

RENAULT

Technical Note6019A

X61, and TL4 - X77, and TL4 - X84, and TL4 - X85, and TL4 - X91, and TL4 - X95, and TL4

TL4 manual gearbox

Edition 9

77 11 335 822

APRIL 2009

Edition Anglaise

"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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TL4 manual gearbox

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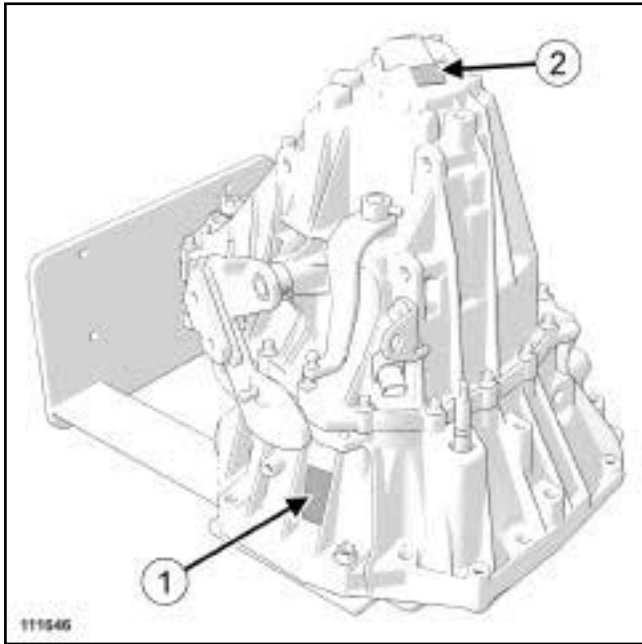
MANUAL GEARBOX

Manual gearbox: Specifications

21A

X61 – X77 – X84 – X85 – X91 – X95

I - IDENTIFICATION



111646

- (1) Identification plate
- (2) Etching

II - GEAR RATIOS

Suffix	1st	2nd	3rd	4th	5th	6th	Final drive	Reverse gear
000	11/41	19/37	31/41	40/39	38/29	47/30	15/59	11/28
001	11/41	19/37	31/41	40/39	38/29	47/30	15/56	11/28
002	11/41	19/37	31/41	40/39	38/29	47/30	16/57	11/28
003	11/35	19/37	29/43	34/41	38/39	39/34	16/69	11/23
008	11/37	19/37	28/39	35/39	35/32	43/33	15/59	11/25
013	11/41	19/37	31/41	40/39	38/29	47/30	15/59	11/28
014	11/41	19/37	31/41	40/39	38/29	47/30	15/59	11/28
015	11/41	19/40	31/45	35/39	35/32	43/33	16/71	11/28
016	11/41	19/40	31/45	35/39	35/32	43/33	16/71	11/28
017	11/37	19/37	28/39	35/39	35/32	43/33	16/69	11/25
018	11/41	19/37	31/41	40/39	38/29	47/30	16/66	11/28
019	11/41	19/40	31/45	35/39	35/32	43/33	15/71	11/28
020	11/41	19/40	31/45	35/39	35/32	43/33	16/71	11/28
021	11/41	19/40	31/45	35/39	35/32	43/33	15/71	11/28
022	11/41	19/37	31/41	40/39	38/29	47/30	15/59	11/28
024	11/35	19/37	29/43	34/41	35/34	37/30	16/69	11/23
026	11/41	19/37	29/43	40/39	38/29	47/30	15/59	11/28

MANUAL GEARBOX

Manual gearbox: Specifications

21A

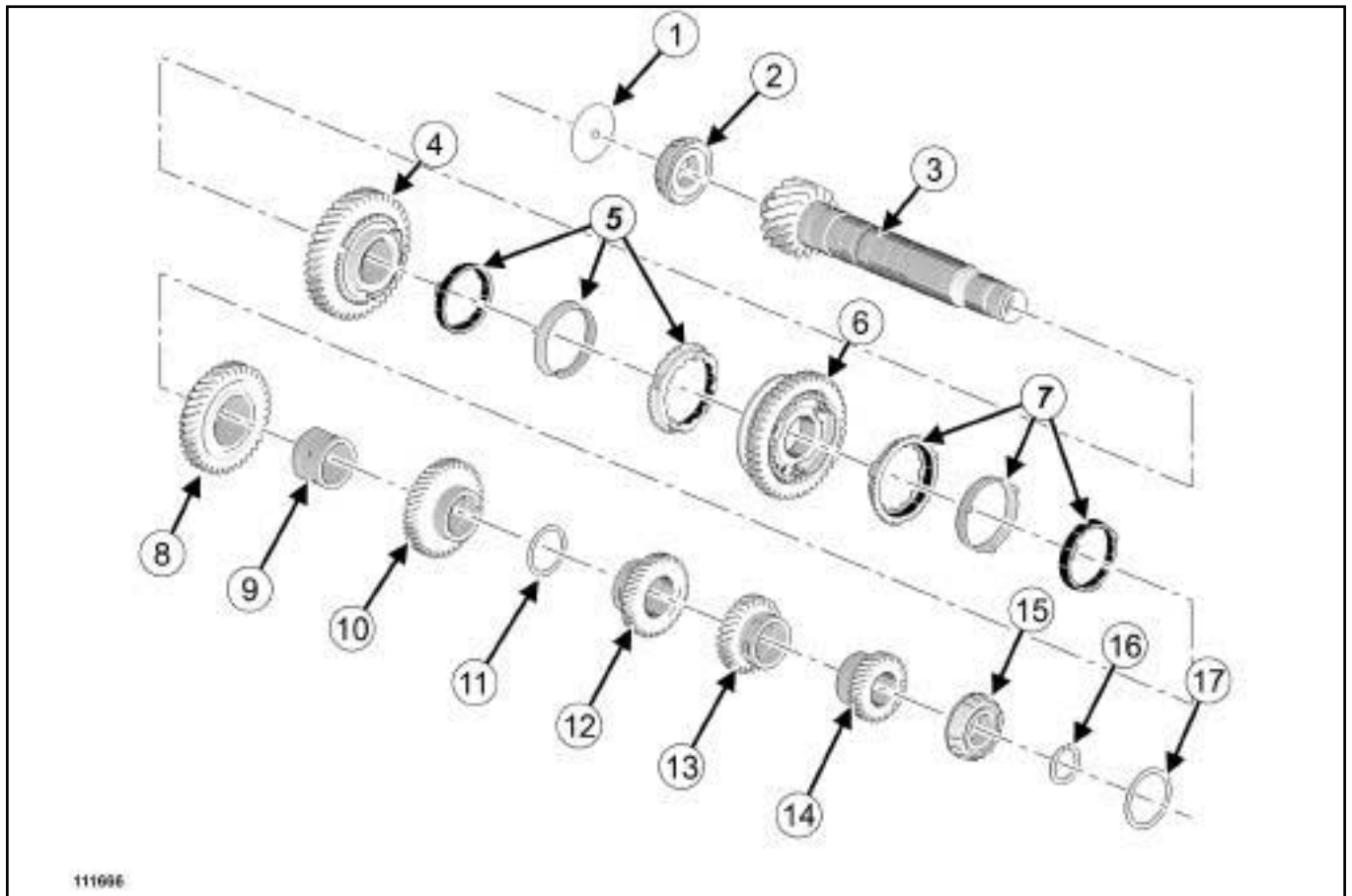
X61 – X77 – X84 – X85 – X91 – X95

Suffix	1st	2nd	3rd	4th	5th	6th	Final drive	Reverse gear
027	11/41	19/37	31/41	40/38	39/29	47/30	14/59	11/28
028	11/41	19/40	31/45	35/28	39/34	41/30	14/64	11/28
029	11/41	19/40	31/45	38/39	35/32	43/33	15/71	11/28
030	11/41	19/40	31/45	35/39	35/32	41/30	16/71	11/28
031	11/37	19/40	27/41	34/41	35/34	37/30	16/69	11/23
032	11/37	19/37	28/39	35/39	35/32	43/33	16/66	11/28
033	11/37	19/37	28/39	35/39	35/32	43/33	16/69	11/28
034	11/41	19/37	31/41	40/39	38/29	47/30	16/66	11/39
035	11/41	19/40	31/45	35/39	35/32	43/33	16/69	11/28
036	11/41	19/40	31/45	35/38	39/34	41/30	14/64	11/28
037	11/41	19/40	31/45	35/28	39/34	41/30	15/71	11/28
038	11/41	19/40	31/45	35/39	35/32	43/33	14/64	11/28
039	11/37	19/37	28/39	35/39	35/32	43/33	16/69	11/25
040	11/41	19/37	31/41	40/39	38/29	47/30	15/56	11/28
041	11/41	19/37	31/41	40/39	38/29	47/30	16/66	11/39
042	11/41	19/40	31/45	35/39	35/32	41/30	15/71	11/39
045	11/41	19/37	31/41	40/39	38/29	47/30	15/59	11/28

Manual gearbox: List and location of components

X61 – X77 – X84 – X85 – X91 – X95

I - OUTPUT SHAFT



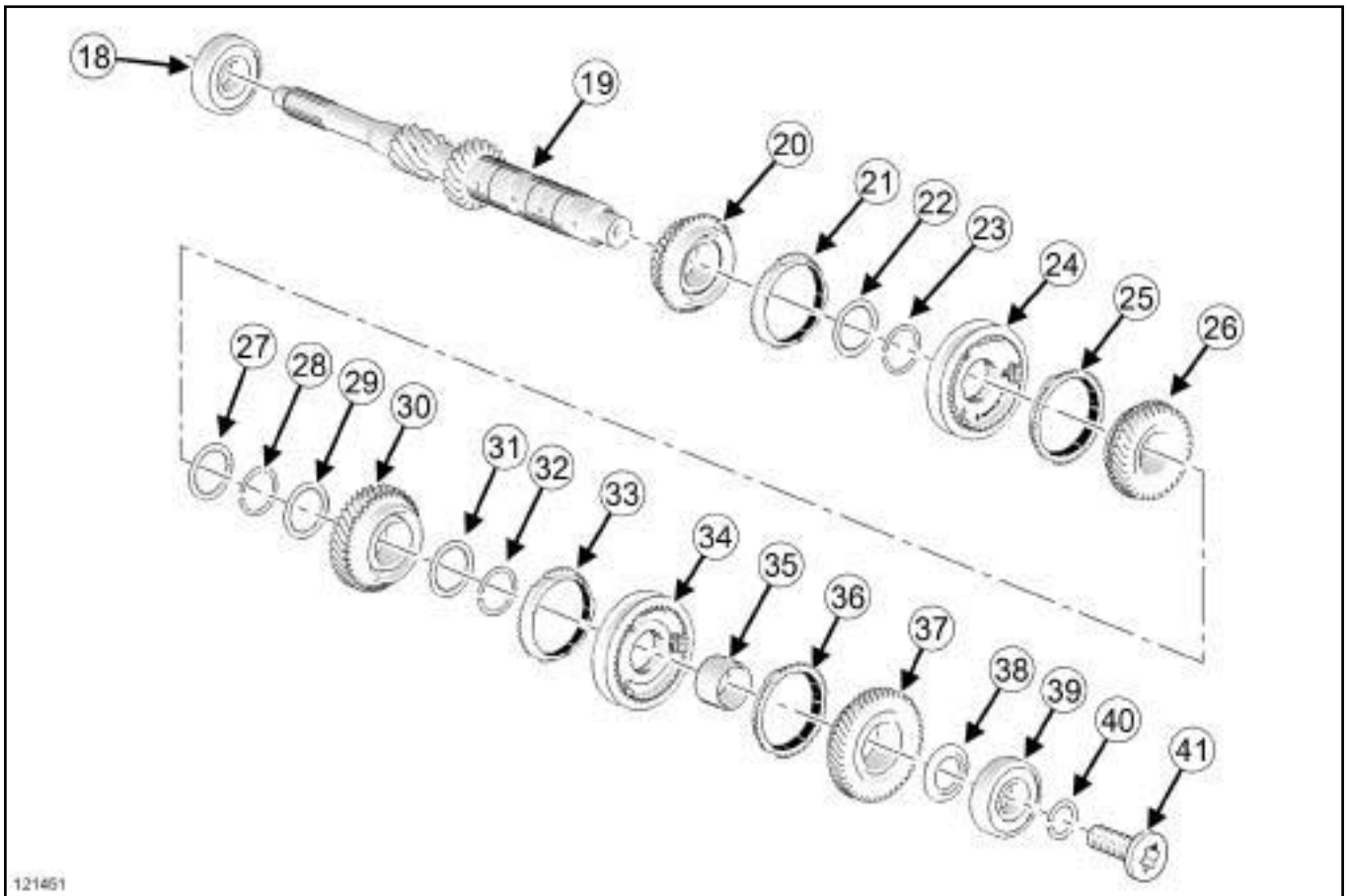
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- | | |
|------|-----------------------------------|
| (1) | Oil deflector |
| (2) | Bearing |
| (3) | Output shaft |
| (4) | First idle gear |
| (5) | Triple-cone synchroniser rings |
| (6) | First-second sliding gear hub |
| (7) | Triple-cone synchroniser rings |
| (8) | Second idle gear |
| (9) | Sprocket supporting ring |
| (10) | Third idle gear |
| (11) | Intermediate adjusting shim |
| (12) | Fourth fixed gear |
| (13) | Fifth fixed gear |
| (14) | Sixth fixed gear |
| (15) | Bearing |
| (16) | Lock ring |
| (17) | Bearing preloading adjusting shim |

Manual gearbox: List and location of components

X61 – X77 – X84 – X85 – X91 – X95

II - INPUT SHAFT



121451

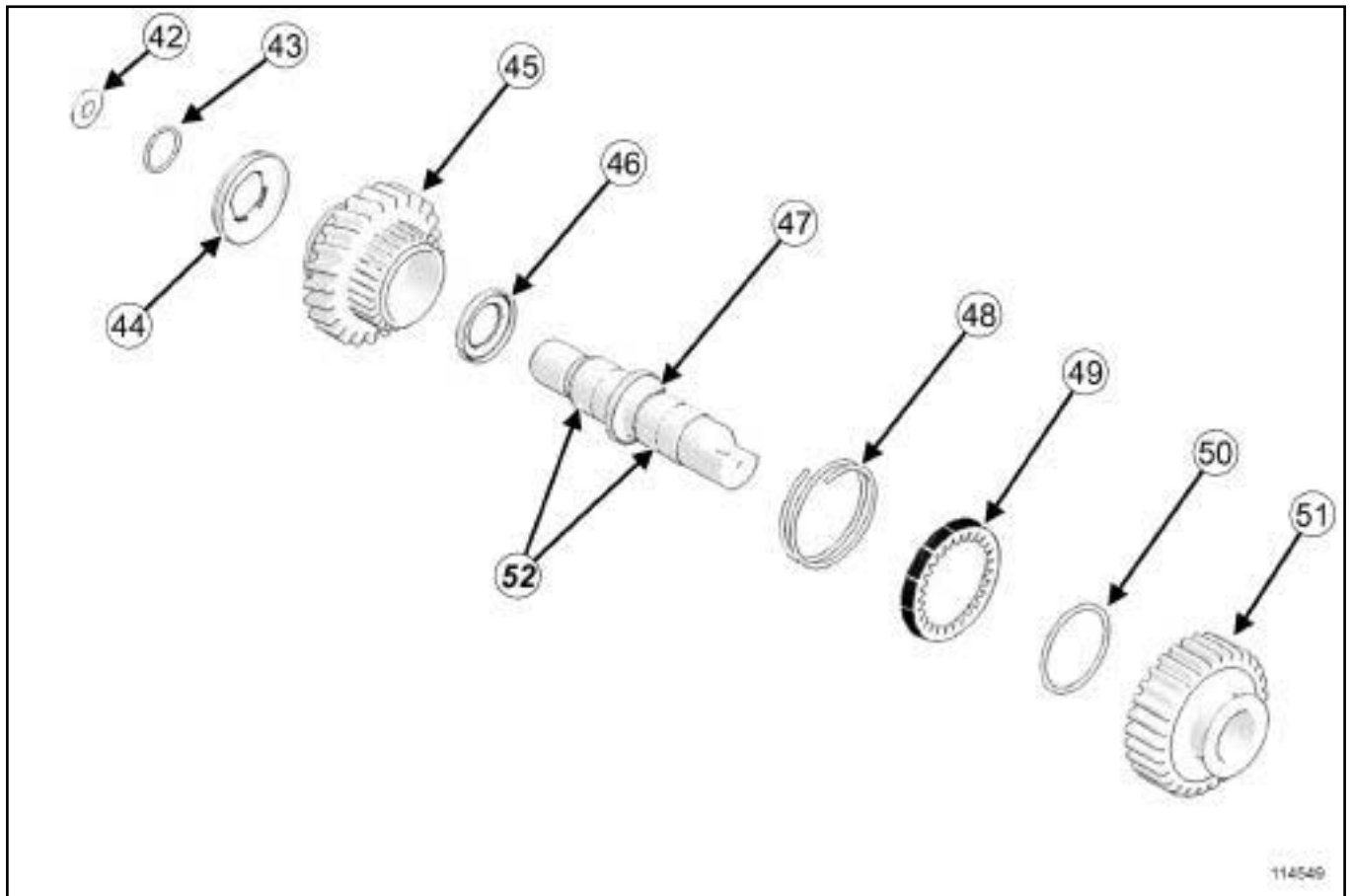
121451

(18)	Bearing	(37)	Sixth idle gear
(19)	Primary shaft	(38)	Lock washer
(20)	Third idle gear	(39)	Bearing
(21)	Synchromesh ring	(40)	Locking ring (old assembly)
(22)	Splined washer	(41)	Hollow bolt (new assembly)
(23)	Lock ring		
(24)	Third-fourth sliding hub		
(25)	Synchromesh ring		
(26)	Fourth idle gear		
(27)	Splined washer		
(28)	Lock ring		
(29)	Splined washer		
(30)	Fifth idle gear		
(31)	Splined washer		
(32)	Lock ring		
(33)	Synchromesh ring		
(34)	Fifth/sixth selector rod hub		
(35)	Sixth idle gear needle bearing		
(36)	Synchromesh ring		

