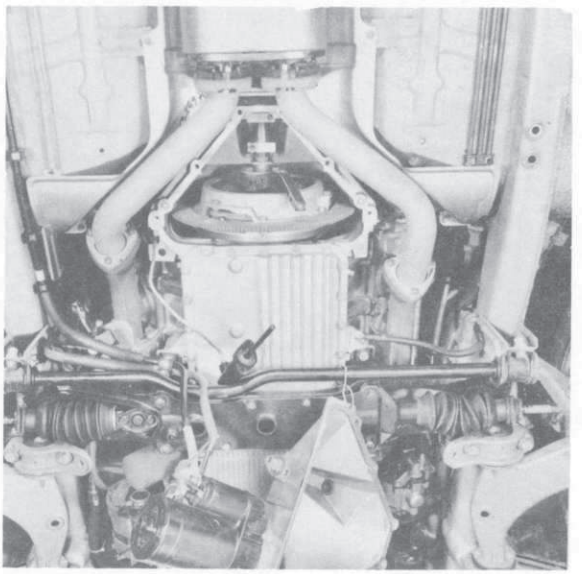
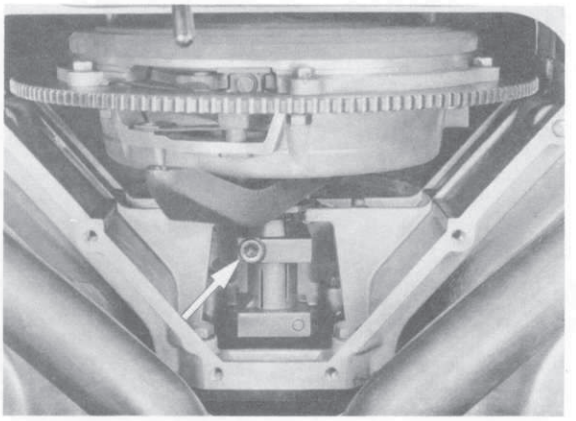
5. a) Before 1983 Models
Remove cover for clutch housing with starter and suspend from stabilizer. If applicable, also remove converter (modified shape).

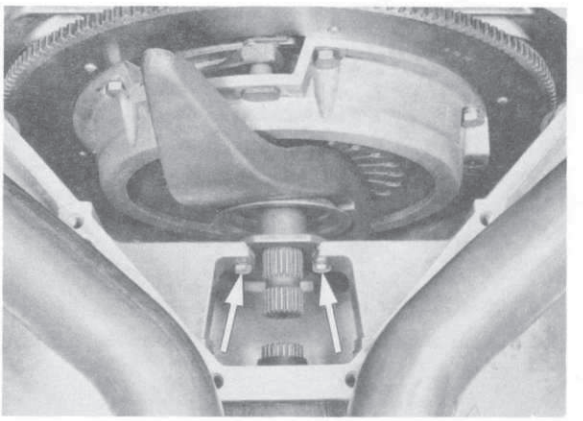


5. b) Since 1983 Models
(Modified Starter Installation)
Remove starter or loosen starter and suspend it from car.
Take off clutch housing cover.
If applicable, also remove catalytic converter.

6. Remove coupling screws and push back coupling on central shaft II. In case of long coupling, remove plug from central tube to unscrew rear bolt.

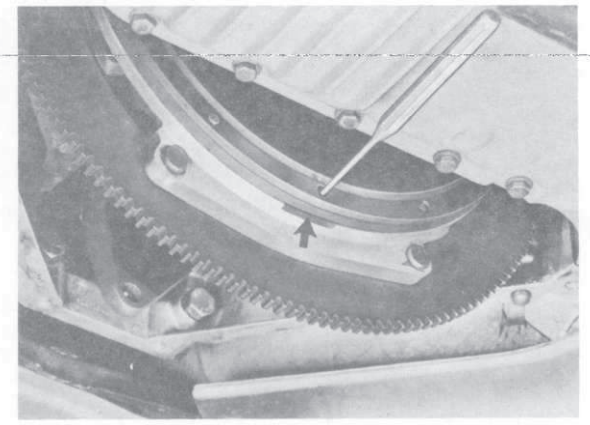


7. Remove release bearing sleeve mounting bolts and push sleeve toward flywheel.



8. Mark position of pressure plate, intermediate plate and flywheel in relation to each other for installation later.
For dowel pin centered clutches drive the cylindrical pins in direction of pressure plate with a punch far enough so that they are beyond the centering bore of the flywheel. Check visually at opening of intermediate plate (arrow).

Beginning with 1984 models one of the three centering pins is stepped (6 mm dia. in area of intermediate ring/pressure plate and 8 mm dia. in flywheel).
Consequently the intermediate ring can only be installed in a certain position to the flywheel (see intermediate ring on page 30 - 16 a).
Remove stepped centering pin (large bore in flywheel) completely.
This is only possible in direction of the flywheel.
Drive the other two centering pins in direction of pressure plate as described above, until they are beyond the centering bore of the flywheel (do not remove completely).

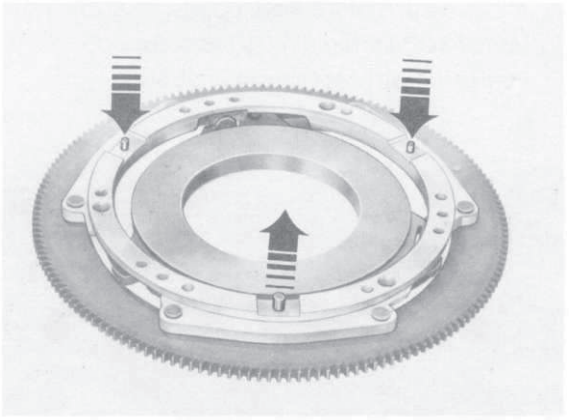


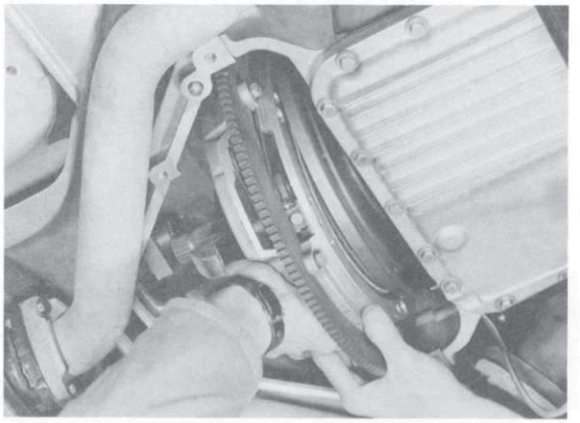
Note:

The pressure plate remains pre-loaded and removal will be easier by using 4 mm thick wire brackets (locally made) underneath the bolt heads before loosening the mounting bolts (less force required/brackets bevelled). In addition, it will not be necessary to unscrew the mounting bolts in steps of 1 to 1 1/2 turns.
Also refer to point 6 on page 30 - 6 and point 2 on page 30 - 17.

