

Transmission G3/50, G3/60

Order-No. 6510 5044 02

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26.3 Transmission

Bm. 714

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26.3 Installation Survey

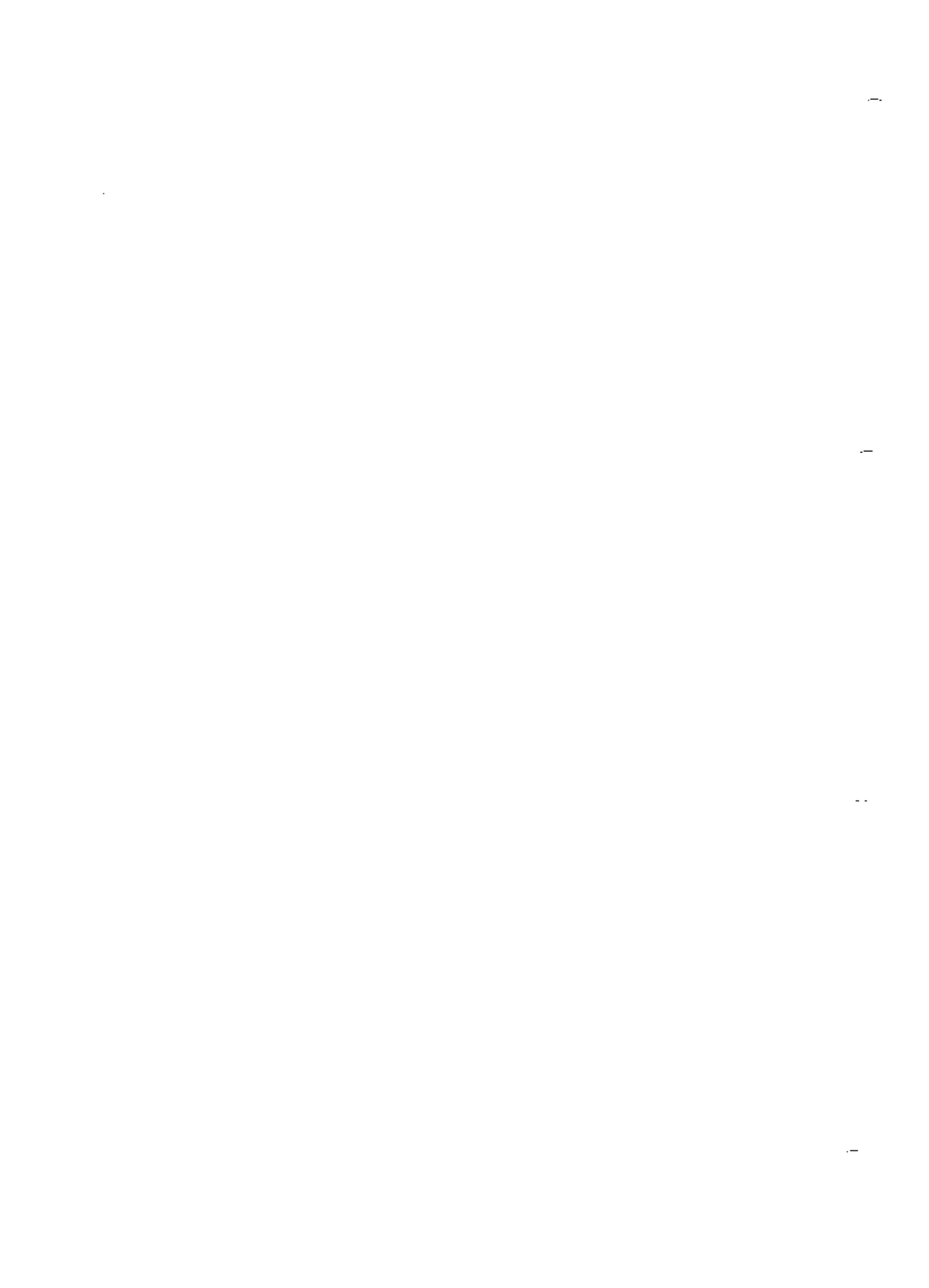
Bm 714

Transmission	Transmission type designation	installed in		
		Model	Model designation	
MB G 3 50-5 8.5	714.000	1413 -	383 002	
		-	003	
		-	005	
		-	007	
		-	008	
		KO	060	
		KO	061	
		A	103	
		AK	141	
		AKO	161	
		1417 A	383 113	
		AK	143	
		AKO	165	
		AKO	166	
		1613 -	385 004	
-	006			
MB G 3:60-5 7.5	714.001	1613 KO	385 062 ²⁾	
		KO	063 ²⁾	
		1617 -	385 014 ²⁾	
		-	016 ²⁾	
		-	018 ²⁾	
		KO	067 ²⁾	
	KO	068 ²⁾		
	KO	069 ²⁾		
	714.031	1613 K	385.040 ¹⁾	
		1617 K AK	385.043 ¹⁾ 143 ³⁾	
	MB G 3:60-5 6.1	714.006	1619 -	385.024 ²⁾
			-	026 ²⁾
-			028 ²⁾	
-			029 ²⁾	
S			054 ²⁾	
KO			070 ²⁾	
KO			071 ²⁾	
KO			072 ²⁾	
714.032			1619 K	385 046 ¹⁾

¹⁾ starting October 75 transmission G 3:65 - 8:13.36 GP will be installed

²⁾ starting October 75 transmission G 3:65 - 8:9.29 GP will be installed

³⁾ starting October 75 transmission G 3:50 - 5:8.5 will be installed



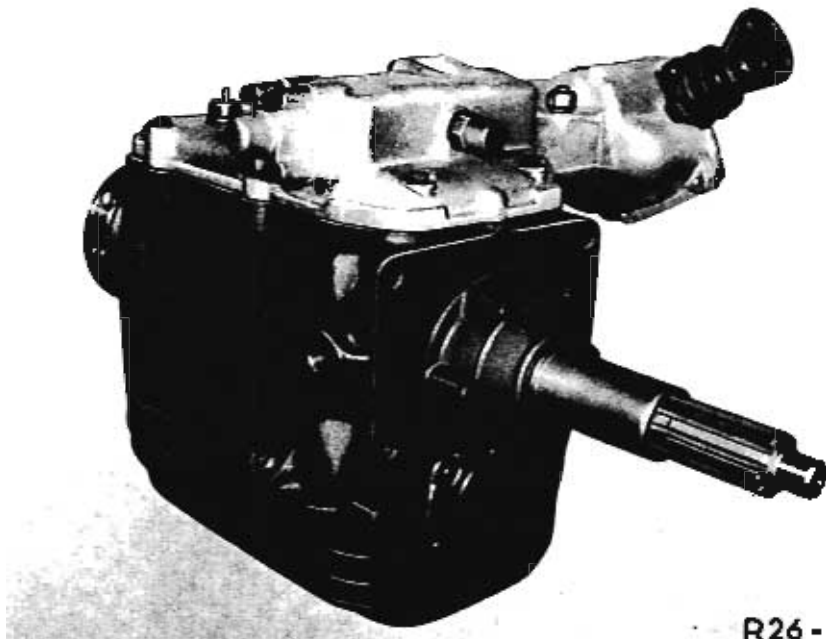
26.3 Special Tools

Bm. 714

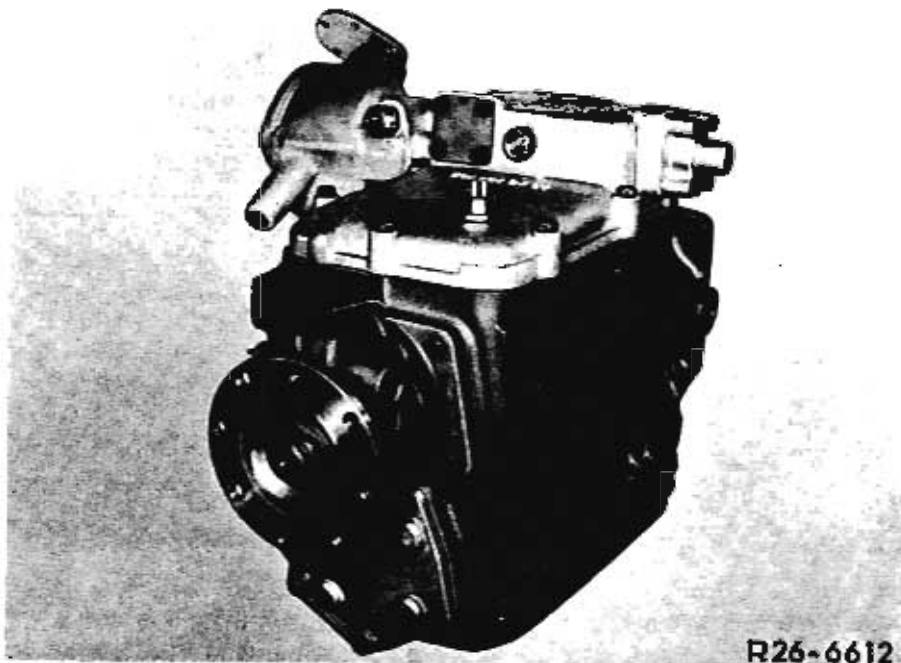
Designation	Part. No.	Transmission	
		3/50	3/60
Box wrench (SW 75)	385 589 00 03 00	X	X
Wrench	385 589 01 07 00	X	X
Socket wrench insert (SW 41)	000 589 10 09 00	X	X
Mandrel	312 589 03 14 00	X	X
Assembly sleeve	317 589 00 14 00	X	X
Mandrel	000 589 07 15 00	X	X
Mandrel	306 589 01 15 00	X	X
Mandrel	312 589 00 15 00	X	X
Mandrel	312 589 05 15 00	X	X
Mandrel	312 589 08 15 00	X	X
Mandrel	317 589 00 15 00		X
Dial gauge	001 589 53 21 00	X	X
Extension	366 589 00 21 05	X	X
Gauge	385 589 00 23 00	X	X
Slip gauge	000 589 13 23 00	X	X
Holding wrench	366 589 00 31 00	X	X
Internal puller	000 589 27 33 00	X	X
Countersupport	000 589 34 33 00	X	X
Puller	000 589 45 33 00	X	X
Puller	000 589 89 33 00	X	X
Puller	000 589 90 33 00	X	X
Puller	001 589 41 33 00	X	X
Puller	035 589 01 33 00	X	X
Puller	321 589 20 33 00	X	X
Puller	343 589 00 33 00	X	X
Insert M 10	343 589 00 33 02	X	X
Gripper	000 589 26 34 00	X	X
Mandrel	304 589 03 39 00	X	X
Holder	343 589 00 40 00	X	X
Clamping bars	000 589 59 63 00	X	X
Centering mandrel	312 589 01 61 00	X	X
Centering mandrel	343 589 03 61 00		X

26.3 Illustrations

Bm. 714



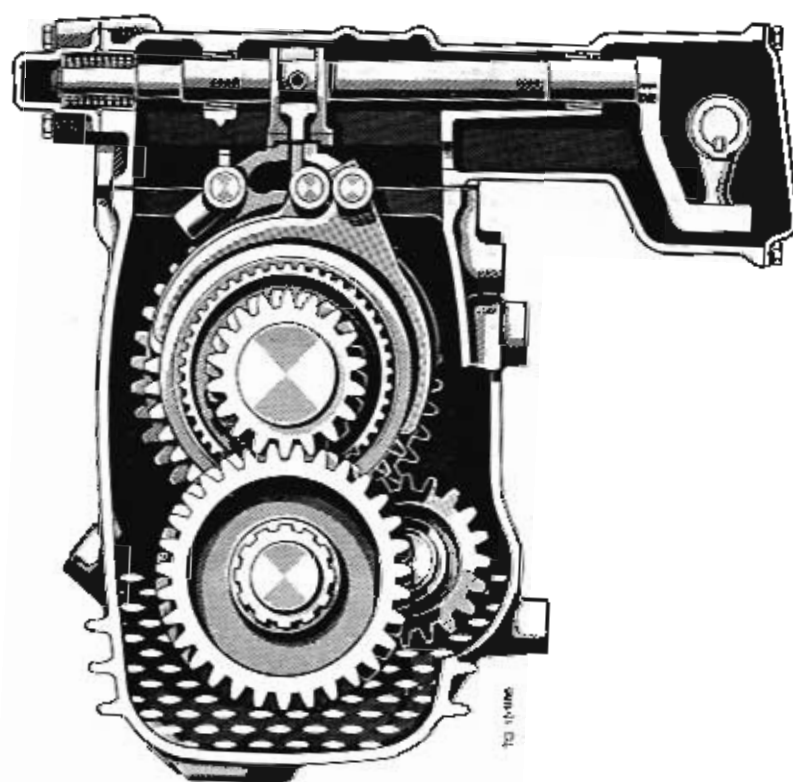
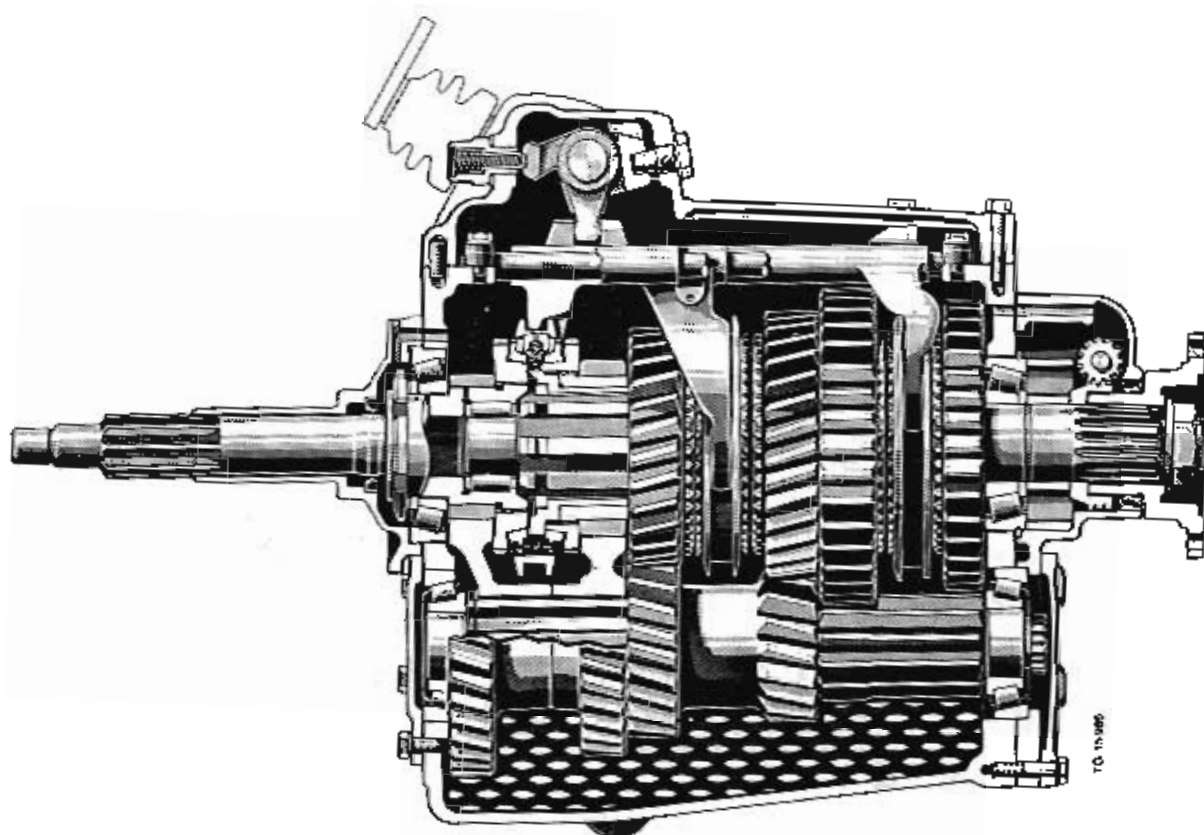
R26-6613