Manual gearbox: List and location of components

X61 – X77 – X84 – X85 – X91 – X95

III - REVERSE GEAR SHAFT



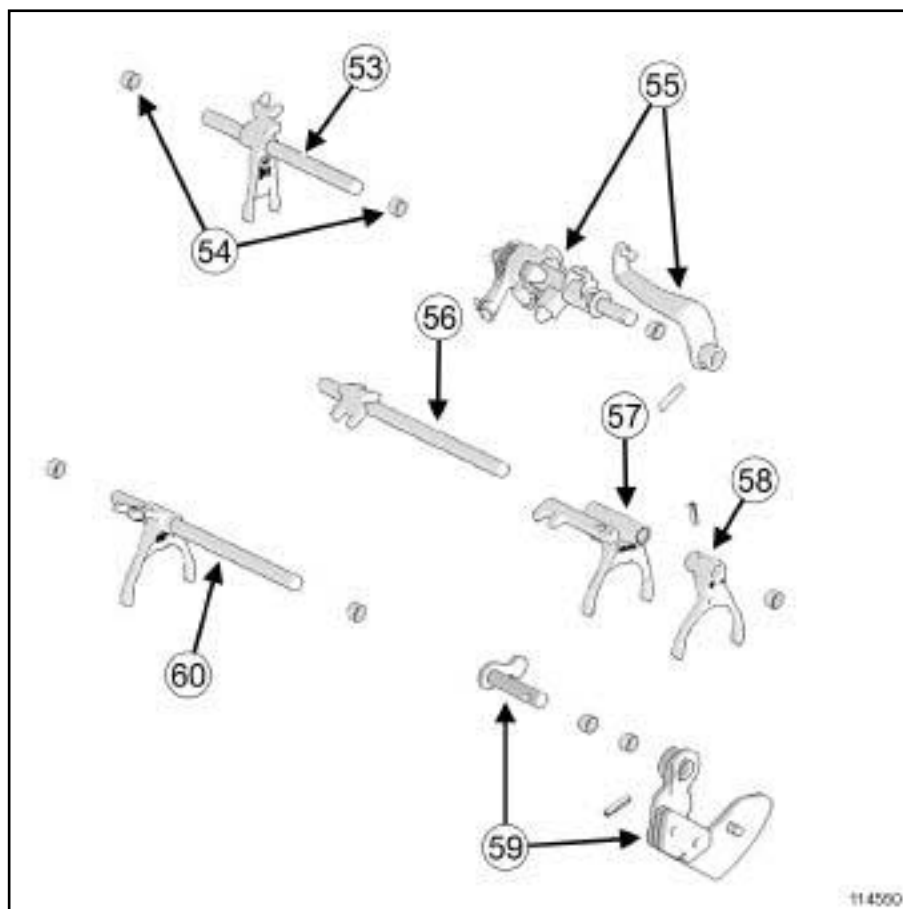
114549

- | | |
|------|---|
| (42) | Spring washer positioned in the clutch housing (Pay attention to the direction of fitting: convex side facing the reverse gear shaft) |
| (43) | Lock ring |
| (44) | Needle roller thrust bearing |
| (45) | Reverse gear primary pinion |
| (46) | Retaining thrust bearing |
| (47) | Reverse gear shaft |
| (48) | Return spring |
| (49) | Synchromesh ring |
| (50) | Lock ring |
| (51) | Reverse gear sliding pinion |
| (52) | Needle bearings fitted on the reverse gear shaft |

Manual gearbox: List and location of components

X61 – X77 – X84 – X85 – X91 – X95

IV - INTERNAL CONTROL



114550

- | | |
|------|----------------------------------|
| (53) | Reverse gear selector fork shaft |
| (54) | Selector fork shaft |
| (55) | Selector module |
| (56) | Selector fork shaft |
| (57) | Third - fourth gear fork |
| (58) | Fifth - sixth gear fork |
| (59) | Gear change lever selector shaft |
| (60) | First - second gear fork |

X61 – X77 – X84 – X85 – X91 – X95

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 **Manual gearbox: Precautions for repair**).

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-11).

II - REMOVAL OPERATION

- Remove:
 - the mechanism housing (see **21A, Manual gearbox, Mechanism cover: Removal - Refitting**, page 21A-12),
 - the gearbox shafts (see **21A, Manual gearbox, Gearbox shaft: Removal - Refitting**, page 21A-18),
 - the differential (see **21A, Manual gearbox, Manual gearbox differential: Removal - Refitting**, page 21A-38).

III - REPAIR OPERATION

- Strip:
 - the input shaft (see **21A, Manual gearbox, Input shaft: Stripping - Rebuilding**, page 21A-21),
 - the output shaft (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-39),
 - the bearings of the mechanism housing (see **21A, Manual gearbox, Pressure plate housing bearing: Removal - Refitting**, page 21A-15),
 - the bearings of the clutch housing (see **21A, Manual gearbox, Clutch housing bearing: Removal - Refitting**, page 21A-33),

- the selector fork shaft rings (see **21A, Manual gearbox, Selector fork shaft ring: Removal - Refitting**, page 21A-35).

- Use **SURFACE CLEANER** (see **Vehicle: Parts and consumables for repair**) to clean all of the removed parts.
- Check (see **21A, Manual gearbox, Manual gearbox: Check**, page 21A-9):
 - 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:
 - lock rings,
 - the differential outlet seals,
 - input shaft inlet seal,
 - the pins,
 - the input and output shaft oil deflectors,
 - the bearings,
 - the second idle gear supporting ring,
 - the hollow bolt on the input shaft,
 - the clutch hydraulic slave cylinder,
 - clutch hydraulic slave cylinder bolts

II - REFITTING OPERATION

- Refit:
 - the selector fork shaft rings (see **21A, Manual gearbox, Selector fork shaft ring: Removal - Refitting**, page 21A-35),
 - the bearings of the clutch housing (see **21A, Manual gearbox, Clutch housing bearing: Removal - Refitting**, page 21A-33),
 - the bearings of the mechanism housing (see **21A, Manual gearbox, Pressure plate housing bearing: Removal - Refitting**, page 21A-15),
 - the differential bearings (see **21A, Manual gearbox, Manual gearbox differential bearing: Removal - Refitting**, page 21A-39).

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Rebuild:

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

Adjust the output shaft (see **21A, Manual gearbox, Gearbox shaft: Adjustment**, page **21A-30**)

Refit:

- the differential (see **21A, Manual gearbox, Manual gearbox differential: Removal - Refitting**, page **21A-38**) ,
- the gearbox shafts (see **21A, Manual gearbox, Gearbox shaft: Removal - Refitting**, page **21A-18**) ,
- the mechanism housing (see **21A, Manual gearbox, Mechanism cover: Removal - Refitting**, page **21A-12**) .

III - FINAL OPERATION

- Remove the gearbox from the component support (see **21A, Manual gearbox, Gearbox support equipment: Use**, page **21A-11**) .
- Refit the gearbox (see **Manual gearbox: Removal - Refitting**) .

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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 **Manual gearbox: Precautions for repair**).

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-11).

Remove:

- the mechanism housing (see **21A, Manual gearbox, Mechanism cover: Removal - Refitting**, page 21A-12),
- the gearbox shafts (see **21A, Manual gearbox, Gearbox shaft: Removal - Refitting**, page 21A-18).

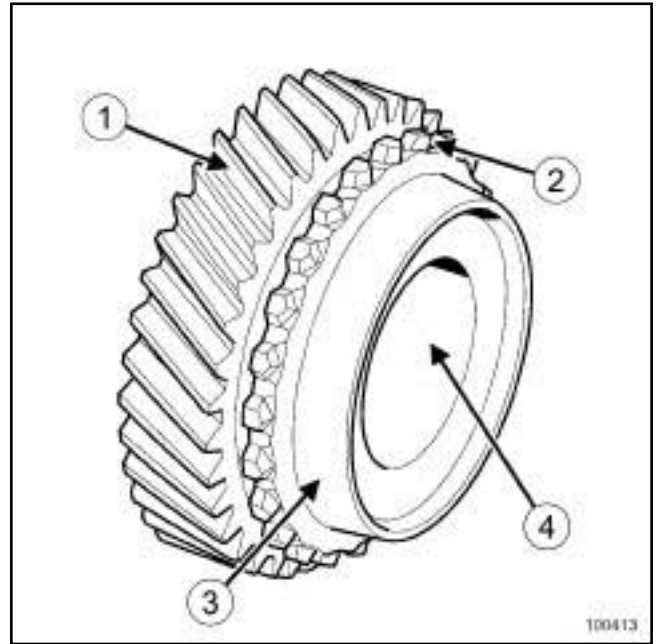
Strip:

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

Before any checks, clean the parts concerned (see **Manual gearbox: Precautions for repair**).

II - TEST OPERATION

1 - Gearing



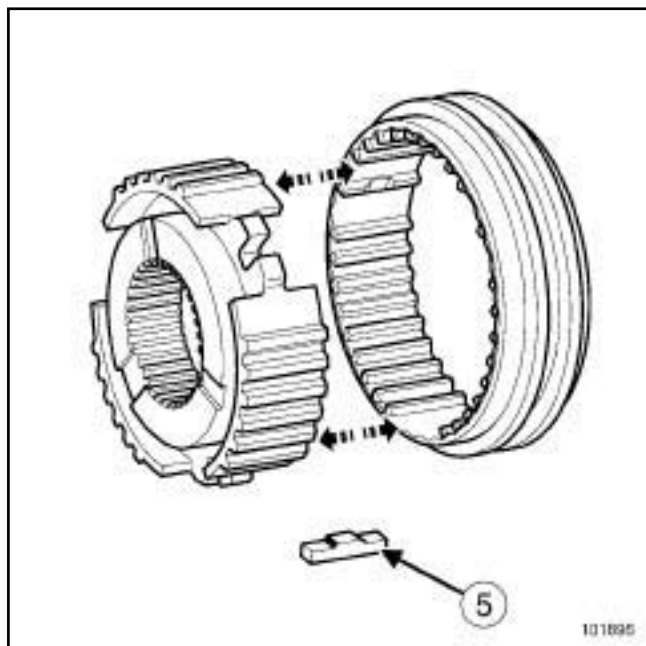
When checking, make sure that you pay particular attention to the appearance of the teeth, especially that of the chamfers and claws.

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 sign of scratches or blue stains,
- the inner wall (4) shows no sign of sticking or wear.

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2 - Selector rod hub

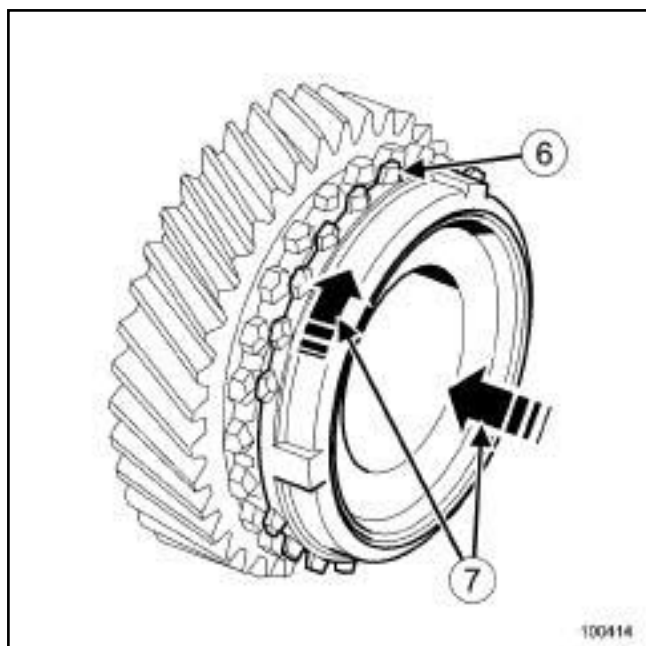


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Check:

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

3 - Synchronmesh ring

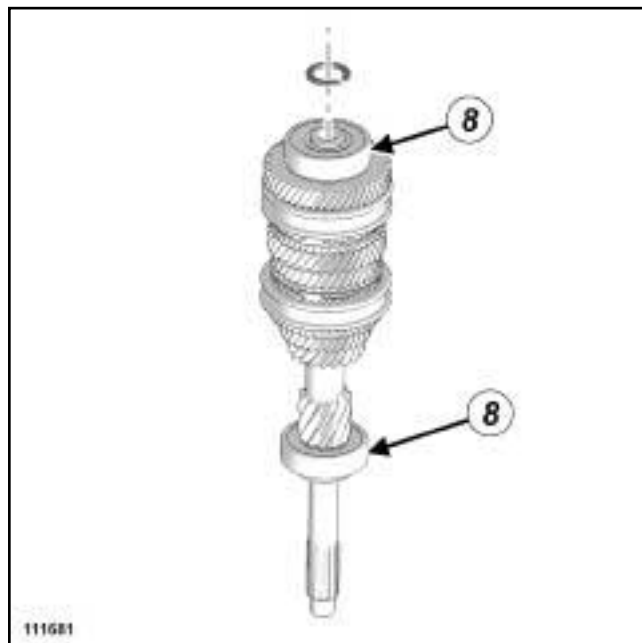


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Check that the claw teeth (6) show no sign of wear or any fractures.

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



111681

Make sure the bearings (8) are rotating properly.

If a bearing rotates unevenly or noisily, it must be replaced.

III - FINAL OPERATION

Rebuild:

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

Adjust the output shaft (see 21A, Manual gearbox, Gearbox shaft: Adjustment, page 21A-30)

Refit:

- the gearbox shafts (see 21A, Manual gearbox, Gearbox shaft: Removal - Refitting, page 21A-18) ,
- the mechanism housing (see 21A, Manual gearbox, Mechanism cover: Removal - Refitting, page 21A-12) .

Remove the gearbox from the component support (see 21A, Manual gearbox, Gearbox support equipment: Use, page 21A-11) .

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

MANUAL GEARBOX

Gearbox support equipment: Use

21A

X61 – X77 – X84 – X85 – X91 – X95

Essential special tooling

Bvi. 1417 Housing support.

Essential equipment

workshop hoist

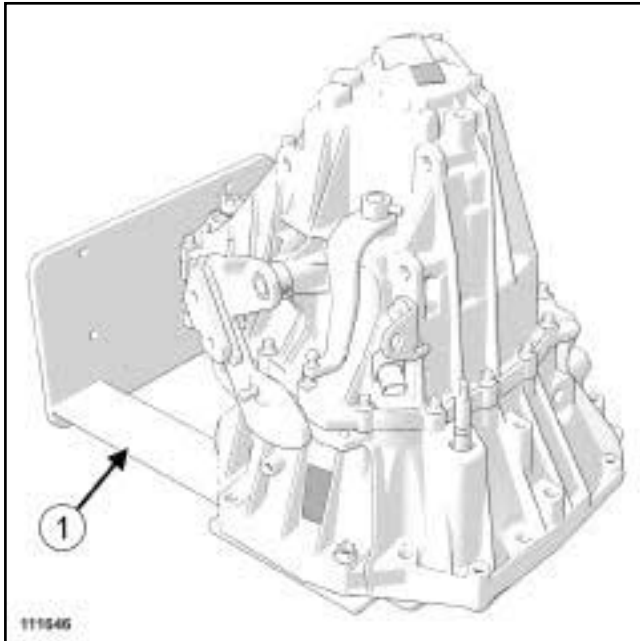
IMPORTANT

To work in complete safety, it is essential to use a component stand.

