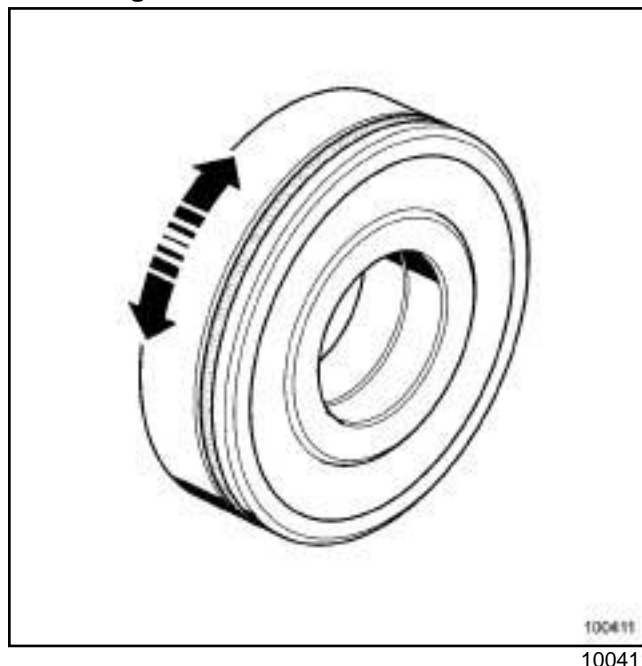
### 3 - Synchroniser ring



Check that the dog teeth (6) show no sign of wear or any fractures.

To check that the synchroniser ring is working correctly, push the ring on the friction cone and rotate (7) : the ring should not turn. Otherwise, replace the synchroniser ring.

### 4 - Bearings



Check:

- that the bearings rotate correctly,
- the lateral play.

Note:

If the bearing rotation is unequal and/or noisy, or if the bearing has play, replace the bearing.

### III - FINAL OPERATION

Rebuild:

- the output shafts (see **Output shaft: Removal - Refitting**) ,
- the input shaft (see **Primary shaft : Removal - Refitting**) .

Refit:

- the gearbox shafts (see **21A, Manual gearbox, Gearbox shaft: Removal - Refitting**, page 21A-20) ,
- the mechanism housing (see **21A, Manual gearbox, Mechanism cover: Removal - Refitting**, page 21A-15) .

Remove the gearbox from the component support (see **21A, Manual gearbox, Gearbox support equipment: Use**, page 21A-14) .

Refit the gearbox (see **Manual gearbox: Removal - Refitting**) .

# MANUAL GEARBOX

## Gearbox support equipment: Use

# 21A

X70 – X83 – X65 – X66 – X73 – X74 – X81

**Essential special tooling**Essential special toolingEssential special tooling

**Bvi. 1417** Housing support.

**Essential equipment**Essential equipment

component support

workshop hoist

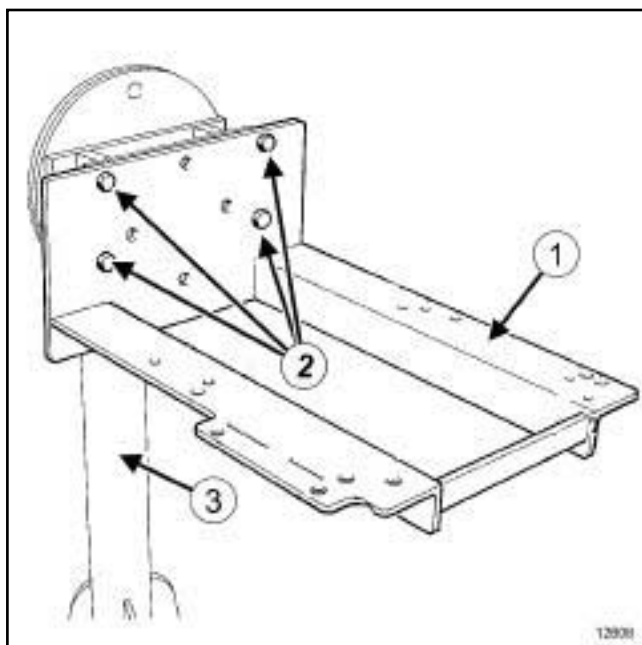
### IMPORTANT

To work on the gearbox in complete safety, it is essential to use a component support.

### I - PREPARATION OPERATION FOR FITTING THE GEARBOX ON THE COMPONENT SUPPORT

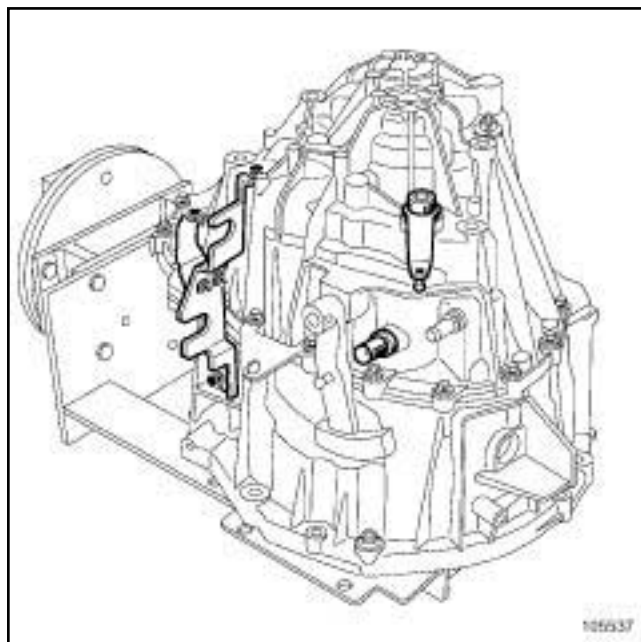
- ☐ Remove the gearbox (see **Manual gearbox: Removal - Refitting**) .

### II - OPERATION FOR FITTING THE GEARBOX ON THE COMPONENT SUPPORT



12608

- ☐ Fit the gearbox stand plate (**Bvi. 1417**) (1) on a **component support** (3) using the bolts (2) .



105537

- ☐ Fit the gearbox on the stand plate using the **workshop hoist**.
- ☐ Secure the gearbox on the stand plate using bolts and nuts.

### III - OPERATION FOR REMOVING THE GEARBOX FROM THE COMPONENT SUPPORT

- ☐ Remove:
  - the bolts and nuts from the gearbox on the stand plate,
  - the gearbox from the component support using the **workshop hoist**,
  - the stand plate (**Bvi. 1417**) from the component support.

### IV - FINAL OPERATION

- ☐ Refit the gearbox (see **Manual gearbox: Removal - Refitting**) .



# MANUAL GEARBOX

## Mechanism cover: Removal - Refitting

# 21A

X70 – X83 – X65 – X66 – X73 – X74 – X81

### Essential special toolingEssential special toolingEssential special tooling

**Emb. 1797** 24 mm socket for removing and refitting clutch master cylinder

### Tightening torques

mechanism housing bolts	28 N.m
-------------------------	--------

control mounting bolts	23 N.m
------------------------	--------

reverse gear switch	22 N.m
---------------------	--------

### Note:

Consult the safety and cleanliness advice and operation recommendations before carrying out any repair (see **21A, Manual gearbox, Manual gearbox: Precautions for repair, page 21A-1**).

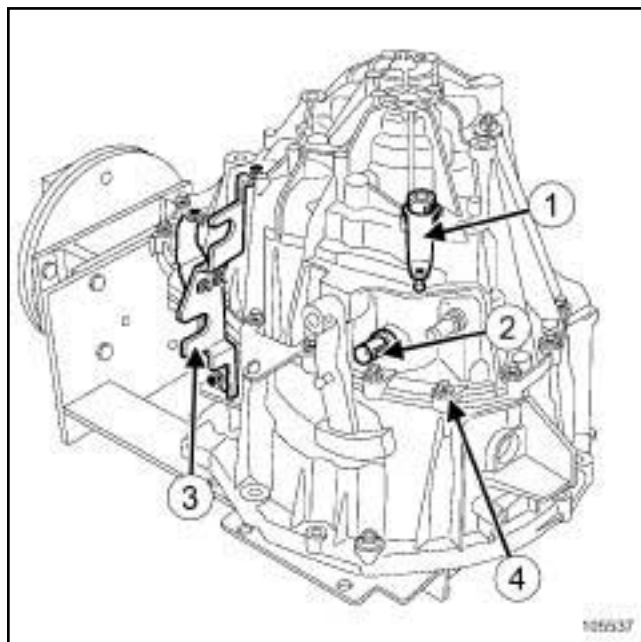
## REMOVAL

### I - REMOVAL PREPARATION OPERATION

- ☐ Remove the manual gearbox (see **Manual gearbox: Removal - Refitting**).
- ☐ Position the gearbox on the component support (see **21A, Manual gearbox, Gearbox support equipment: Use, page 21A-14**).

### II - OPERATION FOR REMOVAL OF PART CONCERNED

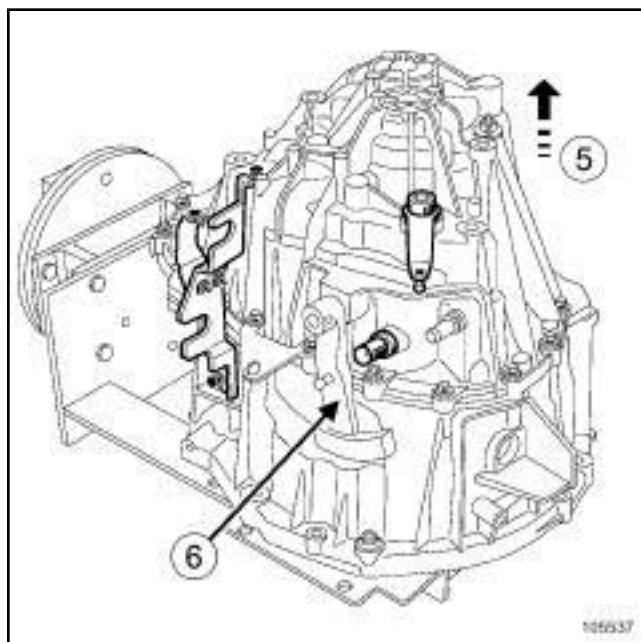
- ☐ Remove the clutch slave cylinder (see **Clutch thrust bearing: Removal - Refitting**).



105537

### ☐ Remove:

- the gear lever (1) ,
- the reversing lights switch (2) ,
- the control cable mounting (3) ,
- the gearbox bell housing bolts (4) .



105537

- ☐ Remove the housing upwards according to the arrow (5) while pivoting the shift lever (6) .

# MANUAL GEARBOX

## Mechanism cover: Removal - Refitting

# 21A

X70 – X83 – X65 – X66 – X73 – X74 – X81

### REFITTING

#### I - REFITTING PREPARATION OPERATION

- ❑ Clean the joint faces of the mechanism housing using **SUPER CLEANING AGENT FOR JOINT FACES** (see **Vehicle: Parts and ingredients for the repairwork**) (04B, Consumables - Products).

#### WARNING

Do not scrape the joint faces of the aluminium, any damage caused to the joint face will result in a risk of leaks.

- ❑ Remove the residue using a plastic spatula.
- ❑ Finish cleaning the joint faces using a **GREY ABRASIVE PAD** part number **77 01 405 943**.
- ❑ Use **SURFACE CLEANER** (see **Vehicle: Parts and ingredients for the repairwork**) (04B, Consumables - Products) to clean:
  - the joint face of the mechanism housing and the clutch housing,
  - the mechanism housing.

#### WARNING

To ensure proper sealing, the gasket surfaces must be clean, dry and not greasy (avoid any finger marks).

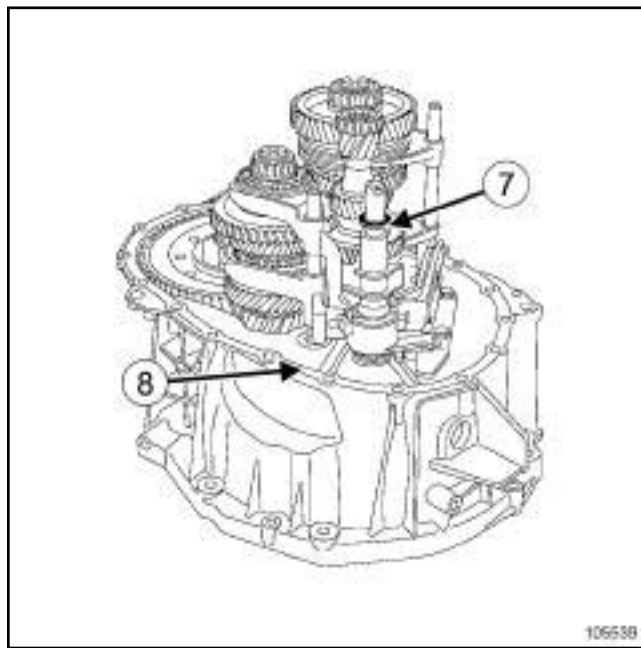
#### WARNING

Applying excess sealant could cause it to be squeezed out when parts are tightened. A mixture of sealant and fluid may cause damage to some components.

- ❑ Parts always to be replaced:
  - the differential outlet seals,
  - the input shaft output seal,
  - the circlips,
  - the pins,
  - the fork shaft rings,
  - the hydraulic clutch slave cylinder.

#### II - REFITTING OPERATION FOR PART CONCERNED

- ❑ Adjust the shafts (see **21A, Manual gearbox, Gearbox shaft: Adjustment**, page **21A-33**) if replacing parts such as the gear supporting rings or the synchroniser hubs.