R26-6612

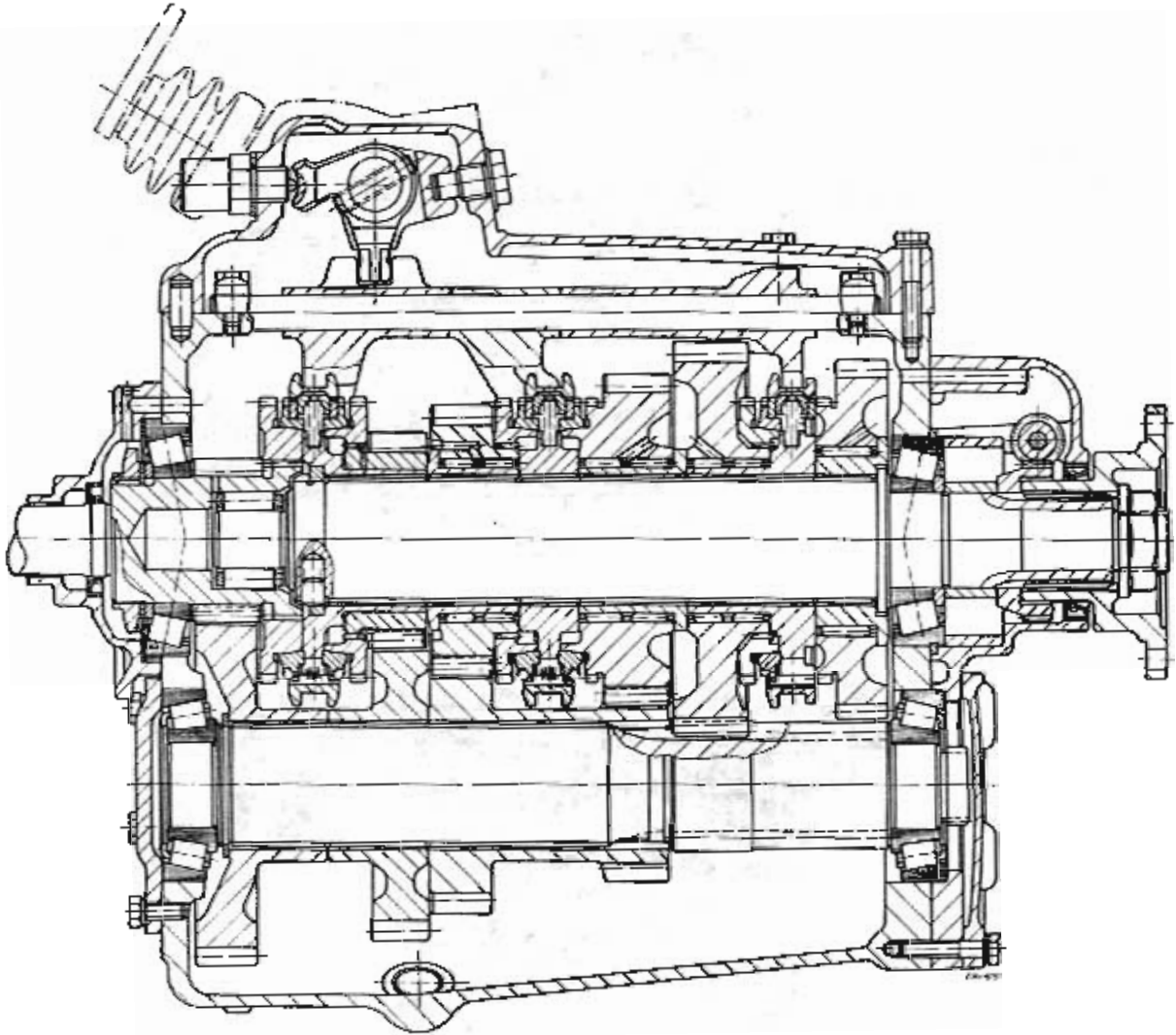
26.3 Sectional Views

Bm. 714 (G 3/50)



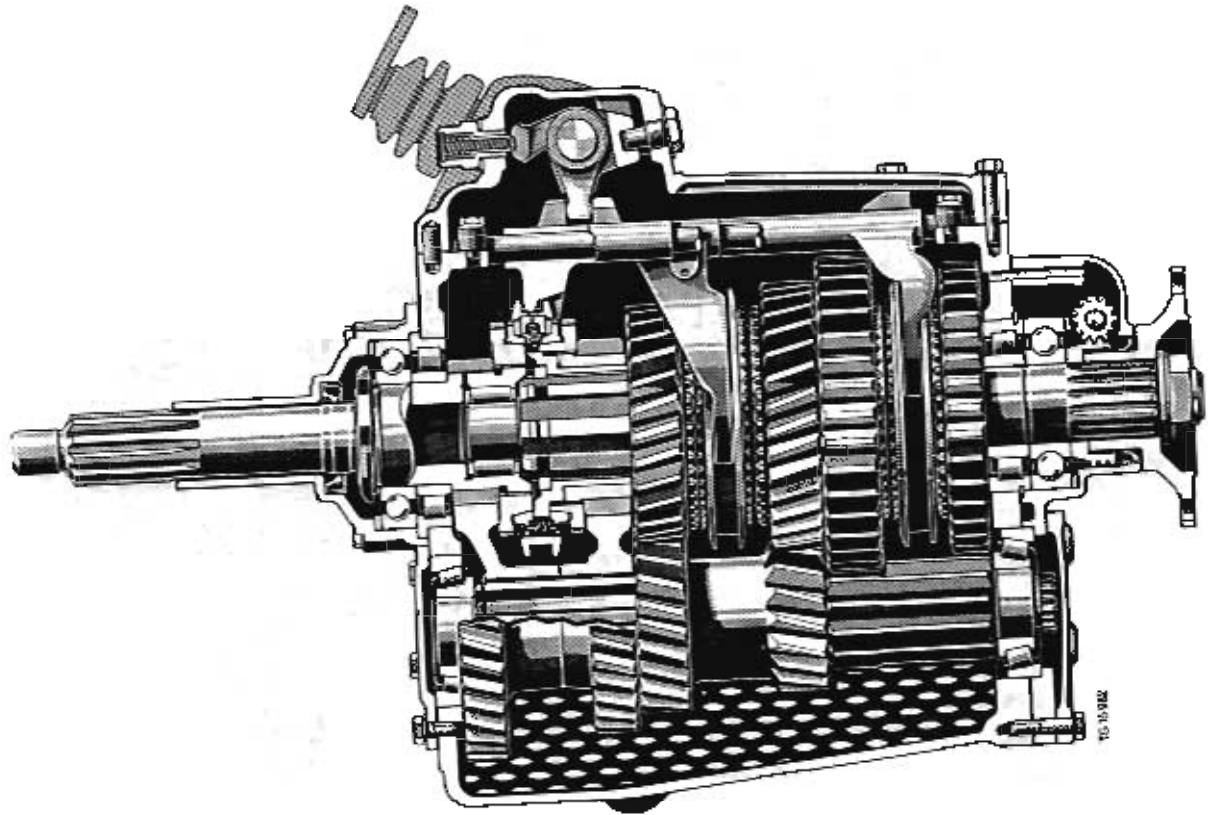
26.3

Bm. 714 (G 3/50)



26.3

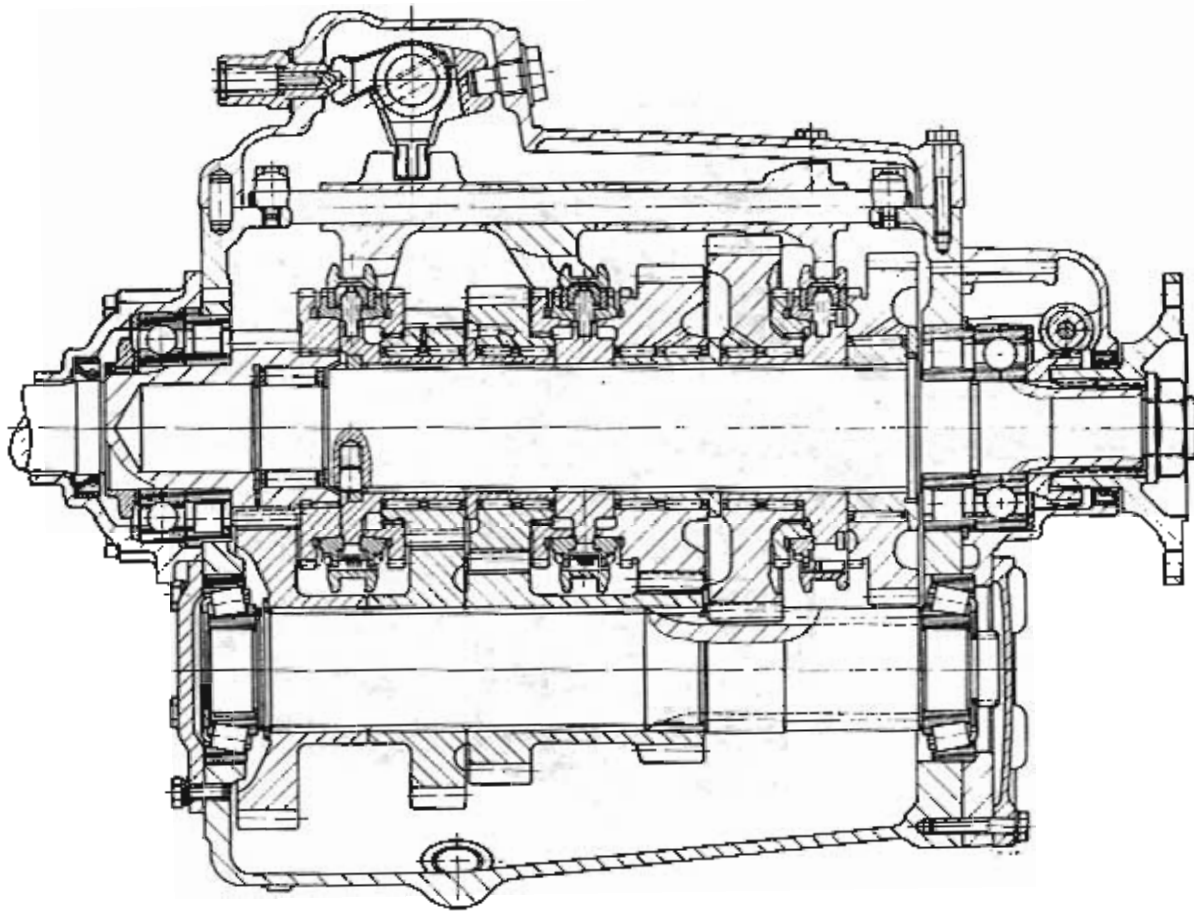
Bm. 714 (G 3.60)



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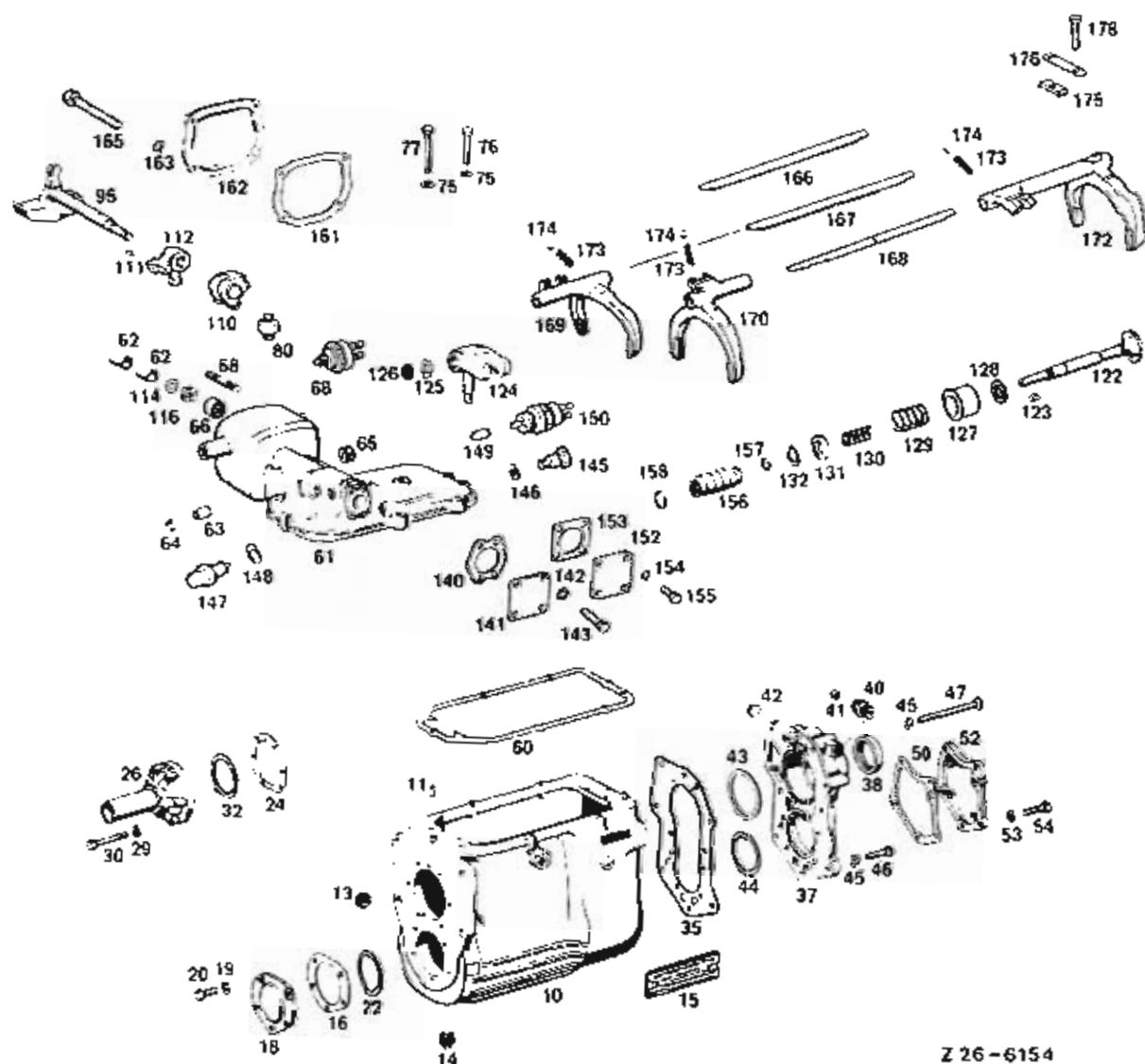
26.3

Bm 714 (G 3'60)



26.3 Exploded Views

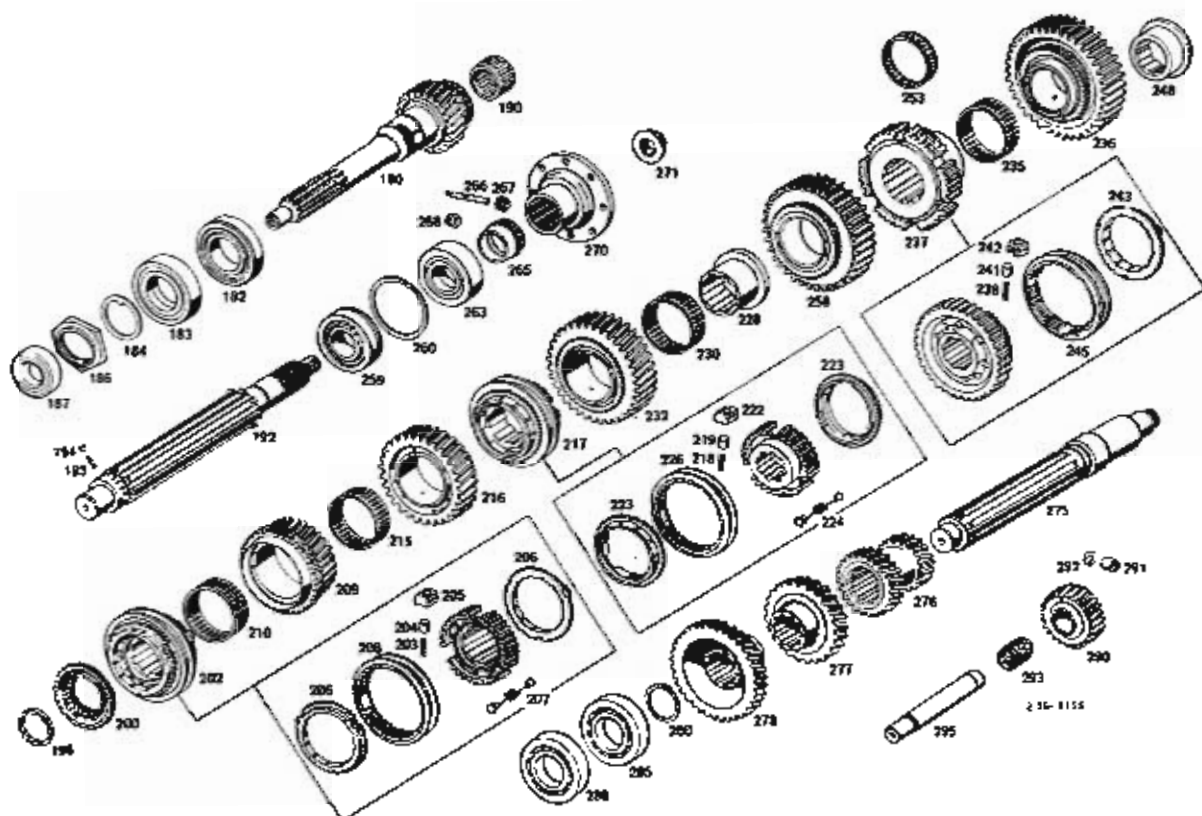
Bm 714



Z 26-6154

Transmission housing, transmission shift cover, shift forks

10. Transmission housing	45. Snap ring	114. Lock washer	152. Closing cover
11. Cyl. pin	46. Screw	115. Nut	153. Gasket
13. Closing plug	47. Screw	122. Shift rod	154. Snap ring
14. Closing plug	50. Gasket	173. Disc spring	155. Screw
15. Unit name plate	52. Closing cover	124. Shift finger	156. Sleeve
16. Gasket	53. Spring washer	125. Locking plate	157. Circlip
18. Closing cover	54. Screw	126. Nut	158. Circlip
19. Snap ring	60. Gasket	127. Bushing	164. Gasket
20. Screw	61. Housing cover	128. Washer	165. Closing cover
22. Spacing washer	62. Bushing	129. Spring	166. Snap ring
24. Gasket	63. Bushing	130. Spring	165. Screw
26. Housing cover	64. Closing cover	131. Washer	166. Shift rod
29. Spring washer	65. Plug	132. Circlip	167. Shift rod
30. Screw	66. Needle bearing	140. Gasket	168. Shift rod
30. Thrust washer	68. Switch	141. Closing cover	169. Shift fork
35. Gasket	75. Spring washer	142. Spring washers	172. Shift fork
39. Housing cover	76. Screw	143. Screw	173. Spring
38. Sealing ring	77. Screw	145. Guide pin	174. Bolt
40. Threaded bushing	80. Breather	146. Spring washer	175. Link
41. Gasket	85. Shift rod	147. Screw	176. Link
42. Slotted plug	110. Pin	148. Spring washer	178. Screw
43. Thrust washer	111. Woodruff key	149. Bolt	
44. Spacing washer	112. Shift finger	150. Switch	