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

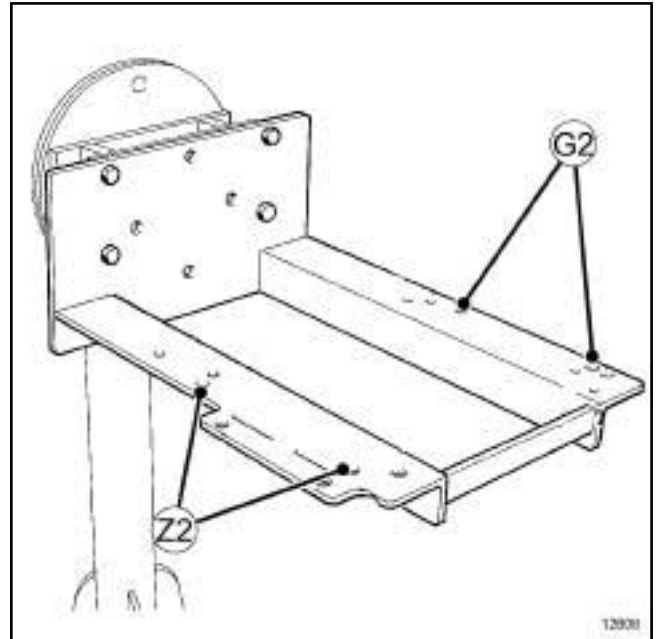
- Remove the gearbox (see **Manual gearbox: Removal - Refitting**) .

II - OPERATION FOR FITTING THE GEARBOX ON THE COMPONENT SUPPORT



- Fit:

- the housing support plate (**Bvi. 1417**) (1) on a **component support**,
- the gearbox with the engine face against the plate using the **workshop hoist**.



- Clamp the gearbox to the holes (**Z2**) and (**G2**) .

III - OPERATION FOR REMOVING THE GEARBOX FROM THE COMPONENT SUPPORT

- Remove:

- the gearbox mountings on the stand plate,
- the gearbox using the **workshop hoist**,
- the housing support 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

X61 – X77 – X84 – X85 – X91 – X95

Tightening torques 	
reverse gear shaft bolt (initial torque)	10 N.m
mechanism housing bolts	28 N.m
reverse gear shaft bolt	30 N.m
dual function switch	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 **Manual gearbox: Precautions for repair**).

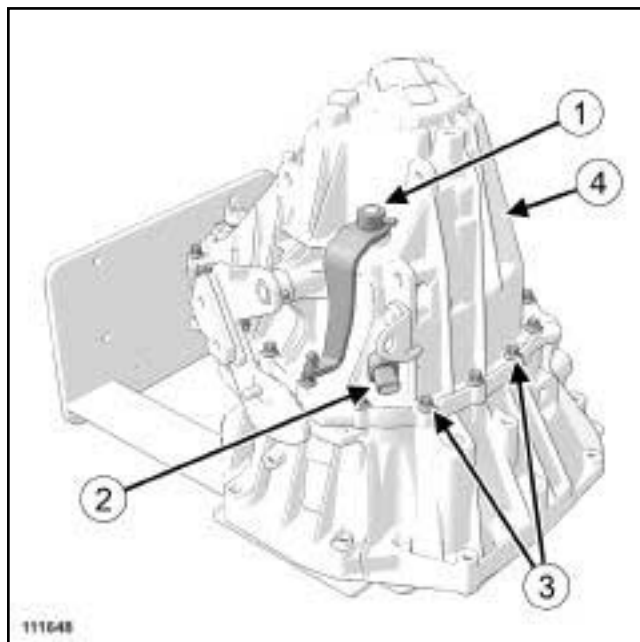
REMOVAL

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-11).

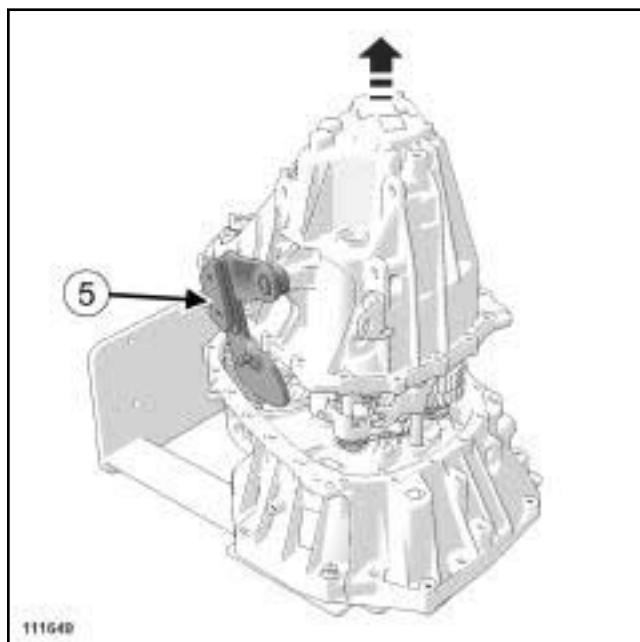
II - OPERATION FOR REMOVAL OF PART CONCERNED

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



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- Remove:
 - the gear lever (1),
 - the dual function switch (2),
 - the mechanism housing bolts (3),
 - the reverse gear shaft bolt (4).



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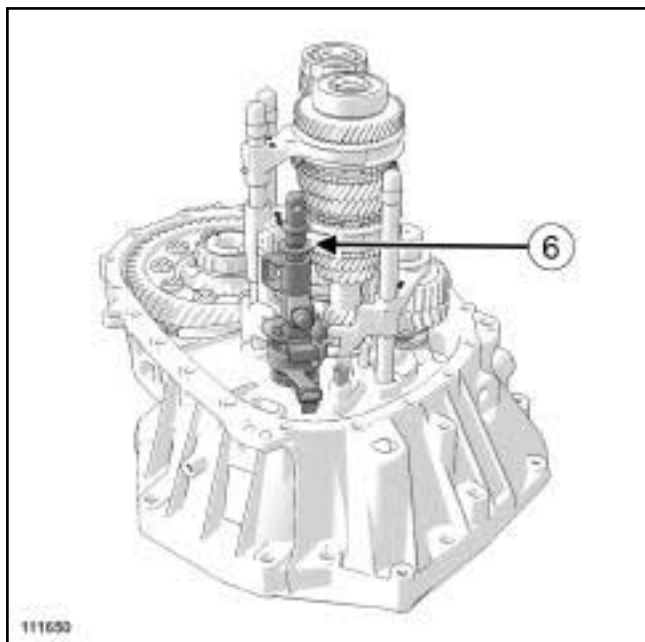
- Lift off the housing while moving the gear lever around (5).

MANUAL GEARBOX

Mechanism cover: Removal - Refitting

21A

X61 – X77 – X84 – X85 – X91 – X95



111650



Note:

The washer is paired with the control module. It can remain stuck inside the mechanism housing.

- Retrieve the setting washer (6) from the control module.

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**).

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**) 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 could damage certain components (engine, radiator, etc.).

- Parts always to be replaced:

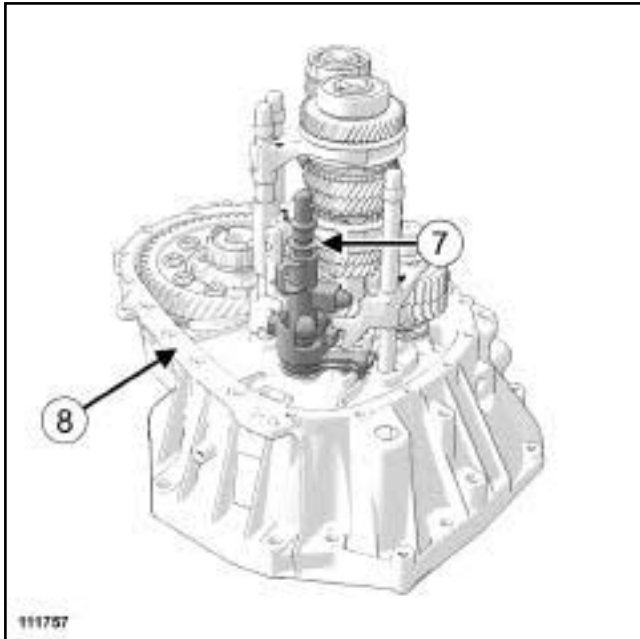
- lock rings,
- the differential outlet seals,
- input shaft inlet seal,
- the pins,
- the input and output shaft oil deflectors,
- the bearings,
- the second idle gear supporting ring,
- the hollow bolt on the input shaft,
- the clutch hydraulic slave cylinder,
- clutch hydraulic slave cylinder bolts

II - REFITTING OPERATION FOR PART CONCERNED

- Adjust the output shaft (see **21A, Manual gearbox, Gearbox shaft: Adjustment**, page **21A-30**) when carrying out an operation on the output shaft.

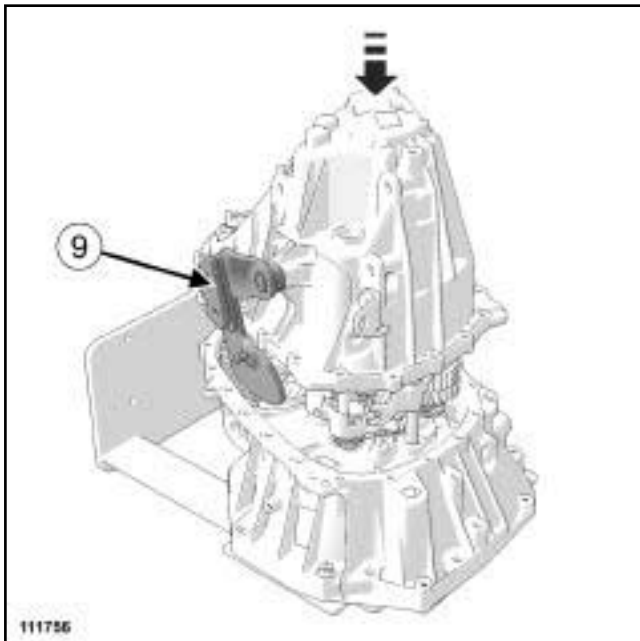
Mechanism cover: Removal - Refitting

X61 – X77 – X84 – X85 – X91 – X95



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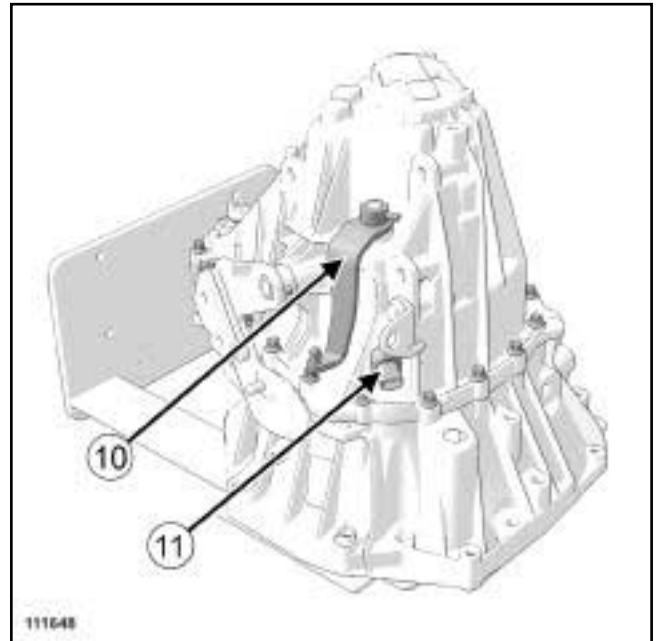
- Check that the calibration washer (7) is in place.
- Apply a bead of **SILICONE ADHESIVE SEALANT** (see **Vehicle: Parts and ingredients for the repairwork**) all around the joint face (8) of the mechanism housing.



111756

- Engage the housing by shifting the gear lever (9) in order to engage the shift finger into the selection module.
- Refit the reverse gear shaft bolt fitted with its sealing washer.
- Torque tighten the **reverse gear shaft bolt (initial torque) (10 N.m)**.

- Pretighten the mechanism housing bolts.
- Loosen the reverse gear shaft bolt.
- Rotate the input shaft while shifting through the gears.
- Torque tighten:
 - all of the **mechanism housing bolts (28 N.m)**,
 - the **reverse gear shaft bolt (30 N.m)**.



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- Refit:
 - the gear lever (10) ,
 - the dual function switch (11) the thread of which is coated with **SILICONE ADHESIVE SEALANT** (see **Vehicle: Parts and ingredients for the repairwork**) .
- Torque tighten the **dual function switch (23 N.m)**.
- Refit:
 - the input shaft seal (see **Input shaft lip seal: Removal - Refitting**) ,
 - the differential output seals (see **Differential output seal: Removal - Refitting**) ,
 - the hydraulic 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-11) .
- Refit the gearbox (see **Manual gearbox: Removal - Refitting**) .

Pressure plate housing bearing: Removal - Refitting

X61 – X77 – X84 – X85 – X91 – X95

Essential special tooling	
Bvi. 1417	Housing support.
Bvi. 1418	Adjustable support for fitting bearings.
Bvi. 1722	Tool kit for repairing gear-boxes.
Bvi. 1743	Tool kit for repairing gear-boxes.

IMPORTANT

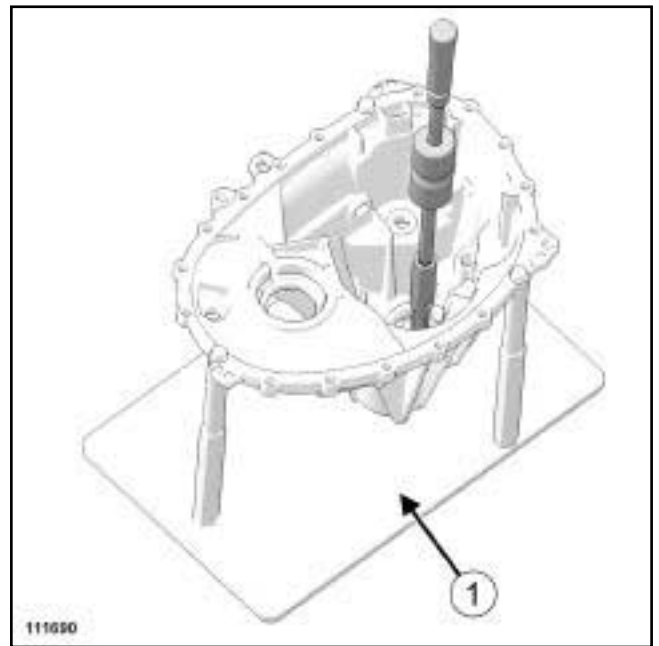
To avoid all risk of damage to the systems, apply the safety and cleanliness instructions and operation recommendations before carrying out any repair (see **Manual gearbox: Precautions for repair**).

REMOVAL

I - REMOVAL PREPARATION OPERATION

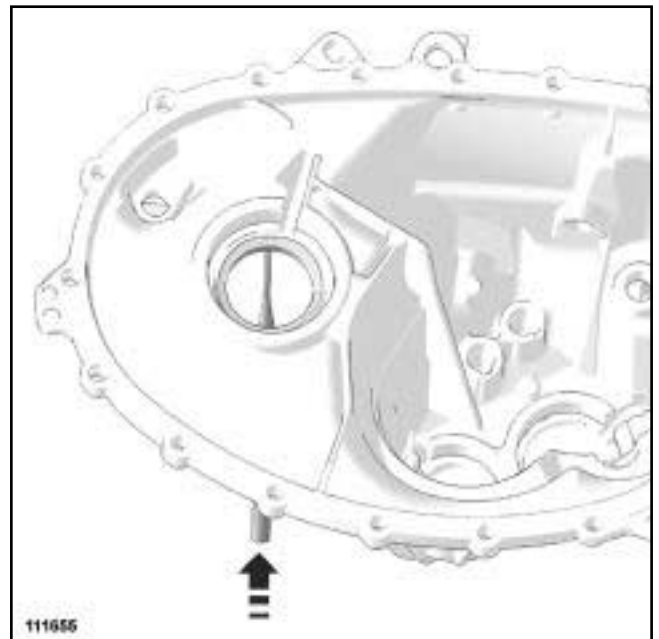
- Remove the gearbox (see **Manual gearbox: Removal - Refitting**).
- Position the gearbox on the component support (see **21A, Manual gearbox, Gearbox support equipment: Use**, page 21A-11).
- Remove the mechanism housing (see **21A, Manual gearbox, Mechanism cover: Removal - Refitting**, page 21A-12).