105539

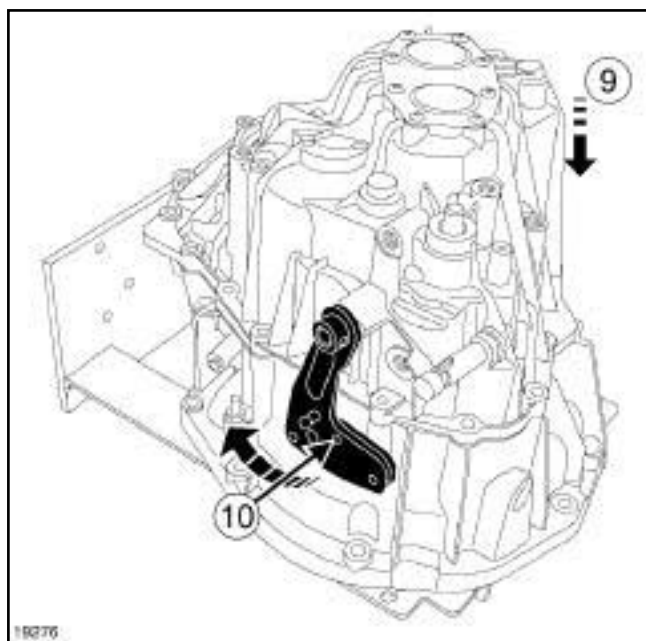
- ❑ Check that the calibration washer (7) is in place.
- ❑ Apply a bead of **SILICONE ADHESIVE** (see **Vehicle: Parts and ingredients for the repairwork**) to the joint face of the mechanism housing. (8)

# MANUAL GEARBOX

## Mechanism cover: Removal - Refitting

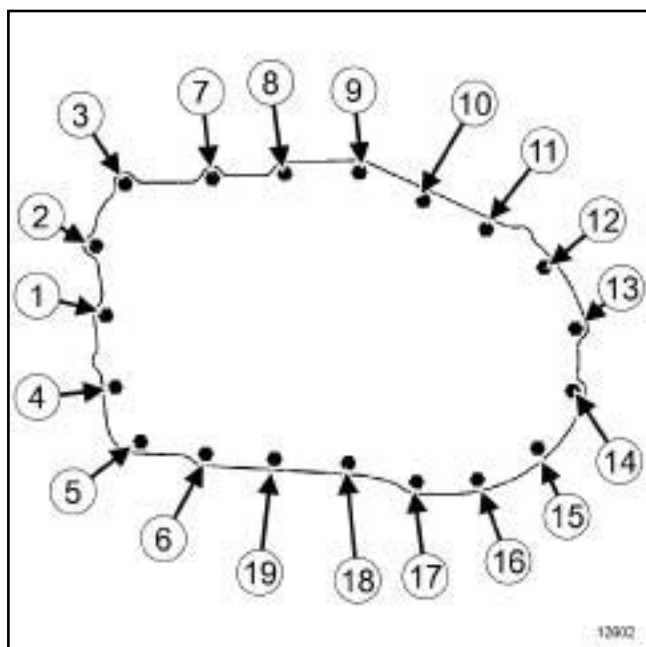
# 21A

X70 – X83 – X65 – X66 – X73 – X74 – X81



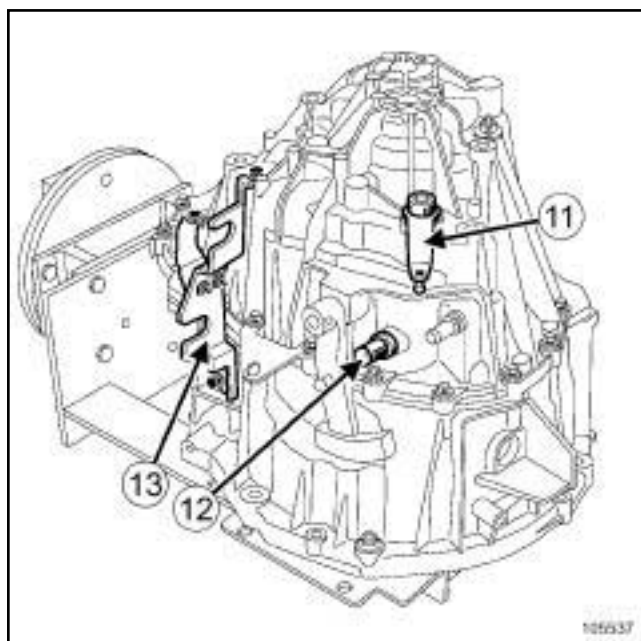
19276

- ❑ Refit the mechanism housing according to the arrow (9) by tilting the shift lever (10) to engage the lever finger in the control module.



12602

- ❑ Refit the mechanism housing bolts and finger tighten them.
- ❑ Pretighten the bolts (2) and (14) to **10 N.m**.
- ❑ Turn the input shaft while shifting through all the gears to ensure that the bearings are correctly fitted.
- ❑ Torque tighten in order the **mechanism housing bolts (28 N.m)**.



105537

- ❑ Refit:

- the gear lever (11) ,
- the reverse gear switch (12) ,
- the control cable mounting (13) .

### Note:

Failure to respect the tightening torque of the reverse gear switch could prevent reverse gear from being engaged.

- ❑ Torque tighten:

- the **control mounting bolts (23 N.m)**.
- the **reverse gear switch (22 N.m)** using the tool (Emb. 1797).

- ❑ Refit:

- the input shaft lip seal (see **Input shaft lip seal: Removal - Refitting**) ,
- the differential output seals (see **Differential output seal: Removal - Refitting**) ,
- the clutch slave cylinder (see **Clutch thrust bearing: Removal - Refitting**) .

### III - FINAL OPERATION

- ❑ Remove the gearbox from the component support (see **21A, Manual gearbox, Gearbox support equipment: Use**, page 21A-14) .
- ❑ Refit the gearbox (see **Manual gearbox: Removal - Refitting**) .

## Pressure plate housing bearing: Removal - Refitting

X70 – X83 – X65 – X66 – X73 – X74 – X81

**Essential special tooling**

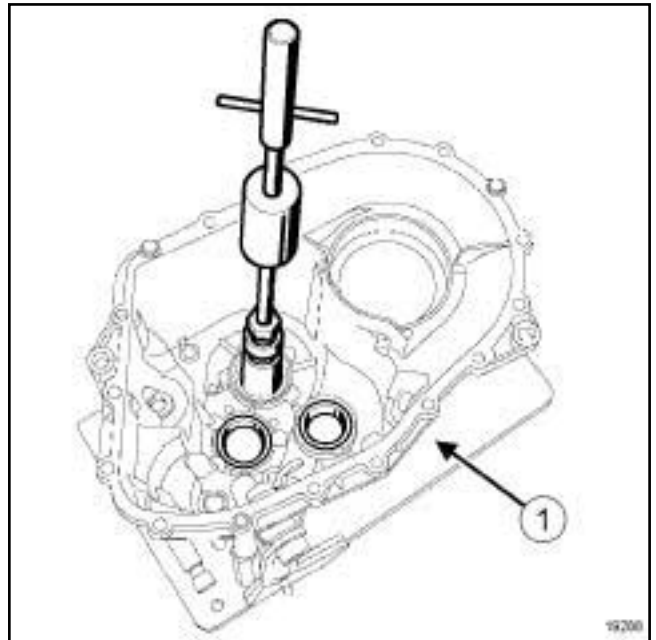
<b>Bvi. 1417</b>	Housing support.
<b>Bvi. 1418</b>	Adjustable support for fitting bearings.
<b>Bvi. 1419</b>	Bearing cage positioning tool.
<b>Bvi. 1510</b>	Tool kit for PF gearbox operations.

**IMPORTANT**

To avoid all risk of damage to the systems, apply the safety and cleanliness instructions and operation recommendations before carrying out any repair (see **21A, Manual gearbox, Manual gearbox: Precautions for repair, page 21A-1**).

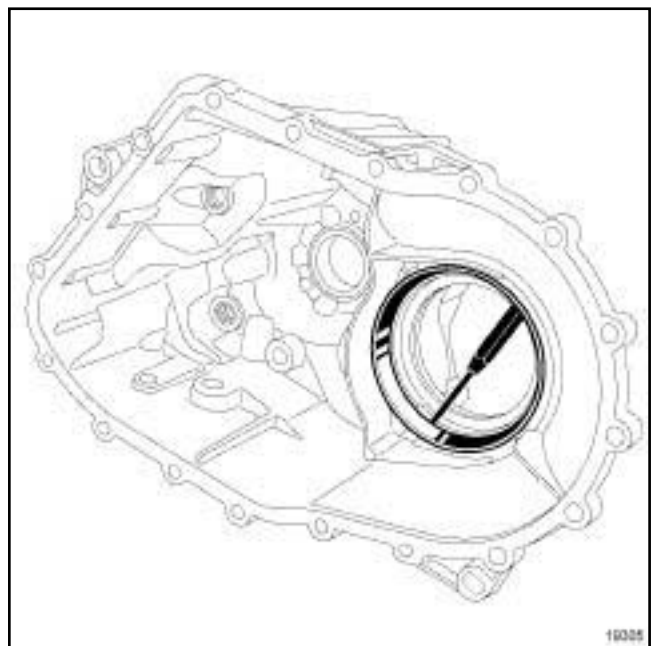
**REMOVAL****I - REMOVAL PREPARATION OPERATION**

- ☐ Remove the gearbox (see **Manual gearbox: Removal - Refitting**).
- ☐ Position the gearbox on the component support (see **21A, Manual gearbox, Gearbox support equipment: Use, page 21A-14**).
- ☐ Remove the mechanism housing (see **21A, Manual gearbox, Mechanism cover: Removal - Refitting, page 21A-15**).

**II - OPERATION FOR REMOVAL OF PART CONCERNED**

19288

- ☐ Position the mechanism housing using the tool (**Bvi. 1417**) (1) and secure it with bolts.
- ☐ Remove the three bearing cups on the input and output shafts, using a slide hammer puller with a diameter of **42 mm**.
- ☐ Mark, and be sure not to mix up the adjusting shims positioned under the cups.



19305

- ☐ Remove the large bearing cup on the differential using a drift.

## Pressure plate housing bearing: Removal - Refitting

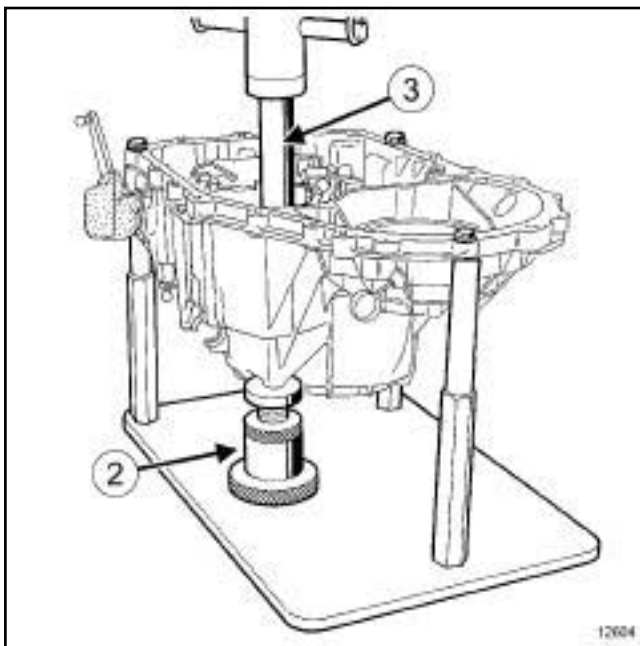
X70 – X83 – X65 – X66 – X73 – X74 – X81

### REFITTING

#### I - REFITTING PREPARATION OPERATION

- ❑ Use **SURFACE CLEANER** to clean (see **Vehicle: Parts and ingredients for the repairwork**) :
  - the bearing mating faces in the mechanism housing,
  - the mechanism housing,
  - the shafts.
- ❑ Parts always to be replaced:
  - the removed bearings,
  - the differential outlet seals,
  - the input shaft output seal,
  - the pins,
  - the circlips,
  - the hydraulic clutch slave cylinder.

#### II - REFITTING OPERATION FOR PART CONCERNED

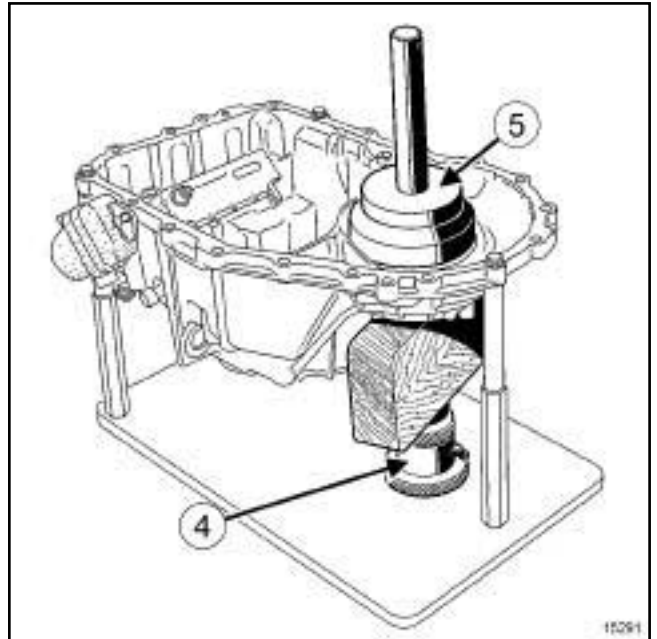


12604

- ❑ Position the tool **(Bvi. 1418)** (2) under the mechanism housing corresponding to each shaft line.

Position the adjusting shims corresponding to each shaft line.

Refit the bearing cups of the input and output shafts using the tool **(Bvi. 1419)** (3) .



15291

- ❑ Mount **(Bvi. 1418)** (4) under the mechanism housing.
- ❑ Refit the large differential bearing cup using the tool **(Bvi. 1510) suffix H** (5) .

#### III - FINAL OPERATION

- ❑ Refit the mechanism housing (see **21A, Manual gearbox, Mechanism cover: Removal - Refitting, page 21A-15**) .
- ❑ Remove the gearbox from the component support (see **21A, Manual gearbox, Gearbox support equipment: Use, page 21A-14**) .
- ❑ Refit the gearbox (see **Manual gearbox: Removal - Refitting**) .

# MANUAL GEARBOX

## Gearbox shaft: Removal - Refitting

# 21A

X70 – X83 – X65 – X66 – X73 – X74 – X81

### Tightening torques

control reversing switch bolts	23 N.m
--------------------------------	--------

### IMPORTANT

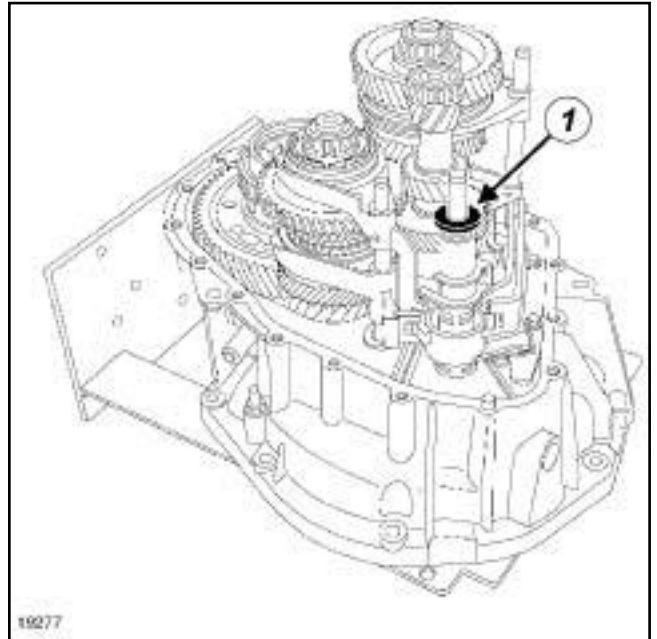
To avoid all risk of damage to the systems, apply the safety and cleanliness instructions and operation recommendations before carrying out any repair (see **21A, Manual gearbox, Manual gearbox: Precautions for repair, page 21A-1**).