Input shaft, main shaft, countershaft and reversing shaft

180	Input shaft	216	Gear	259	Cyl. roller bearing
182	Cyl. roller bearing	217	Synchronizer body	260	Circlip
183	Tapered bearing	218	Spring	263	Tapered bearing
184	Thrust washer	219	Bolt	265	Drive gear
186	Nut	222	Driver	266	Shaft
187	Sealing ring	223	Synchronizer cone	267	Drive gear
190	Roller assembly	224	Spring	268	Plug
192	Main shaft	226	Sliding sleeve	270	Flange
193	Spring	228	Bushing	271	Nut
194	Bolt	230	Roller assembly	275	Countershaft
196	Thrust washer	232	Gear	276	Gear
200	Synchronizer ring	235	Roller assembly	277	Gear
202	Synchronizer body	238	Gear	278	Gear
203	Spring	237	Synchronizer body	280	Locking ring
204	Bolt	238	Spring	285	Tapered roller bearing
205	Driver	241	Bolt	286	Tapered roller bearing
206	Synchronizer cone	242	Driver	290	Reversing gear
207	Spring	243	Synchronizer cone	291	Spacing tube
208	Sliding sleeve	245	Sliding sleeve	292	Thrust washer
209	Gear	246	Bushing	293	Roller assembly
210	Roller assembly	253	Roller assembly	295	Reversing shaft
215	Roller assembly	258	Coupling gear		

26.3 Reductions and Number of Gears

Bin. 714

		Constant gear	1st speed	2nd speed	3rd speed	4th speed	5th speed	reverse speed
G 3/50-5/8,5								
Number of teeth	$\frac{Z 2}{Z 1}$	$\frac{38}{16}$	$\frac{39}{11}$	$\frac{32}{17}$	$\frac{25}{23}$	$\frac{19}{29}$	—	$\frac{20}{11}$ $\frac{36}{20}$
Reduction	$i =$	2,375	3,55	1,88	1,08	0,65	—	3,27
Total reduction	$i =$	—	8,41	4,47	2,57	1,55	1,0	7,77

G 3/60-5/6,1

Number of teeth	$\frac{Z 2}{Z 1}$	$\frac{31}{18}$	$\frac{39}{11}$	$\frac{32}{17}$	$\frac{26}{22}$	$\frac{23}{27}$	—	$\frac{20}{11}$ $\frac{36}{20}$
Reduction	$i =$	1,722	3,55	1,88	1,27	0,85	—	3,27
Total reduction	$i =$	—	6,10	3,24	2,19	1,46	1,0	5,63

G 3/60-5/7,5

Number of teeth	$\frac{Z 2}{Z 1}$	$\frac{36}{17}$	$\frac{39}{11}$	$\frac{32}{17}$	$\frac{25}{23}$	$\frac{19}{29}$	—	$\frac{20}{11}$ $\frac{36}{20}$
Reduction	$i =$	2,117	3,55	1,88	1,08	0,65	—	3,27
Total reduction	$i =$	—	7,50	3,98	2,30	1,38	1,0	6,77



26.3 Adjusting Data

Br 714

End play of input shaft¹⁾ between outer bearing race and front housing cover	0,03–0,05					
End play of main shaft¹⁾ between outer bearing race and rear housing cover	0,03–0,05					
End play of countershaft¹⁾	0,03–0,05					
Adjustment of countershaft Dimension from transmission housing front to constant countershaft gear	15,5 ± 0,1					
¹⁾ With basket can crossed						
Sliding sleeve distance Dimension from transmission housing face rear						
to center of sliding sleeve 1st speed and reverse speed	64,9 ± 0,1					
to center of sliding sleeve 2nd and 3rd speed	179 ± 0,1					
to center of sliding sleeve 4th and 5th speed	268,8 ± 0,1					
Lengths of flange bushings to obtain reference dimensions						
2nd speed	50,5	50,6				
3rd speed	42,0	42,1				
Reverse speed	28,0	28,1	28,2	28,3	28,4	28,5
	28,6	28,7	28,8			
End play of gear wheels						
1st gear wheel	0,18–0,25					
2nd gear wheel	0,20–0,25					
3rd gear wheel	0,19–0,24					
4th gear wheel	0,20–0,25					
Reverse gear wheel	0,15–0,25					
Synchronizing play						
1st to 4th speed	0,5					
5th speed	0,8					
Reference dimension when placing synchronizer cone against outer cone						
	max.			min.		
1st to 4th speed	2,0 +0,1 –0,25			1,0		
5th speed	1,7 +0,1 –0,25			0,9		

26.3 Compensating Washers

Bm. 714

Thrust washers (locking rings)

Main shaft	6,9; 7,0; 7,1; 7,2; 7,3; 7,4 7,5; 7,6; 7,7; 7,8; 7,9
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Circclip for cyl. or tapered roller bearings

Main shaft	2,68; 2,73; 2,78; 2,83; 2,88; 2,93
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Thrust washers (lug washers)

Transmission housing cover front	3,1; 3,18; 3,28; 3,34; 3,42; 3,50; 3,58; 3,66; 3,74
Transmission housing cover rear	2,9; 3,0; 3,1; 3,2; 3,3; 3,4; 3,5; 3,6

Compensating washers

Transmission housing cover front (input shaft bearing)	1,0; 1,1; 1,2; 1,3
Transmission housing cover front and rear (countershaft bearing)	0,05; 0,1; 0,2; 0,4; 0,8

Length of spacing tube

In rear transmission housing cover (G 3/50 only)	27,8; 27,9; 28,0; 28,1; 28,2; 28,3
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26.3 Removal and Installation of Transmission

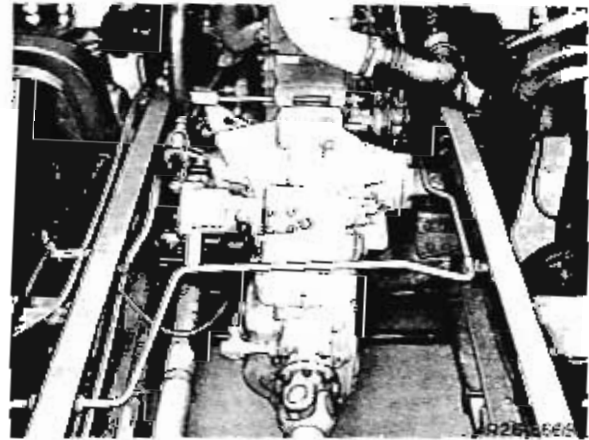
Br 714

Special Tools

Centering mandrel	312 589 0161 00
Centering mandrel	343 589 0361 00
Transmission jack	conventional

Note: Remove transmission from vehicle, only, when it is absolutely certain that a fault originates on or in transmission. When removing a transmission, simultaneously check condition of clutch and remove faults, if any. During installation, make sure of absolute cleanliness. In addition, replace all locking plates, damaged nuts and screws.

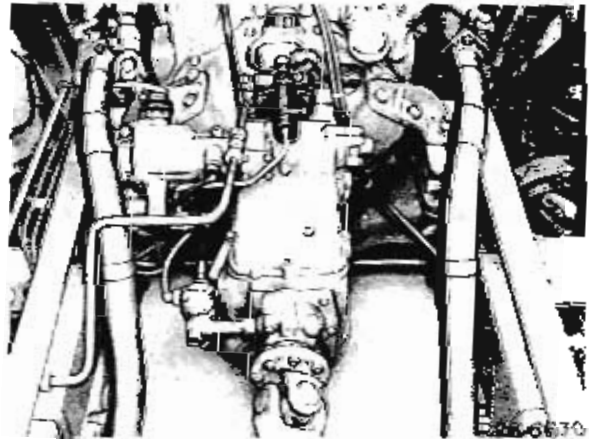
Transmission 714 on vehicles with engine 352



Scope

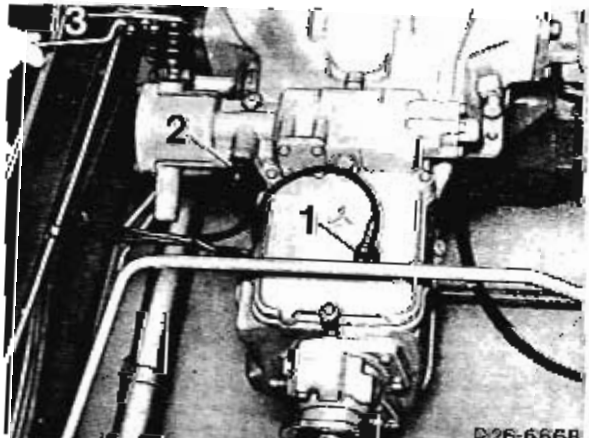
- 1 Drain transmission oil from warm transmission.
- 2 Tilt cab forward.

Transmission 714, on vehicles with engine 401



- 3 Unscrew universal shaft and remote control shaft on transmission.
- 4 Unscrew universal shaft intermediate bearing from frame cross member.
- 5 Unscrew tachometer shaft or changeover gear.

- 1 Backup light switch
- 2 Starter locking switch
- 3 Remote control shaft

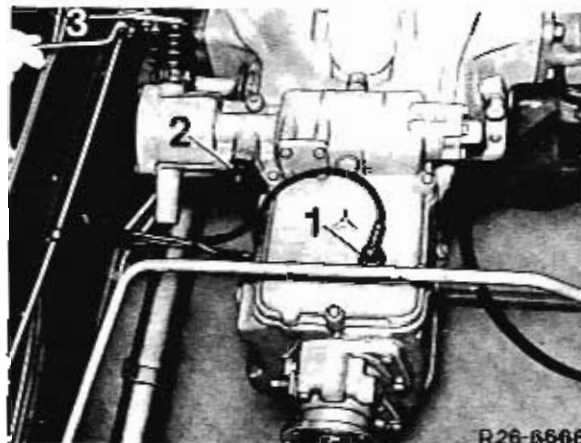


26.3

6 Pull off plug on backup light switch and on starter locking switch item 1 and 2.

7 Unscrew line to clutch slave cylinder (on vehicles with OM 401 engine only).

- 1 Backup light switch
- 2 Starter locking switch
- 3 Remote control shaft



8 Place mobile transmission jack (vehicle jack) under transmission and jack up slightly.

9 Unscrew transmission from clutch housing and remove.

10 Pull out transmission toward the rear until input shaft moves out of clutch housing. Then lower transmission and pull out from under chassis.

11 For installation proceed vice versa.

12 Check oil level in transmission and fluid level of hydraulic clutch actuation and correct, if required.

Installation Notes:

1 Prior to installing transmission, it will be of advantage to check the clutch driven plate for perfect seat by means of pertinent centering mandrel.

2 Coat splining of input shaft, as well as slide surface of throwout bearing on cover for input shaft with Molykote-Paste G-Rapid.



Removal and Installation, Sealing (Transmission Installed) of Transmission Housing Cover Rear (with Tachometer Drive)

Bm. 714

Tightening Torques	Nm	(xpm)
Clutch flange	300 – 350	(30 – 35)
All bolts M 8	22 – 28	(2,2 – 2,8)

Data

End play of main shaft ¹⁾ between outer bearing race and rear transmission cover	0,03 – 0,05 mm
End play of countershaft ¹⁾	0,03 – 0,05 mm

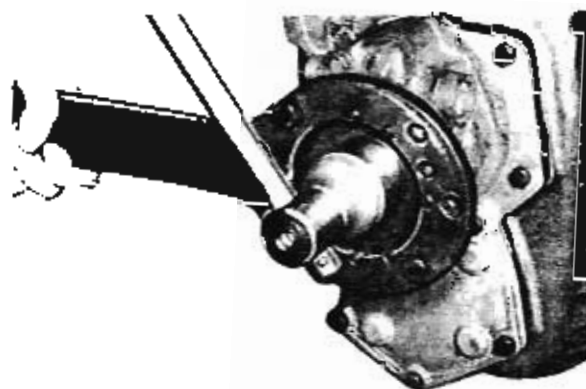
¹⁾ With gasket compressed

Special Tools

Socket wrench insert (SW 41)	000 589 10 09 00
Mandrel	312 589 00 15 00
Dial gauge	001 589 53 21 00
Extension	366 589 00 21 05
Holding wrench	366 589 00 31 00
Puller	035 589 01 33 00
Holder	343 589 00 40 00
Clamping bars	000 589 59 63 00

Removal

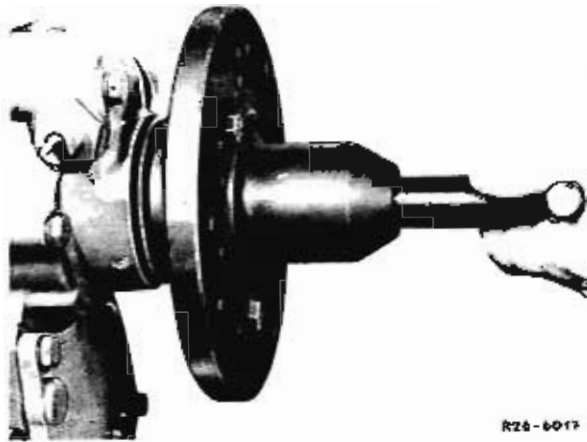
- 1 Unscrew universal shaft from clutch flange.
- 2 Unscrew universal shaft intermediate bearing from cross member.
- 3 Unscrew tachometer shaft or changeover gear from transmission.
- 4 Unscrew closing cover or attach pto from transmission housing cover rear.
- 5 Unlock nut on clutch flange. Screw Holding Wrench 366 589 00 31 00 to clutch flange and unscrew nut with Socket Wrench Insert (SW 41) 000 589 10 09 00. Remove screws on holding wrench and remove holding wrench.



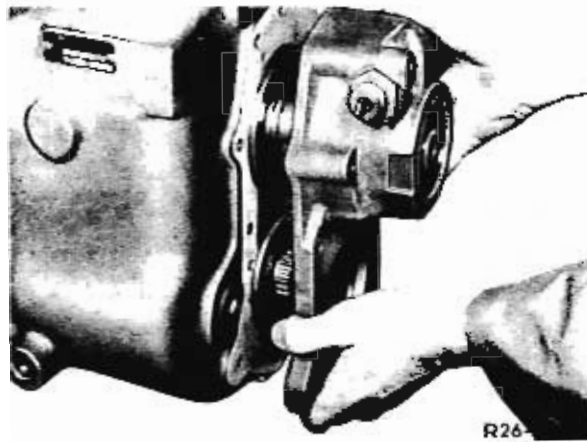
R26-6607

26.3

6 Screw Puller 035 589 01 33 00 on clutch flange and pull off flange.



7 Unscrew screws on rear transmission housing cover. Loosen cover with light hammer blows and pull off toward the rear by means of two screw drivers or assembly levers and remove. Watch out for compensating washers.



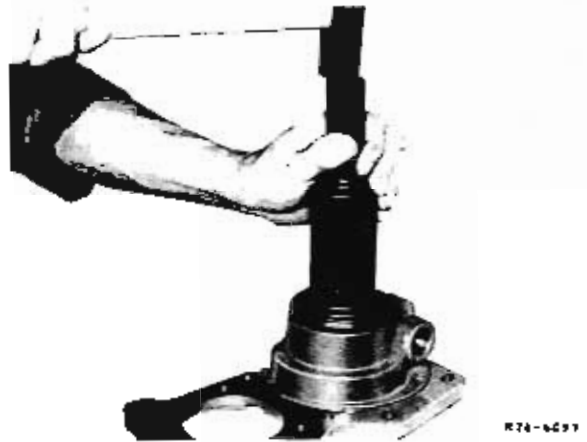
8 Remove tachometer drive gear from main shaft.

9 Check all parts for wear.

Installation

1 Force new radial sealing ring into transmission housing cover with Mandrel 312 589 00 15 00.

2 Place gasket on transmission housing cover.

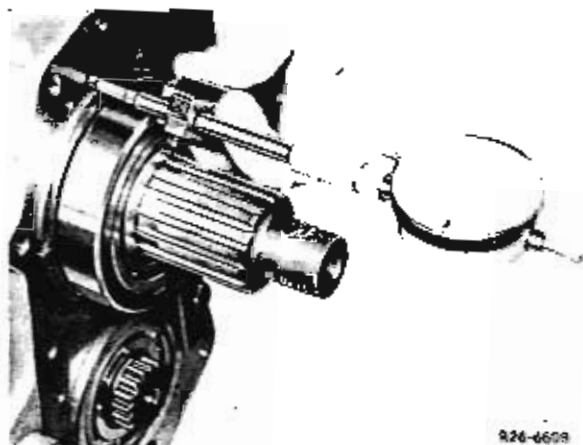


3 Measure distance from gasket to contact surface of ball bearing with Dial Gauge 001589532100, plus Extension 366 589 00 21 05 and Holder 343 589 00 40 00.