II - OPERATION FOR REMOVAL OF PART CONCERNED



111690

- Attach the housing using (**Bvi. 1417**) (1).
- Remove the output shaft bearing cup using a slide hammer puller with a diameter of **42 mm**.
- Remove the adjusting shim located under the cup.



111655

- Remove the differential bearing cups using a roll pin punch.

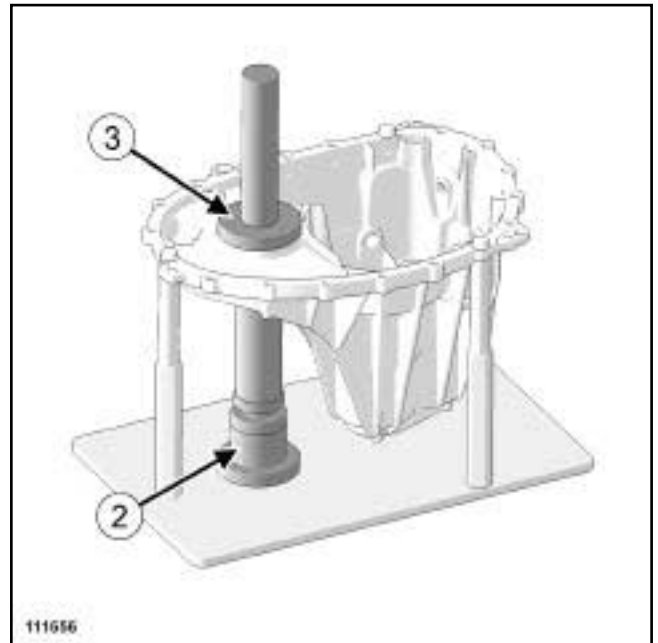
X61 – X77 – X84 – X85 – X91 – X95

REFITTING

I - REFITTING PREPARATION OPERATION

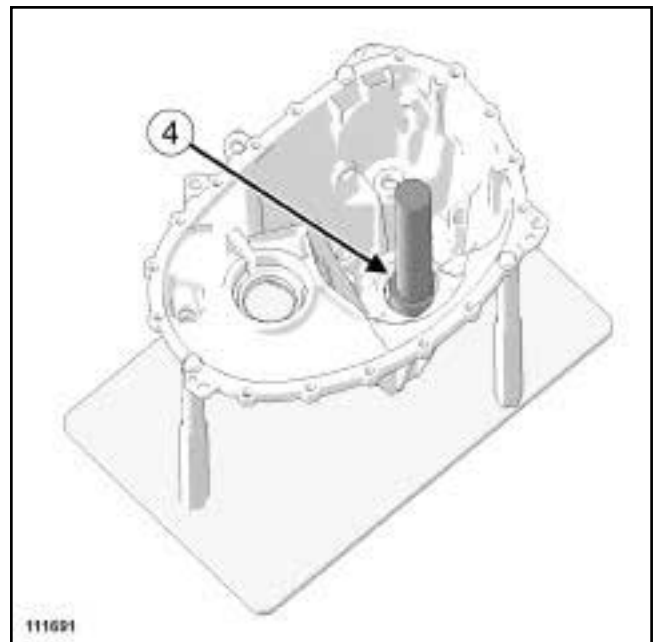
- ❑ Use **SURFACE CLEANER** (see **Vehicle: Parts and ingredients for the repairwork**) to clean:
 - the bearing mating faces in the mechanism housing,
 - the mechanism housing.
- ❑ Parts always to be replaced:
 - lock rings,
 - the differential outlet seals,
 - input shaft inlet seal,
 - the pins,
 - the input and output shaft oil deflectors,
 - the bearings,
 - the second idle gear supporting ring,
 - the hollow bolt on the input shaft,
 - the clutch hydraulic slave cylinder,
 - clutch hydraulic slave cylinder bolts
- ❑ Check all of the removed parts (see **21A, Manual gearbox, Manual gearbox: Check**, page 21A-9) .

II - REFITTING OPERATION FOR PART CONCERNED



111656

- ❑ Mount (**Bvi. 1418**) (2) under the mechanism housing.
- ❑ Refit the differential bearing cup using the (**Bvi. 1722** suffix T (3)) .



111691

- ❑ Position (**Bvi. 1418**) under the housing corresponding to the output shaft line.
- ❑ Position the adjusting shim.
- ❑ Refit the output shaft bearing cup using the (**Bvi. 1743** suffix D (4)) .

Pressure plate housing bearing: Removal - Refitting

X61 – X77 – X84 – X85 – X91 – X95

III - FINAL OPERATION

- Refit the mechanism housing (see **21A, Manual gearbox, Mechanism cover: Removal - Refitting**, page **21A-12**).
- Remove the gearbox from the component support (see **21A, Manual gearbox, Gearbox support equipment: Use**, page **21A-11**).
- Refit the gearbox (see **Manual gearbox: Removal - Refitting**).

MANUAL GEARBOX

Gearbox shaft: Removal - Refitting

21A

X61 – X77 – X84 – X85 – X91 – X95

Essential special tooling

Bvi. 949 Tool for removing/refitting Mecanindus pins for selector fork shafts

IMPORTANT

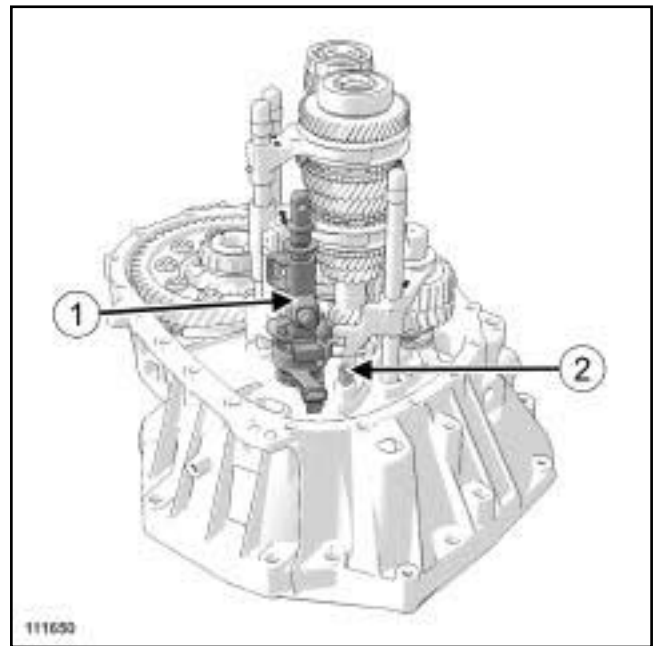
To avoid all risk of damage to the systems, apply the safety and cleanliness instructions and operation recommendations before carrying out any repair (see **Manual gearbox: Precautions for repair**).

REMOVAL

I - REMOVAL PREPARATION OPERATION

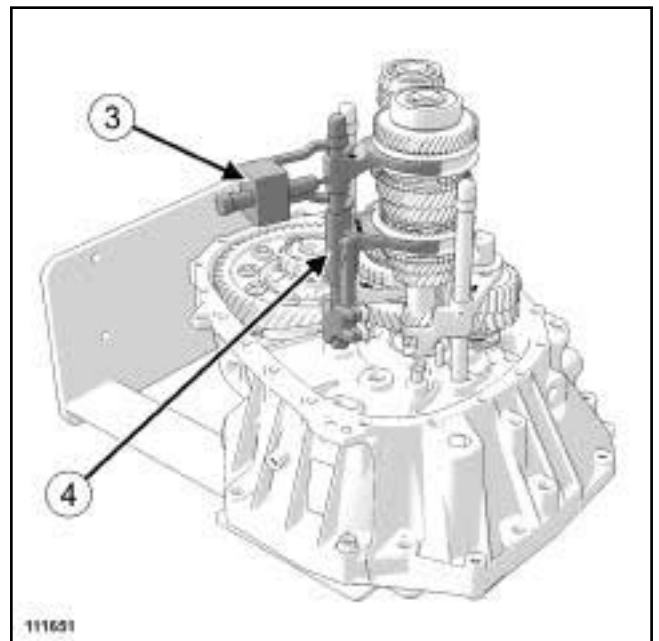
- Remove the gearbox (see **Manual gearbox: Removal - Refitting**).
- Position the gearbox on the component support (see **21A, Manual gearbox, Gearbox support equipment: Use**, page 21A-11).
- Remove the mechanism housing (see **21A, Manual gearbox, Mechanism cover: Removal - Refitting**, page 21A-12).

II - OPERATION FOR REMOVAL OF PART CONCERNED



111650

- Pivot the control module (1) while disengaging the spring above the return bushing (2) and remove the module from the top.



111651

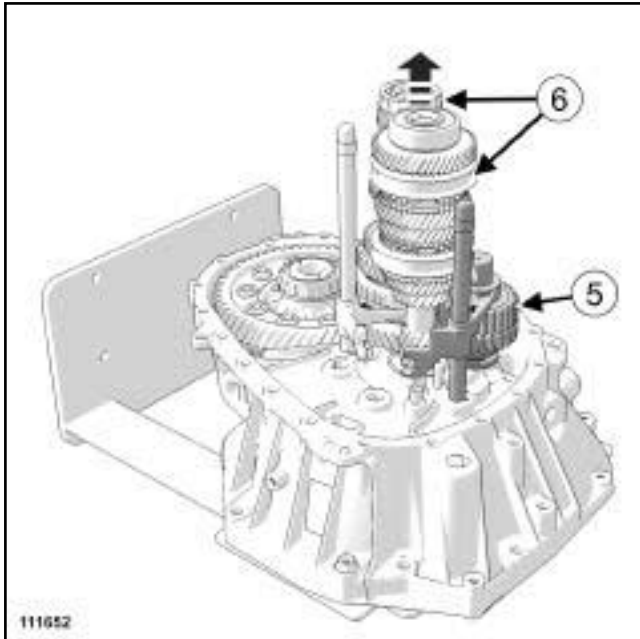
- Unpin the fifth/sixth gear fork using tool (**Bvi. 949**) (3).
- Remove the « shaft - fork » assembly (4).

MANUAL GEARBOX

Gearbox shaft: Removal - Refitting

21A

X61 – X77 – X84 – X85 – X91 – X95



111652

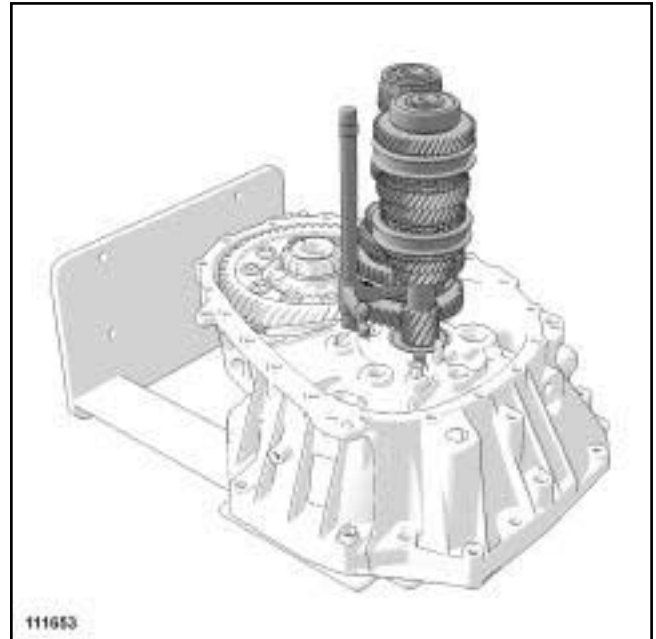
- ❑ Remove the reverse gear unit (5) by lifting the input and output shafts (6) .

❑

Note:

Mark the fitting direction of the spring washer: convex side facing the reverse gear assembly shaft.

Retrieve the spring washer located under the reverse gear assembly shaft.



111653

- ❑ Remove the « output shaft - shaft - fork - input shaft » assembly.

REFITTING

I - REFITTING PREPARATION OPERATION

- ❑ Use **SURFACE CLEANER** (see **Vehicle: Parts and ingredients for the repairwork**) to clean:
 - the shafts,
 - the shaft mating surfaces,
 - the mechanism housing.
- ❑ Parts always to be replaced:
 - the differential outlet seals,
 - input shaft inlet seal,
 - lock rings,
 - the pins,
 - the hollow bolt on the input shaft,
 - the input and output shaft oil deflectors,
 - the second idle gear supporting ring,
 - the bearings,
 - the clutch hydraulic slave cylinder,
 - clutch hydraulic slave cylinder bolts
- ❑ Check all of the removed parts (see **21A, Manual gearbox, Manual gearbox: Check**, page 21A-9) .

MANUAL GEARBOX

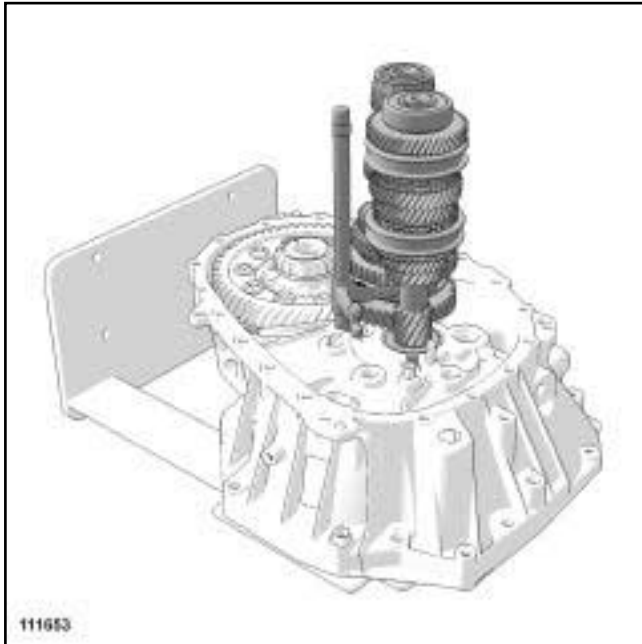
Gearbox shaft: Removal - Refitting

21A

X61 – X77 – X84 – X85 – X91 – X95

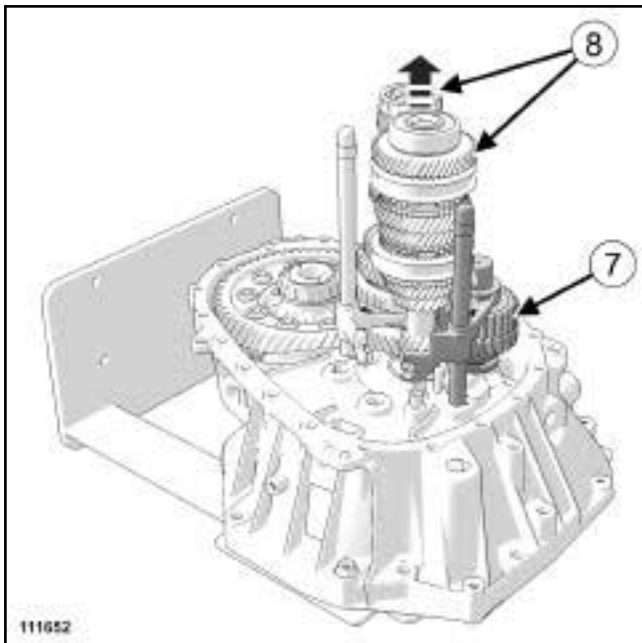
II - REFITTING OPERATION FOR PART CONCERNED

- ❑ Adjust the output shaft (see 21A, **Manual gearbox, Gearbox shaft: Adjustment**, page 21A-30) when carrying out an operation on the output shaft.