## REMOVAL

### I - REMOVAL PREPARATION OPERATION

- ☐ Remove the gearbox (see **Manual gearbox: Removal - Refitting**).
- ☐ Position the gearbox on the component support (see **21A, Manual gearbox, Gearbox support equipment: Use, page 21A-14**).
- ☐ Remove the mechanism housing (see **21A, Manual gearbox, Mechanism cover: Removal - Refitting, page 21A-15**).

### II - OPERATION FOR REMOVAL OF PART CONCERNED

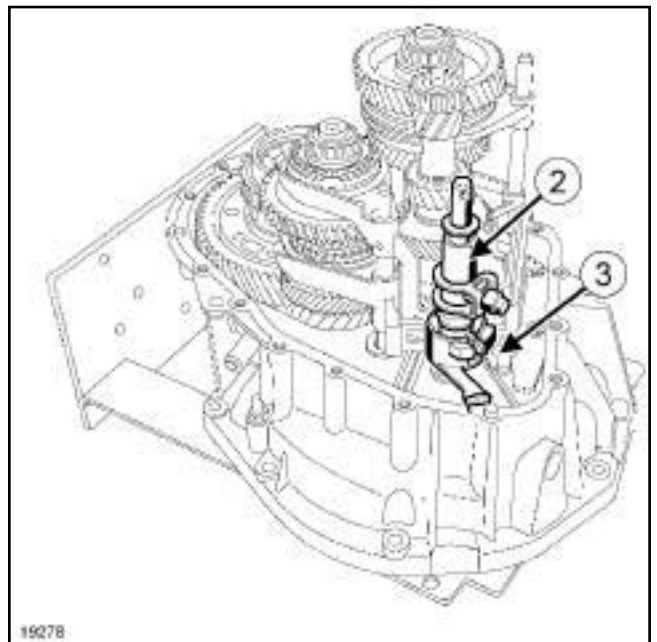


☐

#### Note:

The washer is supplied with the selector module, it can stay attached to the housing.

- ☐ Recover the adjusting washer (1) of the selector module.



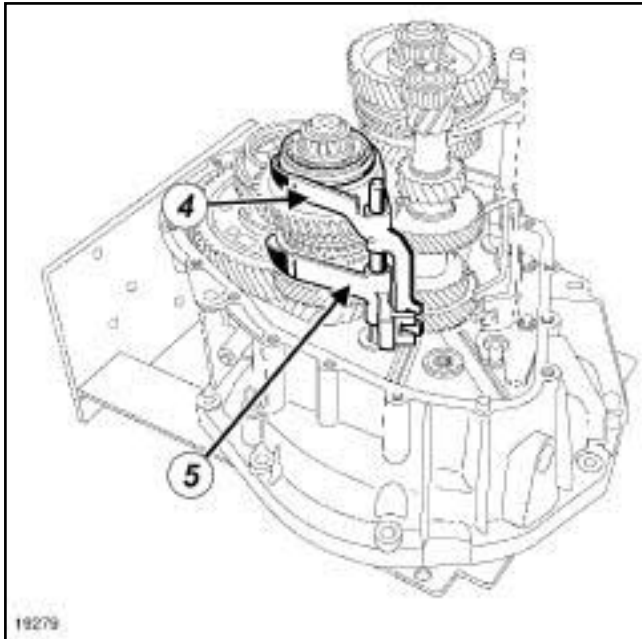
- ☐ Pivot the selector module (2) while removing the spring above the return bushing (3) and remove the module from the top.

# MANUAL GEARBOX

## Gearbox shaft: Removal - Refitting

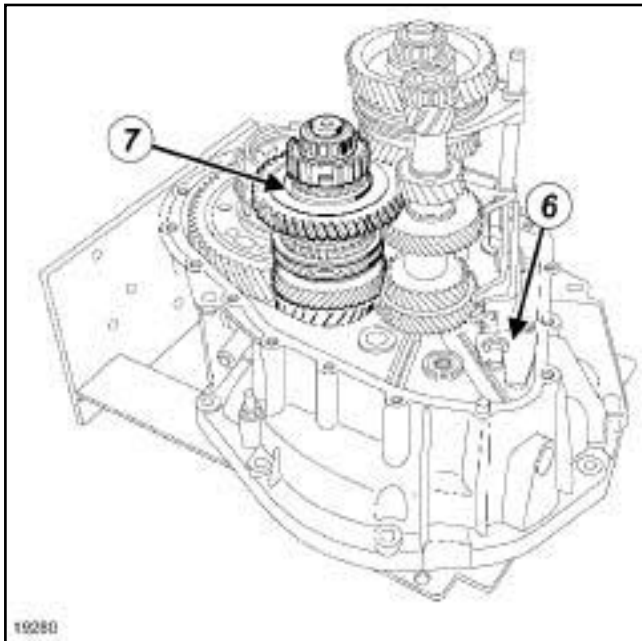
# 21A

X70 – X83 – X65 – X66 – X73 – X74 – X81



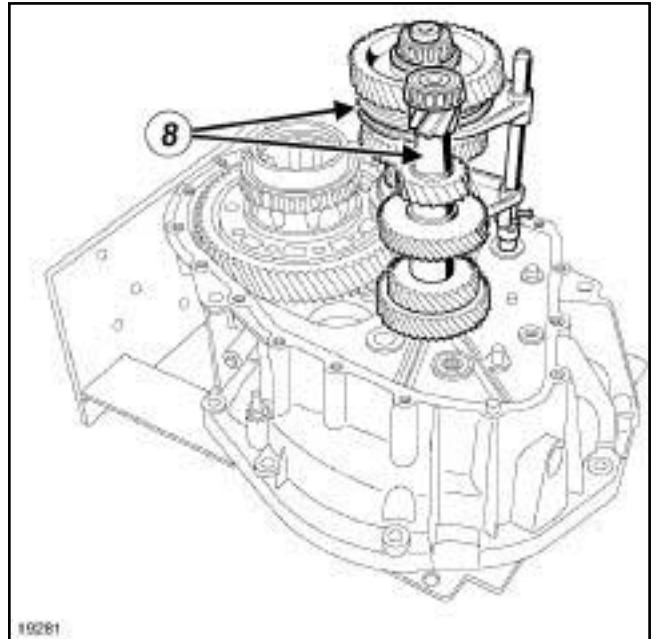
19279

- ❑ Remove the reverse gear shaft and selector assembly (4) and the third - fourth gear fork (5) .



19280

- ❑ Remove:
  - the control reversing switch (6) ,
  - the short output shaft (7) .



19281

- ❑ Remove the long output shaft assembly with the fork and the input shaft (8) .

## REFITTING

### I - REFITTING PREPARATION OPERATION

- ❑ Parts always to be replaced when they have been removed:
  - the lock rings,
  - the differential output seals,
  - the input shaft output seal,
  - the pins,
  - the clutch slave cylinder.
- ❑ Use **SURFACE CLEANER** (see **Vehicle: Parts and ingredients for the repairwork**) (04B, Consumables - Products) to clean:
  - the shafts,
  - the shaft mating surfaces,
  - the mechanism housing.

### II - REFITTING OPERATION FOR PART CONCERNED

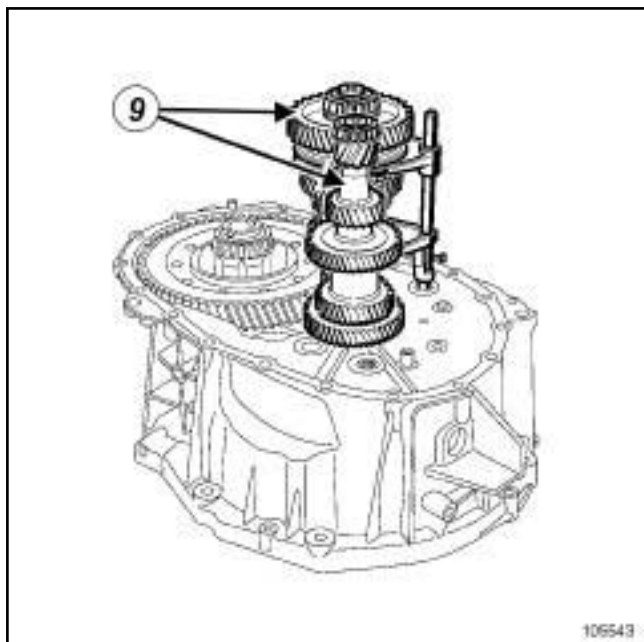
- ❑ Adjust the shafts (see **21A, Manual gearbox, Gearbox shaft: Adjustment**, page **21A-33**) if replacing parts such as the gear supporting rings or the synchroniser hubs.

# MANUAL GEARBOX

## Gearbox shaft: Removal - Refitting

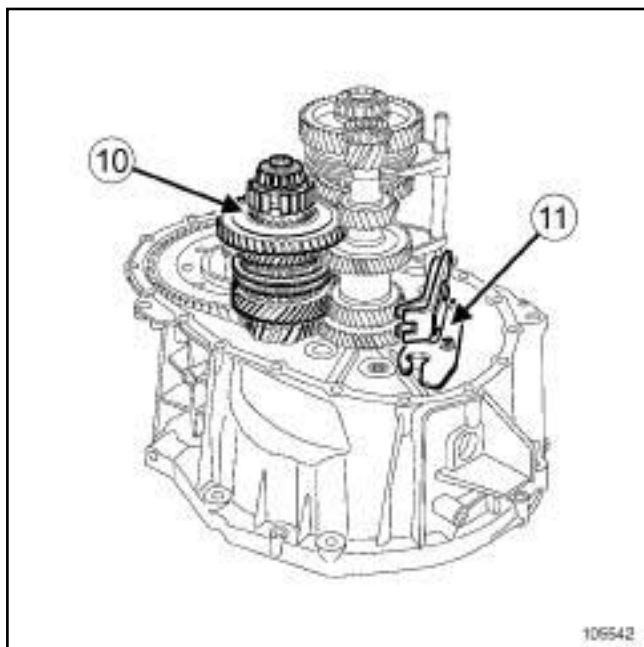
# 21A

X70 – X83 – X65 – X66 – X73 – X74 – X81



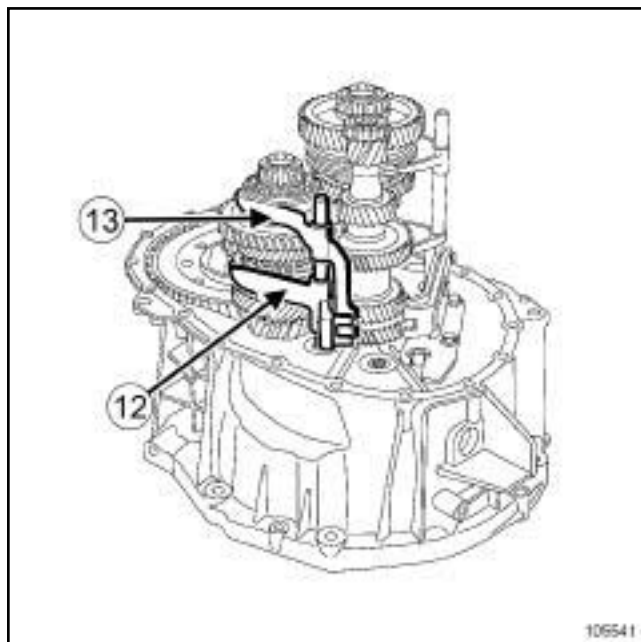
105543

- ❑ Refit the long output shaft assembly with the fork and the input shaft (9)



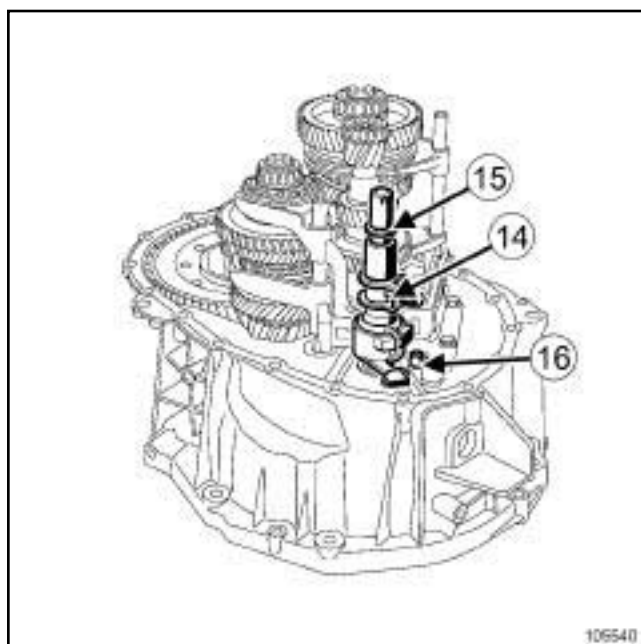
105542

- ❑ Refit:
  - the short output shaft (10) ,
  - the control reversing switch (11) .
- ❑ Torque tighten the **control reversing switch bolts (23 N.m)**.



105541

- ❑ Fit:
  - the third - fourth gear fork (12) ,
  - the «reverse gear synchroniser hub and fork assembly» (13) .



105540

- ❑ Refit:
  - the control module (14) and in the third - fourth gear position, fit the return spring over the retaining bushing (16) ,
  - the calibration washer (15) .



# MANUAL GEARBOX

## Gearbox shaft: Removal - Refitting

# 21A

X70 – X83 – X65 – X66 – X73 – X74 – X81

### III - FINAL OPERATION

- ☐ Refit the mechanism housing (see **21A, Manual gearbox, Mechanism cover: Removal - Refitting, page 21A-15**) .
- ☐ Remove the gearbox from the component support (see **21A, Manual gearbox, Gearbox support equipment: Use, page 21A-14**) .
- ☐ Refit the gearbox (see **Manual gearbox: Removal - Refitting**) .