Beginning with 1984 models

10. Push back entire clutch (pressure plate, intermediate ring with starter gear ring, both clutch discs, release lever, release bearing sleeve, central shaft I) and remove downward.





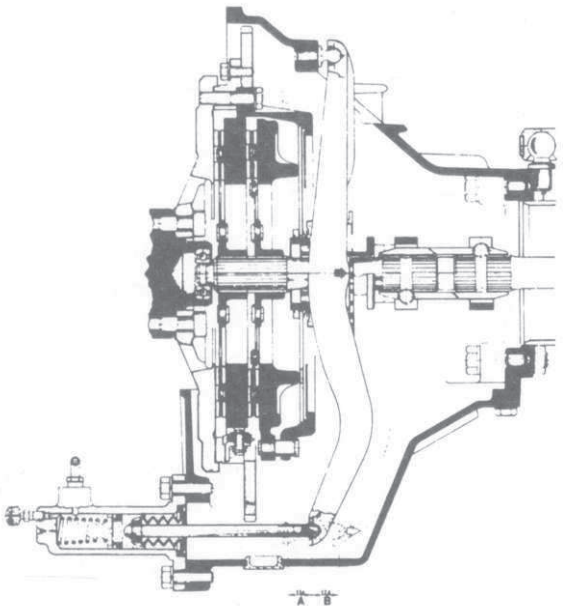
9. Unscrew the clutch mounting bolts one after the other by 1 to 1 1/2 turns until pressure is removed from the pressure plate. Disconnect release lever at ball stud, by pushing the release lever down toward the flywheel. Now remove the mounting bolts.

Installing

1. Check and, if necessary, replace clutch parts prior to installation. Also refer to "Disassembling and Assembling Clutch", "Clutch Control Ball Stud Versions" and "Checking Discs, Pressure Plate and Intermediate Plate".

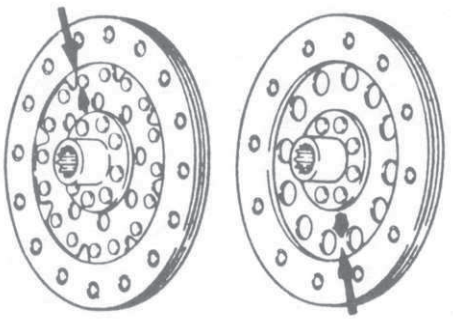
2. Prior to installation push intermediate ring at the three adjusting elements in direction of the release bearing. If applicable, pre-load clutch pressure plate (see page 30 - 17).

3. Assemble clutch (hubs of discs face release bearing, correct location of centering pins from intermediate ring for dowel pin centered clutches – see page 30 - 18). Guide clutch into clutch housing and center discs with drive shaft in grooved ball bearings of crankshaft.



Note:

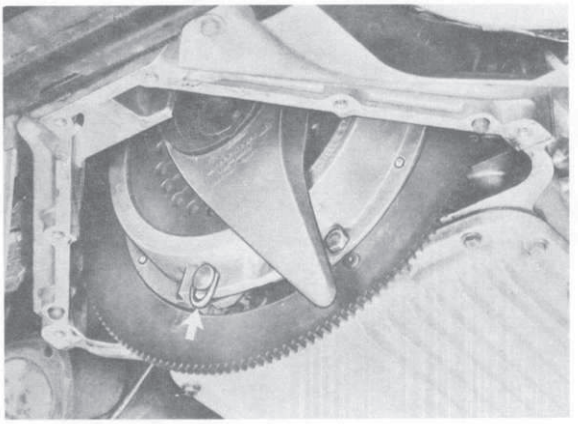
The discs are different. Disc I (sometimes marked with white paint dot) is between flywheel and intermediate ring. Disc II (larger liner springs or longer hub) is between pressure plate and intermediate ring (see page 30 - 14).
When installing discs on short central shaft make sure residual unbalance sides (yellow arrow/black side) are offset 180° opposite each other.



4. Note marks when installing pressure plate, intermediate ring and flywheel.
Guide centering pins of a dowel pin centered clutch into the flywheel.
Beginning with 1984 models guide in far enough that correct position of intermediate ring (missing centering pin) to flywheel (large bore) is given.
Insert mounting bolts.

5. On cars from 1984 models on align stepped centering pin with centering bore in intermediate ring and drive it in from the flywheel side.

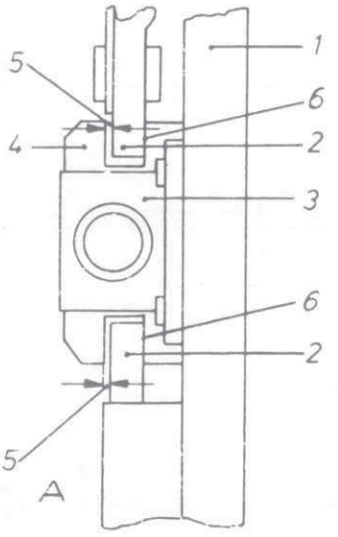
6. Screw in clutch mounting bolts uniformly until the clutch is held tight.
Make sure that central shaft I moves easily.
Then remove the clips from underneath the pressure plate bolt heads. If applicable (since 1984 models), drive stepped centering pin further against stop.



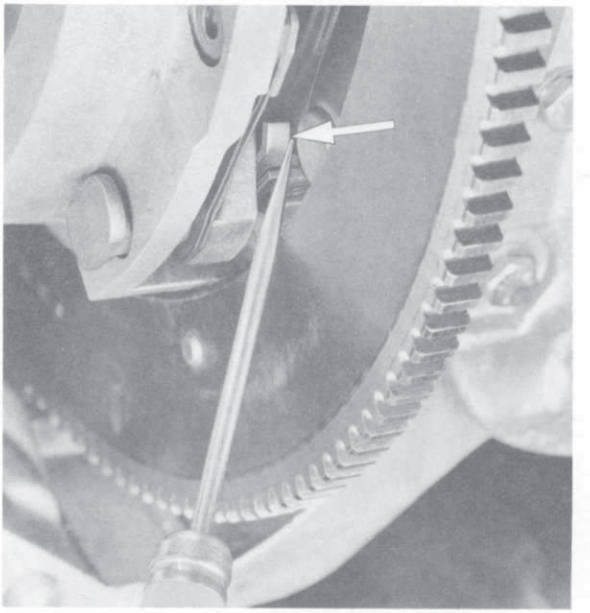
Note:

Differences in tolerances could make it difficult to guide in the dowel pin-centered clutch. Should this apply, position the centering pins as for removal in point 8. Guide in clutch and insert mounting bolts. Drive in centering pins after they have been aligned with the flywheel bores (reposition pressure plate for this purpose). After tightening the mounting bolts, drive in centering pins until they are flush with the pressure plate.