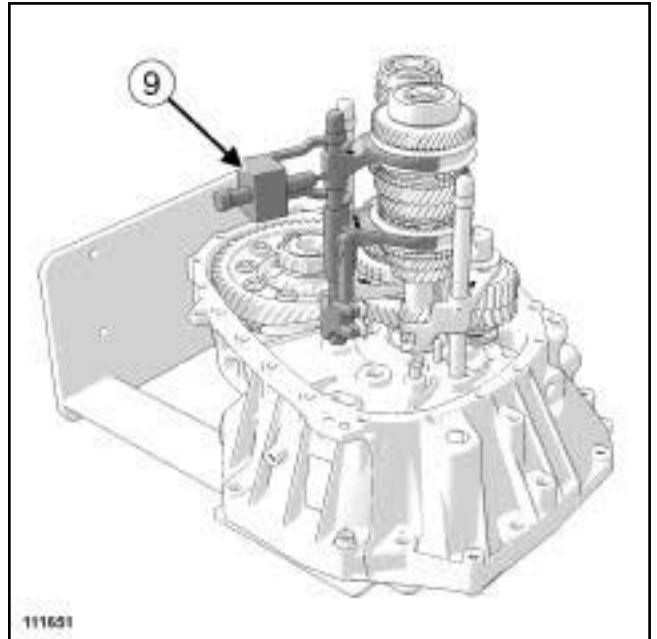
111653

- ❑ Refit the output shaft assembly with the first - second fork and the input shaft.



111652

- ❑ Position the spring washer under the reverse gear assembly **with the convex side facing the reverse gear shaft**.
- ❑ Refit the reverse gear assembly (7) by slightly raising the input and output shafts (8).



111651

- ❑ Position the "5th - 6th fork shaft" assembly.
- ❑ Pin the fork using tool (Bvi. 949) (9).

III - FINAL OPERATION

- ❑ Refit the mechanism housing (see 21A, **Manual gearbox, Mechanism cover: Removal - Refitting**, page 21A-12).
- ❑ Remove the gearbox from the component support (see 21A, **Manual gearbox, Gearbox support equipment: Use**, page 21A-11).
- ❑ Refit the gearbox (see **Manual gearbox: Removal - Refitting**).

MANUAL GEARBOX

Input shaft: Stripping - Rebuilding

21A

X61 – X77 – X84 – X85 – X91 – X95

Essential special tooling

Bvi. 1823	Primary shaft locking tool
Bvi. 1510	Tool kit for PF gearbox operations.

Tightening torques

the hollow bolt of the input shaft (initial torque)	100 N.m
the hollow bolt of the input shaft	165 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 **Manual gearbox: Precautions for repair**).

STRIPPING

I - STRIPPING PREPARATION OPERATION

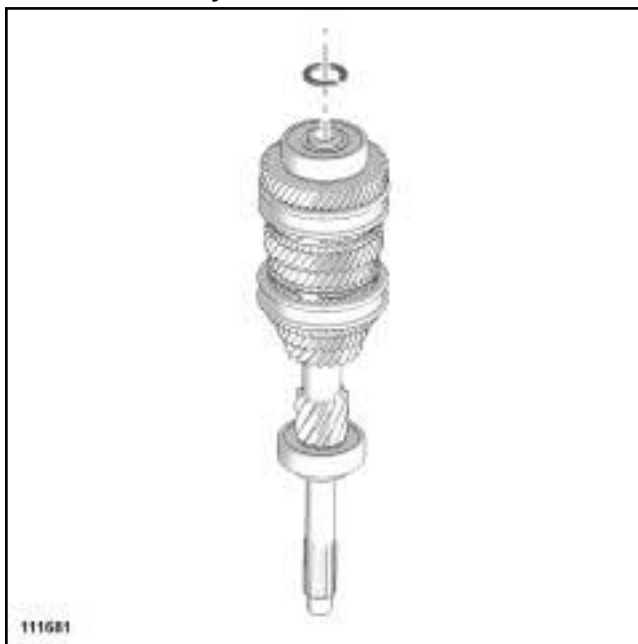
- Remove the gearbox (see **Manual gearbox: Removal - Refitting**).
- Position the gearbox on the component support (see **21A, Manual gearbox, Gearbox support equipment: Use**, page 21A-11).
- Remove:
 - the mechanism housing (see **21A, Manual gearbox, Mechanism cover: Removal - Refitting**, page 21A-12),
 - the gearbox shafts (see **21A, Manual gearbox, Gearbox shaft: Removal - Refitting**, page 21A-18).

II - STRIPPING OPERATION FOR THE INPUT SHAFT

Note:

Mark each splined washer to identify its associated idle gear (**do not mix them up**).

Former assembly



111681

- Remove the locking ring using horseshoe type pliers.

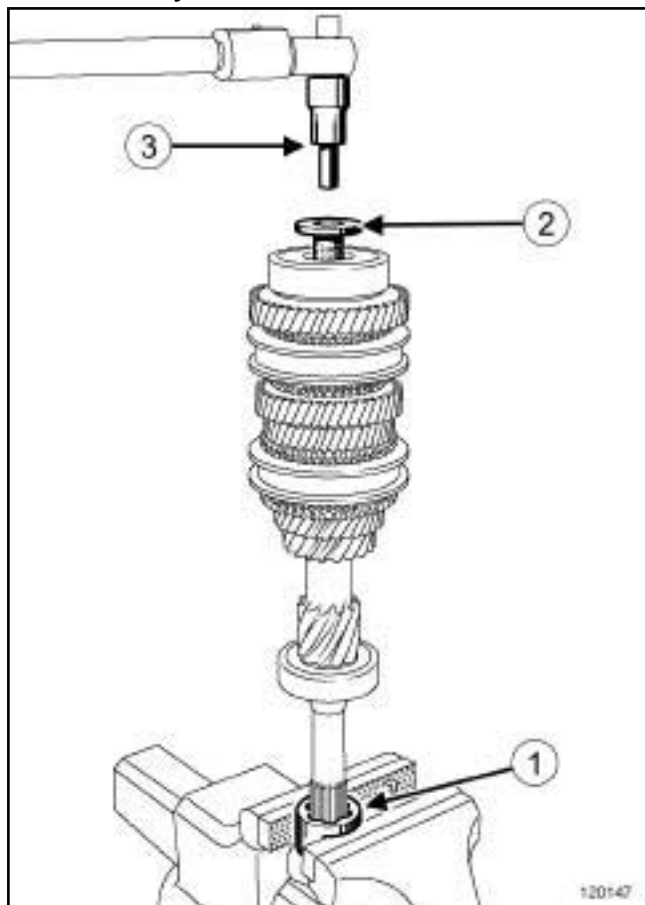
MANUAL GEARBOX

Input shaft: Stripping - Rebuilding

21A

X61 – X77 – X84 – X85 – X91 – X95

New assembly



120147

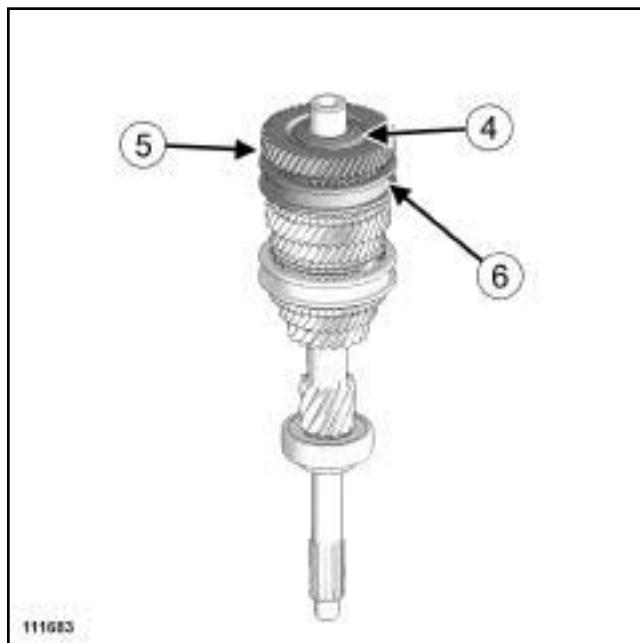
- Lock the input shaft using the **(Bvi. 1823)** (1) and a vice.
- Remove the hollow bolt (2) using a **10 mm diameter hexagon socket** (3) .



111682

111682

- Remove the bearing using a press and a separator.



111683

111683

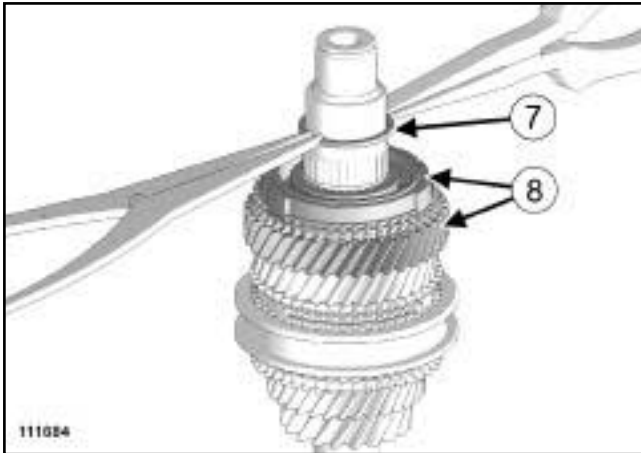
- Remove:
 - the lock washer (4) ,
 - the sixth idle gear (5) with its needle bearing,
 - the fifth/sixth gear selector rod hub (6) .

MANUAL GEARBOX

Input shaft: Stripping - Rebuilding

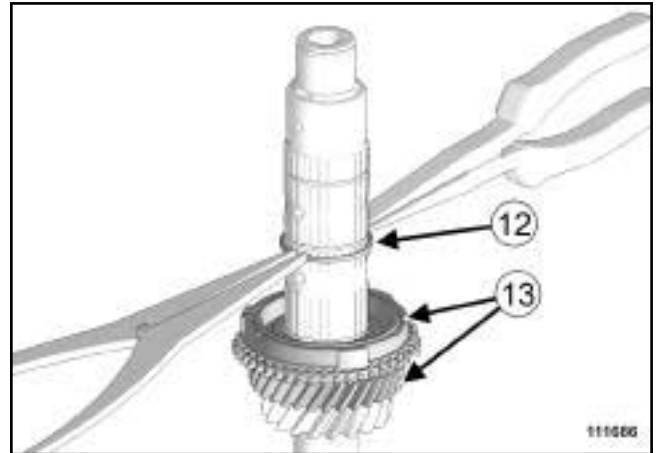
21A

X61 – X77 – X84 – X85 – X91 – X95



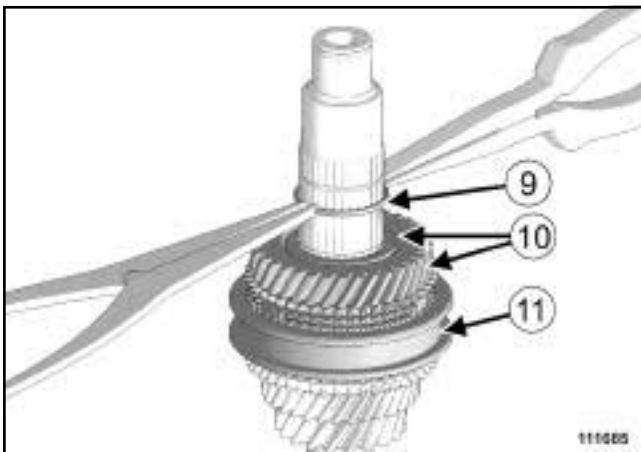
111684

- Remove:
 - the locking ring (7) ,
 - the fifth idle gear with its splined washer (8) .



111686

- Remove:
 - the locking ring (12) ,
 - the third idle gear with its splined washer (13) .



111685

- Remove:
 - the locking ring (9) ,
 - the fourth idle gear with its splined washer (10) ,
 - the third - fourth gear selector rod hub (11) .

REASSEMBLING

I - REBUILDING PREPARATION OPERATION

- Use **SURFACE CLEANER** (see **Vehicle: Parts and ingredients for the repairwork**) to clean
 - the shafts,
 - the shaft mating surfaces,
 - the mechanism housing.
- Parts always to be replaced:
 - lock rings,
 - the differential outlet seals,
 - input shaft inlet seal,
 - the pins,
 - the input and output shaft oil deflectors,
 - the bearings,
 - the second idle gear supporting ring,
 - the hollow bolt on the input shaft,
 - the clutch hydraulic slave cylinder,
 - clutch hydraulic slave cylinder bolts
- Check all of the removed parts (see **21A, Manual gearbox, Manual gearbox: Check**, page **21A-9**) .
- Lubricate:
 - the synchroniser rings,
 - the needle bearing of the sixth idle gear.

MANUAL GEARBOX

Input shaft: Stripping - Rebuilding

21A

X61 – X77 – X84 – X85 – X91 – X95

II - REBUILDING OPERATION FOR PART CONCERNED

□

Note:

The splined washers are paired with their respective gear. **Do not mix them up**

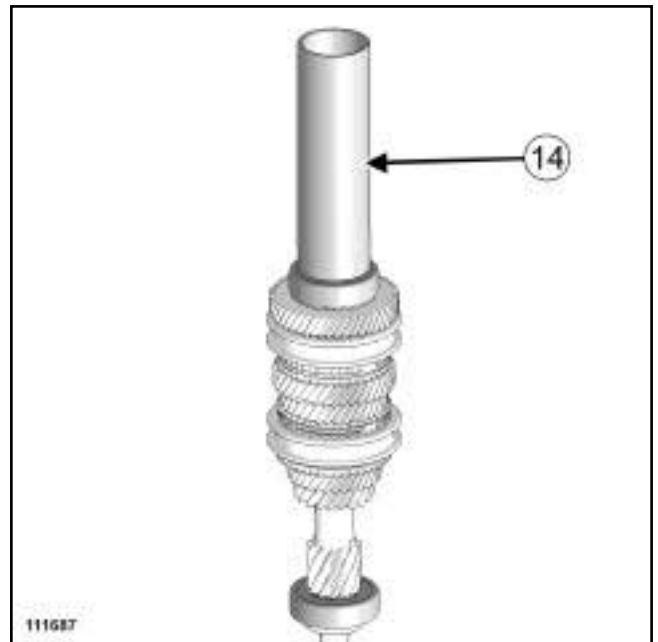
If replacing a gear, always fit the adjustment washer that is supplied with it.

WARNING

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

Refit:

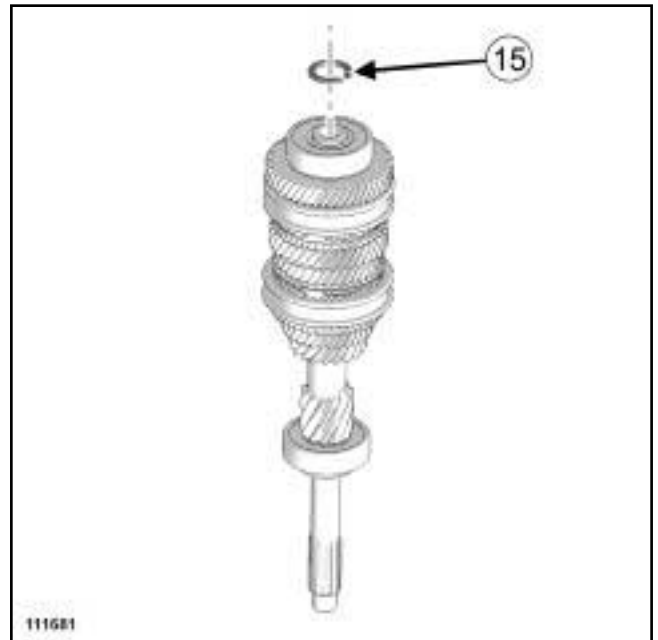
- the third idle gear with its splined washer,
- the locking ring (12) ,
- the third - fourth gear selector rod hub, with the hub shoulder on the third gear side,
- the fourth idle gear with its splined washer,
- the locking ring (9) ,
- the fifth idle gear with its splined washer,
- the locking ring (7) ,
- the fifth - sixth gear selector rod hub, with the hub shoulder on the sixth gear side,
- the sixth idle gear with its needle bearing,
- the lock washer (4) .



111687

- Refit the bearings using the (Bvi. 1510) suffix G (14) .

Former assembly



111681

- Refit the new locking ring (15) , which fits exactly into the groove without play.