# MANUAL GEARBOX

## Input shaft: Stripping - Rebuilding

# 21A

X70 – X83 – X65 – X66 – X73 – X74 – X81

**Essential special tooling**Essential special toolingEssential special tooling

**Bvi. 1510-01** Tool kit for PK6 gearbox operations.

### IMPORTANT

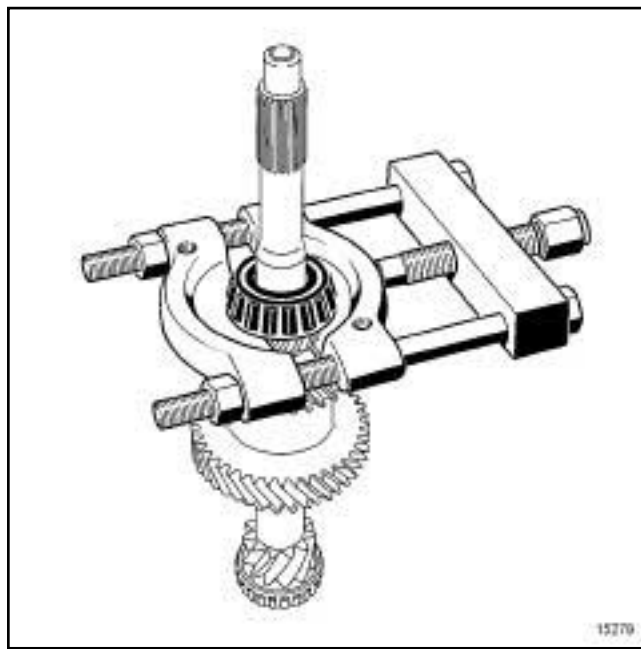
To avoid all risk of damage to the systems, apply the safety and cleanliness instructions and operation recommendations before carrying out any repair (see **21A, Manual gearbox, Manual gearbox: Precautions for repair, page 21A-1**) .

## STRIPPING

### I - STRIPPING PREPARATION OPERATION

- ☐ Remove the gearbox (see **Manual gearbox: Removal - Refitting**) .
- ☐ Position the gearbox on the component support (see **21A, Manual gearbox, Gearbox support equipment: Use, page 21A-14**) .
- ☐ Remove:
  - the mechanism housing (see **21A, Manual gearbox, Mechanism cover: Removal - Refitting, page 21A-15**) ,
  - the gearbox shafts (see **21A, Manual gearbox, Gearbox shaft: Removal - Refitting, page 21A-20**) .

### II - STRIPPING OPERATION FOR PART CONCERNED



15279

- ☐ Remove the bearings using a press and separator.

## REASSEMBLING

### I - REBUILDING PREPARATION OPERATION

- ☐ Parts always to be replaced when they have been removed:
  - the circlips,
  - the differential output seals,
  - the input shaft output seal,
  - the pins,
  - the hydraulic clutch slave cylinder.
- ☐ Use **SURFACE CLEANER** (see **Vehicle: Parts and ingredients for the repairwork**) (04B, Consumables - Products) to clean:
  - the shafts,
  - the shaft mating surfaces,
  - the mechanism housing.

### II - REBUILDING OPERATION FOR PART CONCERNED

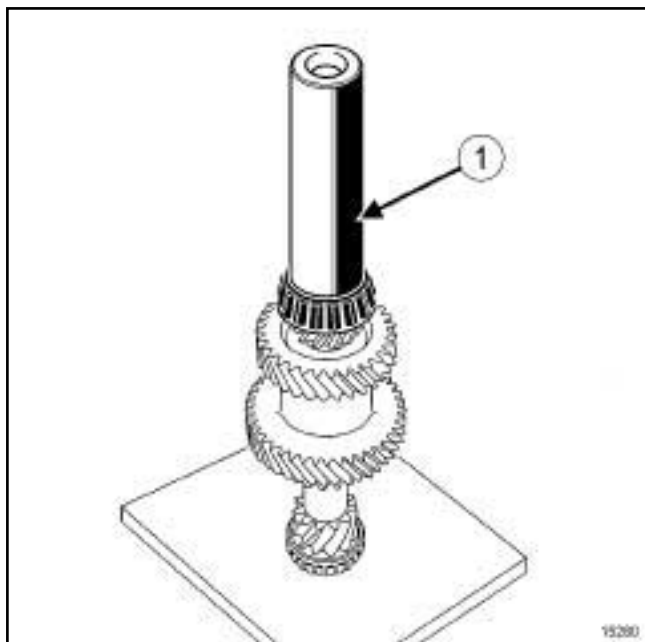
- ☐ Adjust the shafts (see **21A, Manual gearbox, Gearbox shaft: Adjustment, page 21A-33**) if replacing parts such as the gear supporting rings or the synchroniser hubs.

# MANUAL GEARBOX

## Input shaft: Stripping - Rebuilding

# 21A

X70 – X83 – X65 – X66 – X73 – X74 – X81



15280

- ☐ Refit the bearings using the **(Bvi. 1510-01) suffix M (1)** .

### III - FINAL OPERATION

- ☐ Refit:
  - the gearbox shafts (see **21A, Manual gearbox, Gearbox shaft: Removal - Refitting**, page 21A-20) ,
  - the mechanism housing (see **21A, Manual gearbox, Mechanism cover: Removal - Refitting**, page 21A-15) .
- ☐ Remove the gearbox from the component support (see **21A, Manual gearbox, Gearbox support equipment: Use**, page 21A-14) .
- ☐ Refit the gearbox (see **Manual gearbox: Removal - Refitting**) .

## Output shaft: Stripping - Rebuilding

X70 – X83 – X65 – X66 – X73 – X74 – X81

### Essential special toolingEssential special toolingEssential special tooling

**Bvi. 1510-01** Tool kit for PK6 gearbox operations.

### IMPORTANT

To avoid all risk of damage to the systems, apply the safety and cleanliness instructions and operation recommendations before carrying out any repair (see **21A, Manual gearbox, Manual gearbox: Precautions for repair, page 21A-1**).

## STRIPPING

### I - STRIPPING PREPARATION OPERATION

- ☐ Remove the gearbox (see **Manual gearbox: Removal - Refitting**).
- ☐ Position the gearbox on the component support (see **21A, Manual gearbox, Gearbox support equipment: Use, page 21A-14**).
- ☐ Remove:
  - the mechanism housing (see **21A, Manual gearbox, Mechanism cover: Removal - Refitting, page 21A-15**),
  - the gearbox shafts (see **21A, Manual gearbox, Gearbox shaft: Removal - Refitting, page 21A-20**).

### II - STRIPPING OPERATION FOR PART CONCERNED

#### 1 - Removing the long output shaft gearing

☐

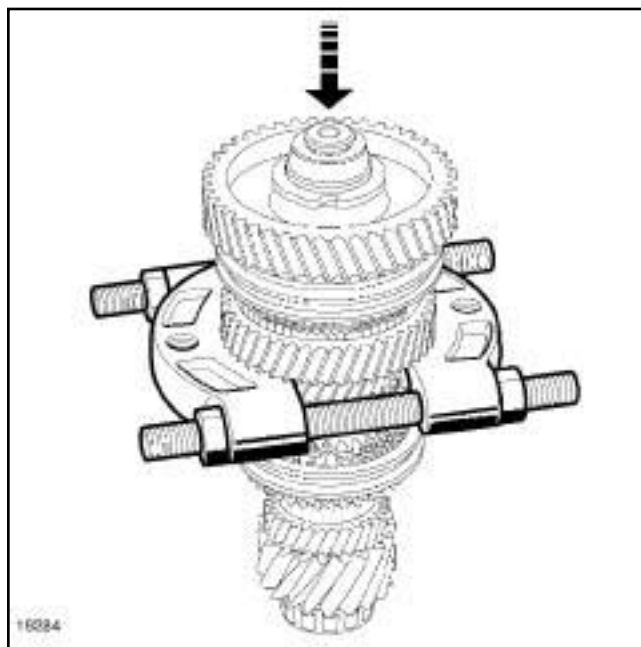
#### Note:

The gear supporting rings are tightly fitted onto the shafts. The thrust required for separation is around **10 to 15 tonnes**, so the proper equipment is needed (press and support).



19283

- ☐ Remove the circlips using **horseshoe type circlip pliers**.

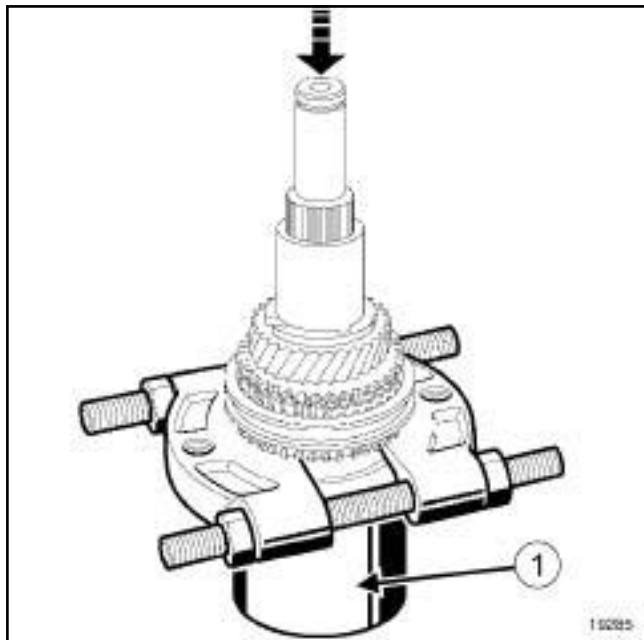


19284

- ☐ Remove the bearings - pinions - hubs assembly using a press and a separator, using the second gear pinion for support.

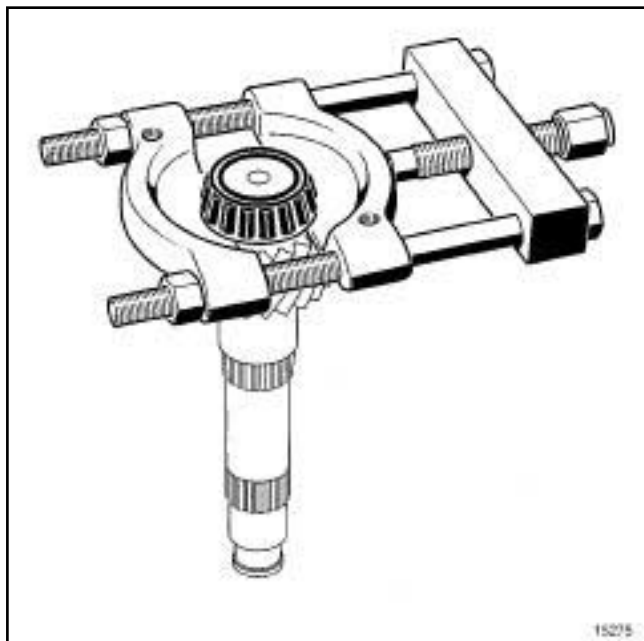
## Output shaft: Stripping - Rebuilding

X70 – X83 – X65 – X66 – X73 – X74 – X81



19285

- ❑ Remove the bearings - pinions - hubs assembly using a press and separator, with the tool **(Bvi. 1510-01) suffix L (1)** by using the fifth gear pinion as support (or the sixth gear pinion, depending on the gearbox type).



15275

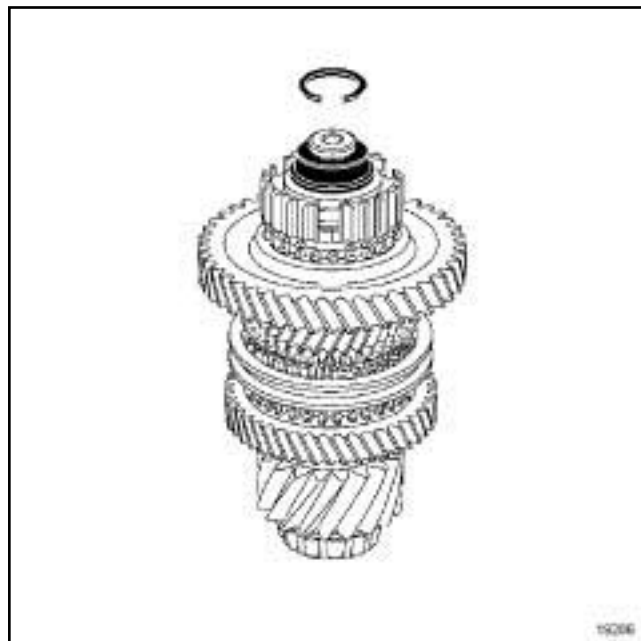
- ❑ Remove the bearing with an extractor.

### 2 - Removing the short output shaft gearing

❑

Note:

The gear supporting rings are tightly fitted onto the shafts. The thrust required for separation is around **10 to 15 tonnes**, so the proper equipment is needed (press and support).

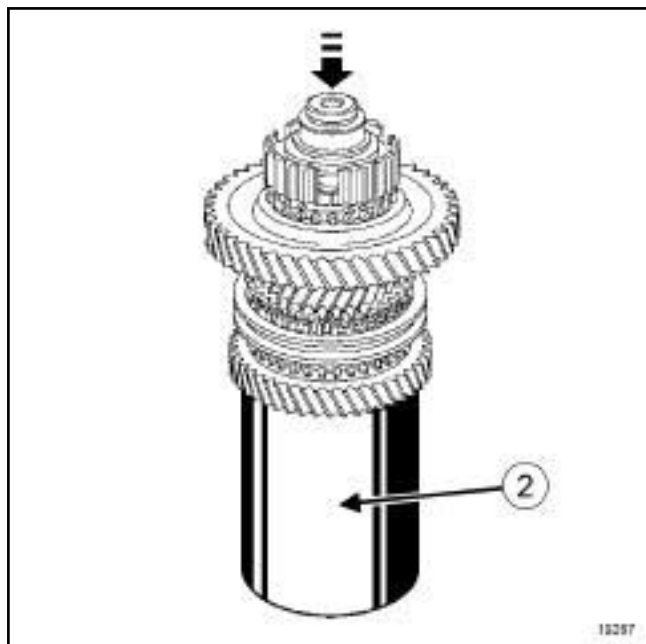


19286

- ❑ Remove the circlips using **horseshoe type circlip pliers**.

## Output shaft: Stripping - Rebuilding

X70 – X83 – X65 – X66 – X73 – X74 – X81



19287



Note:

Place a rag at the base of the tool to cushion the shaft when it drops.