7. The forks of the stop brackets must rest on the stop of the intermediate plate on the flywheel end on both sides. This will produce a gap of 0.7 to 1.0 mm or 1.2 to 1.5 mm (see sketch). Push back the 3 forks of the stop brackets uniformly on both sides with a screwdriver (in direction of pressure plate). This alone will guarantee proper function of the clutch and stop brackets.




1 – Intermediate ring housing
2 – Intermediate ring stop
3 – Adjusting element
4 – Fork
5 – Gap of 0.7 to 1.0 mm or 1.2 to 1.5 mm
6 – Position of fork on stop
A – Release bearing side
S – Flywheel side



8. Mount release bearing sleeve.

9. Connect release lever at ball stud. Place ball stud and ball socket opposite each other and press down release lever toward the rear until the lever engages.

10. First mount coupling on central shaft I. Center bores of coupling on shafts accurately. Install cover for clutch bell housing and slave cylinder.

Note:

Location of slave cylinder piston rod can be checked through inspection hole.

11. Install lower body brace, if applicable, positioning correctly. Protruding support plate on lower body brace must face forward to cover for clutch bell housing.

REMOVING AND INSTALLING SINGLE-DISK CLUTCH

'87 MODELS ONWARD

ENGINE TYPE M 28 .41

Removing

1. Detach ground lead from battery.

2. Remove complete lower engine guard.

3. Unbolt clutch actuating cylinder, disconnect clutch hose holder from oil pan and allow cylinder to dangle with line connected.

Note:

Never depress the clutch with actuating cylinder disconnected.

4. Unbolt starter motor, withdraw and leave on bracket.

5. Unbolt exhaust flanges on left and right manifolds and detach air injector.

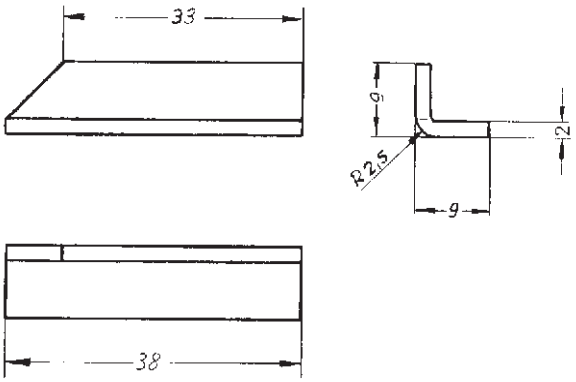
6. Remove cover from clutch housing.

7. Remove clamping sleeve cap screws and push sleeve back along central shaft II. If long clamping sleeve is fitted, remove plug in central tube to permit removal of the rear screw.

8. Remove securing screws for guide tube and push guide tube toward flywheel.

9. Disengage release lever from ball joint by pressing lever down toward flywheel.

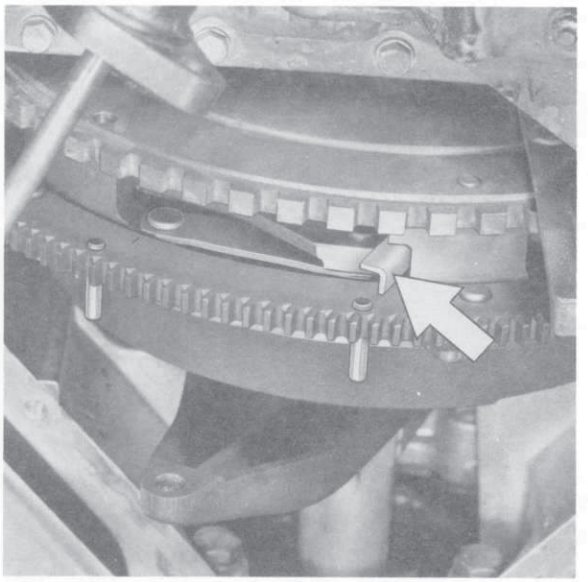
10. Fabricate three sheet-metal angles (2 mm thick), if no angles are installed.




Note:

These improvised angles are used to tension and position the genuine Porsche spare parts.

11. Insert angle in notch of pressure plate and slacken mounting bolts. Drive centering pins out of flywheel toward pressure plate.



12. Remove mounting bolts uniformly one after the other and remove pressure plate from bottom, complete with release lever, guide tube, driven plate and central shaft 1.

**Note**

1. The straight pins for the TDC sensor must point downward to permit removal of the complete clutch (risk of damage).

2. Lubricant "Optimoly HT" has been replaced by "Optimoly Olista Longtime 3EP". To be used on clamping sleeve, drive shaft, clutch release lever, guide tube and clutch release bearing.

3. As of Model '93, engine type **M 28.49.928 GTS**, the clutch release bearing is fitted with a plastic guide sleeve. Guide tube and guide sleeve are fitted without grease and **must not be greased either** when repairs are made in this area.

**Installing**

1. Install pre-loaded pressure plate with driven plate in clutch housing, center drive plate with central shaft 1 in deep-groove ball bearing of crankshaft and tighten mounting bolts 1 to 1/2 turns.

2. Fit guide tube. Make sure that the guide tube is seated correctly in the corresponding cutout in the clutch bell housing and that the entire contact surface of guide tube and clutch bell housing is in contact.

3. Engage release lever by placing ball and socket opposite each other and pressing release lever down and back until it is felt to engage.

4. Attach calmping sleeve to central shaft 1 first. Align holes of clamping sleeve on shafts.

5. Uniformly tighten mounting bolts of presure plate. Tightening torque 22 Nm (16 ftlb) remove angles (3 of).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6. Check centering pins. Using a depth gauge, measure from the rear of the flywheel (engine side) through the bore to the centering pin (approx. 4 mm).