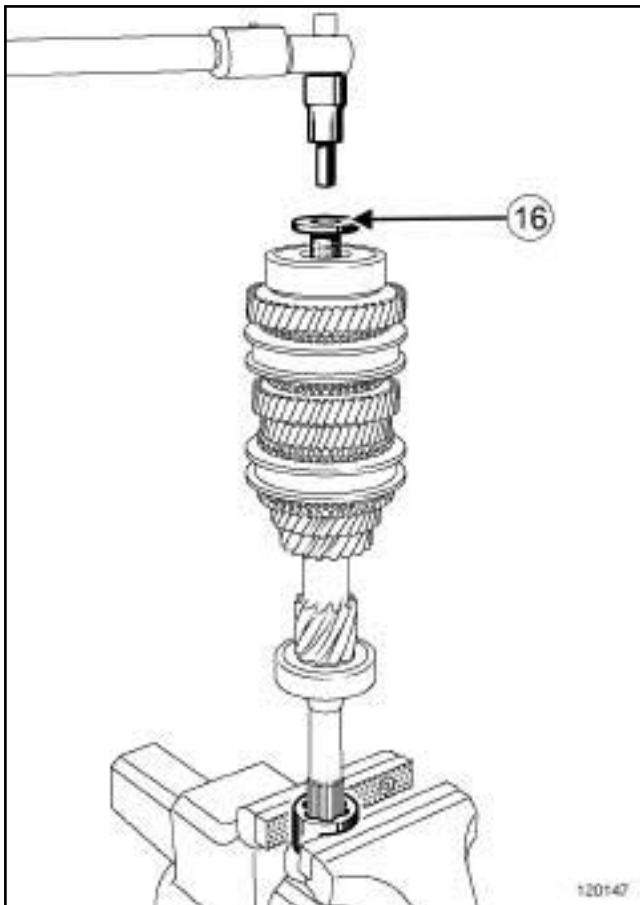
MANUAL GEARBOX

Input shaft: Stripping - Rebuilding

21A

X61 – X77 – X84 – X85 – X91 – X95

New assembly



120147

Note:

Failure to observe this procedure could result in operating play and gearbox malfunction.

- Refit the new hollow bolt (16) of the input shaft.
- Torque tighten **the hollow bolt of the input shaft (initial torque) (100 N.m)**
- Loosen the hollow bolt by one half-turn.
- Torque tighten **the hollow bolt of the input shaft (165 N.m).**

III - FINAL OPERATION

Refit:

- the gearbox shafts (see 21A, **Manual gearbox, Gearbox shaft: Removal - Refitting**, page 21A-18) ,
- the mechanism housing (see 21A, **Manual gearbox, Mechanism cover: Removal - Refitting**, page 21A-12) .

- Remove the gearbox from the component support (see 21A, **Manual gearbox, Gearbox support equipment: Use**, page 21A-11) .
- Refit the gearbox (see **Manual gearbox: Removal - Refitting**) .

Output shaft: Stripping - Rebuilding

X61 – X77 – X84 – X85 – X91 – X95

Essential special tooling

Bvi. 1510-01	Tool kit for PK6 gearbox operations.
Bvi. 1743	Tool kit for repairing gearboxes.
Bvi. 1419	Bearing cage positioning tool.

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 **Manual gearbox: Precautions for repair**).

STRIPPING

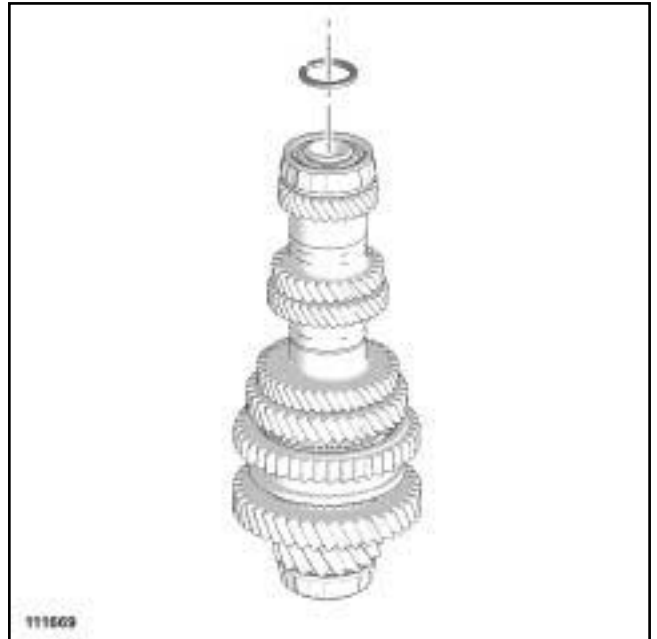
I - STRIPPING PREPARATION OPERATION

- 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-11).
- Remove:
 - the mechanism housing (see **21A, Manual gearbox, Mechanism cover: Removal - Refitting**, page 21A-12),
 - the gearbox shafts (see **21A, Manual gearbox, Gearbox shaft: Removal - Refitting**, page 21A-18).

II - STRIPPING OPERATION FOR THE OUTPUT SHAFT

Note:

The gear supporting ring and the fixed gears are fitted tightened on the shaft. The thrust required for separation is approximately **10 to 15 tonnes**, so the proper equipment is needed (press and support).



111669

- Remove the locking ring using horseshoe type pliers.

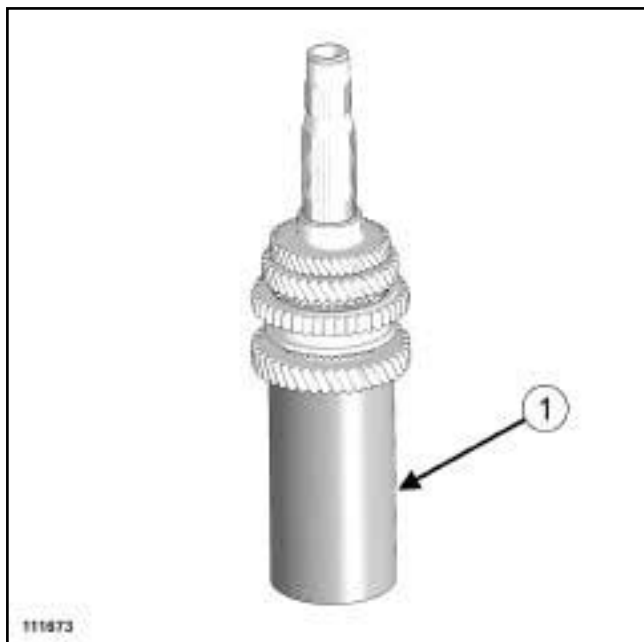


111670

- Use a press and a separator to remove the "fourth - fifth and sixth gears - bearing" assembly by pressing under the fourth gear.

Output shaft: Stripping - Rebuilding

X61 – X77 – X84 – X85 – X91 – X95



111673

- Remove the "ring - gears - hubs" assembly using a press and the **(Bvi. 1510-01) suffix L (1)** by pressing under the first idle gear.



111674

- Remove the bearing with an extractor.

REASSEMBLING

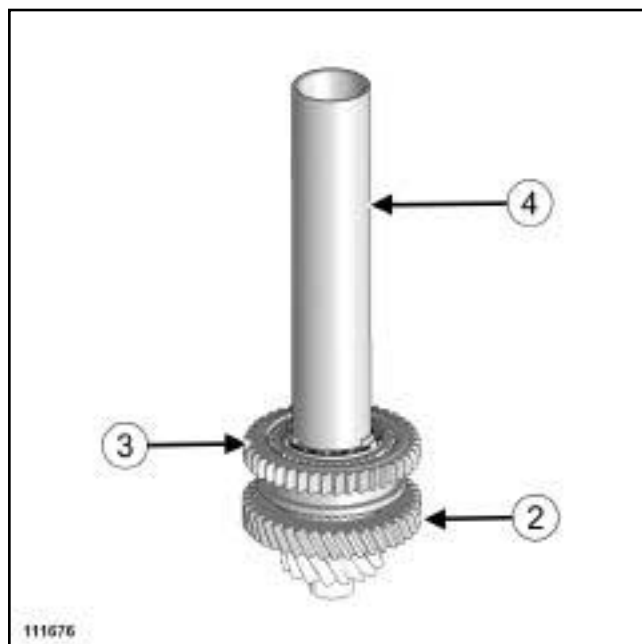
I - REBUILDING PREPARATION OPERATION

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

- the shaft mating surfaces,
- the mechanism housing.
- Parts always to be replaced:
 - lock rings,
 - the differential outlet seals,
 - input shaft inlet seal,
 - the pins,
 - the input and output shaft oil deflectors,
 - the bearings,
 - the second idle gear supporting ring,
 - the hollow bolt on the input shaft,
 - the clutch hydraulic slave cylinder,
 - clutch hydraulic slave cylinder bolts

II - REBUILDING OPERATION FOR PART CONCERNED

- Adjust the output shaft (see **21A, Manual gearbox, Gearbox shaft: Adjustment**, page 21A-30) .

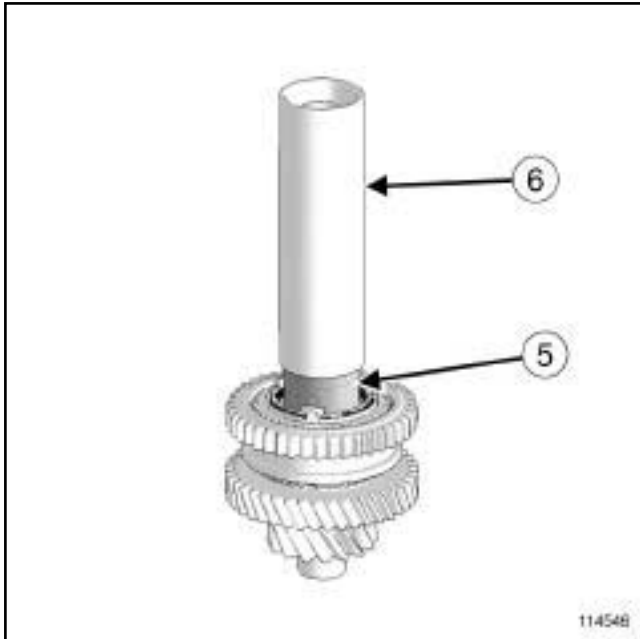


111676

- Refit:
 - the first idle gear (2) and its synchronisation,
 - the first - second gear selector rod hub (3) using the **(Bvi. 1743) suffix C (4)** and align the hub marks with those of the synchroniser ring.

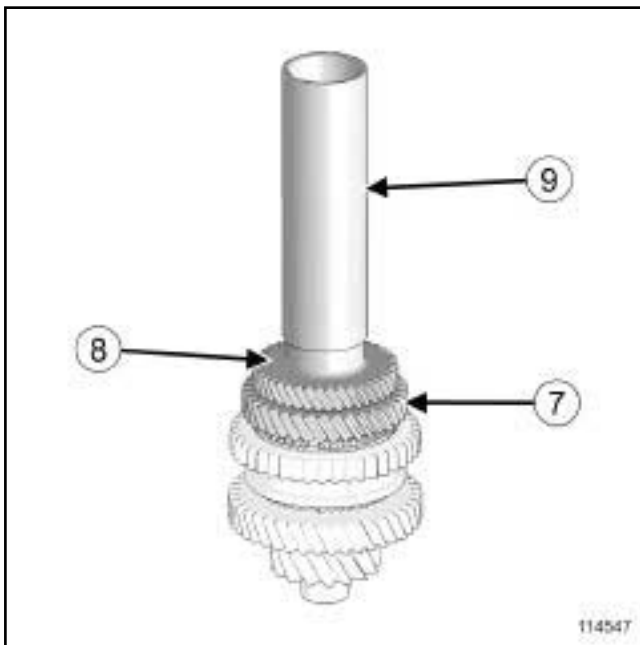
Output shaft: Stripping - Rebuilding

X61 – X77 – X84 – X85 – X91 – X95



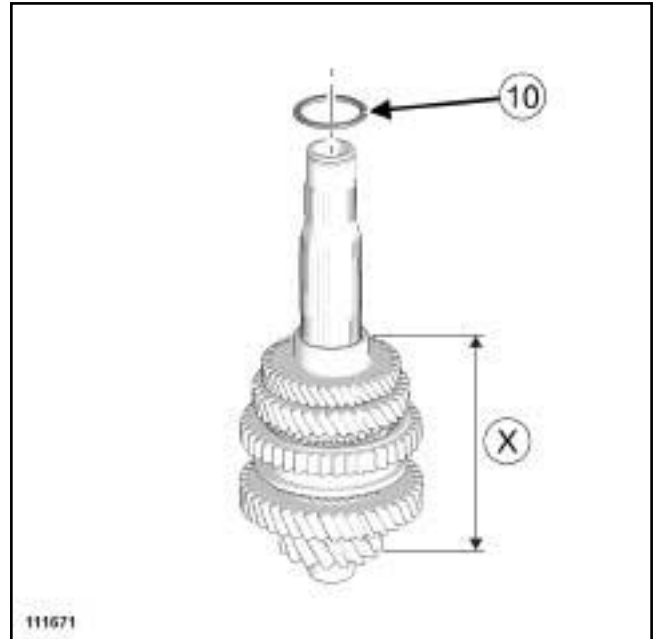
114546

- Refit the second idle gear supporting ring (5) using the (Bvi. 1743) suffix C (6) and apply a final force of 5 tonnes.



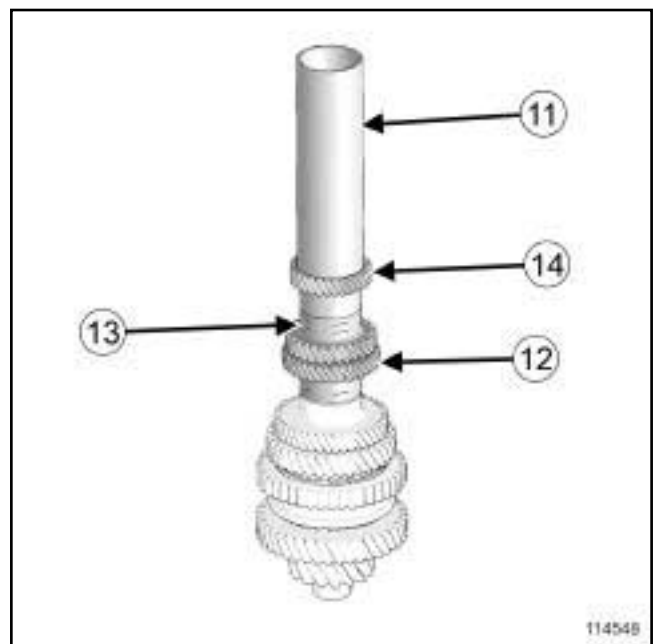
114547

- Refit:
 - the second idle gear (7) ,
 - the third fixed gear (8) using tool (Bvi. 1743) suffix C (9) .



111671

- Measure the dimension (X) between the bottom of the output shaft gear and the top of the third fixed gear, to determine the thickness of the intermediate adjusting washer (10) of the output shaft (see 21A, Manual gearbox, Gearbox shaft: Adjustment, page 21A-30) .

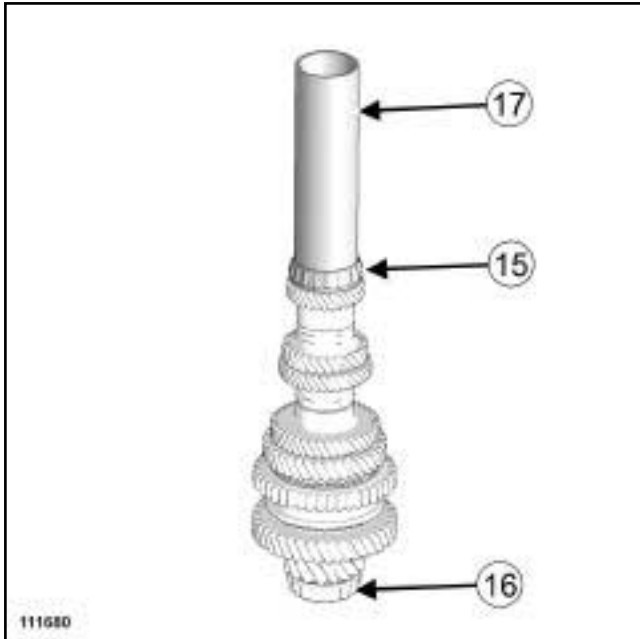


114548

- Refit using the (Bvi. 1743) suffix C (11) :
 - the fourth fixed gear (12) ,
 - the fifth fixed gear (13) ,
 - the sixth fixed gear (14) .

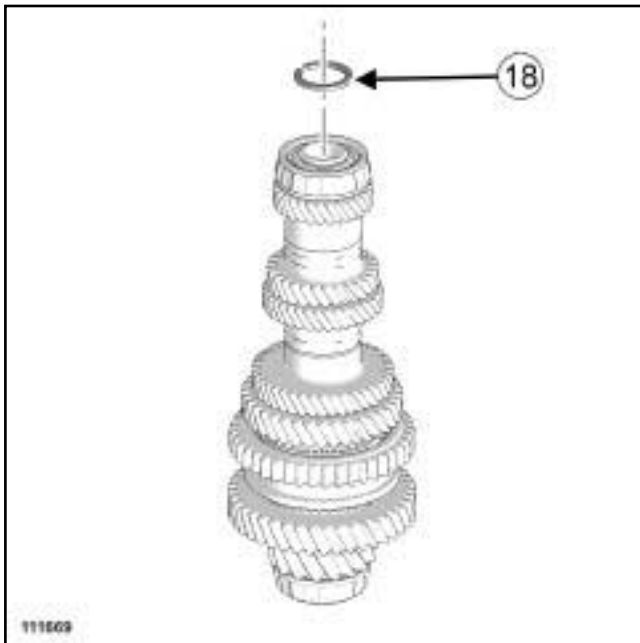
Output shaft: Stripping - Rebuilding

X61 – X77 – X84 – X85 – X91 – X95



111680

- Refit the bearings (15) and (16) using the tool (Bvi. 1419) (17) .