- ☐ Remove the bearings - pinions - hubs assembly using the tool (**Bvi. 1510-01**) suffix **L (2)** .

## REASSEMBLING

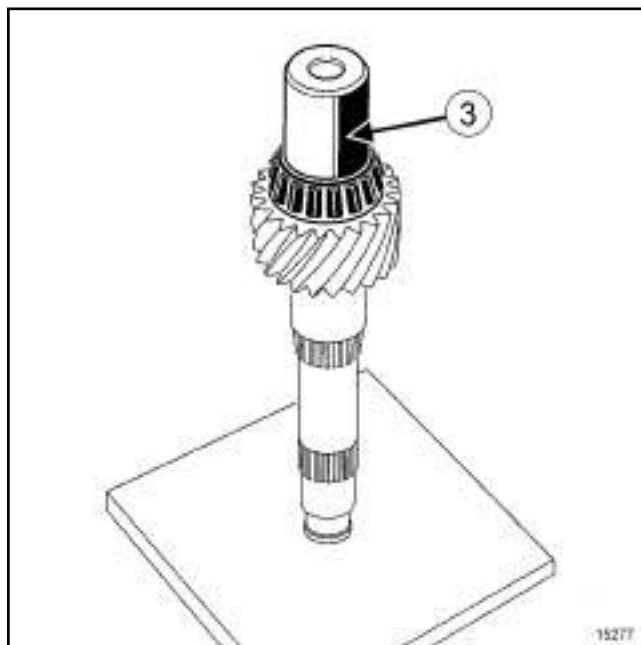
### I - REBUILDING PREPARATION OPERATION

- ☐ Parts always to be replaced if removed:
  - the circlips,
  - the differential output seals,
  - the input shaft output seal,
  - the pins,
  - the hydraulic clutch slave cylinder.
- ☐ Use **SURFACE CLEANER** (see **Vehicle: Parts and ingredients for the repairwork**) (04B, Consumables - Products) to clean:
  - the shafts,
  - the shaft mating surfaces,
  - the mechanism housing.

### II - REBUILDING OPERATION FOR PART CONCERNED

- ☐ Adjust the shafts (see **21A, Manual gearbox, Gear-box shaft: Adjustment**, page **21A-33**) if replacing parts such as the gear supporting rings or the synchroniser hubs.

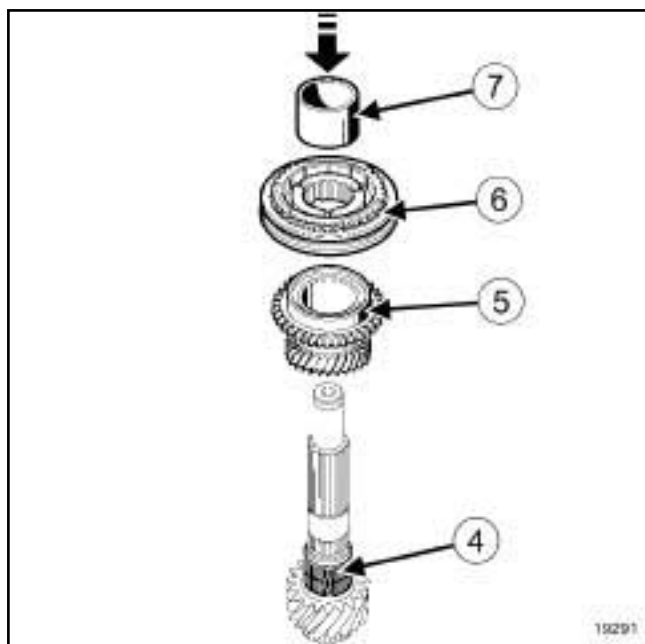
#### 1 - Refitting the long secondary shaft gearing



15277

- ☐ Refit the bearing using the tool (**Bvi. 1510-01**) suffix **0 (3)** .

X70 – X83 – X65 – X66 – X73 – X74 – X81

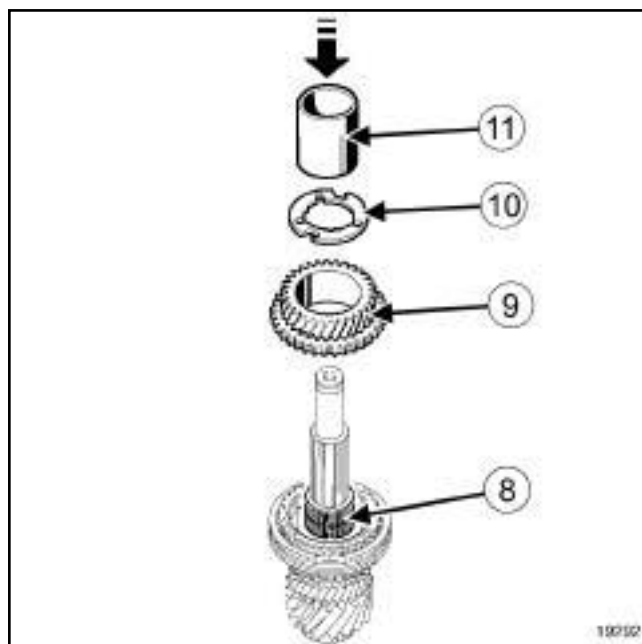


19291

❑ Fit the needle bearing (4) .

❑ Refit:

- the sixth gear idler pinion (5) with its synchroniser,
- the sixth - fifth synchroniser hub (6) using the tool **(Bvi. 1510-01) suffix N**, and align the hub notches with those on the synchroniser ring,
- the fifth gear idler pinion bearing (7) using the tool **(Bvi. 1510-01) suffix N** and apply a final pressure of **5 tonnes**.

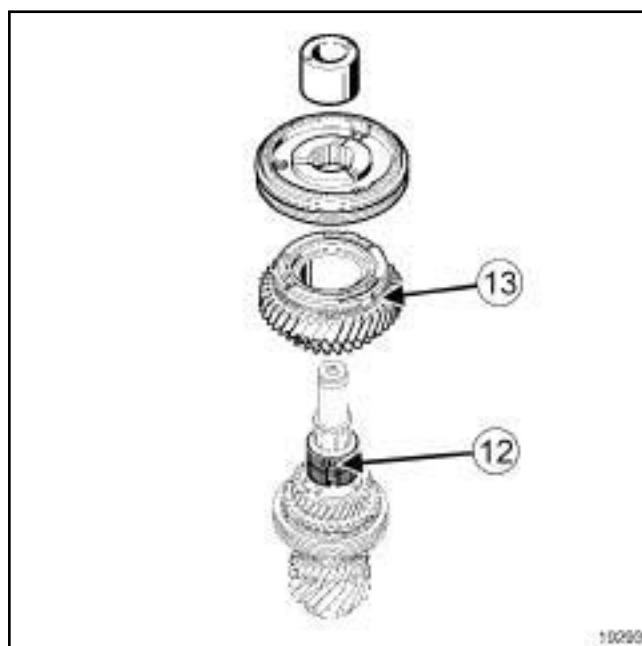


19292

❑ Fit the needle bearing (8) .

❑ Refit:

- the fifth gear idler pinion (9) with its synchroniser,
- the splined washer (10) ,
- the second gear idler pinion bearing (11) using the tool **(Bvi. 1510-01) suffix N** and apply a final pressure of **5 tonnes**.

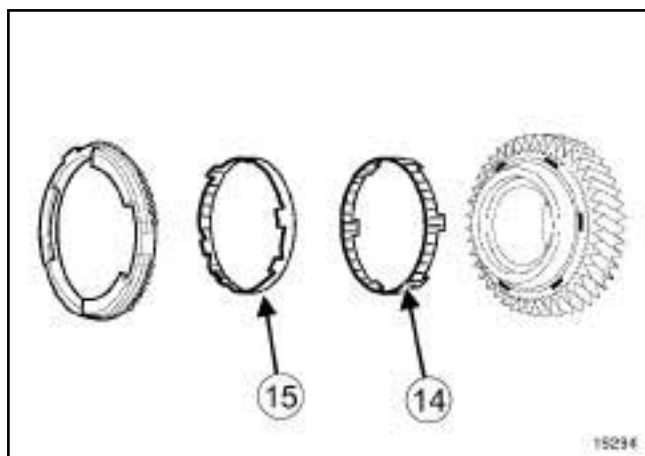


19293

❑ Fit the needle bearing (12) .

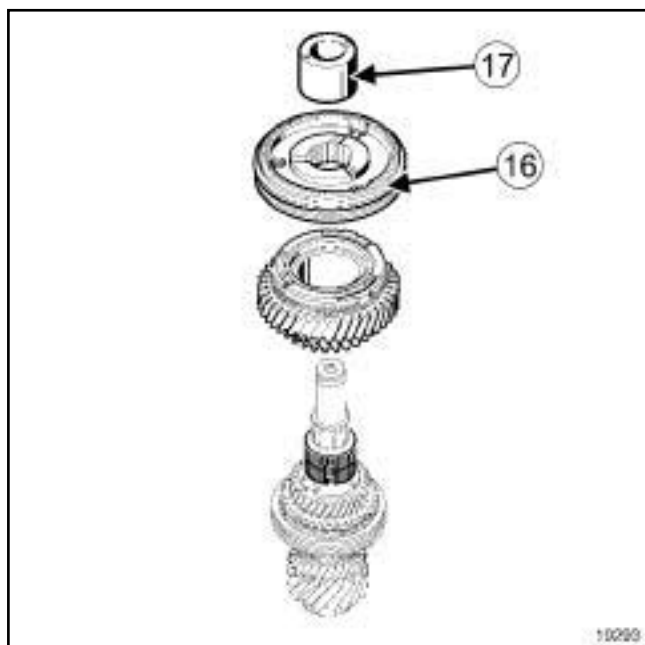
❑ Fit the second gear idler pinion (13) .

X70 – X83 – X65 – X66 – X73 – X74 – X81



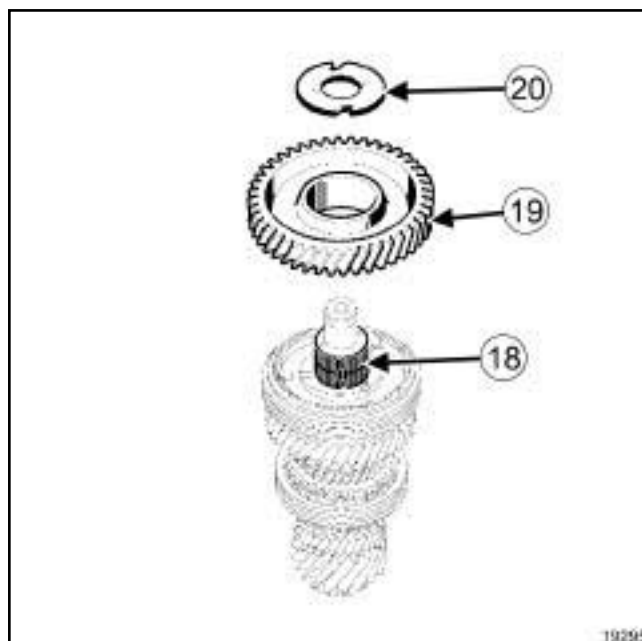
19294

- ❑ Position the notches of the triple cone synchroniser (14) and (15) .



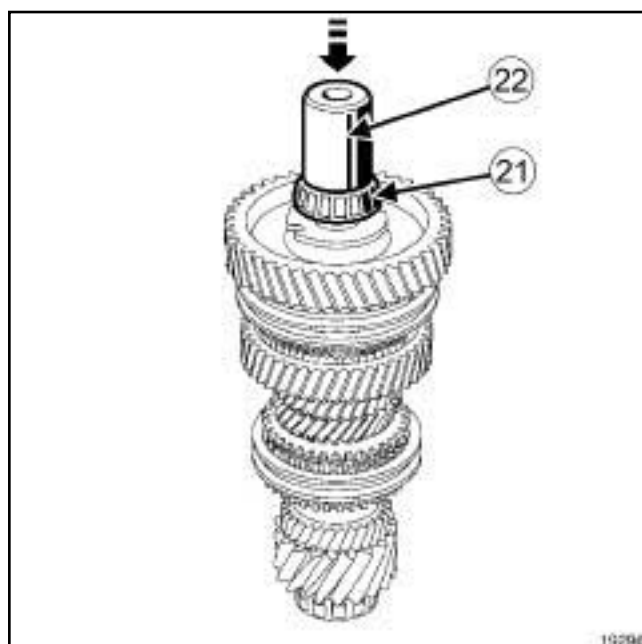
19293

- ❑ Refit:
  - the first - second synchroniser hub (16) using the tool **(Bvi. 1510-01) suffix N** (the long collar of the hub at the second gear pinion end),
  - the second gear idler pinion bearing (17) using the tool **(Bvi. 1510-01) suffix N** and apply a final pressure of **5 tonnes**.



19295

- ❑ Fit the needle bearing (18) .
- ❑ Refit:
  - the first gear idler pinion (19) ,
  - the splined washer (20) .



19296

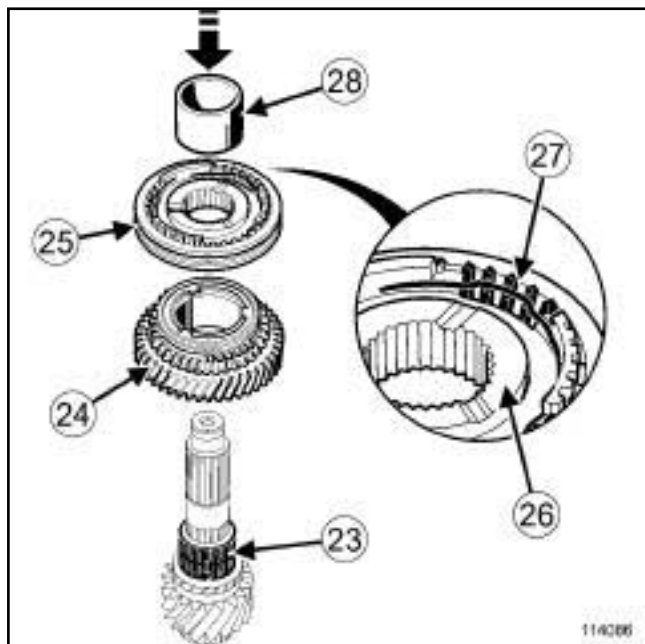
- ❑ Refit the bearing (21) using the tool **(Bvi. 1510-01) suffix 0 (22)** .
- ❑ Choose and refit a new circlip which exactly fits into the groove using **circlip pliers**.