26.3 Removal and Installation, Sealing (Transmission Installed) of Transmission Housing Cover Rear (with Tachometer Drive)

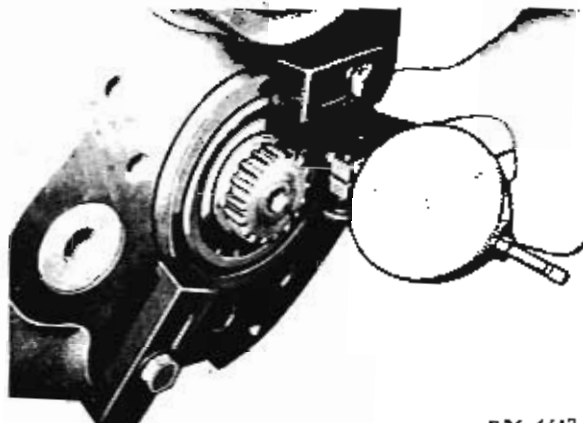
4 Measure distance from ball bearing to contact surface of rear transmission housing cover with Dial Gauge 001 589 53 21 00, plus Extension 366 589 00 21 05 and Holder 343 589 00 40 00.



5 Determine difference in dimensions from Job No. 3 and 4 and insert pertinent thrust washer (lug washer), so that an end play of 0.03–0.05 mm (with gasket compressed) is attained.

For thrust washers refer to Table 26.3–005/2.

6 Insert rear tapered roller bearing outer race by means of two Clamping Bars 343 589 01 63 00 until countershaft is free of play but can still be easily rotated.



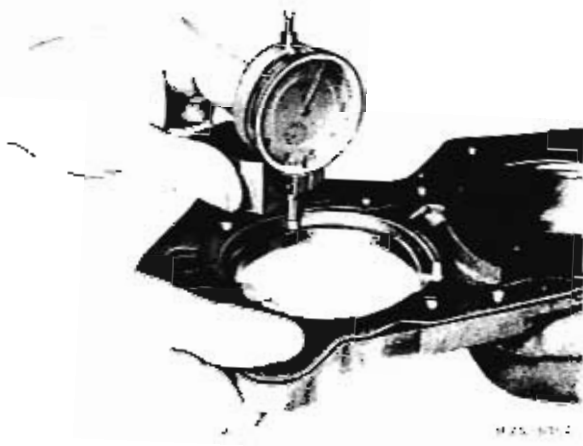
7 Insert Dial Gauge 001 589 53 21 00 into Holder 343 589 00 40 00 and measure dimension between outer race of rear tapered roller bearing and contact surface of transmission housing cover rear at several points.

8 Also determine dimension of gasket of transmission housing cover up to contact surface of tapered roller bearing by means of Dial Gauge 001 589 53 21 00 and Holder 343 589 00 40 00.

9 Compensate difference with compensating washers to provide an end play 0.03–0.05 mm (with gasket compressed).

For compensating washers refer to Table 26.3–005/2.

10 Place gasket on rear transmission housing cover.



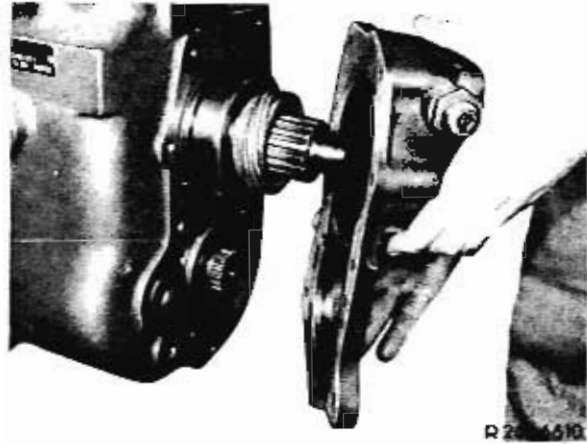
11 Insert measured compensating washers from Job No. 5 and 9 into transmission housing cover.

Note: Coat compensating washers slightly with grease, so that washers won't fall out when mounting cover.

12 Unscrew both clamping bars from tapered roller bearing of countershaft.

13 Slip tachometer drive gear on main shaft.

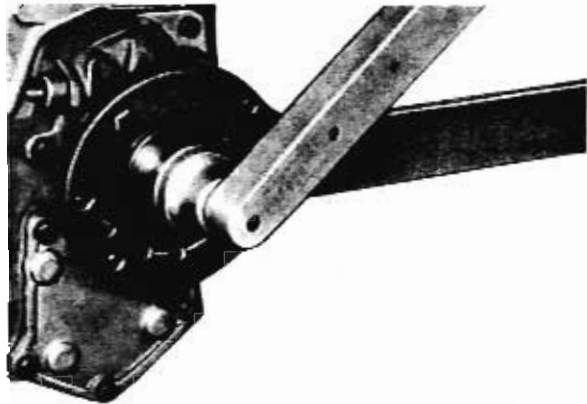
14 Slip transmission housing cover rear on main shaft. Screw bolts into transmission housing and tighten to specified torque.



15 Screw closing cover or pto with gasket to transmission housing or to rear transmission housing cover.

16 Slightly grease clutch flange at sealing ring running surface and slip on main shaft.

17 Screw Holding Wrench 366 589 00 31 00 to clutch flange. Position nut on main shaft and tighten to specified torque by means of Socket Wrench Insert (SW 41) 000 589 10 09 00 and secure.



18 Screw universal shaft intermediate bearing to cross member and universal shaft to clutch flange.

19 Screw tachometer shaft or changeover gear to transmission.

26.3 Removal and Installation of Tachometer Drive (Transmission Housing Cover Removed)

Bm, 714

Tightening Torque	Nm	(kpm)
Tachometer connection	25	(2,5)

Removal

- 1 Unscrew tachometer connection from rear transmission housing cover.
- 2 Force closing cover opposite tachometer connection out of transmission housing cover.
- 3 Force tachometer drive shaft out of transmission housing cover by means of pertinent mandrel and remove tachometer drive pinion.
- 4 Check all parts for condition and wear.



Fig. 10040

Installation

- 1 Heat tachometer drive pinion to approx. 80° C and insert in recess of transmission housing cover.
- 2 Introduce tachometer drive shaft into housing and press into pinion.
- 3 Screw tachometer connection with sealing ring into transmission housing cover and tighten to specified torque.
- 4 Force closing cover opposite tachometer connection into transmission housing cover.

26.3 Removal and Installation, Disassembly and Assembly of Transmission Shift Cover

Bm. 714

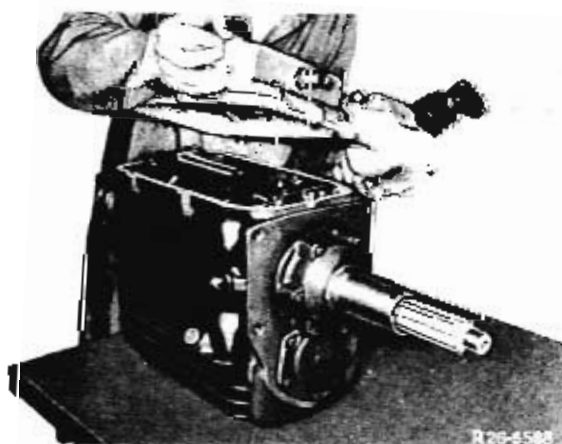
Tightening Torque	Nm	(kpm)
All bolts M 8	22 – 28	(2.2 – 2.8)

Special Tools

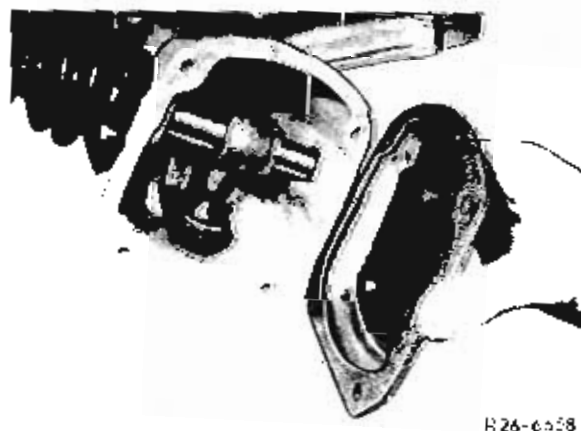
Hook wrench	000 589 11 05 00
Mandrel	000 589 07 15 00
Internal puller	000 589 27 33 00
Puller	321 589 20 33 00
Countersupport	000 589 34 33 00

Removal and Disassembly

1 Unscrew bolts on transmission shift cover top and remove cover.



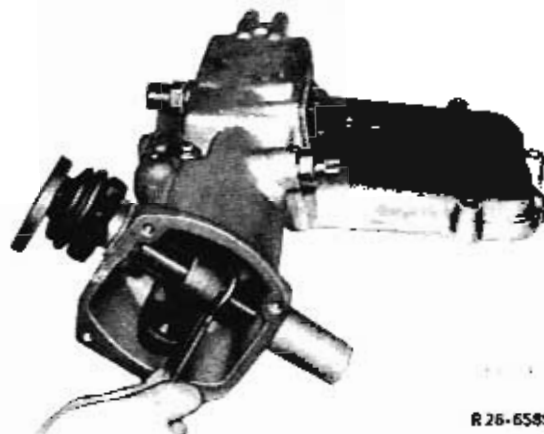
2 Unscrew lateral closing cover on transmission shift cover.



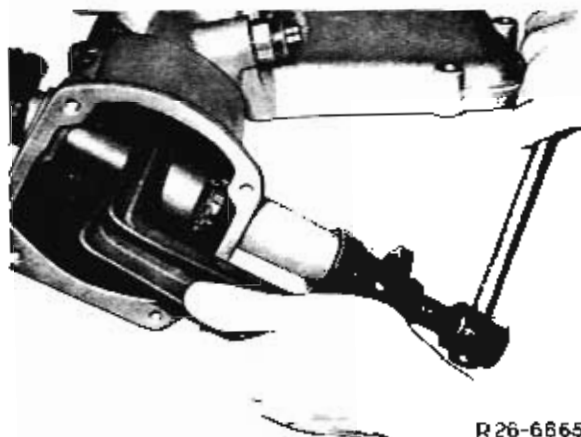
26.3

3 Unlock slot nut of short shift rod and loosen by means of a hook wrench (conventional).

Note: Leave 3—4 threads of slot nut screwed-on for support against transmission cover when pulling off selector lever.



4 Pull selector lever from gear-shifting shaft with Puller 321 589 20 33 00.



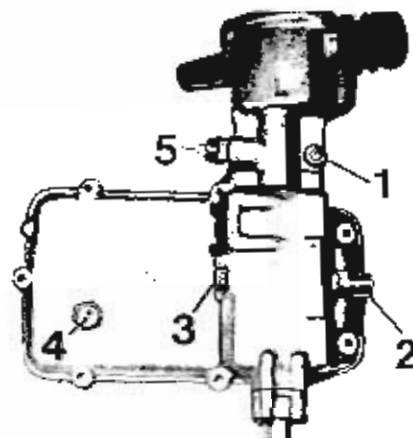
5 Remove special tool, unscrew slot nut completely and remove woodruff key (wedge) from shift rod.



6 Lift sleeve from transmission housing cover. Pull out short shift rod and remove slot nut, lock washer and selector lever.

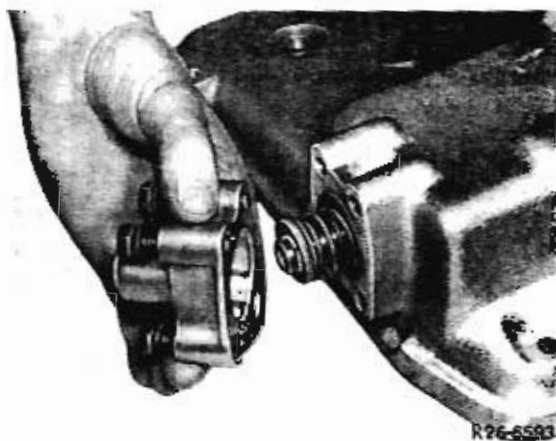
7 Unscrew guide and locking screw for pawl (detent) and shift finger as well as backup light switch and starter locking switch. Remove thrust pin from bore of starter locking switch.

- 1 Breather
- 2 Locking screw
- 3 Guide screw
- 4 Backup light switch
- 5 Starter locking switch



26.3 Removal and Installation, Disassembly and Assembly of Transmission Shift Cover

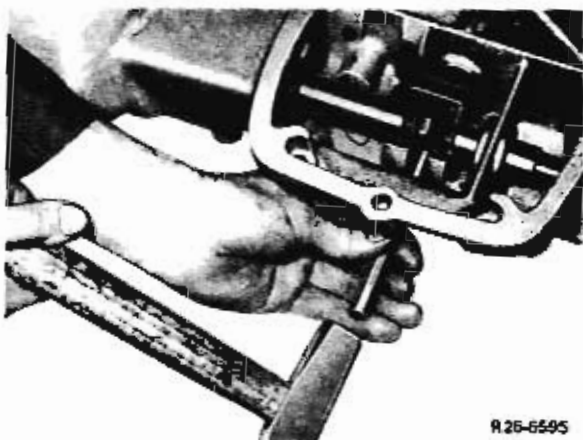
8 Unscrew closing cover on transmission shift cover rear.



9 Unsnap locking ring, remove holding washer, compression springs, second holding washer and spring cup from shift rod.

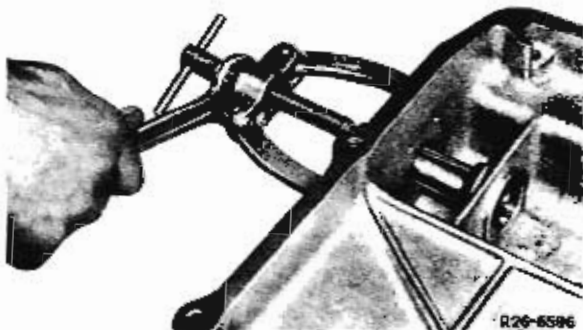


10 Turn shift rod axially until dowel of shift finger is in front of locking screw bore. Then remove dowel through opposite bore by means of a pertinent mandrel.



11 Pull long shift rod out of transmission shift cover, while also removing pawl and shift finger.

12 If required, pull both needle bearings out of transmission shift cover by means of Internal Puller 000 589 27 33 00 and Countersupport 000 589 34 33 00.



26.3

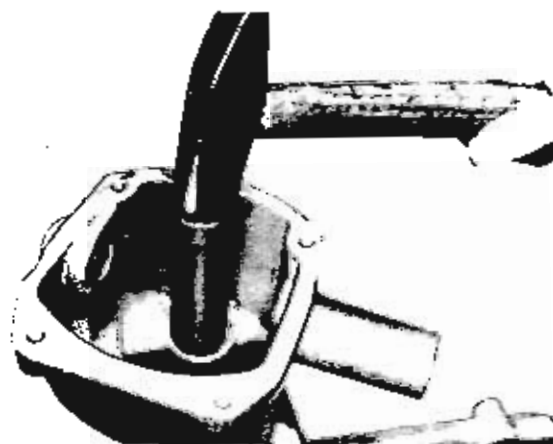
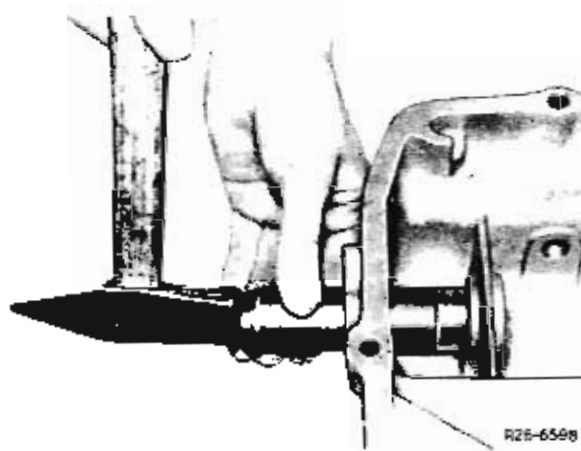
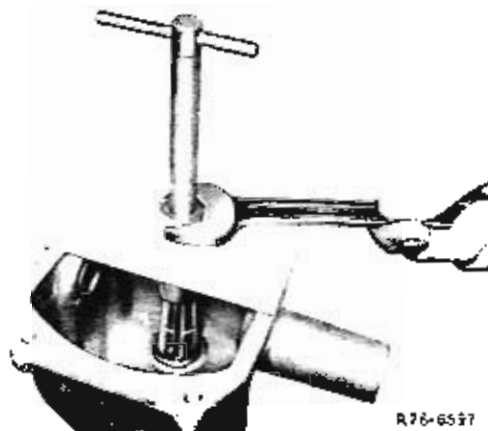
Note: For pulling needle bearing in shift cover dome, remove countersupport from internal puller and use pertinent base instead.

13 Unscrew breather on transmission shift cover.

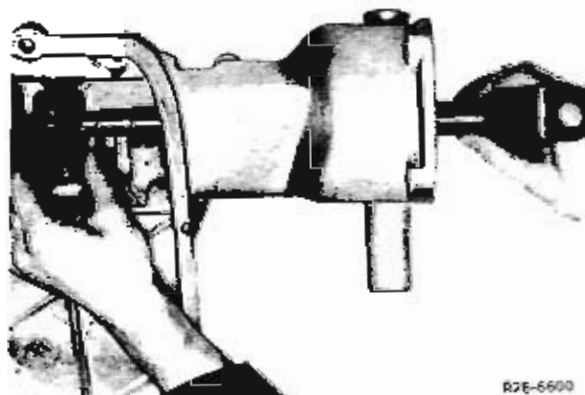
14 Check all parts for condition and wear.