7. Insert slave cylinder into clutch bell housing and tighten cover. Then fit slave cylinder into place.


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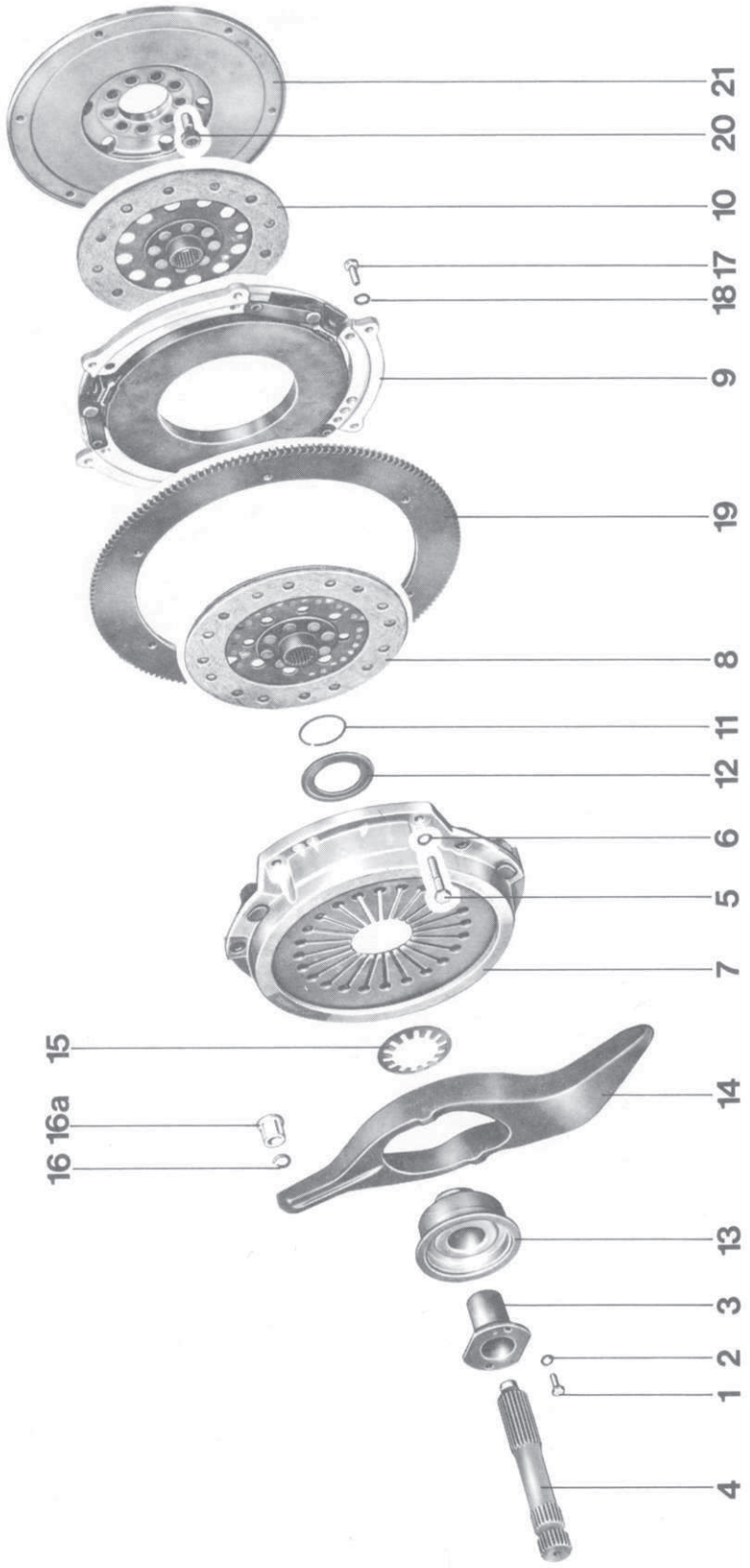
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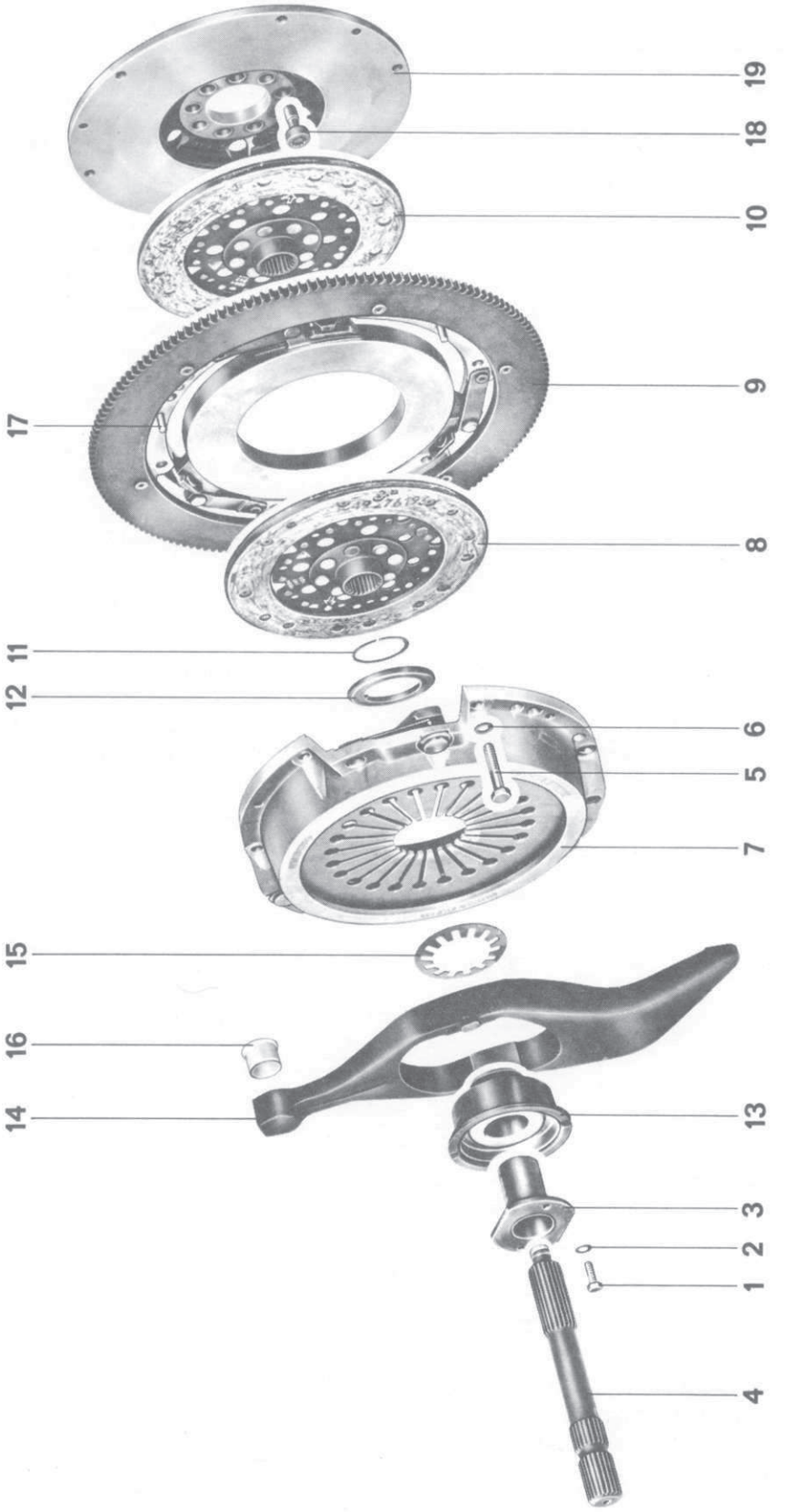
| No. | Description | Qty. | Note When: Removing | Installing | Special Instructions |
|---|---|---|---|---|---|
| 1 | Bolt | 2 | | Tighten to specified torque | |
| 2 | Washer | 2 | | Replace if necessary | |
| 3 | Guide tube | 1 | | Coat sliding surface for release bearing with $MoS_2$ | |
| 4 | Short drive shaft | 1 | | Thin coat of Optimoly HT on splines (use hard brush) | page 30 - 9 |
| 5 | Bolt | 6 | Loosen one after the other by 1 to 1 1/2 turns | Screw in uniformly to specified torque. Then remove assembly clip | |
| 6 | Washer | 6 | | Replace if necessary | |
| X 7 | Pressure plate | 1 | See note | Check for wear. Lubricate pre-load washer in area no. 12 and no. 15 with Optimoly HT | |
| 8 | Clutch disc II (spring-loaded, 0.85 – 1.15 mm) | 1 | | Inspect; thin coat of Optimoly HT on splines, watch position to no. 10 | Hub length: 20 mm<br>page 30 - 9 |
| X 9 | Intermediate ring | 1 | See note | Prior to installing push on 3 adjusting elements toward release bearing | |
| 10 | Clutch disc I (not spring-loaded/ or slight spring load, 0 – 0.4 mm) | 1 | | Inspect; thin coat of Optimoly HT on splines; watch position to no. 8 | Hub length: 20 mm<br>page 30 - 9 |
| 11 | Snap ring | 1 | | Important! Install snap ring so that gap is between retainer (turning lock) on release bearing or offset to groove in new version release bearing | |