## Output shaft: Stripping - Rebuilding

X70 – X83 – X65 – X66 – X73 – X74 – X81

### 2 - Refitting the short output shaft gearing



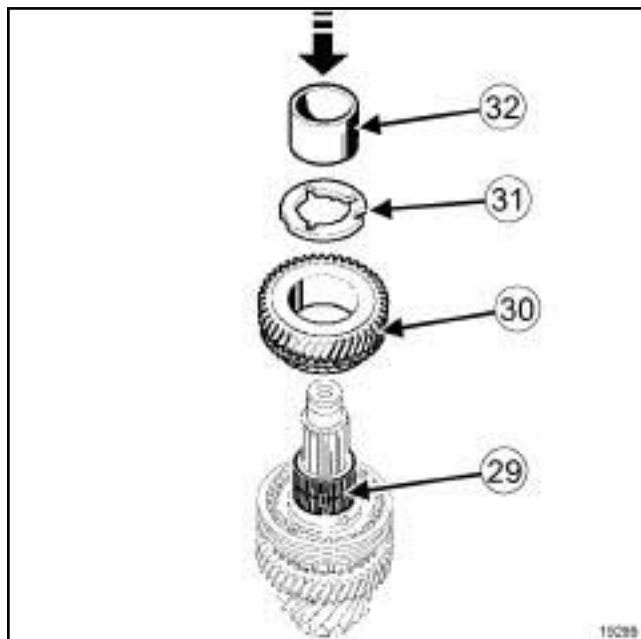
- ☐ Fit the needle bearing (23) .
- ☐ the third gear idler pinion (24) with its triple cone synchroniser.

#### Note:

Observe the correct direction of fitting the third - fourth synchroniser hub (25) :

- large bearing face of the hub on the fourth idler gear end (26) ,
- large claw teeth of the synchroniser hub on the fourth gear end (27) .

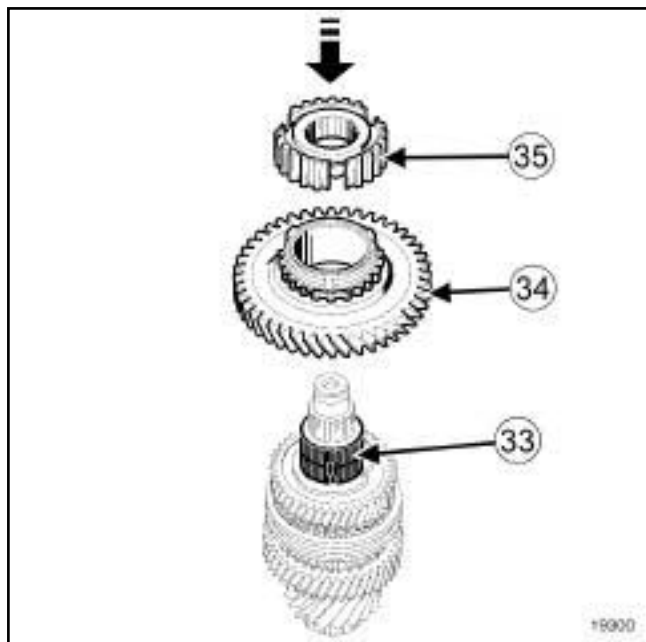
- ☐ Refit:
  - the third - fourth synchroniser hub (25) using the tool (Bvi. 1510-01) suffix N,
  - the fourth gear idler pinion bearing (28) using the tool (Bvi. 1510-01) suffix N and apply a final pressure of **5 tonnes**.



- ☐ Fit the needle bearing (29) .
- ☐ Refit:
  - the fourth gear idler pinion (30) with its synchroniser,
  - the splined washer (31) ,
  - the reverse gear idler pinion bearing (32) using the tool (Bvi. 1510-01) suffix N and apply a final pressure of **5 tonnes**.

## Output shaft: Stripping - Rebuilding

X70 – X83 – X65 – X66 – X73 – X74 – X81

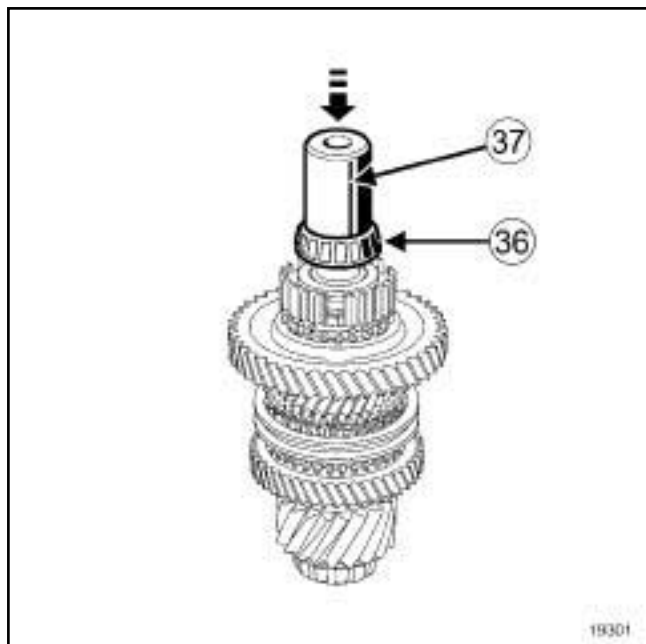


19300

❑ Fit the needle bearing (33) .

❑ Refit:

- the reverse gear idler pinion (34) with its synchroniser,
- the reverse gear synchroniser hub (35) using the tool (Bvi. 1510-01) suffix N.



19301

❑ Refit the bearing (36) using the tool (Bvi. 1510-01) suffix 0 (37) .

❑ Choose and refit a new circlip which exactly fits into the groove using **circlip pliers**.

### III - FINAL OPERATION

❑ Refit:

- the gearbox shafts (see 21A, **Manual gearbox, Gearbox shaft: Removal - Refitting**, page 21A-20) ,
- the mechanism housing (see 21A, **Manual gearbox, Mechanism cover: Removal - Refitting**, page 21A-15) .

❑ Remove the gearbox from the component support (see 21A, **Manual gearbox, Gearbox support equipment: Use**, page 21A-14) .

❑ Refit the gearbox (see **Manual gearbox: Removal - Refitting**) .

# MANUAL GEARBOX

## Gearbox shaft: Adjustment

# 21A

X70 – X83 – X65 – X66 – X73 – X74 – X81

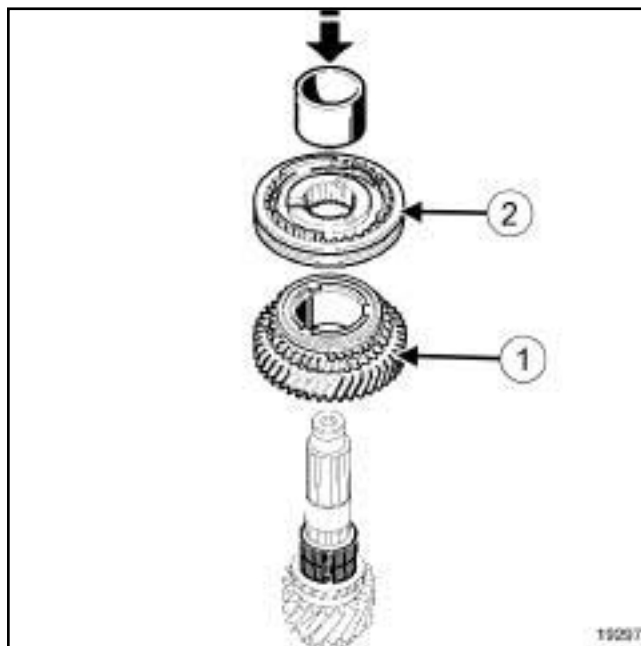
### IMPORTANT

To avoid all risk of damage to the systems, apply the safety and cleanliness instructions and operation recommendations before carrying out any repair (see **21A, Manual gearbox, Manual gearbox: Precautions for repair, page 21A-1**).

### I - ADJUSTMENT PREPARATION OPERATION

- ☐ Remove the gearbox (see **Manual gearbox: Removal - Refitting**).
- ☐ Position the gearbox on the component support (see **21A, Manual gearbox, Gearbox support equipment: Use, page 21A-14**).
- ☐ Remove:
  - the mechanism housing (see **21A, Manual gearbox, Mechanism cover: Removal - Refitting, page 21A-15**),
  - the gearbox shafts (see **21A, Manual gearbox, Gearbox shaft: Removal - Refitting, page 21A-20**).
- ☐ Strip down the output shafts (see **21A, Manual gearbox, Output shaft: Stripping - Rebuilding, page 21A-26**).
- ☐ Use **SURFACE CLEANER** (see **Vehicle: Parts and ingredients for the repairwork**) (04B, Consumables - Products) to clean:
  - the shafts,
  - the shaft mating surfaces,
  - the mechanism housing.

### II - ADJUSTMENT OPERATION



#### Note:

Replacing parts such as idle sprocket support rings (1) or sliding hubs (2) needs a so-called "comparative" setting change, described below.

- ☐ Measure the height dimension of the original part (to be replaced) and the new part.

If the difference between the two parts is greater than **0.025 mm**, work on the adjusting shim:

  - by increasing the thickness of the adjusting shim if the new component is smaller than the old one,
  - decreasing the thickness of the adjusting shim if the new part is greater than the old part.

# MANUAL GEARBOX

## Gearbox shaft: Adjustment

# 21A

X70 – X83 – X65 – X66 – X73 – X74 – X81

### Example of replacing sprocket supporting rings and sliding hubs on the short secondary shaft:

#### ☐ Fourth gear bearings:

- Original part: 30.610 mm,
- New part: 30.612 mm,
- Difference: +0.002 mm.

#### Reverse gear bearings:

- Original part: 30.610 mm,
- New part: 30.611 mm,
- Difference: +0.001 mm.

#### Third - fourth synchroniser hub:

- Original part: **17.285 mm**,
- New part: **17.313 mm**,
- Difference: **+0.028 mm**.

#### Reverse gear synchroniser hub:

- Original part: 12.242 mm,
- New part: 12.243 mm,
- Difference: +0.001 mm.

#### Adjusting shim:

- Original part: 2.10 mm,
- New part:  $2.10 - 0.028 = 2.072$  mm,
- Difference: **-0,028 mm**.

Given that shims vary by **0.020mm**, in this example the shim required is the **2.08mm** shim.

### III - FINAL OPERATION

#### ☐ Rebuild the output shafts (see **21A, Manual gearbox, Output shaft: Stripping - Rebuilding**, page **21A-26**) .

#### ☐ Refit:

- the gearbox shafts (see **21A, Manual gearbox, Gearbox shaft: Removal - Refitting**, page **21A-20**) ,
- the mechanism housing (see **21A, Manual gearbox, Mechanism cover: Removal - Refitting**, page **21A-15**) .

#### ☐ Remove the gearbox from the component support (see **21A, Manual gearbox, Gearbox support equipment: Use**, page **21A-14**) .

#### ☐ Refit the gearbox (see **Manual gearbox: Removal - Refitting**) .

# MANUAL GEARBOX

## Hollow sunwheel: Removal - Refitting

# 21A

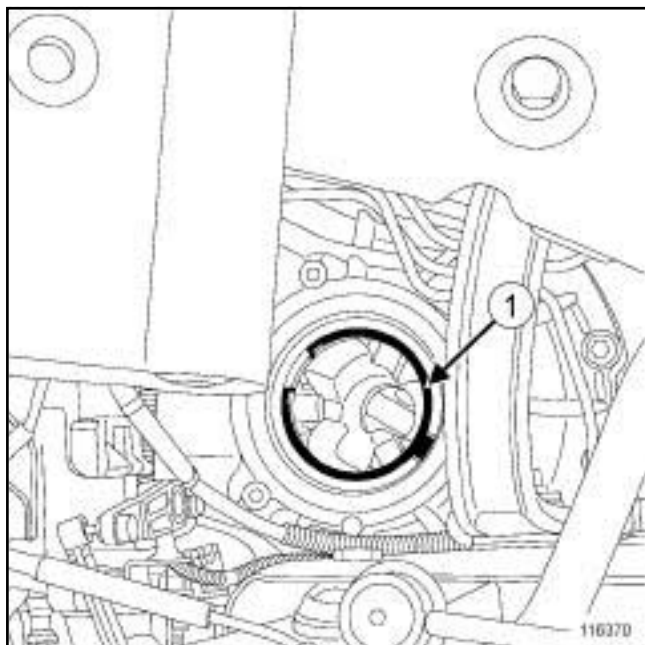
X70 – X83 – X65 – X66 – X73 – X74 – X81

### REMOVAL

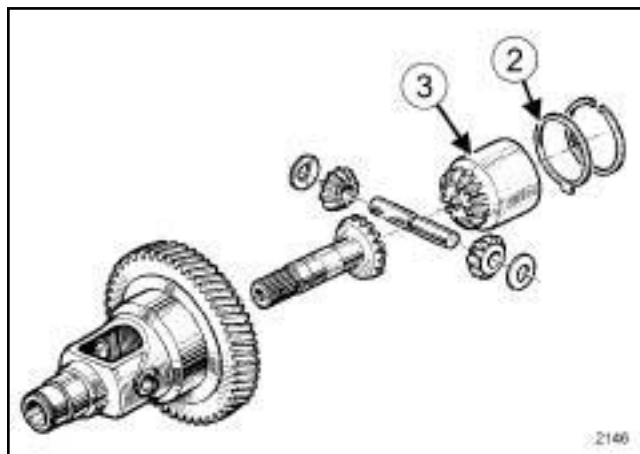
#### I - REMOVAL PREPARATION OPERATION

- ☐ Position the vehicle on a two-post lift (see **Vehicle: Towing and lifting**) (02A, Lifting equipment).
- ☐ Remove:
  - the front left-hand wheel (see **Wheel: Removal - Refitting**) (35A, Wheels and tyres),
  - the left-hand driveshaft (see **Front left-hand wheel driveshaft: Removal - Refitting**) .

#### II - OPERATION FOR REMOVAL OF PART CONCERNED



- ☐ Remove the locking spring ring (1) using pliers.



- ☐ Remove:
  - the washer (2) ,
  - the hollow sunwheel (3) .

### REFITTING

#### I - REFITTING PREPARATION OPERATION

- ☐ Always replace the locking spring ring.