Assembly and Installation

1 Grease both needle bearings and force into transmission shift cover by means of Mandrel 000 589 07 15 00.



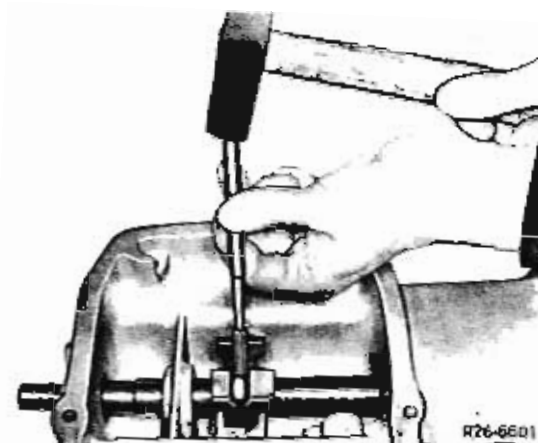
2 Carefully introduce long shift rod into needle bearings, while simultaneously slipping pawl and shift finger on shift rod.



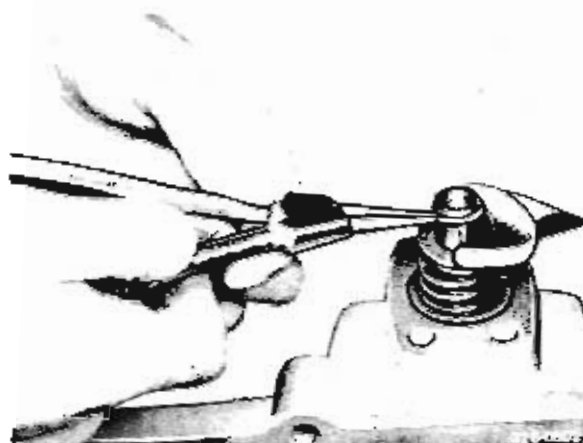
26.3 Removal and Installation, Disassembly and Assembly of Transmission Shift Cover

3 Turn shift rod until bore for dowel is in alignment with bore in shift finger, then insert dowel for flush fit with pertinent mandrel.

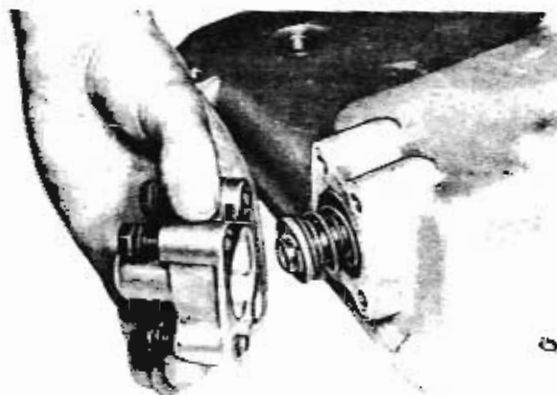
Note: Dowel should not project at pawl end in shift finger.



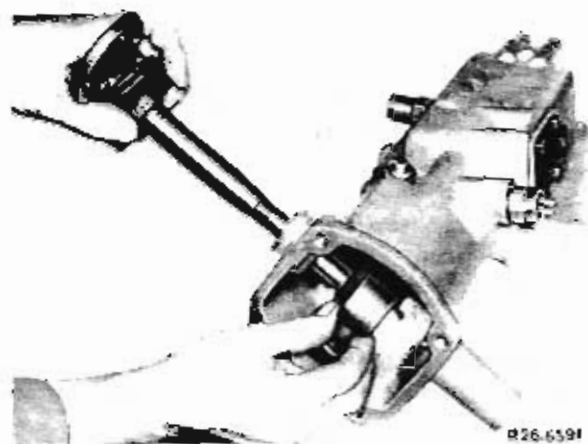
4 Slip spring cup, holding washer, compression springs and second holding washer on shift rod, then compress compression springs and snap-in locking ring.



5 Screw closing cover with gasket to transmission shift cover.



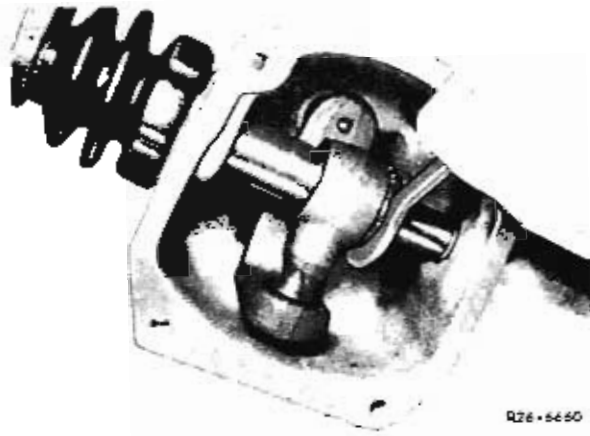
6 Slip sleeve on short shift rod.



7 Slightly grease shift rod and introduce into first bearing bushing in transmission shift cover. Then insert woodruff key (wedge) into shift rod. Simultaneously introduce selector lever into driver of long shift rod and into short shift rod, and slip lock washer and slot nut on short shift rod. Push shift rod into second bearing bushing (watch out for woodruff key).

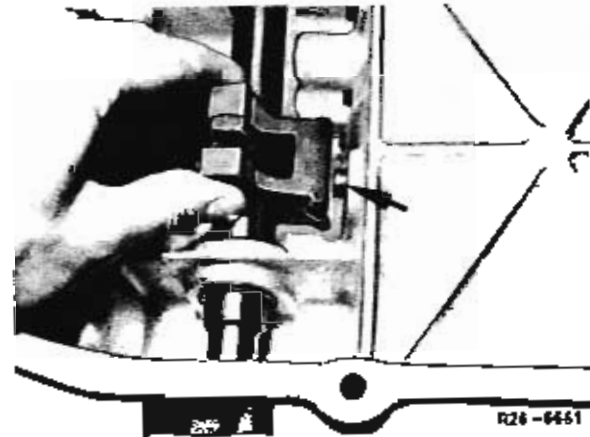
26.3

8 Tighten slot nut well with hook wrench (conventional) and secure with lock washer.



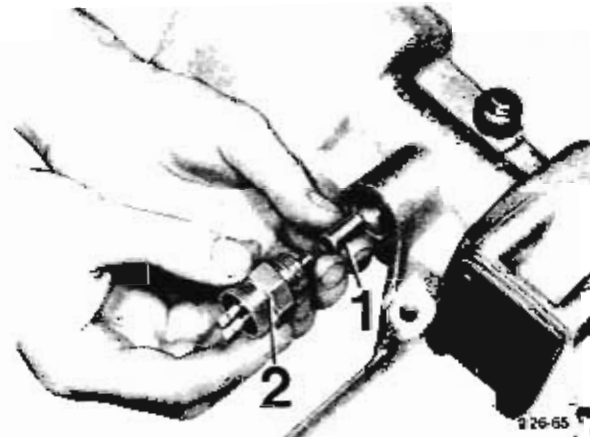
9 Pull sleeve over collar on transmission shift cover.

10 Coat guide screw for pawl on threads with sealing compound and screw into transmission shift cover. Turn long shift rod with pawl and shift finger until pin of guide screw (arrow) enters groove of pawl.



11 Screw locking screw (coat with sealing compound on threads), backup light switch and breather into transmission shift cover.

12 Screw starter locking switch with thrust pin (items 1 a. 2) into transmission shift cover.



- 1 Thrust pin
- 2 Starter locking switch

13 Screw lateral closing cover with gasket to transmission shift cover.

14 Check shift rods in transmission shift cover for easy operation.

15 Place transmission shift cover with gasket on transmission housing and tighten to specified torque.

26.3 Removal and Installation, Disassembly and Assembly of Shift Rods with Shift Forks

Bm. 714

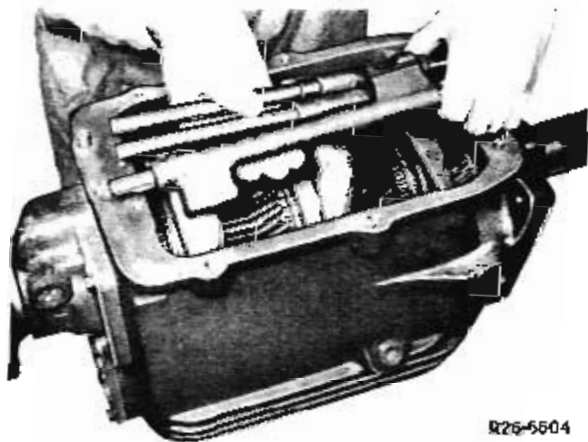
Tightening Torque	Nm	(kpm)
Screws M8	22 – 28	(2,2 – 2,8)

Removal and Disassembly

- 1 Remove transmission shift cover (26.3–200/1).
- 2 Engage first gear.
- 3 Unlock screws of holding clips for shift rods and unscrew. Remove holding clips with locking plates and screws.



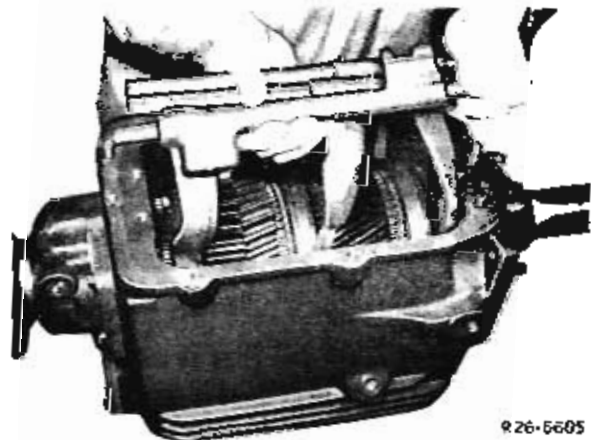
- 4 Slightly raise shift rod for 1st or reverse gear while simultaneously holding rod at input end slightly above shift rods of 2nd/3rd and 4th/5th gear.



R26-5604

- 5 Hold all three shift rods at bottom and remove in upward direction.

Note: Make sure that first gear is engaged, since otherwise the shift fork for 1st or reverse gear will rest against transmission housing during removal and will be stuck.

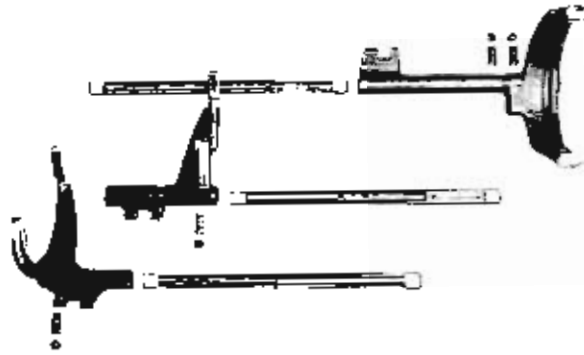


R26-5605

26.3

6 Remove shift rods from shift forks, applying light blows with a soft hammer, if required.

7 Check all parts for condition and wear.

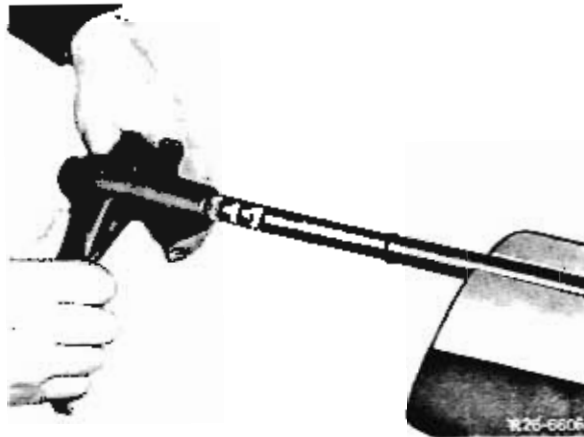


R26-6671

Assembly and Installation

1 Slightly lubricate all shift rods and shift forks. Insert compression springs and balls into shift forks.

2 Slip shift forks on pertinent shift rods up to idle speed position.

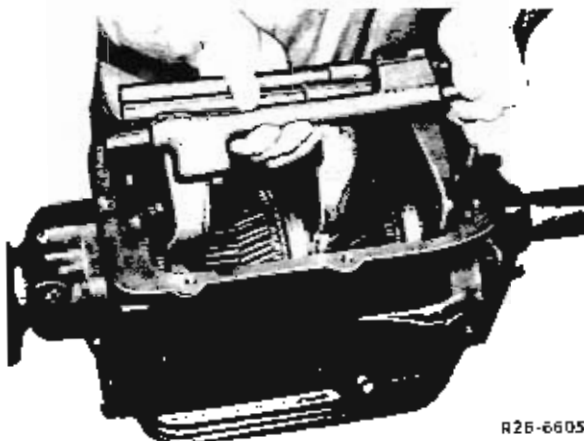


Note: Position each shift fork on shift rod in such a manner that the ball end faces machined surface of shift rod. Then turn shift fork slightly to push in ball. Now slip shift fork on shift rod and turn until ball rests in idle speed groove of shift rod.

3 Engage first gear.

4 Hold all three shift rods with shift forks together and insert shift forks into sliding sleeves.

Note: For inserting sliding forks into shift sleeves, shift rod for 1st or reverse gear must be held slightly above the two other shift rods at drive end, and 1st gear must be engaged.



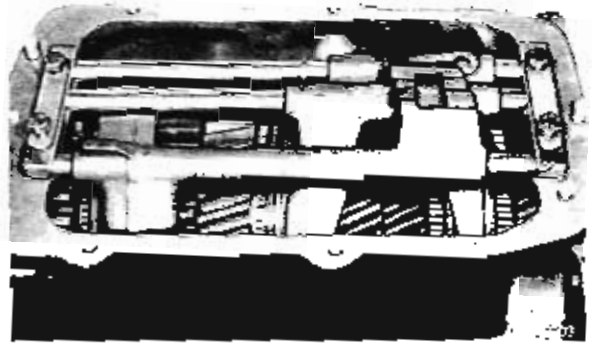
R26-6605

26.3 Removal and Installation, Disassembly and Assembly of Shift Rods with Shift Forks

5 Align inserted shift rods. Place all holding clips and new locking plates on shift rods and screw down.

6 Secure hex. screws by bending locking plates.

Note: Always use new locking plates.



7 Disengage engaged 1st gear.

8 Install transmission shift cover (26.3-200/1).



26.3 Removal and Installation of Input Shaft

Bm. 714

Tightening Torque	Nm	(kpm)
Front housing cover	22 - 28	(2,2 - 2,8)

Data

End play of input shaft between outer bearing race and front transmission cover (with gasket compressed)	0,03 - 0,05 mm
--	----------------

Special Tools

Mandrel	306 589 01 15 00
Mandrel	312 589 08 15 00
Dial gauge	001 589 53 21 00
Extension	366 589 00 21 05
Puller	000 589 45 33 00
Holder	343 589 00 40 00

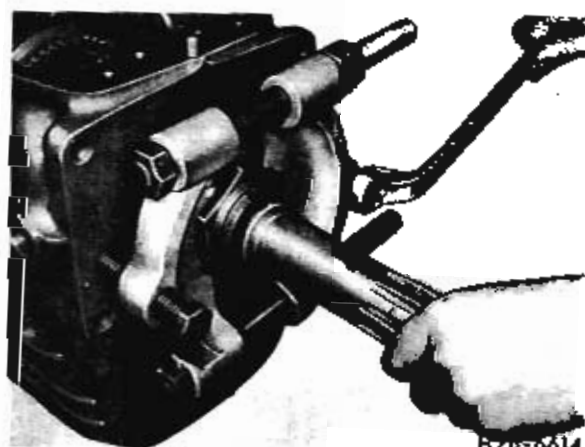
Removal

1 Unscrew screws on transmission housing cover front and remove cover together with thrust washer. Force-out radial sealing ring by means of a fitting mandrel.

2 Place Puller 000 589 45 33 00 on input shaft and screw down behind hex. nut.

3 Pull input shaft out of transmission housing by uniformly screwing down pulling screws. Turn input shaft in such a manner that the cutout on short teeth is above countershaft gear (locking groove of input shaft at top).

4 Unscrew puller and pull out input shaft. Remove roller assembly from input shaft.

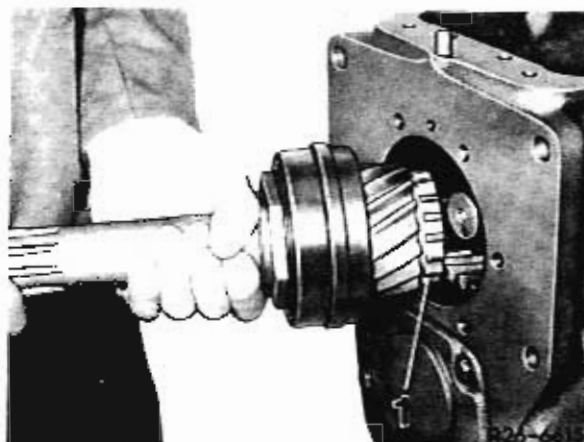


Installation

1 Grease roller assembly and insert into input shaft.

2 Introduce input shaft into housing bore in such a manner that the cutout of the short teeth is above the countershaft gear (item 1).

1 Cutout



3 Force input shaft by means of light blows with a soft hammer into housing until flange of cyl. or tapered roller bearing rests against transmission housing.

Note: Turn input shaft slightly so that the short teeth of the input shaft can slip into the opposite teeth of the clutch body.

4 On transmission G 3/50 as well as G 3/60 in combination with engine OM 352 force radial sealing ring into front transmission housing cover by means of Mandrel 306 589 01 15 00, and on transmission C 3/60 in combination with engine OM 401 by means of Mandrel 312 589 08 15 00, with the sealing lip facing the transmission.