| No. | Description | Qty. | Note When: Removing | Installing | Special Instructions |
|---|---|---|---|---|---|
| 12 | Thrust washer | 1 | | Position correctly | |
| 13 | Release bearing | 1 | | Don't wash, only wipe dry. Coat sliding surfaces for guide tube with $MoS_2$ and in release lever with a white lubricating paste | Note correct combination with release lever |
| 14 | Release lever | 1 | | Coat bearing surface for slave cyl. piston rod with white solid lubricating paste and cams for release bearing with $MoS_2$. | Note correct combination with release bearing and ball stud |
| 15 | Washer | 1 | | Position correctly | |
| 16 | Snap ring | 1 | | Position correctly | Only for initial version |
| 16A | Ball socket bushing | 1 | | Position correctly. Coat with solid white paste (AOS 1260006). Press in with VW 421 | For modified or present version |
| 17 | Bolt | 6 | | | |
| 18 | Washer | 6 | | Replace if necessary | |
| X19 | Starter ring | 1 | See note | After installing give teeth light coat of Optimoly HT | |
| 20 | Bolt | 9 | | Torque: 90 + 5 Nm (65 + 4 ftlb) | |
| X21 | Flywheel with centering collar | 1 | See note | | |

Note

The parts marked with a "X" in the chart have been balanced together in manufacturing and must therefore be marked when removing, to guarantee installation in same position later.

Insofar as central shaft I (928.421.235.16) is installed (only possible as from certain chassis numbers/replaces 928.423.235.13 after depletion of stocks). Identification: dull silver, when splines of clutch discs and central shaft I are not coated with Optimoly HT but instead with Optimoly Olista Longtime 3 EP.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| No. | Description | Qty. | Note When: Removing | Note When: Installing | Special Instructions |
|---|---|---|---|---|---|
| 1 | Bolt | 2 | | Tighten to specified torque | |
| 2 | Washer | 2 | | Replace if necessary | |
| 3 | Guide tube | 1 | | Coat sliding surface for release bearing with $MoS_2$ | See page 30 - 13 |
| 4 | Central shaft I | 1 | | Lubricate splines with grease depending on version | See page 30 - 13 and 30 - 16 a |
| 5 | Bolt | 6 | Loosen one after the other and by 1 to 1 1/2 turns | Screw in uniformly and tighten to specified torque. Then remove clip | |
| 6 | Washer | 6 | | Replace if necessary | |
| X7 | Pressure plate with three centering bores | 1 | See note | Check for wear. Give preload washer light coat of Optimoly HT in area of no. 12 and no. 15 | |
| 8 | Clutch disc II (spring-loaded) | 1 | | Inspect. Lubricate splines acc. central shaft I. Watch position to no. 10 | See page 30 - 13 and 30 - 16 a |
| X9 | Intermediate ring with riveted starter ring | 1 | See note | Prior to installation push three adjusting elements toward release bearing. Thin coat of Optimoly HT on spline of starter ring after installation | See page 30 - 13 |
| 10 | Clutch disc I (spring-loaded) | 1 | | Inspect. Lubricate splines acc. central shaft I. Watch position to no. 8 | See page 30 - 13 and 30 - 16 a |

| No. | Description | Qty. | Note When: Removing | Note When: Installing | Special Instructions |
|---|---|---|---|---|---|
| 11 | Snap ring | 1 | | Important! Install snap ring so that gap is between retainer (turning lock) on release bearing or on new release bearings offset to groove in release bearing | |
| 12 | Thrust washer | 1 | | Position correctly | |
| 13 | Release bearing | 1 | | Don't wash, only wipe dry. Coat sliding surfaces for guide tube with $MoS_2$ and sliding surface in release lever with solid white paste | |
| 14 | Release lever | 1 | | Coat bearing surface for slave cylinder piston rod with solid white paste | Coat contact areas for release bearing with $MoS_2$ |
| 15 | Washer | 1 | | Position correctly | |
| 16 | Ball socket bushing | 1 | | Position correctly. Coat with solid white paste (AOS 1260006). Press in with VW 421 | |
| 17 | Centering pin | 3 | | Straighten or replace damaged pins. Protrusion beyond bearing surface of intermediate ring on flywheel 3.5 – 0.5 mm. Must have tight fit | |
| 18 | Bolt | 9 | | Torque: 90 + 5 Nm (65 + 4 ftlb) | |
| X19 | Flywheel with centering bores | 1 | | | |

Note

Parts in table marked with "X" were balanced together in manufacturing and must therefore be marked prior to removing for installation in same position later (also refer to procedures).