#### II - REFITTING OPERATION FOR PART CONCERNED

- ☐ Refit:
  - the hollow sunwheel,
  - the washer,
  - the locking spring ring.

#### III - FINAL OPERATION

- ☐ Refit:
  - the left-hand driveshaft (see **Front left-hand wheel driveshaft: Removal - Refitting**) ,
  - the front left-hand wheel (see **Wheel: Removal - Refitting**) (35A, Wheels and tyres).

# MANUAL GEARBOX

## Clutch housing bearing: Removal - Refitting

# 21A

X70 – X83 – X65 – X66 – X73 – X74 – X81

### Essential special toolingEssential special toolingEssential special tooling

<b>Bvi. 1418</b>	Adjustable support for fitting bearings.
<b>Bvi. 1510</b>	Tool kit for PF gearbox operations.
<b>Bvi. 1722</b>	Tool kit for repairing gearboxes.

### IMPORTANT

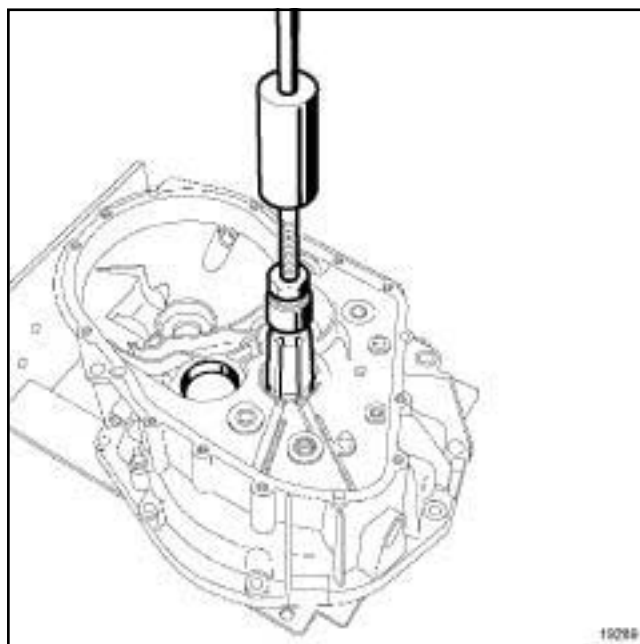
To avoid all risk of damage to the systems, apply the safety and cleanliness instructions and operation recommendations before carrying out any repair (see **21A, Manual gearbox, Manual gearbox: Precautions for repair**, page **21A-1**) .

## REMOVAL

### I - REMOVAL PREPARATION OPERATION

- ☐ Remove the gearbox (see **Manual gearbox: Removal - Refitting**) .
- ☐ Position the gearbox on the component support (see **21A, Manual gearbox, Gearbox support equipment: Use**, page **21A-14**) .
- ☐ Remove:
  - the mechanism housing (see **21A, Manual gearbox, Mechanism cover: Removal - Refitting**, page **21A-15**) ,
  - the gearbox shafts (see **21A, Manual gearbox, Gearbox shaft: Removal - Refitting**, page **21A-20**) ,
  - the differential (see **21A, Manual gearbox, Manual gearbox differential: Removal - Refitting**, page **21A-40**) .

### II - OPERATION FOR REMOVAL OF PART CONCERNED



19289

- ☐ Remove the bearing cups using a slide hammer puller **42 mm** in diameter.

## REFITTING

### I - REFITTING PREPARATION OPERATION

- ☐ Use **SURFACE CLEANER** to clean (see **Vehicle: Parts and ingredients for the repairwork**) :
  - the bearing mating faces in the clutch housing,
  - the clutch housing,
  - the mechanism housing,
  - the shafts,
  - the differential.
- ☐ Parts always to be replaced:
  - the circlips,
  - the differential outlet seals,
  - the input shaft output seal,
  - the pins,
  - the hydraulic clutch slave cylinder.

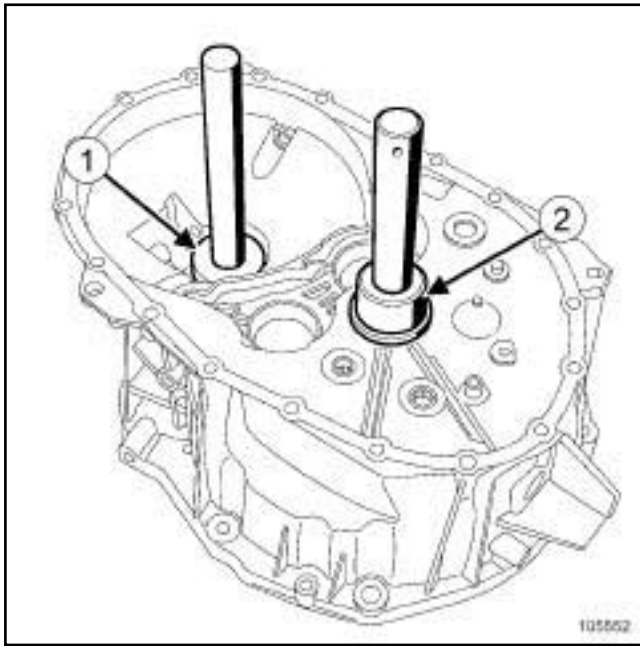
# MANUAL GEARBOX

## Clutch housing bearing: Removal - Refitting

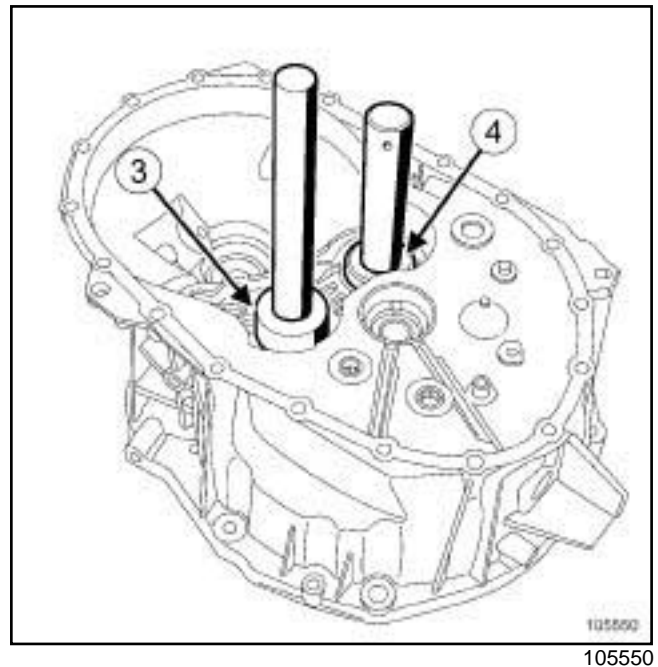
# 21A

X70 – X83 – X65 – X66 – X73 – X74 – X81

### II - REFITTING OPERATION FOR PART CONCERNED



- ☐ Position the clutch housing on the press plate.
- ☐ Position **(Bvi. 1418)** under the housing for each shaft line.
- ☐ Refit:
  - the differential bearing cup using the tool **(Bvi. 1510) suffix B (1)** ,
  - the input shaft bearing cup using the tool **(Bvi. 1722) suffix S (2)** .



#### Note:

Do not forget to refit a new deflector under the race of the short output shaft

Refit the bearing cups of the output shafts using the tools **(Bvi. 1722) suffix S (3)** and **(4)** .

### III - FINAL OPERATION

- ☐ Refit:
  - the differential (see **21A, Manual gearbox, Manual gearbox differential: Removal - Refitting**, page **21A-40**) ,
  - the gearbox shafts (see **21A, Manual gearbox, Gearbox shaft: Removal - Refitting**, page **21A-20**) ,
  - the mechanism housing (see **21A, Manual gearbox, Mechanism cover: Removal - Refitting**, page **21A-15**) .
- ☐ Remove the gearbox from the component support (see **21A, Manual gearbox, Gearbox support equipment: Use**, page **21A-14**) .
- ☐ Refit the gearbox (see **Manual gearbox: Removal - Refitting**) .

# MANUAL GEARBOX

## Selector fork shaft ring: Removal - Refitting

# 21A

X70 – X83 – X65 – X66 – X73 – X74 – X81

**Essential special tooling**Essential special tooling  
Essential special tooling

**Bvi. 1510-01** Tool kit for PK6 gearbox operations.

### IMPORTANT

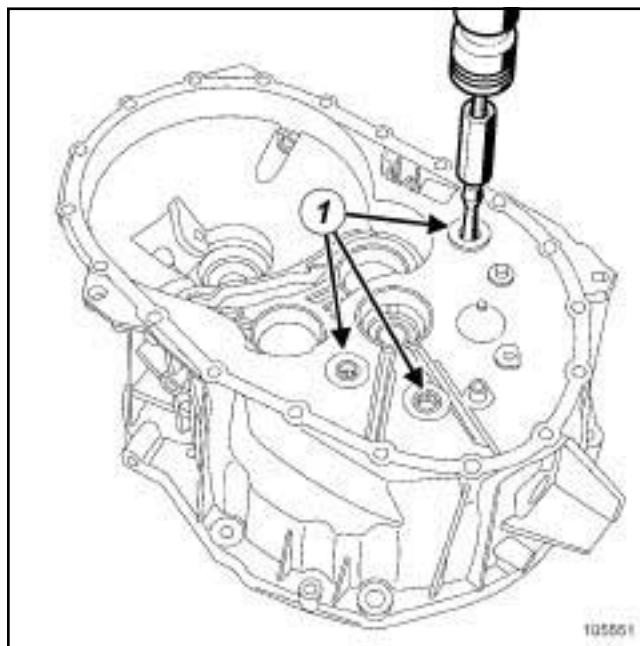
To avoid all risk of damage to the systems, apply the safety and cleanliness instructions and operation recommendations before carrying out any repair (see **21A, Manual gearbox, Manual gearbox: Precautions for repair, page 21A-1**) .

## REMOVAL

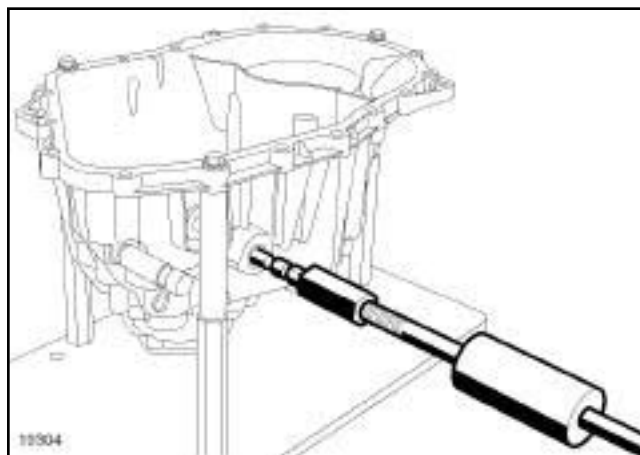
### I - REMOVAL PREPARATION OPERATION

- ☐ Remove the gearbox (see **Manual gearbox: Removal - Refitting**) .
- ☐ Position the gearbox on the component support (see **21A, Manual gearbox, Gearbox support equipment: Use, page 21A-14**) .
- ☐ Remove:
  - the mechanism housing (see **21A, Manual gearbox, Mechanism cover: Removal - Refitting, page 21A-15**) ,
  - the gearbox shafts (see **21A, Manual gearbox, Gearbox shaft: Removal - Refitting, page 21A-20**) ,
  - the differential (see **21A, Manual gearbox, Manual gearbox differential: Removal - Refitting, page 21A-40**) .

### II - OPERATION FOR REMOVAL OF PART CONCERNED



- ☐ Remove the bearings (1) using a slide hammer puller **14 mm** in diameter.



- ☐ Remove the selector shaft and the two needle bearings using a slide hammer puller **14 mm** in diameter.



# MANUAL GEARBOX

## Selector fork shaft ring: Removal - Refitting

# 21A

X70 – X83 – X65 – X66 – X73 – X74 – X81

### REFITTING

#### I - REFITTING PREPARATION OPERATION

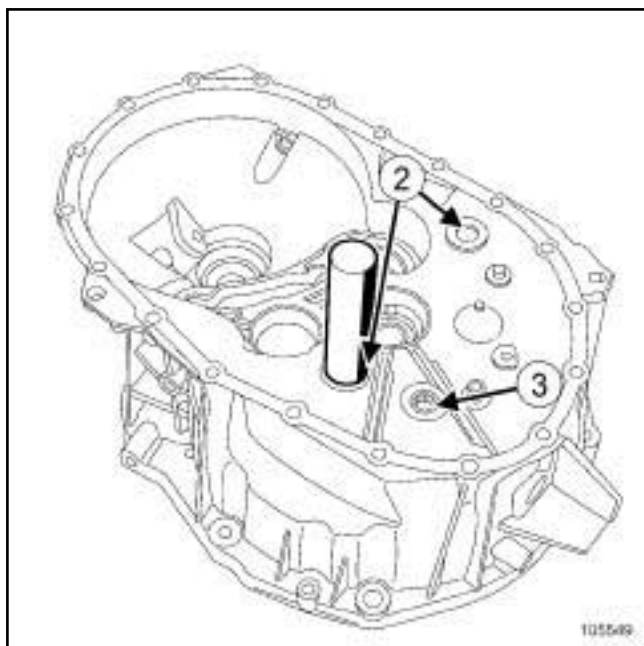
- ❑ Use **SURFACE CLEANER** to clean (see **Vehicle: Parts and ingredients for the repairwork**) :

- the mating faces of the bearings,
- the shafts,
- the mating faces of the shafts,
- the differential,
- the mechanism housing,
- the clutch housing.

- ❑ Parts always to be replaced:

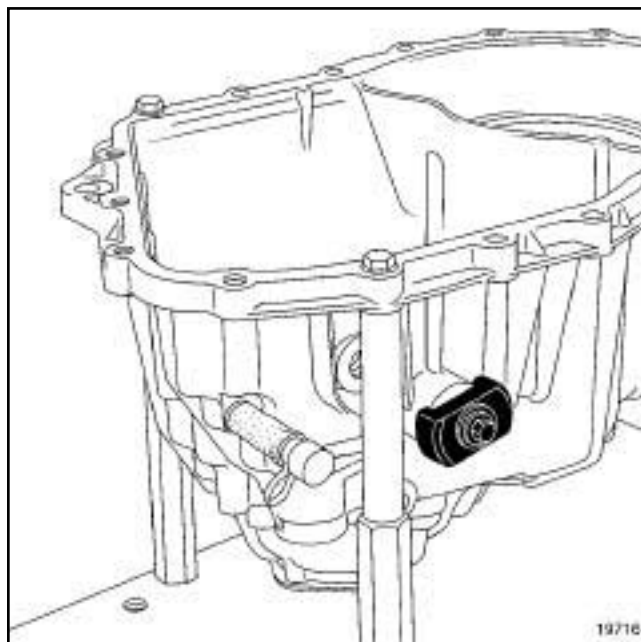
- circlips,
- the differential outlet seals,
- the input shaft output seal,
- the pins,
- the clutch hydraulic slave cylinder,
- the selector shaft bearings,
- the fork shaft bearings.