5 Place gasket on front transmission housing cover.



R 26 - 6092

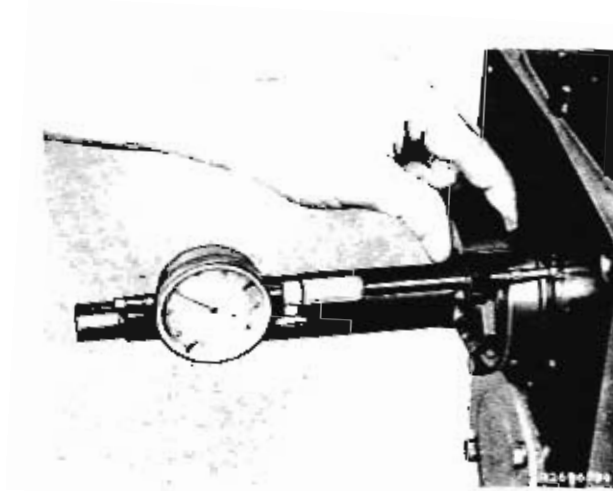
6 Measure distance from gasket to supporting surface of thrust washer (lug washer) with Dial Gauge 001 589 53 21 00 including Extension 366 589 00 21 05 and Holder 343 589 00 40 00.



R 24 - 6092

26.3 Removal and Installation of Input Shaft

7 Measure distance from outer bearing race of radial ball bearing or tapered roller bearing of input shaft up to face of transmission housing with the same special tool as for Job No. 6.



8 Determine difference between Job No. 6 and 7 and select thrust washer to obtain an end play of 0,03–0,05 mm (with gasket compressed). For thrust plates refer to Table 26.3–005/2.

9 Insert respective thrust washer into front transmission housing cover and mount gasket. Slightly grease radial sealing ring in cover.

10 Slip front transmission housing cover with gasket over input shaft and tighten screws to specified torque.

26.3 Disassembly and Assembly of Input Shaft

Bm. 714

Tightening Torque	Nm	(kpm)
Hex. nut to input shaft ¹⁾	350	(35)

1) Tightening torque in combination with Box Wrench 385 589 00 03 00 only 300 Nm (30 kpm)

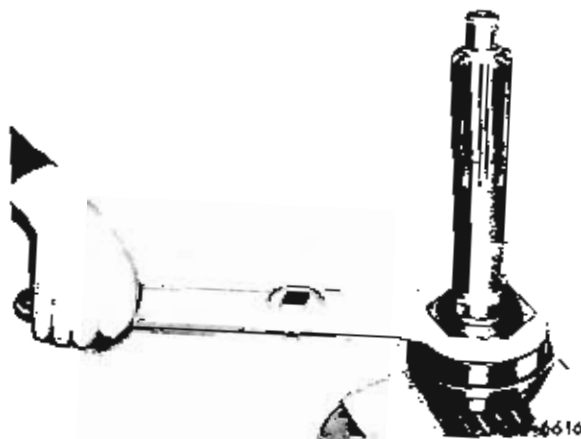
Special Tools

Box wrench (SW 75)	385 589 00 03 00
Installation mandrel	317 589 00 15 00
Puller	000 589 45 33 00
Puller	000 589 89 33 00
Pulling hook	000 589 90 33 00

Disassembly

1 Clamp input shaft with short teeth into vise (using soft jaws) or using a clutch body (5th gear) which is no longer used, and insert input shaft into teeth.

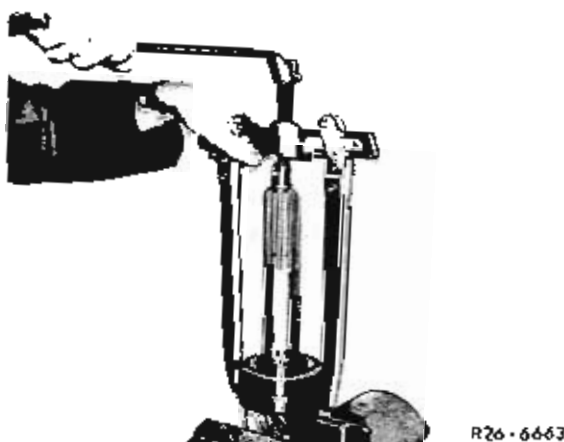
2 Unlock hex. nut and unscrew by means of Box Wrench (SW 75) 385 589 00 03 00. Remove nut and thrust washer.



Note: The input shaft has lefthand threads.

3 Pull radial ball bearing and cyl. roller bearing from input shaft by means of Puller 000 589 89 33 00 and Pulling Hook 000 589 90 33 00.

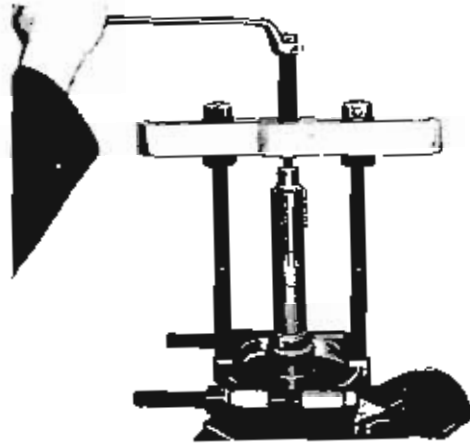
Note: Transmission 3/50 has only one tapered roller bearing on input shaft.



26.3

4 Pull inner race of cyl. roller bearing from input shaft by means of Puller 000 589 45 33 00.

5 Check all parts for condition and wear.



R26-6617

Assembly

1 Heat inner race of cyl. roller bearing to approx. 80° C and slip on input shaft. Upon cooling down of bearing, apply Mandrel 317 589 00 15 00 to obtain free-of-play contact.

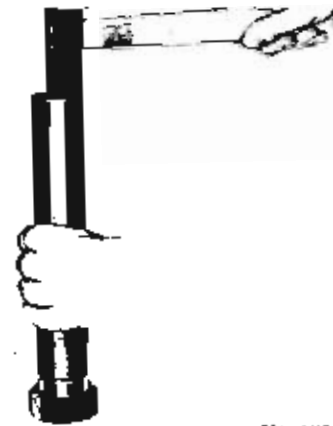
2 Place cyl. roller bearing on pressed-on inner race (collar at input end).

3 Heat both inner races of radial ball bearing to approx. 80° C. Slip one inner race on input shaft, then mount outer race and slip-on second inner race. Apply Mandrel 317 589 00 15 00 to force radial ball bearing against seat on cyl. roller bearing.

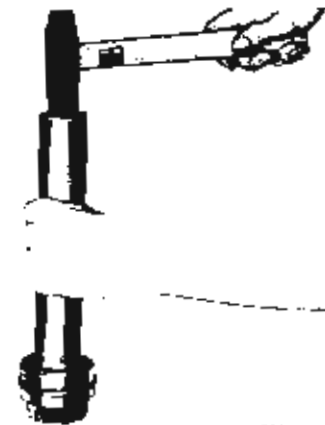
Note: Transmission 3/50 has only one tapered roller bearing on input shaft.

4 Clamp input shaft with short teeth into vise (using soft jaws) or clamp a clutch body (5th gear) which is no longer used into vise and insert input shaft into teeth.

5 Place thrust washer on radial ball bearing or, on transmission 3/50, on tapered roller bearing.



R26-6618

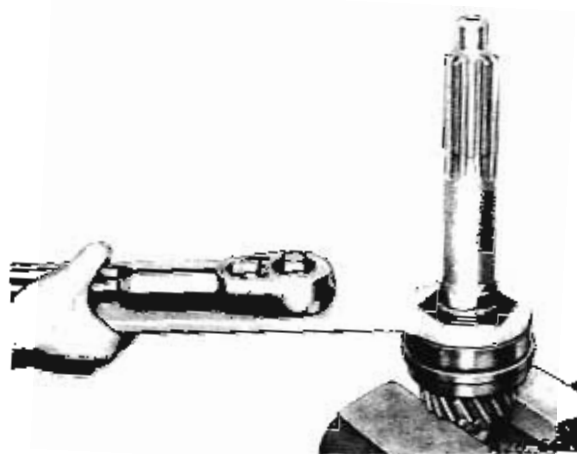


R26-6619

26.3 Disassembly and Assembly of Input Shaft

6 Tighten hex. nut to specified torque by means of Box Wrench (SW 75) 385 589 00 03 00 and torque wrench.

Note: Input shaft has lefthand threads.



7 Peen flange of hex. nut into groove of input shaft by means of a punch.

Note: Do not shear-off locking flange.

26.3 Removal and Installation of Main Shaft

Bm. 714

Data:

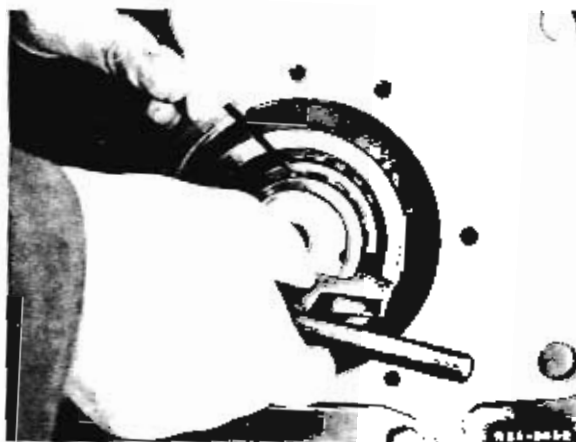
End play of main shaft between outer bearing race and rear housing cover (with gasket compressed)	0,03–0,05
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Special Tools

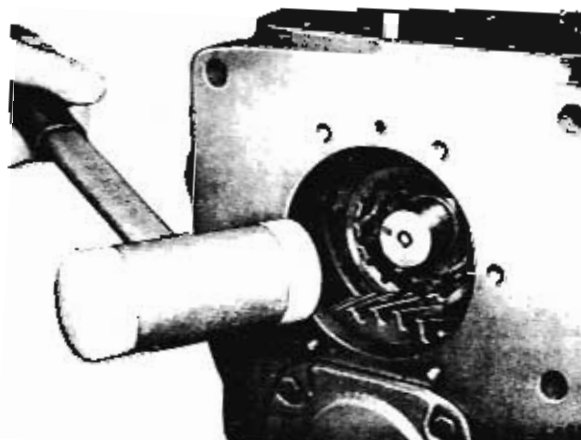
Special wrench	385 589 00 07 00
Mandrel	312 589 03 14 00
Assembly sleeve	317 589 00 14 00
Mandrel	304 589 03 39 00

Removal

- 1 Remove transmission shift cover (26.3–200/1).
- 2 Remove shift rods with shift forks (26.3–203/1).
- 3 Remove input shaft (26.3–205/1).
- 4 Remove rear transmission housing cover (26.3–112/1).
- 5 Push safety pin of thrust washer (locking ring) with a scriber or the like inwards while turning thrust washer with Wrench 385 589 01 07 00 to the right or left until the splining of the main shaft is in alignment with journal of thrust washer.

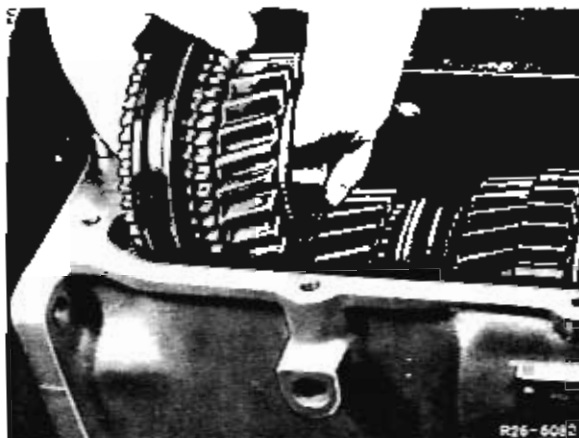


- 6 Force rear bearing out of transmission housing by means of light blows with a soft hammer against front end of main shaft.
- 7 Pull out main shaft completely, remove safety pin and compression spring.

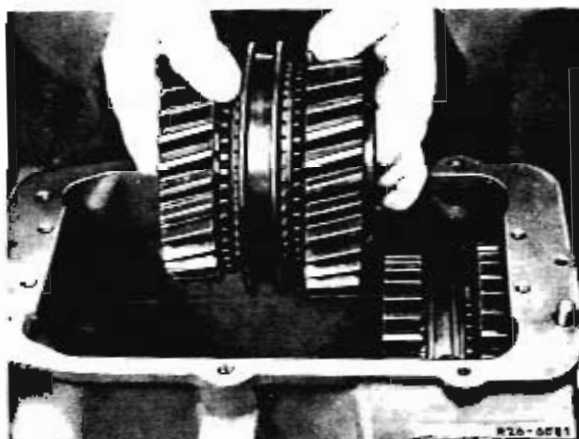


26.3

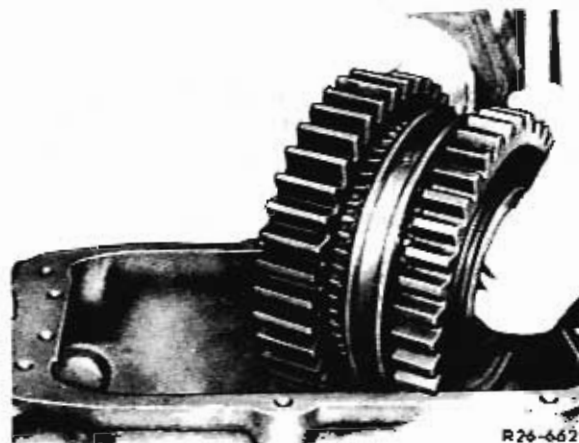
8 Remove fourth gear wheel and synchronizer body 4th and 5th gear, as well as clutch body 5th gear.



9 Remove synchronizer body 2nd and 3rd gear together with 2nd and 3rd gear wheel.



10 Slightly raise first gear wheel with synchronizer body and reverse gear wheel, swivel away from installation position by approx. 90° and remove.



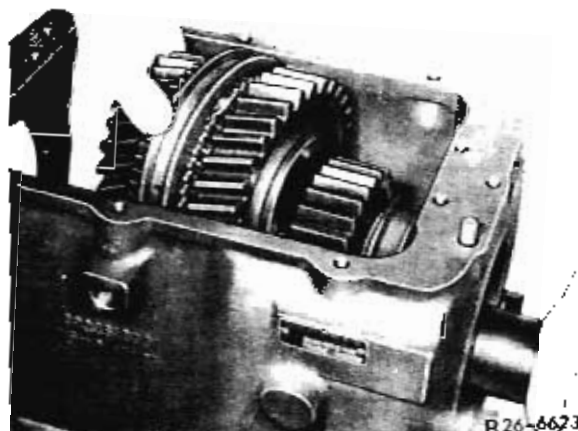
Installation

Note: To determine the length of the flanged bushings and the thickness of the thrust washers, pre-assemble main shaft prior to assembly into transmission housing (26.3-212/3).

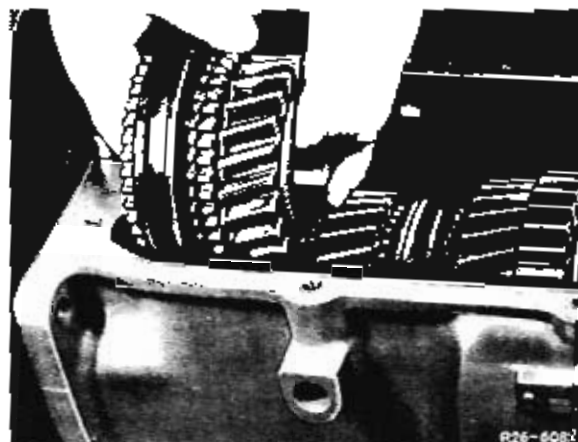
1 Insert gear group 1st gear and reverse gear into transmission housing and introduce Assembly Sleeve 317 589 00 14 00 into inserted gear group.

26.3 Removal and Installation of Main Shaft

2 Insert gear group 2nd and 3rd gear into transmission housing and push assembly sleeve up to 3rd gear wheel.

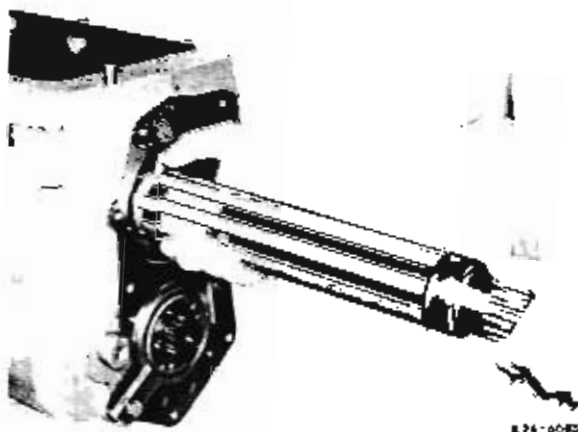


3 Insert fourth gear wheel and synchronizer body 4th and 5th gear, as well as clutch body 5th gear, into transmission housing and insert assembly sleeve completely.



4 Insert compression spring and safety pin into bore of main shaft.

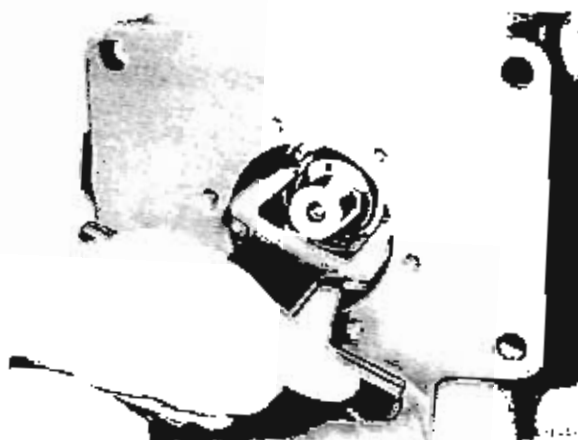
5 Insert main shaft into flanged bushing of reversing gear wheel in such a manner that the safety pin is on top.