## CHANGES ON CLUTCH/ INSTRUCTIONS FOR REPLACEMENTS

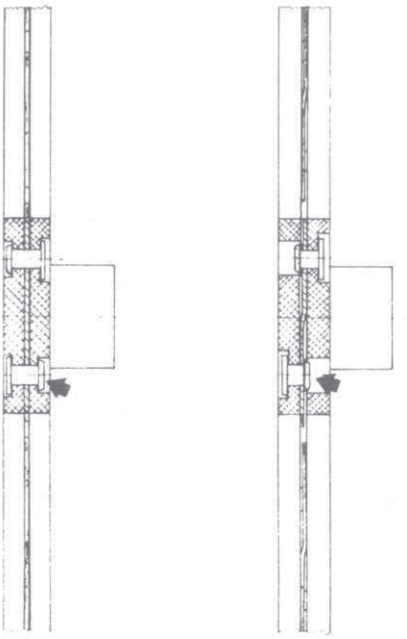
Clutch discs with symmetric liner springs and a longer hub were introduced as from December, 1980 in standard production to improve engaging behavior.
In conjunction with this changes were also necessary on the clutch intermediate ring, central shaft I and release bearing tube.
From 1984 models on cars have a separate test connection to check the ignition timing. This changed the dowel pin centering of the clutch in such a manner that the intermediate ring can now only be installed in correct position to the flywheel.

### Survey of Changed Parts

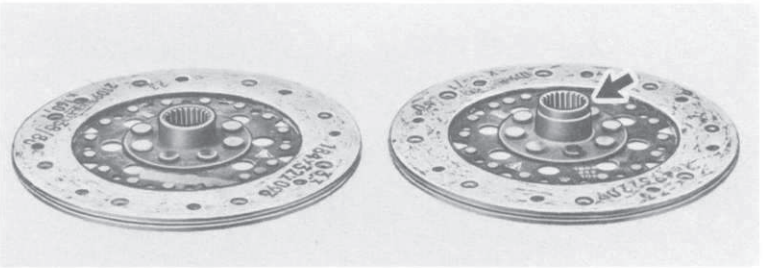
| Description | Up to Dec., 1980 | Changed/Presently |
|---|---|---|
| Clutch disc I (front) | 928.116.011.23 | 928.116.011.27 or 928.116.011.33 |
| Clutch disc II (rear) | 928.116.011.24 | 928.116.011.28 or 928.116.011.34 |
| Intermediate ring | 928.116.033.17 | 928.116.033.22 since 1984 mod. 928.116.033.26 |
| Central shaft | 928.421.235.12 | 928.421.235.13 or 928.421.235.16 |
| Release bearing tube | 928.116.087.11 | 928.116.087.13 |

CROSS REFERENCE OF ORIGINAL AND CHANGED / PRESENT PARTS

| Part Description | Original Version | Changed/Present Version |
|---|---|---|
| 1. Clutch disc I (front) | 928.116.011.23<br>Liners riveted tight on both sides with each rivet.<br>Without gap between liners.<br>Slight liner spring load<br>(0.0 . . . 0.4 mm)<br>Hub length: 20 mm | 928.116.011.27 or 928.116.011.33<br>Liners riveted alternately with only every second rivet.<br>Gap between liners.<br>Liner spring load<br>(0.5 . . . 0.8 mm)<br>Hub length: 20 mm |



| | | |
|---|---|---|
| 2. Clutch disc II (rear) | 928.116.011.24<br>Liner springs with each 2 spring plates<br>(0.85 . . . 1.15 mm)<br>Hub length: 20 mm | 928.116.011.28 or 928.116.011.34<br>Liner springs with each 1 spring plate<br>(0.5 . . . 0.8 mm)<br>Hub length: 29 mm<br>N o t e :<br>Disc with a hub length of 25 mm were used a short time. They also belong to new version. |

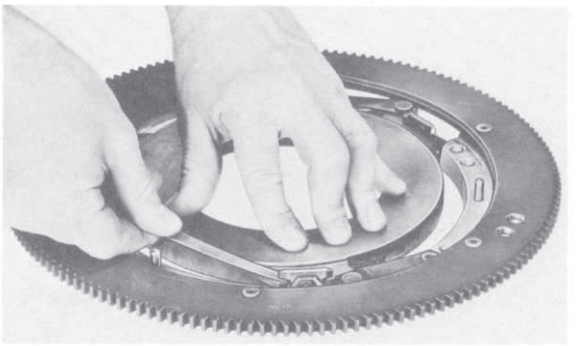


| Part Description | Original Version | Changed/Present Version |
|---|---|---|
| 3. Intermediate ring | 928.116.033.17<br>Travel: 0.7 . . . 1.0 mm<br>Label 3059 008 001 | 928.116.033.22<br>Travel: 1.2 . . . 1.5 mm<br>Label 3059 008 101<br>since '84 models 928.116.033.26<br>(modified dowel pin centering, page 30 - 16 a) |

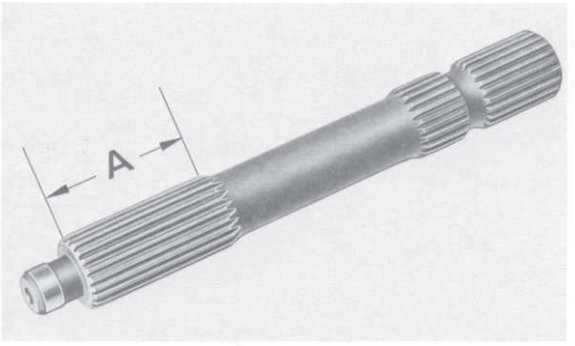
Note:
If the label is missing, the travel could be determined as follows.