111669

- Select and fit a new locking ring (18) which fits exactly in the groove with no play.

III - FINAL OPERATION

- Refit:

- the gearbox shafts (see 21A, Manual gearbox, Gearbox shaft: Removal - Refitting, page 21A-18) ,

- the mechanism housing (see 21A, Manual gearbox, Mechanism cover: Removal - Refitting, page 21A-12) .

- Remove the gearbox from the component support (see 21A, Manual gearbox, Gearbox support equipment: Use, page 21A-11) .
- Refit the gearbox (see Manual gearbox: Removal - Refitting) .

MANUAL GEARBOX

Gearbox shaft: Adjustment

21A

X61 – X77 – X84 – X85 – X91 – X95

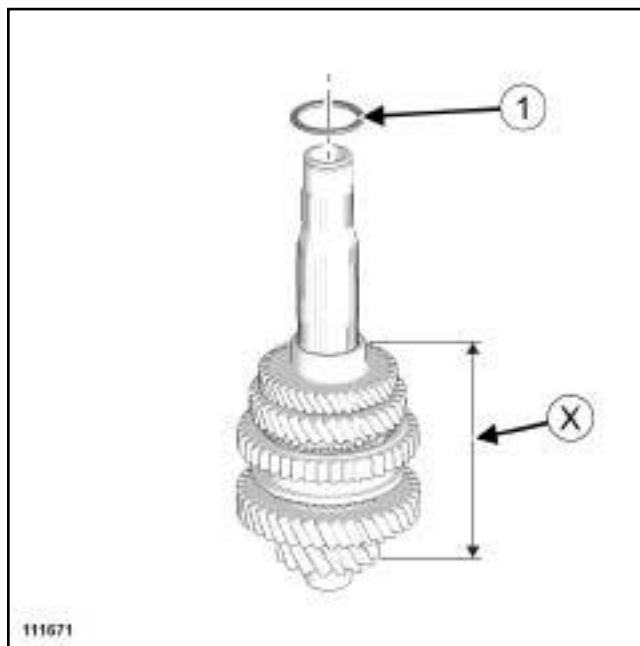
IMPORTANT

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

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-11).
- Remove:
 - the mechanism housing (see **21A, Manual gearbox, Mechanism cover: Removal - Refitting**, page 21A-12),
 - the gearbox shafts (see **21A, Manual gearbox, Gearbox shaft: Removal - Refitting**, page 21A-18).
- Strip down the output shaft (see **21A, Manual gearbox, Output shaft: Stripping - Rebuilding**, page 21A-26).
- Use **SURFACE CLEANER** (see **Vehicle: Parts and ingredients for the repairwork**) to clean:
 - the shafts,
 - the shaft mating surfaces,
 - the mechanism housing.

II - ADJUSTMENT OPERATION



111671

- When an operation is being carried out on the output shaft, determine the thickness of the intermediate adjusting washer (1) by measuring the distance (X) between the base of the torque reduction gear and the top of the third gear.
- Refer to the following table to determine the thickness of the shim (1):
 - dimension (X) measured between **147.690** and **147.666** mm: adjusting shim thickness (1) 1.500 mm
 - dimension (X) measured between **147.665** and **147.641** mm: adjusting shim thickness (1) 1.525 mm
 - dimension (X) measured between **147.640** and **147.616** mm: adjusting shim thickness (1) 1.550 mm
 - dimension (X) measured between **147.615** and **147.591** : adjusting shim thickness (1) 1.575 mm
 - dimension (X) measured between **147.590** and **147.566** : adjusting shim thickness (1) 1.600 mm
 - dimension (X) measured between **147.565** and **147.541** : adjusting shim thickness (1) 1.625 mm
 - dimension (X) measured between **147.540** and **147.516** : adjusting shim thickness (1) 1.650 mm
 - dimension (X) measured between **147.515** and **147.491** : adjusting shim thickness (1) 1.675 mm
 - dimension (X) measured between **147.490** and **147.466** : adjusting shim thickness (1) 1.700 mm

MANUAL GEARBOX

Gearbox shaft: Adjustment

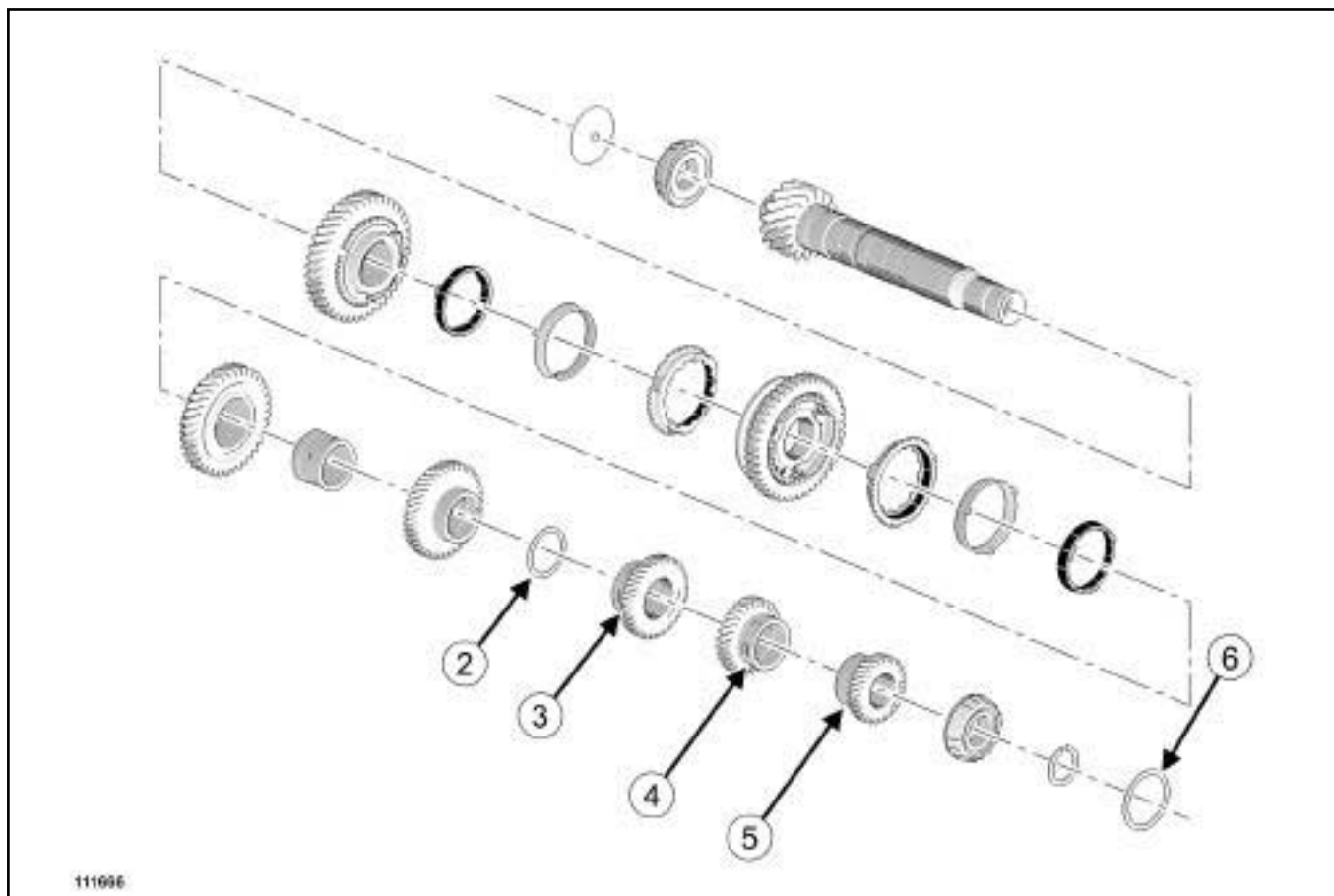
21A

X61 – X77 – X84 – X85 – X91 – X95

- dimension (X) measured between **147.465** and **147.441** : adjusting shim thickness (1) 1.725 mm

- dimension (X) measured between **147.440** and **147.416** : adjusting shim thickness (1) 1.750 mm

- dimension (X) measured between **147.415** and **147.391** : adjusting shim thickness (1) 1.775 mm



111666

□

Note:

Note: after the shim (2) and/or the gears (3), (4), and (5) have been replaced, it is necessary to modify the bearing preloading setting comparatively by modifying shim (6).

□ Replacing the intermediate shim (2):

- increase the size of the bearing preloading shim (6) if the replaced intermediate shim (2) is thinner than the shim used before,
- decrease the size of the bearing preloading shim (6) if the replaced intermediate shim (2) is thicker than the shim used before.

□ Replacing the gears (3), (4) or (5):

- measure the thickness of the old and new sprockets,
- increase the thickness of shim (6) if the difference is a decrease of more than **0.025 mm**,
- decrease the thickness of shim (6) if the difference is an increase of more than **0.025 mm**.

Note:

The preloading shims (6) vary from **0.020 mm** in **0.020 mm** increments.

III - FINAL OPERATION

□ Refit:

- the gearbox shafts (see **21A, Manual gearbox, Gearbox shaft: Removal - Refitting**, page 21A-18),

MANUAL GEARBOX

Gearbox shaft: Adjustment

21A

X61 – X77 – X84 – X85 – X91 – X95

- the mechanism housing (see **21A, Manual gearbox, Mechanism cover: Removal - Refitting**, page **21A-12**).
- Remove the gearbox from the component support (see **21A, Manual gearbox, Gearbox support equipment: Use**, page **21A-11**).
- Refit the gearbox (see **Manual gearbox: Removal - Refitting**).

Clutch housing bearing: Removal - Refitting

X61 – X77 – X84 – X85 – X91 – X95

Essential special tooling	
Bvi. 1418	Adjustable support for fitting bearings.
Bvi. 1743	Tool kit for repairing gear-boxes.
Bvi. 1722	Tool kit for repairing gear-boxes.

IMPORTANT

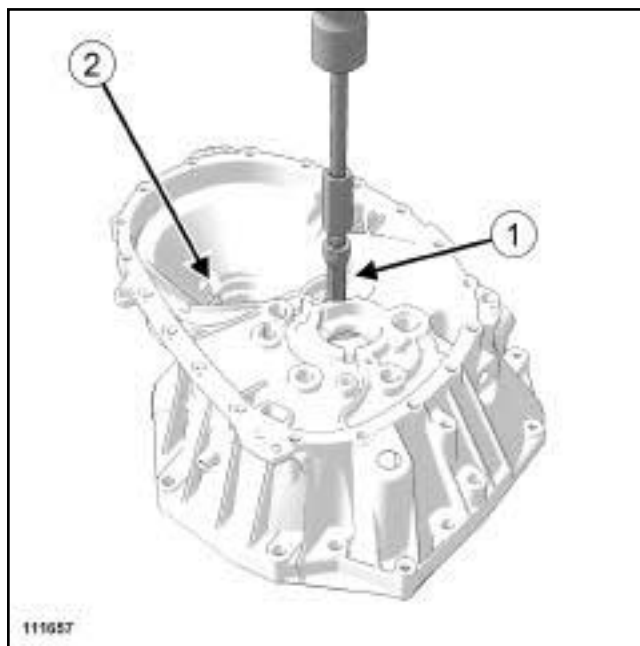
To avoid all risk of damage to the systems, apply the safety and cleanliness instructions and operation recommendations before carrying out any repair (see **Manual gearbox: Precautions for repair**).

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-11).
- Remove:
 - the mechanism housing (see **21A, Manual gearbox, Mechanism cover: Removal - Refitting**, page 21A-12),
 - the gearbox shafts (see **21A, Manual gearbox, Gearbox shaft: Removal - Refitting**, page 21A-18),
 - the differential (see **21A, Manual gearbox, Manual gearbox differential: Removal - Refitting**, page 21A-38).

II - OPERATION FOR REMOVAL OF PART CONCERNED



111657

- Remove:
 - the output shaft bearing cup using a **slide hammer puller** with a diameter of **42 mm (1)**,
 - the differential bearing cup using a **slide hammer puller** with a diameter of **50 mm (2)**.

REFITTING

I - REFITTING PREPARATION OPERATION

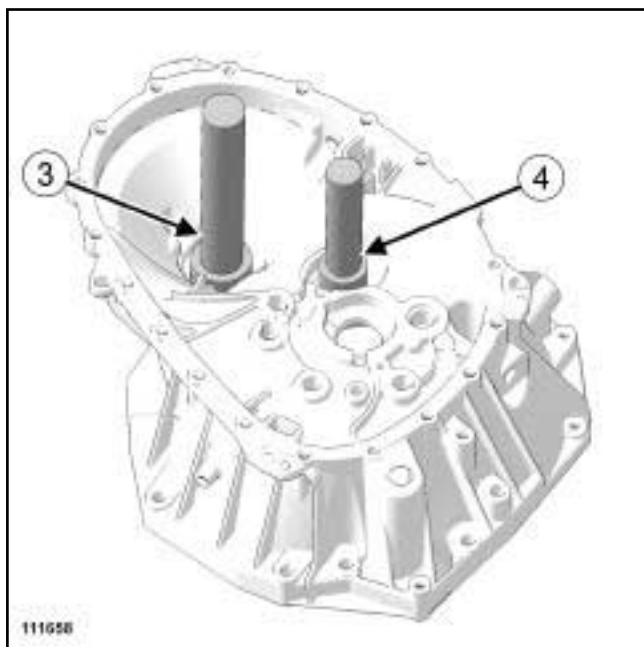
- Use **SURFACE CLEANER** (see **Vehicle: Parts and ingredients for the repairwork**) to clean:
 - the shafts,
 - the shaft mating surfaces,
 - the differential,
 - the mechanism housing,
 - the differential housing.
- Parts always to be replaced:
 - lock rings,
 - the differential outlet seals,
 - input shaft inlet seal,
 - the pins,
 - the input and output shaft oil deflectors,
 - the bearings,
 - the second idle gear supporting ring,

Clutch housing bearing: Removal - Refitting

X61 – X77 – X84 – X85 – X91 – X95

- the hollow bolt on the input shaft,
 - the clutch hydraulic slave cylinder,
 - clutch hydraulic slave cylinder bolts
- Check all of the removed parts (see **21A, Manual gearbox, Manual gearbox: Check**, page 21A-9) .

II - REFITTING OPERATION FOR PART CONCERNED



111658

- Position the clutch housing on the press plate.
- Position **(Bvi. 1418)** under the housing for each shaft line.
- Refit:
 - the new plastic deflector under the output shaft bearing cup **(4)** ,
 - the differential bearing cup using the **(Bvi. 1743) suffix E (3)** ,
 - the output shaft bearing cup using the **(Bvi. 1722) suffix S (4)** .

III - FINAL OPERATION

- Refit:
 - the differential (see **21A, Manual gearbox, Manual gearbox differential: Removal - Refitting**, page 21A-38) ,
 - the gearbox shafts (see **21A, Manual gearbox, Gearbox shaft: Removal - Refitting**, page 21A-18) ,

- the mechanism housing (see **21A, Manual gearbox, Mechanism cover: Removal - Refitting**, page 21A-12) .

- Remove the gearbox from the component support (see **21A, Manual gearbox, Gearbox support equipment: Use**, page 21A-11) .
- Refit the gearbox (see **Manual gearbox: Removal - Refitting**) .

Selector fork shaft ring: Removal - Refitting

X61 – X77 – X84 – X85 – X91 – X95

Essential special tooling

Bvi. 1743 Tool kit for repairing gear-boxes.