6 Push safety pin down and carefully slip main shaft through the individual gear groups. This will push out assembly sleeve.

Note: Do not slip-in main shaft by using force. If there is resistance, slightly turn gear groups so that the splinings of the main shaft can enter the flange bushings and the synchronizing bodies.

7 Slip thrust washer determined during pre-assembly onto main shaft and hold down with Wrench 385 589 01 07 00.



26.3

8 Insert main shaft completely and turn thrust washer with wrench to the left or right until safety pin engages.

9 Fit circlip into groove of cyl. or tapered roller bearing free of play. For circlips, refer to Table 26.3-005/2.

10 Force cyl. roller bearing of transmission 3/60 and tapered roller bearing of transmission 3/50 up to locking ring into transmission housing by means of Mandrel 304 589 03 39 00.

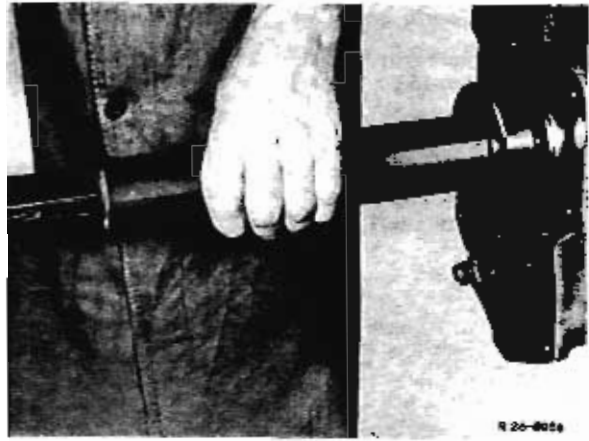
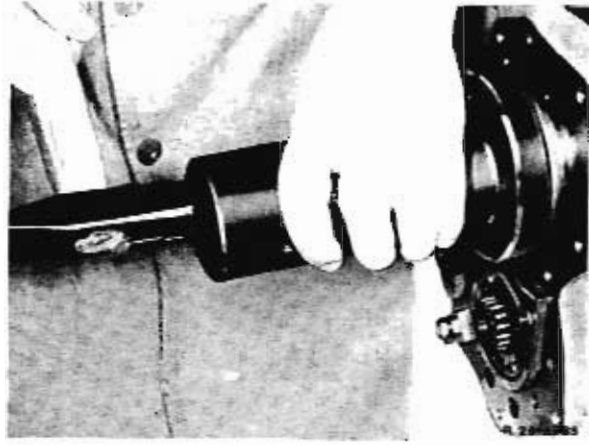
11 On transmission 3/60, force radial ball bearing on main shaft with Mandrel 312 589 03 14 00.

12 Install rear transmission housing cover (26.3-112/1).

13 Install input shaft (26.3-205/1).

14 Install shift rods with shift fork (26.3-203/1).

15 Install transmission shift cover (26.3-200/1).



26.3 Disassembly and Assembly of Main Shaft

Bm. 714

Data

End play of gear wheels	1st speed	0,18–0,25
	2nd speed	0,20–0,25
	3rd speed	0,19–0,24
	4th speed	0,20–0,25
	reverse speed	0,15–0,25

Dimension from transmission housing face rear to center of sliding sleeve	1st and reverse speed	64,9 ± 0,1
	2nd and 3rd speed	179 ± 0,1
	4th and 5th speed	288,8 ± 0,1

Synchronizing clearance	1st to 4th speed	0,5
	5th speed	0,8

Reference dimension when placing synchronizer cone against outer cone

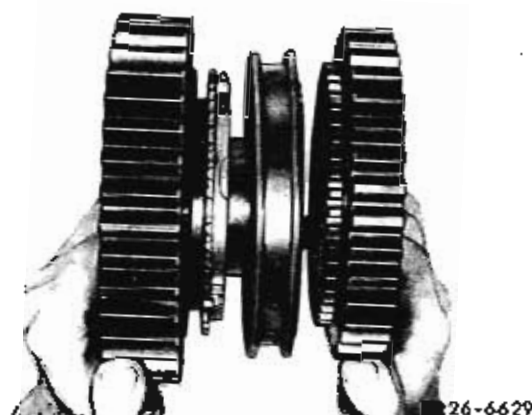
		max.	min.
1st to 4th speed	2,0	+ 0,1	1,0
		- 0,25	
5th speed	1,7	+ 0,1	0,9
		- 0,25	

Special Tools

Wrench	385 589 01 07 00
Gauge	385 589 00 23 00
Slip gauge	000 589 13 23 00

Disassembly

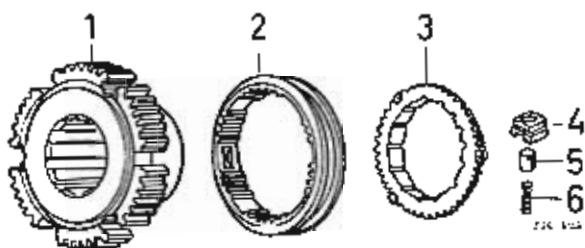
1 Disassemble gear group 1st speed and reverse speed.



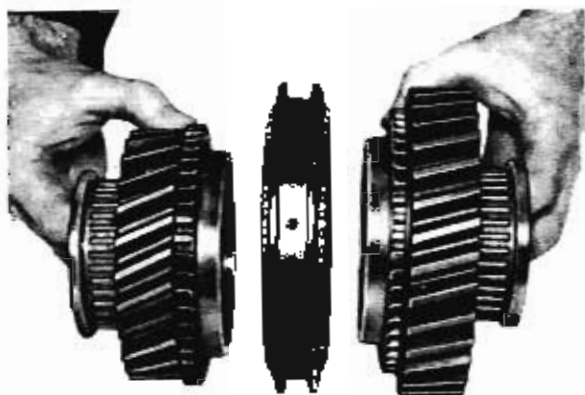
26.3

2 Place complete synchronizing assembly on a support and force sliding sleeve from synchronizer body. Remove driver, locking pin and compression springs.

- 1 Synchronizer body
- 2 Sliding sleeve
- 3 Synchronizer cone
- 4 Driver
- 5 Locking pin
- 6 Compression spring

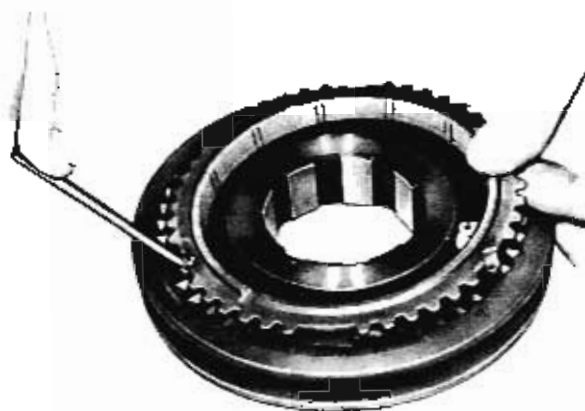


3 Disassemble gear group 2nd and 3rd speed.



R 76-6630

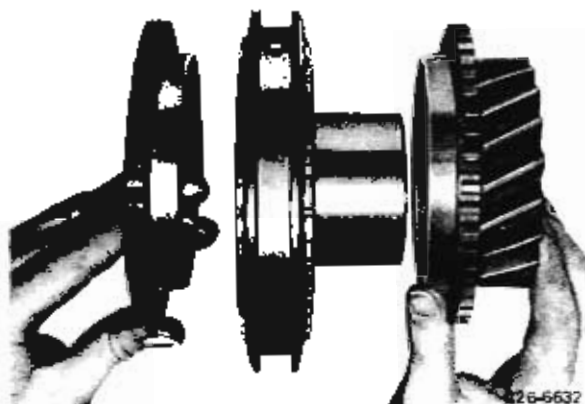
4 Place synchronizing unit on a support. Disconnect return springs and remove synchronizing cones. Force sliding sleeve from synchronizing body. Remove driver, locking pin and compression springs.



R 26-6631

5 Remove synchronizing ring and 4th gear wheel from synchronizing body 4th and 5th speed. Disconnect return springs and remove synchronizer cones. Force sliding sleeve from synchronizer body.

6 Check all parts for condition and wear.



R 26-6632

26.3 Disassembly and Assembly of Main Shaft

Assembly

Note: Prior to assembling main shaft in transmission housing, preassemble main shaft externally to determine the lengths of the flange bushings and the thickness of the thrust washer.

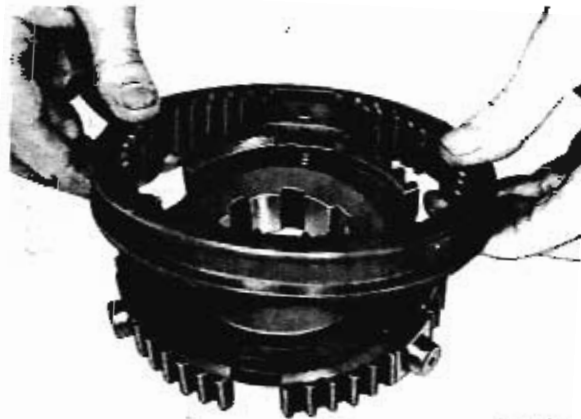
1 Clamp clutch flange into vise or other clamping device.

2 Slip main shaft into clutch flange and screw down with flange nut.

3 Insert driver, compression springs and locking pins into synchronizing body of 1st speed and, with cutouts facing driver, push sliding sleeve on synchronizer body. Slightly push down locking pins.

Note: Prior to assembly of synchronizing units, check synchronizer cones for their wear limit. For this purpose, place synchronizer cones on pertinent gear wheels. Check for uniform and parallel contact by radially turning the two cones.

Measure wear limit as follows: Measure distance between the gear wheel cone and the synchronizer cone by means of a slip gauge at two opposite points. If the measured distance is smaller than the specified minimum dimension, replace synchronizing cone for a new one. Also check cone on gear wheel by sight for wear (wavy surface) and replace, if required. Do not interchange parts checked together.



R26-6633

4 Place synchronizer cone into synchronizer body (observing cutouts) and slip roller assembly as well as 1st gear wheel on synchronizer body.

Note: The synchronizer cone is installed without return springs.

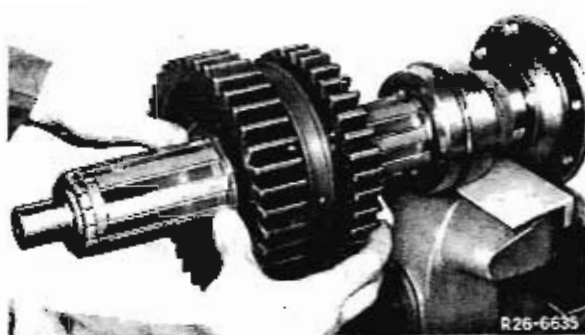
5 Insert flange bushing with roller assembly into reversing gear wheel.



R26-6634

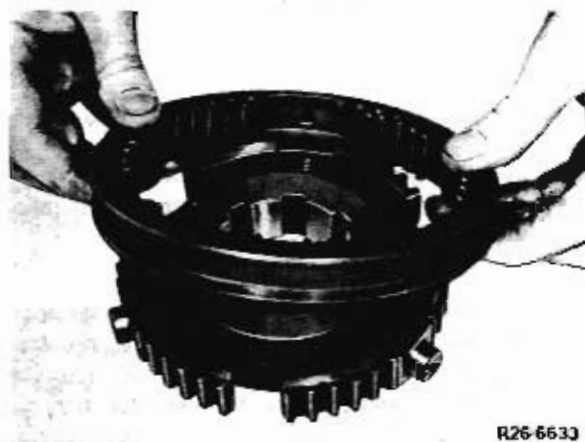
26.3

6 Slip gear group 1st speed and reverse speed together on main shaft.



7 Slip flange bushing with roller assembly into 3rd gear wheel and place on a support.

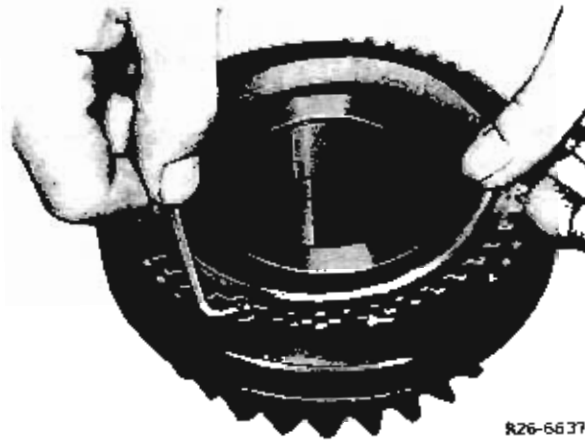
8 Insert driver, compression springs and locking pins into synchronizer body of 2nd and 3rd speed and mount sliding sleeve with cutouts facing the driver. Slightly push down locking pins.



9 Place synchronizer cone with three return springs on 3rd gear wheel. Position synchronizer body with sliding sleeve and second synchronizer cone in such a manner that the cutouts are above the return springs.



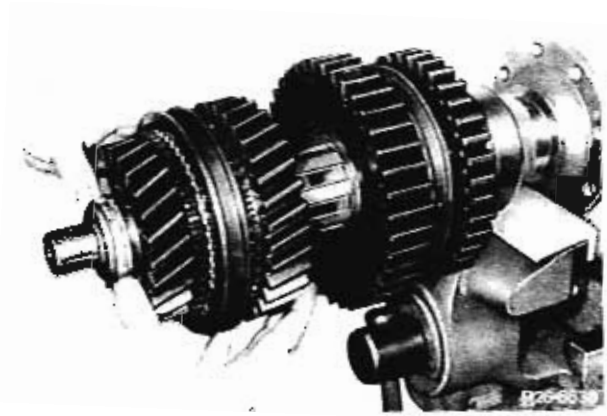
10 Attach return springs to second synchronizer cone.



26.3 Disassembly and Assembly of Main Shaft

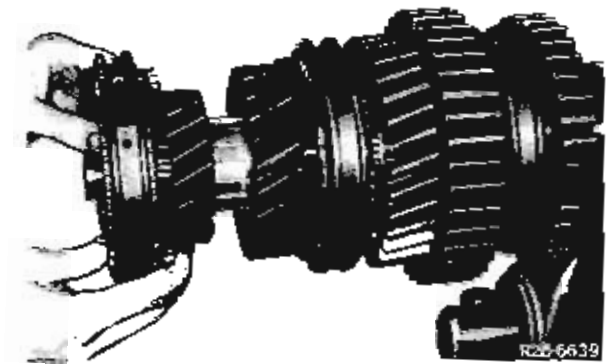
11 Slip flange bushing with roller assembly into 2nd gear wheel and slip on main shaft together with synchronizing unit and 3rd gear wheel.

12 Assemble synchronizing unit for 4th and 5th gear as described in Job No. 7 and 8.



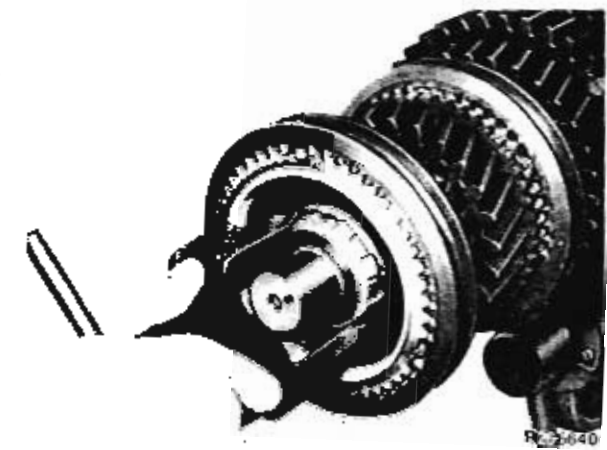
13 Slip 4th gear wheel with roller assembly on synchronizer body and slip together on main shaft.

Note: The 4th gear wheel of transmissions 3/50-5/8.5 and 3/60-5/7.5 is not supported on needle bearings.

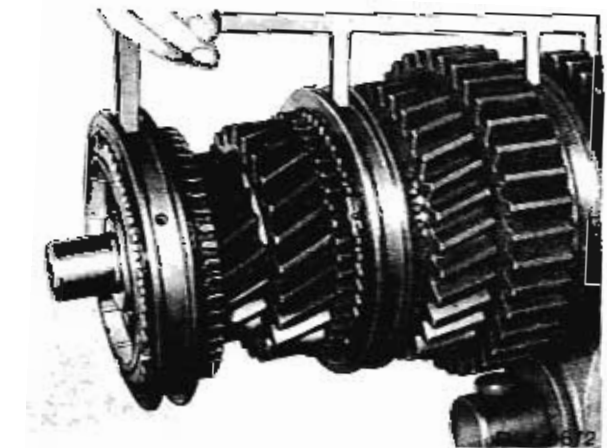


14 Slip thrust washer with the two grooves in outward direction on main shaft and turn to the left or right (lock) by means of Wrench 385 389 01 07 00. The thrust washer should be hard to turn.

Note: A complete gear assembly should have no play on main shaft. Compensate any play by means of pertinent thrust washers. For thrust washers refer to Table 28.3-005/2.