Press down clutch ring from starter ring side against stop.
Determine gap distance on guide with a feeler gauge blade.

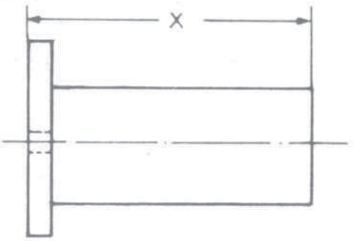
New version – at least 1.2 mm
Old version – at least 1.0 mm



| | | |
|---|---|---|
| 4. Short drive shaft | 928.421.235.12<br>Tooth distance "A"<br>51 mm | 928.421.235.13 (gray/black) or<br>928.421.235.16 (dull silver)<br>Spline distance "A" 56 mm |




| | | |
|---|---|---|
| 5. Guide tube | 928.116.087.11<br>Total length distance "X"<br>50 mm | 928.116.087.13<br>Total length distance "X"<br>49 mm |



Replacement Procedures:

Intermediate ring, central shaft and release bearing tube are no longer available in the original version.

Clutch discs I and II are still available in original version for the diameter and dowel pin centered clutch.

Parts of the modified/present and original version may not be installed together in one car. See remarks for exceptions.
Check chart below when repairing clutches with modified/present clutch parts (dowel pin centered clutch).

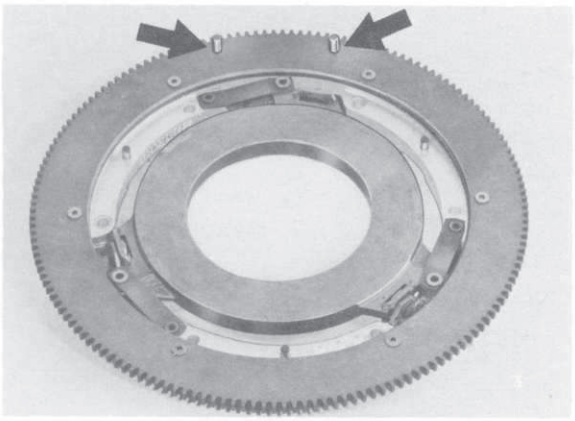
| Part Description | Part Number | Version |
|---|---|---|
| Clutch disc I | 928.116.011.27 or<br>928.116.011.33 | Modified (see remarks)<br>Present |
| Intermediate ring | 928.116.033.22 or<br>928.116.033.26 | Modified<br>Since 1984 models<br>(see remarks) |
| Clutch disc II | 928.116.011.28 or<br>928.116.011.34 | Modified (see remarks)<br>Present |
| Central shaft I | (928.421.235.12)<br>928.421.235.13 or<br>928.421.235.16 | Original version<br>Modified version<br>Present version<br>(see remarks) |
| Release bearing tube | 928.116.087.13<br>or<br>928.116.087.11 modified | Modified/present<br><br>Original version<br>(see remarks) |

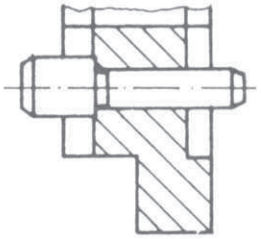
Remarks:

Clutch Discs I and II
Modified clutch discs I, 928.116.011.27, and II,
928.116.011.28, were replaced with clutch discs,
928.116.011.33 and 928.116.011.34 (different liner grade).
Identification: color of liners.
Clutch discs 928.116.011.27 and 928.116.011.28 will not be available after depletion of stocks.
Clutch discs with different type liners should not be installed together in one car.

## Intermediate Ring

Beginning with 1984 models there is a separate test connection, which is connected with a TDC sensor, for checking the ignition timing. The TDC sensor signal is triggered by two cylindrical pins which are pressed in the gear ring of the clutch intermediate ring. This makes precise positioning between the intermediate ring and flywheel necessary.
This position is guaranteed, in that one of the three centering pins in the intermediate ring has two different diameters on each end, namely 6 mm and 8 mm. A centering bore in the flywheel now has a 8 mm diameter. Consequently the intermediate ring can only be mounted in one position.





## Central Shaft I

The first version of central shaft 928.421.235.12 (no longer available) was sometimes installed together with new clutch parts.
The modified central shaft 928.421.235.13 was replaced with central shaft 928.421.235.16 (hard nicle-plated/same size) as from June of 1983. Central shaft 928.421.235.13 will no longer be available after depletion of stocks.
Axial movement of clutch discs on central shaft I is better after long operating time when using the hard nickle-plated version in conjunction with the specified lubricant.

Identification: 928.421.235.13 gray/black
928.421.235.16 dull silver

Lubricant specifications for splines (central shaft I and clutch discs):

| | |
|---|---|
| 928.423.235.12 and 928.423.235.13 | very thin coat of Optimoly HT |
| 928.423.235.16 | coat of Optimoly Olista Longtime 3 EP (Part No. 000.043.024.00) |

## Release Bearing Sleeve

When repairing clutch, the old release bearing sleeve 928.116.087.11 with a total length of 50 mm can be ground off to a length of 49 mm.

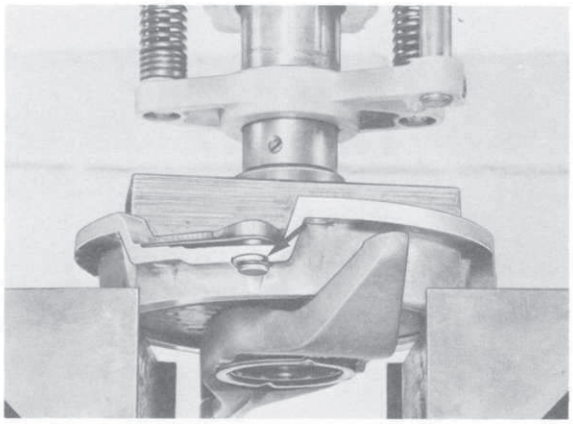
## DISASSEMBLING AND ASSEMBLING CLUTCH

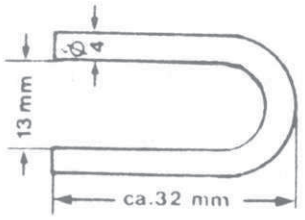
Differences in tolerances could make it necessary to preload the clutch to be able to install the release bearing and release lever.