IMPORTANT

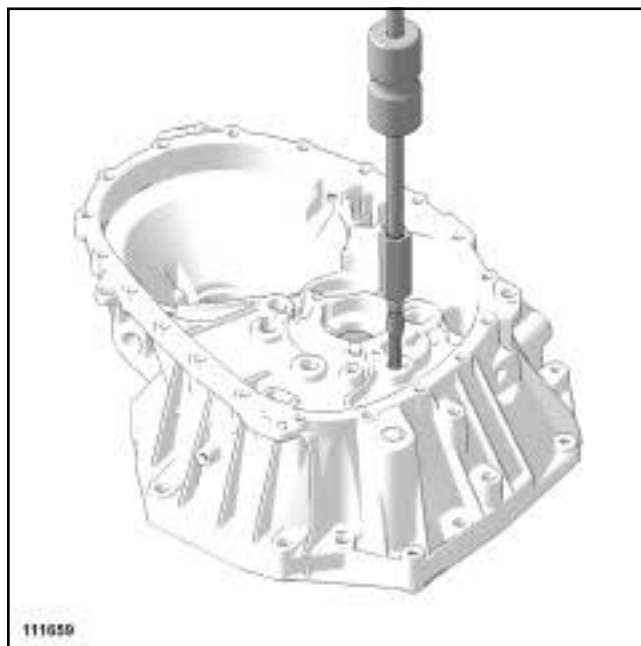
To avoid all risk of damage to the systems, apply the safety and cleanliness instructions and operation recommendations before carrying out any repair (see **Manual gearbox: Precautions for repair**).

REMOVAL

I - REMOVAL PREPARATION OPERATION

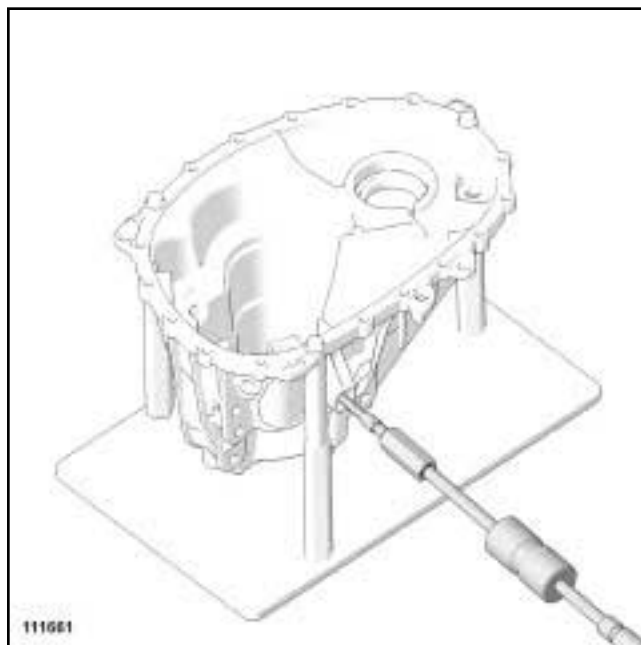
- Remove the gearbox (see **Manual gearbox: Removal - Refitting**).
- Position the gearbox on the component support (see **21A, Manual gearbox, Gearbox support equipment: Use**, page 21A-11).
- Remove:
 - the mechanism housing (see **21A, Manual gearbox, Mechanism cover: Removal - Refitting**, page 21A-12),
 - the gearbox shafts (see **21A, Manual gearbox, Gearbox shaft: Removal - Refitting**, page 21A-18),
 - the differential (see **21A, Manual gearbox, Manual gearbox differential: Removal - Refitting**, page 21A-38).

II - OPERATION FOR REMOVAL OF PART CONCERNED



111659

- Remove the selector fork shaft rings using an inertia extractor with a **14 mm** diameter.



111661

- Remove the selector shaft and the two rings using a slide hammer **14 mm** in diameter.

Selector fork shaft ring: Removal - Refitting

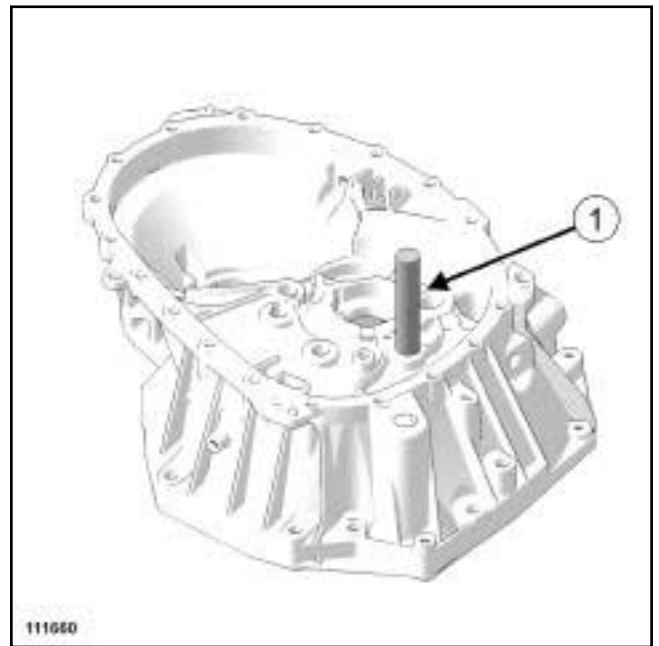
X61 – X77 – X84 – X85 – X91 – X95

REFITTING

I - REFITTING PREPARATION OPERATION

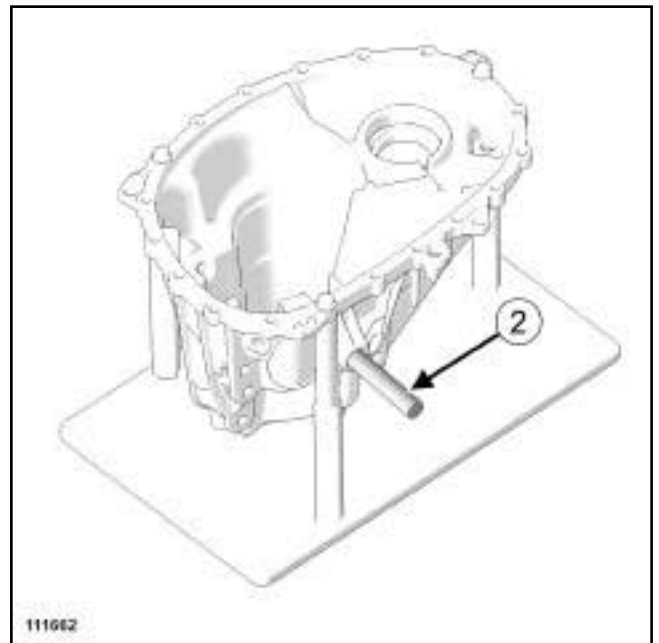
- ❑ Use **SURFACE CLEANER** (see **Vehicle: Parts and ingredients for the repairwork**) to clean:
 - the mating faces of the rings,
 - the shafts,
 - the shaft mating surfaces,
 - the differential,
 - the mechanism housing,
 - the differential housing.
- ❑ Parts always to be replaced:
 - lock rings,
 - the differential outlet seals,
 - input shaft inlet seal,
 - the pins,
 - the input and output shaft oil deflectors,
 - the bearings,
 - the second idle gear supporting ring,
 - the hollow bolt on the input shaft,
 - the clutch hydraulic slave cylinder,
 - clutch hydraulic slave cylinder bolts
- ❑ Check all of the removed parts (see **21A, Manual gearbox, Manual gearbox: Check, page 21A-9**).

II - REFITTING OPERATION FOR PART CONCERNED



111660

- ❑ Refit the selector fork shaft rings using the **(Bvi. 1743) suffix B (1)**.



111662

- ❑ Refit the two rings of the selector shaft using the **(Bvi. 1743) suffix B (2)** on the exterior and **suffix A** on the interior.
- ❑ Refit the selector shaft.

MANUAL GEARBOX

Selector fork shaft ring: Removal - Refitting

21A

X61 – X77 – X84 – X85 – X91 – X95

III - FINAL OPERATION

- Refit:
 - the differential (see **21A, Manual gearbox, Manual gearbox differential: Removal - Refitting**, page **21A-38**),
 - the gearbox shafts (see **21A, Manual gearbox, Gearbox shaft: Removal - Refitting**, page **21A-18**),
 - the mechanism housing (see **21A, Manual gearbox, Mechanism cover: Removal - Refitting**, page **21A-12**).
- Remove the gearbox from the component support (see **21A, Manual gearbox, Gearbox support equipment: Use**, page **21A-11**).
- Refit the gearbox (see **Manual gearbox: Removal - Refitting**).

X61 – X77 – X84 – X85 – X91 – X95

IMPORTANT

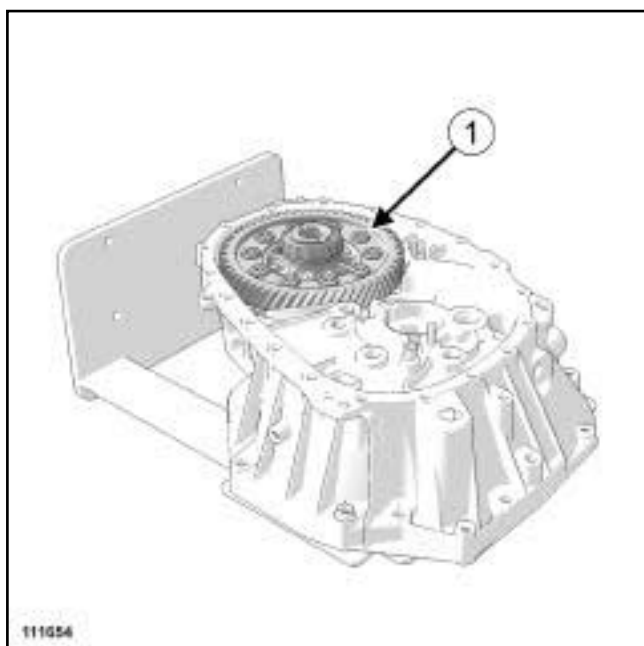
To avoid all risk of damage to the systems, apply the safety and cleanliness instructions and operation recommendations before carrying out any repair (see **Manual gearbox: Precautions for repair**).

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-11).
- Remove:
 - the mechanism housing (see **21A, Manual gearbox, Mechanism cover: Removal - Refitting**, page 21A-12),
 - the gearbox shafts (see **21A, Manual gearbox, Gearbox shaft: Removal - Refitting**, page 21A-18).

II - OPERATION FOR REMOVAL OF PART CONCERNED



- Remove the differential (1).

111654

REFITTING

I - REFITTING PREPARATION OPERATION

- Use **SURFACE CLEANER** (see **Vehicle: Parts and ingredients for the repairwork**) to clean:
 - the shafts,
 - the shaft mating surfaces,
 - the differential,
 - the mechanism housing,
 - the differential housing.
- Parts always to be replaced:
 - lock rings,
 - the differential outlet seals,
 - input shaft inlet seal,
 - the pins,
 - the input and output shaft oil deflectors,
 - the bearings,
 - the second idle gear supporting ring,
 - hollow bolt on input shaft,
 - the clutch hydraulic slave cylinder,
 - clutch hydraulic slave cylinder bolts
- Check all of the removed parts (see **21A, Manual gearbox, Manual gearbox: Check**, page 21A-9).

II - REFITTING OPERATION FOR PART CONCERNED

- Refit the differential.

III - FINAL OPERATION

- Refit:
 - the gearbox shafts (see **21A, Manual gearbox, Gearbox shaft: Removal - Refitting**, page 21A-18),
 - the mechanism housing (see **21A, Manual gearbox, Mechanism cover: Removal - Refitting**, page 21A-12).
- Remove the gearbox from the component support (see **21A, Manual gearbox, Gearbox support equipment: Use**, page 21A-11).
- Refit the gearbox (see **Manual gearbox: Removal - Refitting**).

X61 – X77 – X84 – X85 – X91 – X95

Essential special tooling

Bvi. 1743	Tool kit for repairing gear-boxes.
Bvi. 1722	Tool kit for repairing gear-boxes.

IMPORTANT

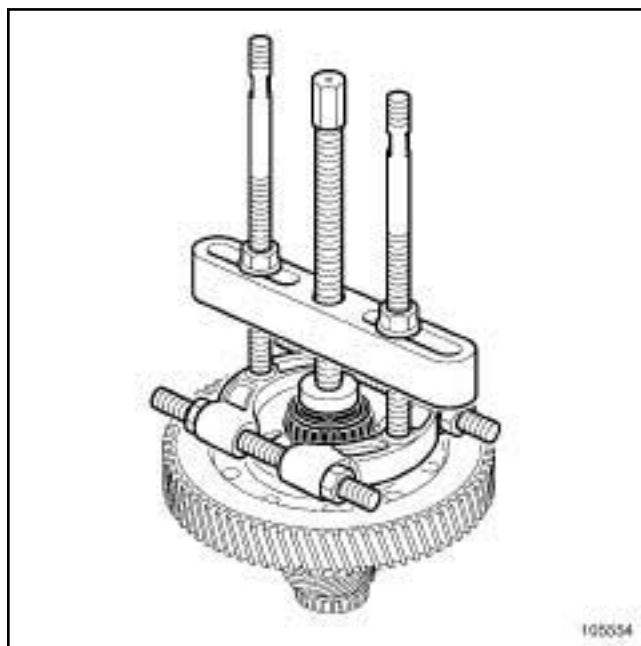
To avoid all risk of damage to the systems, apply the safety and cleanliness instructions and operation recommendations before carrying out any repair (see **Manual gearbox: Precautions for repair**).

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-11).
- Remove:
 - the mechanism housing (see **21A, Manual gearbox, Mechanism cover: Removal - Refitting**, page 21A-12),
 - the gearbox shafts (see **21A, Manual gearbox, Gearbox shaft: Removal - Refitting**, page 21A-18),
 - the differential (see **21A, Manual gearbox, Manual gearbox differential: Removal - Refitting**, page 21A-38).

II - OPERATION FOR REMOVAL OF PART CONCERNED



- Remove the bearings using a separator.

REFITTING

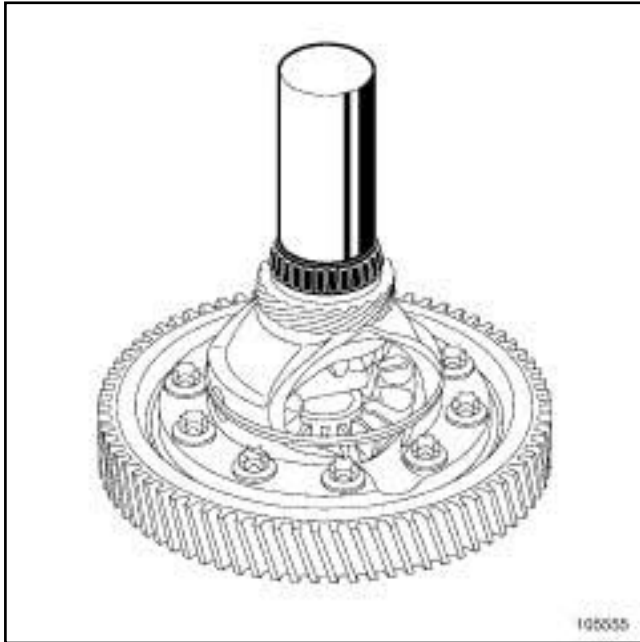
I - REFITTING PREPARATION OPERATION

- Use **SURFACE CLEANER** (see **Vehicle: Parts and ingredients for the repairwork**) to clean:
 - the shafts,
 - the shaft mating surfaces,
 - the differential,
 - the mechanism housing,
 - the differential housing.
- Parts always to be replaced:
 - lock rings,
 - the differential outlet seals,
 - input shaft inlet seal,
 - the pins,
 - the input and output shaft oil deflectors,
 - the bearings,
 - the second idle gear supporting ring,
 - the hollow bolt on the input shaft,
 - the clutch hydraulic slave cylinder,
 - clutch hydraulic slave cylinder bolts

X61 – X77 – X84 – X85 – X91 – X95

- Check all of the removed parts (see **21A, Manual gearbox, Manual gearbox: Check**, page **21A-9**).

II - REFITTING OPERATION FOR PART CONCERNED



105555

- Refit the bearings using tool (**Bvi. 1743**) suffix **C** and tool (**Bvi. 1722**) suffix **W**.

III - FINAL OPERATION

- Refit:
 - the differential (see **21A, Manual gearbox, Manual gearbox differential: Removal - Refitting**, page **21A-38**),
 - the gearbox shafts (see **21A, Manual gearbox, Gearbox shaft: Removal - Refitting**, page **21A-18**),
 - the mechanism housing (see **21A, Manual gearbox, Mechanism cover: Removal - Refitting**, page **21A-12**).
- Remove the gearbox from the component support (see **21A, Manual gearbox, Gearbox support equipment: Use**, page **21A-11**).
- Refit the gearbox (see **Manual gearbox: Removal - Refitting**).