15 Check distances of sliding sleeves with Gauge 385 589 00 23 00. The individual ends of the gauge should enter into the grooves of the sliding sleeves without binding.



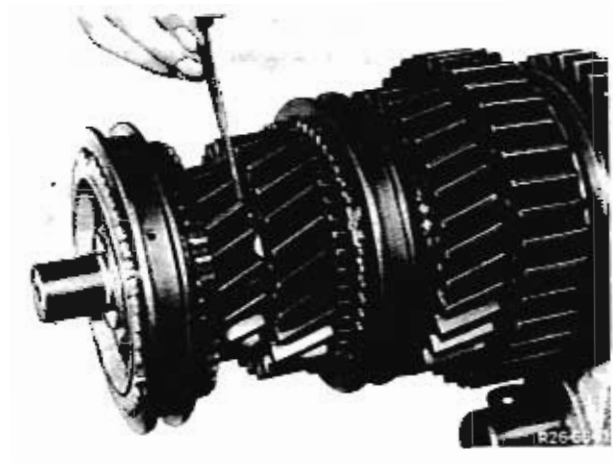
26.3

Note: This checkup is required to avoid constant wiping of sliding sleeves against shift forks and to maintain the correct shift path.

If the gauge does not fit perfectly into grooves of sliding sleeves, remove gear groups from main shaft, disassemble and install pertinent flange sleeves. For flange sleeves refer to Table 26.3—005/1.

16 Check end play of all gear wheels and synchronizing play with Slip Gauge 000 589 13 23 00. For end play and synchronizing play refer to Table 26.3—005/1.

17 Upon checkup, remove gear groups and clutch flange from main shaft.



26.3 Removal and Installation of Reversing Gear

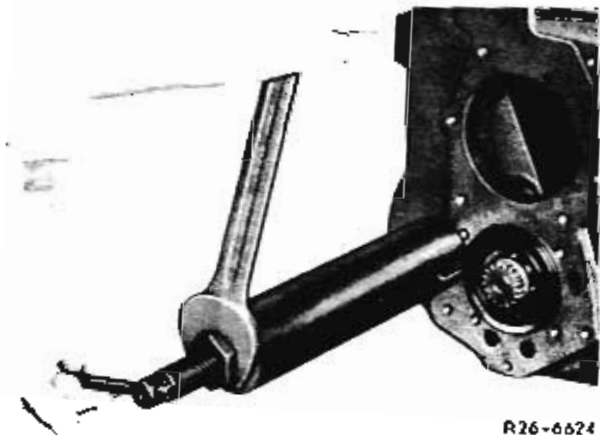
8m. 714

Special Tools

Puller	343 589 00 33 00
Insert (M 10)	343 589 00 33 02

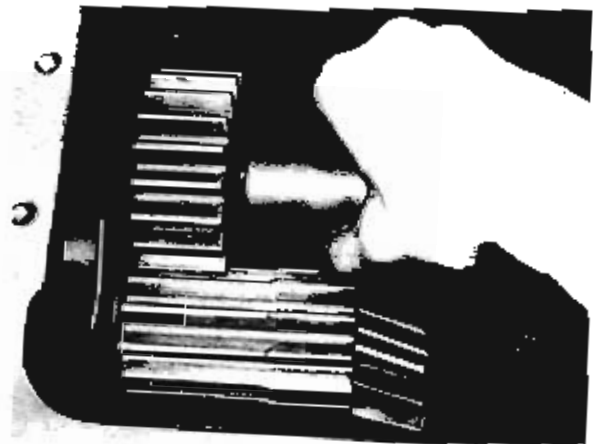
Removal

- 1 Remove main shaft (26.3-210/1).
- 2 Pull reversing shaft out of transmission housing by means of Puller 343 589 00 33 00 and Insert 343 589 00 33 02.



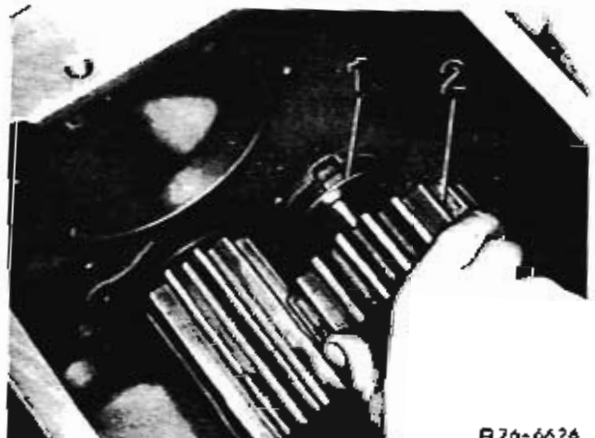
R26-6624

- 3 Remove spacing tube, reversing gear and thrust washer.
- 4 Check all parts for condition and wear.



Installation

- 1 Grease roller assembly and insert into reversing gear.
- 2 Force reversing shaft with a soft hammer up to half into transmission housing. Slip thrust washer and reversing gear (items 1 and 2) on reversing shaft.

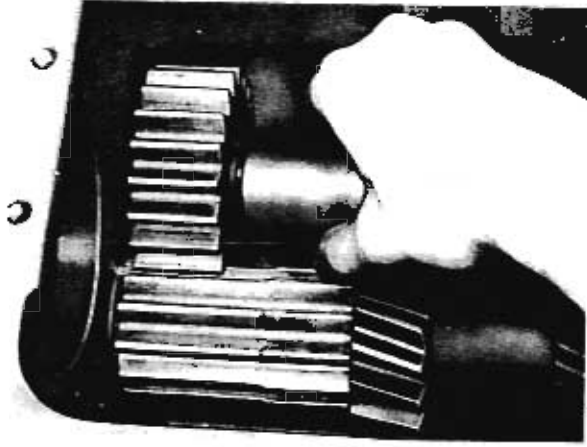


- 1 Thrust washer
- 2 Reversing gear

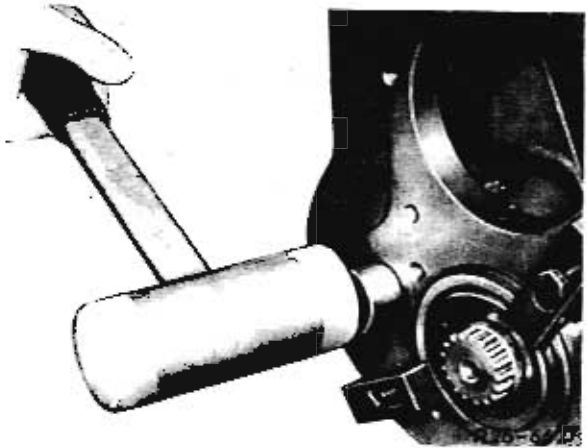
R26-6626

26.3

3 Insert spacing tube.



4 Insert reversing shaft flush by means of a soft hammer.



5 Check reversing gear for easy running.

6 Install main shaft (26.3-210/1).

26.3 Removal and Installation of Countershaft

Bm. 714

Data

End play of countershaft (with gasket compressed)	0,03 – 0,05 mm
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Reference dimension from transmission housing front to constant countershaft gear	15,5 ± 0,1 mm
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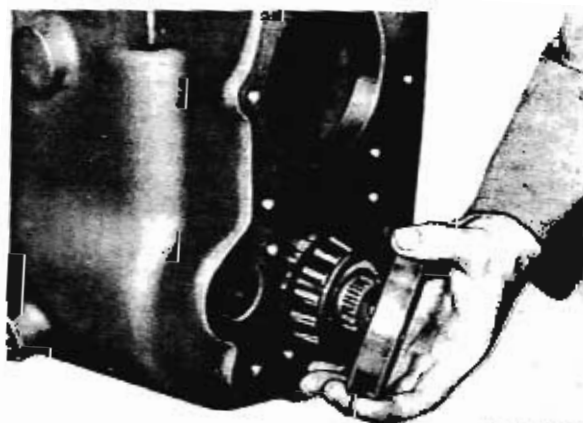
Special Tools

Mandrel	312 589 05 15 00
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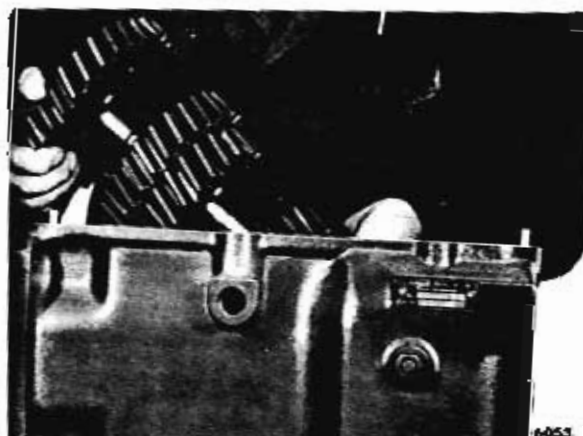
Clamping bars	000 589 59 63 00
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Removal

- 1 Remove reversing gear (26.3–214/1).
- 2 Unscrew closing cover on transmission housing front.
- 3 Push countershaft from input end toward the rear until outer race can be removed from rear tapered roller bearing.
- 4 Lift countershaft at an angle in upward direction out of transmission housing with input end first.



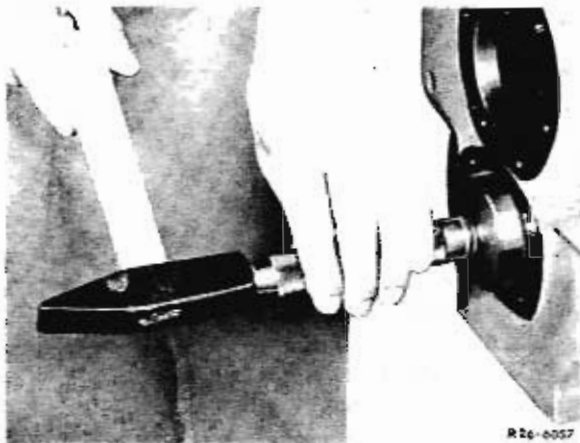
R26-6628



6653

26.3

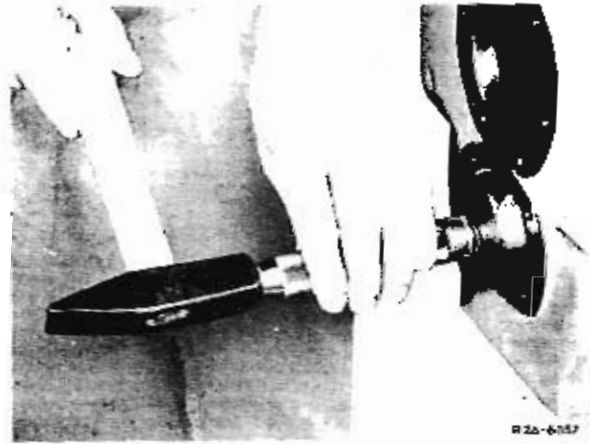
5 Force outer race of front tapered roller bearing out of transmission housing by means of Mandrel 312 589 05 15 00.



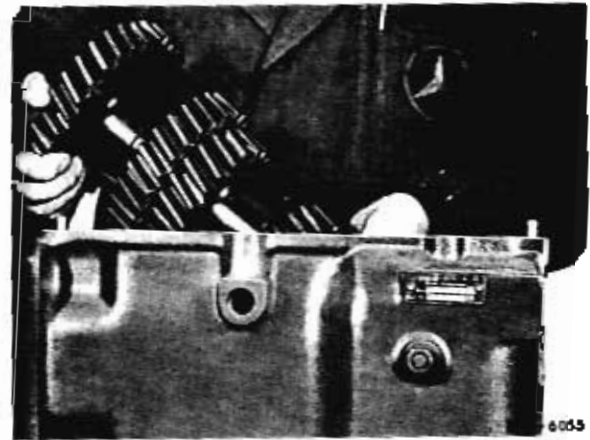
26.3 Removal and Installation of Countershaft

Installation

1 Force front tapered roller bearing outer race into transmission housing front by means of Mandrel 312 589 05 15 00.



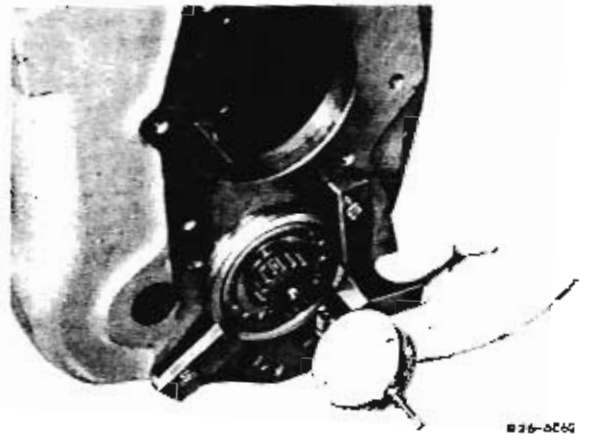
2 Slightly lubricate both tapered roller bearings and insert countershaft at an angle in downward direction into transmission housing with output end first.



3 Force rear tapered roller bearing outer race into transmission housing with Mandrel 312 589 05 15 00.

4 Screw closing cover of countershaft bearing with gasket to front of transmission housing.

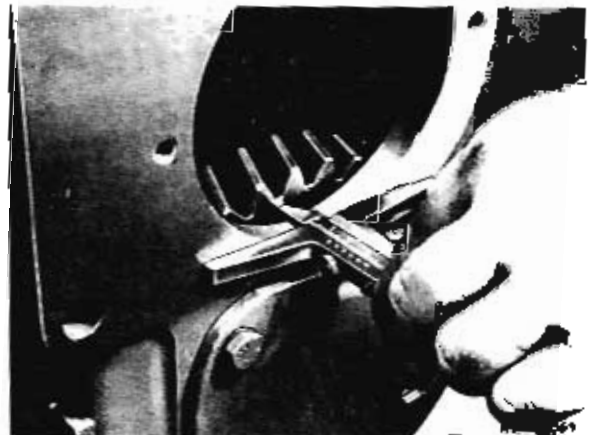
5 Insert outer race of rear tapered roller bearing by means of two Clamping Bars 000 589 59 63 00 until the countershaft is free of play but can still be easily rotated.



6 Measure distance from face of transmission housing to face of constant countershaft gear.

Note: Observing this dimension ($15,5 \pm 0,1$ mm) guarantees accurate meshing of transmission gears. The desired dimension is adjusted by inserting compensating washers in between the closing cover front and outer race of tapered roller bearing. For compensating washers refer to Table 26.3-005/1.

For adjustment of tapered roller bearing refer to Section "Removal and Installation of Transmission Housing Cover Rear" (26.3-112/1).



26.3 Removal and Installation of Countershaft

Bm. 714

Special Tools

Mandrel	312 589 03 14 00
Puller	001 589 41 33 00
Gripper	000 589 29 34 00

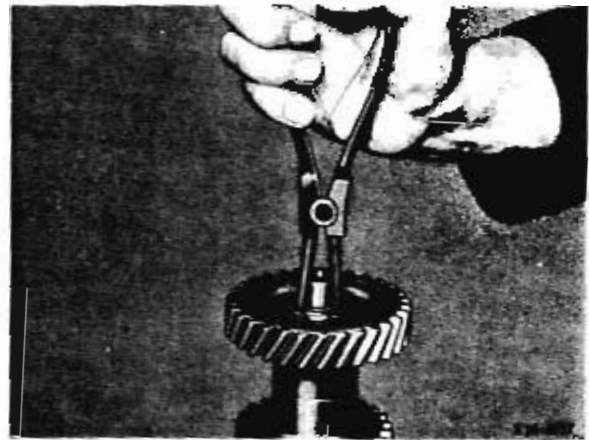
Disassembly

1 Pull both tapered roller bearings from countershaft by means of Puller 001 589 41 33 00 and Gripper 000 589 29 34 00.



R26-6664

2 Unsnap locking ring from constant countershaft gear by means of pliers and remove.



3 Press helical gears from countershaft. Observe the following sequence: Constant countershaft gear, countershaft gear 4th speed, countershaft double gear 2nd and 3rd speed.

4 Check all parts for condition and wear.

26.3

Assembly

1 Heat countershaft double gear (2nd and 3rd speed) to approx. 180° C and slip on countershaft.

2 Heat countershaft gear 4th speed and then the constant countershaft gear also to approx. 180° C and slip on countershaft.

Note: Upon cooling down, move countershaft gears on countershaft by means of a press to a free-of-play seat.

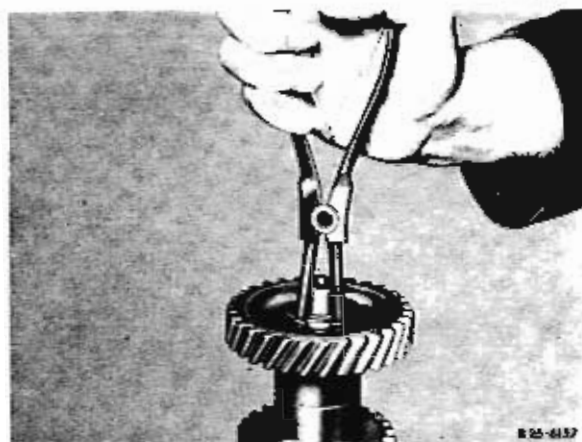
3 Insert locking ring by means of pliers into groove of countershaft.

4 Heat both tapered roller bearings to approx. 80° C and slip on the assembled countershaft.

5 Check correct seat of bearing by means of Mandrel 312 589 03 14 00.



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