#### II - REFITTING OPERATION FOR PART CONCERNED



105549

- ❑ Refit the bearings using the tool (**Bvi. 1510-01**) suffix **P** at (2) and suffix **Q** at (3) .



19716

- ❑ Refit the two bearings of the selector shaft using the tool (**Bvi. 1510-01**) suffix **R**.

#### III - FINAL OPERATION

- ❑ Refit:

- the differential (see **21A, Manual gearbox, Manual gearbox differential: Removal - Refitting**, page **21A-40**) ,
- the gearbox shafts (see **21A, Manual gearbox, Gearbox shaft: Removal - Refitting**, page **21A-20**) ,
- the mechanism housing (see **21A, Manual gearbox, Mechanism cover: Removal - Refitting**, page **21A-15**) .

- ❑ Remove the gearbox from the component support (see **21A, Manual gearbox, Gearbox support equipment: Use**, page **21A-14**) .

- ❑ Refit the gearbox (see **Manual gearbox: Removal - Refitting**) .

X70 – X83 – X65 – X66 – X73 – X74 – X81

### IMPORTANT

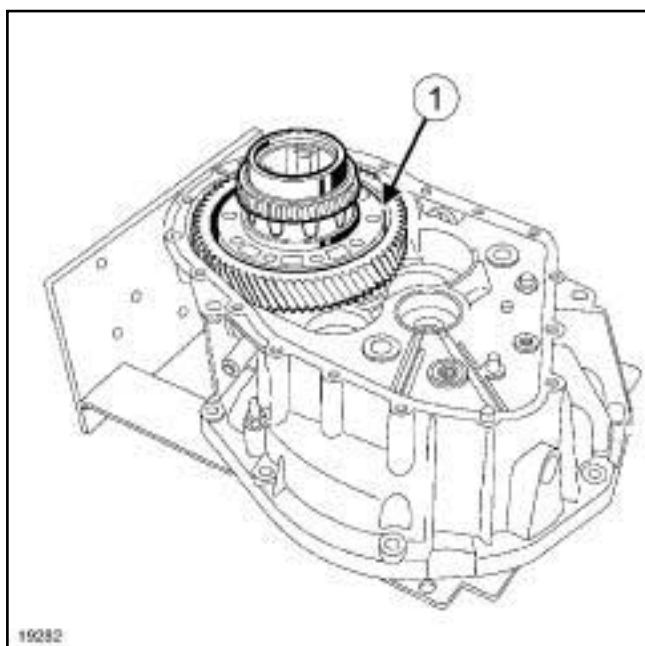
To avoid all risk of damage to the systems, apply the safety and cleanliness instructions and operation recommendations before carrying out any repair (see **21A, Manual gearbox, Manual gearbox: Precautions for repair, page 21A-1**).

## REMOVAL

### I - REMOVAL PREPARATION OPERATION

- ☐ Remove the gearbox (see **Manual gearbox: Removal - Refitting**).
- ☐ Position the gearbox on the component support (see **21A, Manual gearbox, Gearbox support equipment: Use, page 21A-14**).
- ☐ Remove:
  - the mechanism housing (see **21A, Manual gearbox, Mechanism cover: Removal - Refitting, page 21A-15**),
  - the gearbox shafts (see **21A, Manual gearbox, Gearbox shaft: Removal - Refitting, page 21A-20**).

### II - OPERATION FOR REMOVAL OF PART CONCERNED



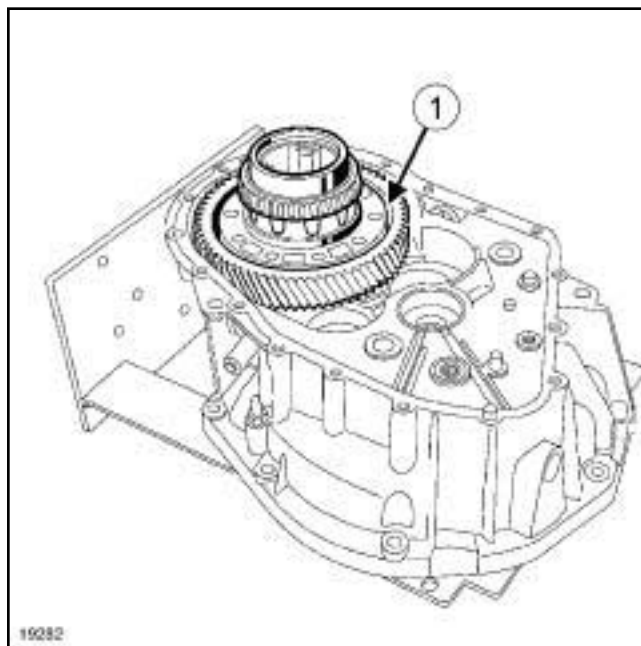
- ☐ Remove the differential (1).

## REFITTING

### I - REFITTING PREPARATION OPERATION

- ☐ Use **SURFACE CLEANER** to clean (see **Vehicle: Parts and ingredients for the repairwork**):
  - the shafts,
  - the mating faces of the shafts,
  - the differential,
  - the mechanism housing,
  - the clutch housing.
- ☐ Parts always to be replaced:
  - the circlips,
  - the differential outlet seals,
  - the input shaft output seal,
  - the pins,
  - the hydraulic clutch slave cylinder.

### II - REFITTING OPERATION FOR PART CONCERNED



- ☐ Refit the differential (1).

### III - FINAL OPERATION

- ☐ Refit:
  - the gearbox shafts (see **21A, Manual gearbox, Gearbox shaft: Removal - Refitting, page 21A-20**),

## Manual gearbox differential: Removal - Refitting

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X70 – X83 – X65 – X66 – X73 – X74 – X81
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- the mechanism housing (see **21A, Manual gearbox, Mechanism cover: Removal - Refitting**, page **21A-15**) .
- ☐ Remove the gearbox from the component support (see **21A, Manual gearbox, Gearbox support equipment: Use**, page **21A-14**) .
- ☐ Refit the gearbox (see **Manual gearbox: Removal - Refitting**) .

X70 – X83 – X65 – X66 – X73 – X74 – X81

### Essential special toolingEssential special toolingEssential special tooling

**Bvi. 1510** Tool kit for PF gearbox operations.

### IMPORTANT

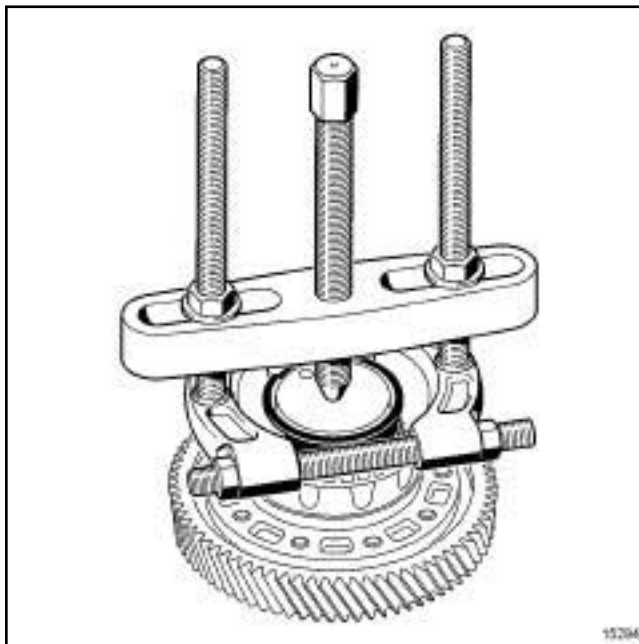
To avoid all risk of damage to the systems, apply the safety and cleanliness instructions and operation recommendations before carrying out any repair (see **21A, Manual gearbox, Manual gearbox: Precautions for repair, page 21A-1**).

## REMOVAL

### I - REMOVAL PREPARATION OPERATION

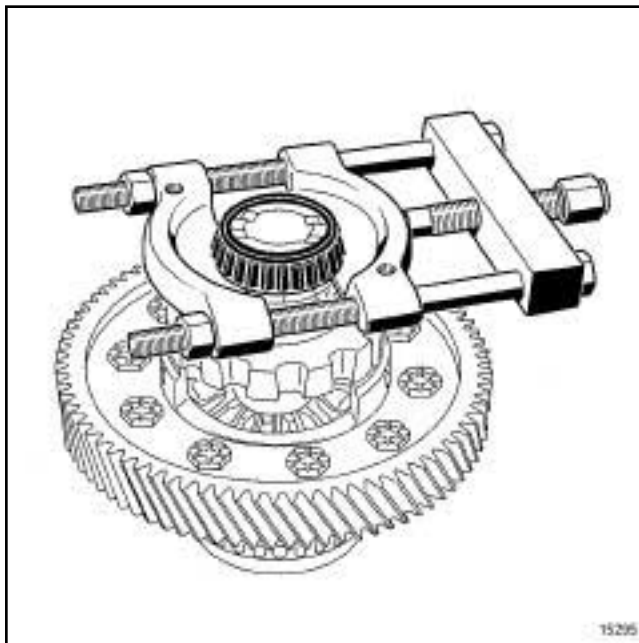
- ☐ Remove the gearbox (see **Manual gearbox: Removal - Refitting**).
- ☐ Position the gearbox on the component support (see **21A, Manual gearbox, Gearbox support equipment: Use, page 21A-14**).
- ☐ Remove:
  - the mechanism housing (see **21A, Manual gearbox, Mechanism cover: Removal - Refitting, page 21A-15**),
  - the gearbox shafts (see **21A, Manual gearbox, Gearbox shaft: Removal - Refitting, page 21A-20**),
  - the differential (see **21A, Manual gearbox, Manual gearbox differential: Removal - Refitting, page 21A-40**).

### II - OPERATION FOR REMOVAL OF PART CONCERNED



15294

- ☐ Remove the large differential bearing using a separator.



15295

- ☐ Remove the small differential bearing using a separator.

X70 – X83 – X65 – X66 – X73 – X74 – X81

### REFITTING

#### I - REFITTING PREPARATION OPERATION

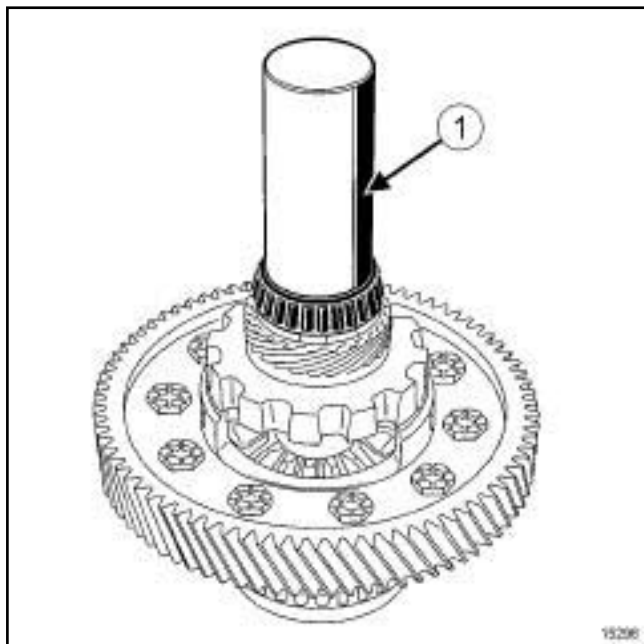
- ☐ Use **SURFACE CLEANER** to clean (see **Vehicle: Parts and ingredients for the repairwork**) :

- the shafts,
- the mating faces of the shafts,
- the differential,
- the mechanism housing,
- the clutch housing.

- ☐ Parts always to be replaced:

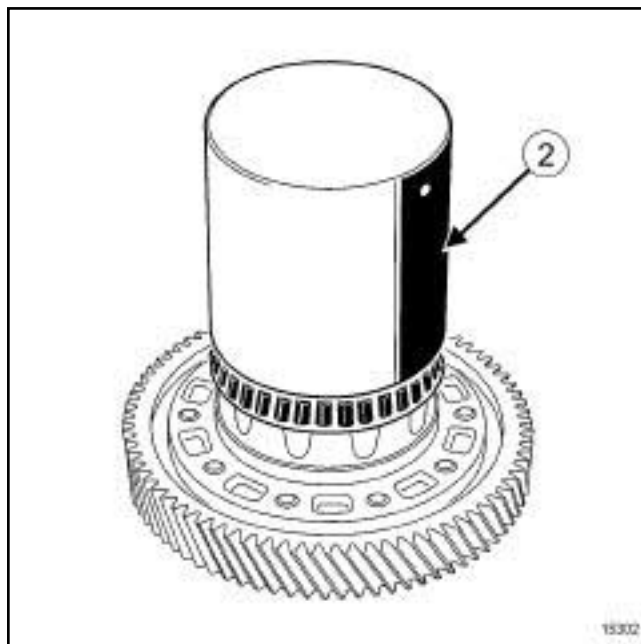
- the circlips,
- the differential outlet seals,
- the input shaft output seal,
- the pins,
- the hydraulic clutch slave cylinder.

#### II - REFITTING OPERATION FOR PART CONCERNED



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- ☐ Refit the small differential bearing using the tool (**Bvi. 1510**) suffix A (1) .



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- ☐ Refit the large differential bearing using the tool (**Bvi. 1510**) suffix I (2) .

#### III - FINAL OPERATION

- ☐ Refit:

- the differential (see **21A, Manual gearbox, Manual gearbox differential: Removal - Refitting**, page 21A-40) ,
- the gearbox shafts (see **21A, Manual gearbox, Gearbox shaft: Removal - Refitting**, page 21A-20) ,
- the mechanism housing (see **21A, Manual gearbox, Mechanism cover: Removal - Refitting**, page 21A-15) .

- ☐ Remove the gearbox from the component support (see **21A, Manual gearbox, Gearbox support equipment: Use**, page 21A-14) .

- ☐ Refit the gearbox (see **Manual gearbox: Removal - Refitting**) .