### Disassembling

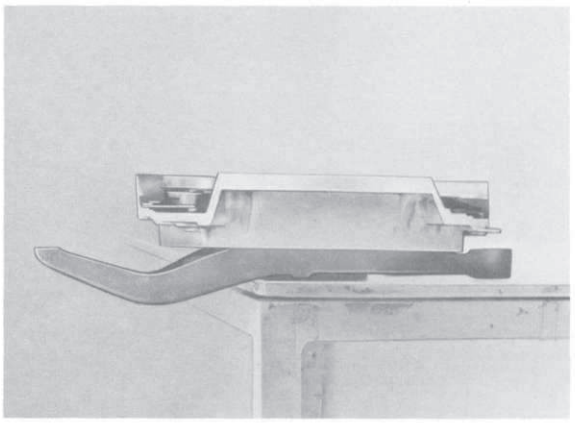
1. Pry the pressure plate off of the intermediate plate uniformly (if a dowel pin-centered clutch).

2. Place pressure plate in a press so that, when preloading, the release lever can be moved out downward without interference. Preload pressure plate carefully until 4 mm thick locally made wire tool can be slid underneath heads of mounting bolts.






3. Place pressure plate and release lever on a workbench. Press down on thrust washer and remove snap ring of release bearing. Bent section of release lever should project over workbench so that pressure plate and thrust washer can move downward and make the snap ring accessible.



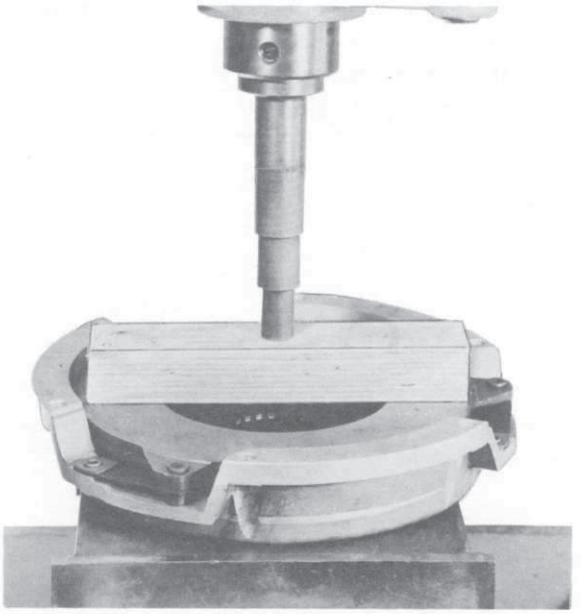
### Assembling

1. Install diameter-centered or dowel pin-centered pressure plates and intermediate plates only with the matching flywheel.
See page 30 - 7 for flywheel of diameter-centered clutch.
See page 30 - 10 for flywheel of dowel pin-centered clutch.

2. Inspect parts of clutch and, if necessary, replace (also refer to page 30 - 23/24). Also slide 4 mm thick locally made wire tool underneath bolt heads of new version pressure plate. Place this pressure plate on a level plate in a press for preloading. Bearing surface on pressure plate must not scrape on pressure plate housing while pressing together.

Note

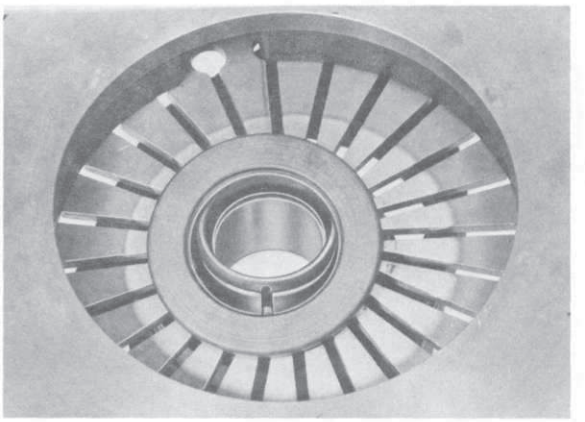
Don't forget to remove wire clip after installation of clutch.



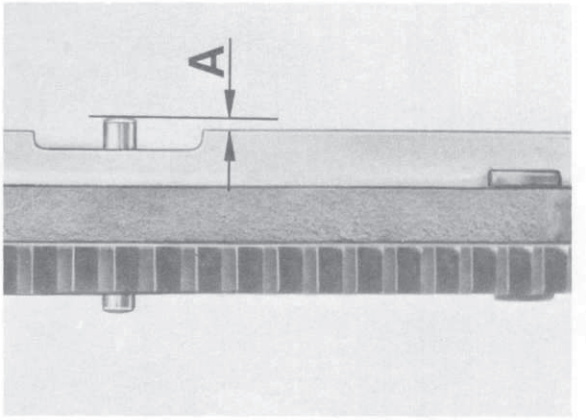
3. Inspect ball socket bushing (snap ring) in release lever. If necessary, install a new ball socket bushing and press in against stop with Special Tool VW 421. Vent hole in release lever must not be covered, otherwise ball socket bushing would spring back when air can't escape.

4. Lubricate bearing surface of release bearing in release lever as well as both sides of preload washer for pressure plate in area of release bearing with Optimoly HT. Mount release bearing with washer and release lever on pressure plate. Gap of circlip should be between retainer on release bearing or offset to groove in release bearing when bearing has an opening.

* Only applicable for the two 6 mm diameter centering pins of cars beginning with 1984 models, since the stepped 6/8 mm diameter pin is removed for installation and removal. Distance A could also not be reached.



5. Check position of centering pins of a dowel pin-centered clutch, correcting if necessary. Protrusion of pins over bearing surface of intermediate plate on flywheel: 3.5 – 0.5 mm (distance A).*




6. Push intermediate plate in direction of release bearing on the three adjusting elements.

7. Assemble clutch, observing the following points:

   a) Yellow arrows on discs are mounted 180° opposite (residual unbalance).

   b) White mark on disc (without spring-loaded liner) faces flywheel.

   c) Hubs of discs face release bearing.

d) Transfer residual unbalance mark of discs (yellow arrows) to engine side of same (facilitates assembly work).

e) Mark pressure plate before installing; drive pressure plate of dowel pin centered clutch on to centering pins or into intermediate plate with a plastic hammer far enough, so that the drive plate located between both can still be moved with short drive shaft (central shaft I).

f) Pressure plate and intermediate plate are also marked with dots of white paint (residual unbalance/heavy side), which are mounted offset 180° (opposite). This must be considered when replacing one or both parts.

g) Recheck protrusion of centering pins on flywheel (3.5 – 0.5 mm), correcting if necessary.

h) Lubricate parts to specifications (see table); however lubricate the starter ring after installation of the clutch. Don't forget to lubricate guide tube for the release bearing.