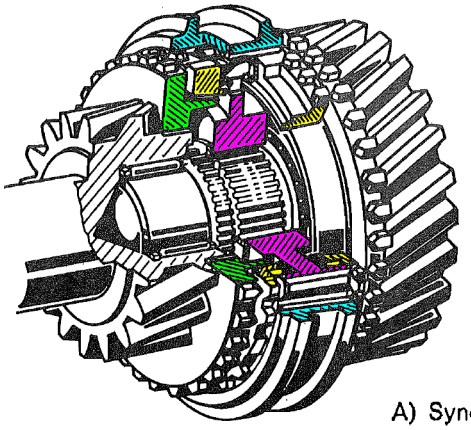
Description of the ZF-B-Synchroniser



A) Synchrobody
B) Mainshaft
C) Synchro Springs
F) Synchro Ring
H) Sliding Sleeve
J) Clutch Body

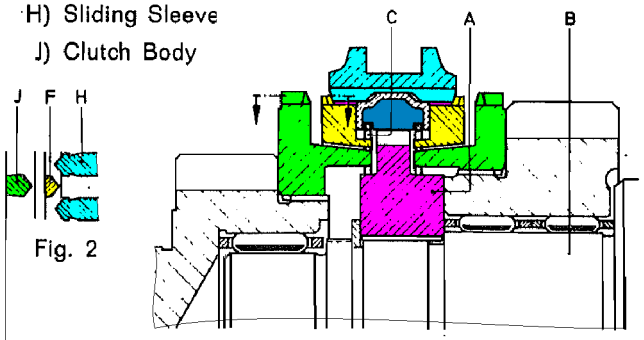


Fig. 2

D) Pressure Piece
E) Needle Bearing
F) Synchro Ring

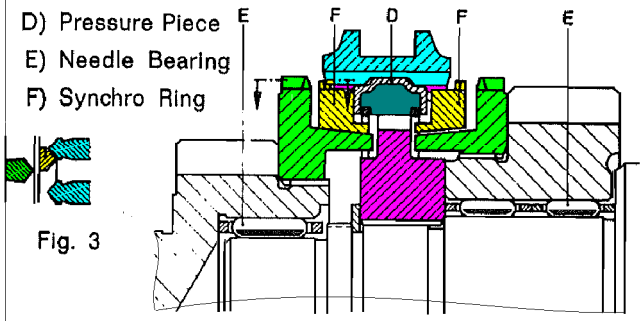


Fig. 3

G) Gear Wheel
H) Sliding Sleeve
J) Clutch Body

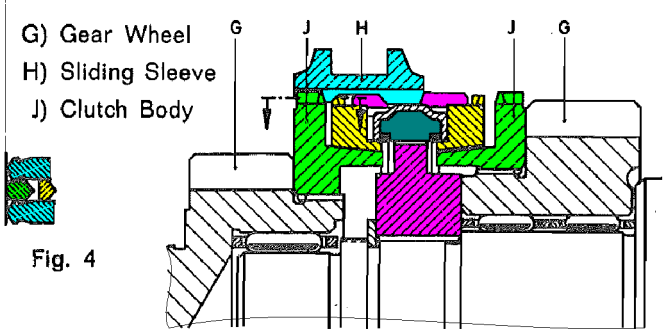
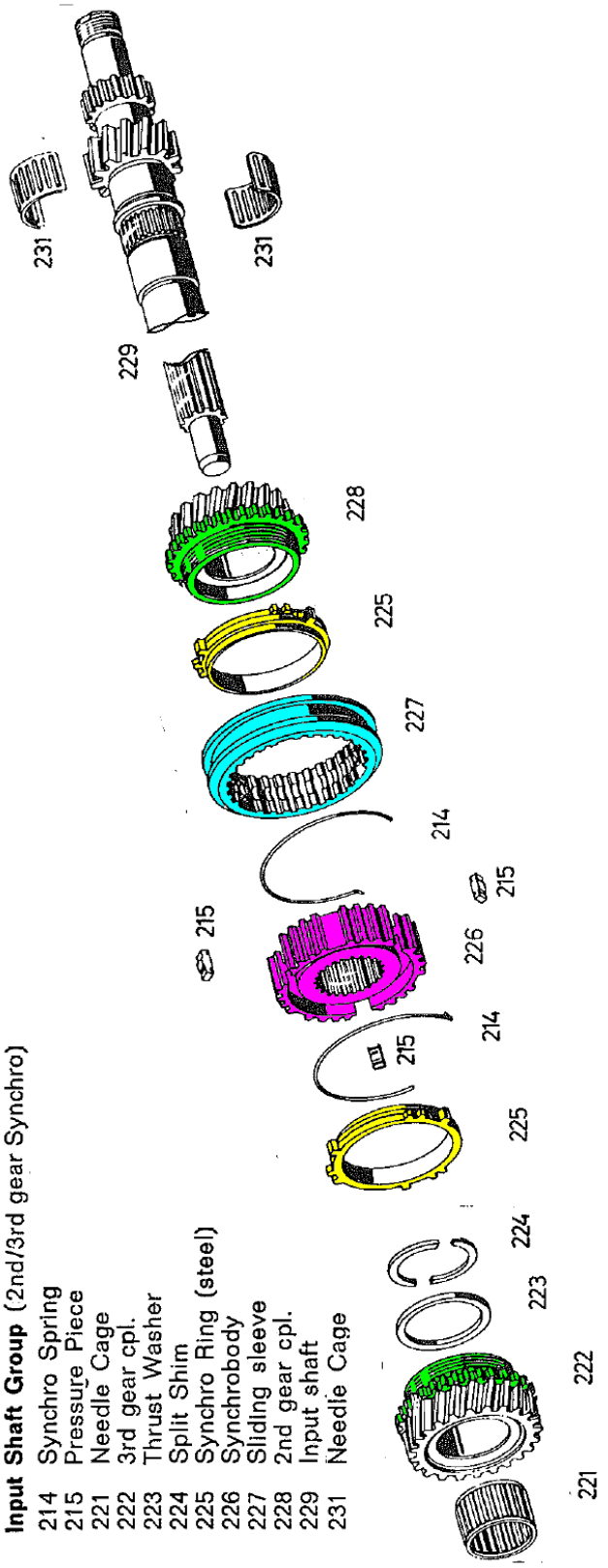


Fig. 4



Input Shaft Group (2nd/3rd gear Synchro)

214 Synchro Spring
215 Pressure Piece
221 Needle Cage
222 3rd gear cpl.
223 Thrust Washer
224 Split Shim
225 Synchro Ring (steel)
226 Synchrobody
227 Sliding sleeve
228 2nd gear cpl.
229 Input shaft
231 Needle Cage

Description

The following components are assembled between 2nd and 3rd gears and between 4th and 5th gears and on 1st gear.

1. The Synchrobody (A) axially and radially Immoveable In relation to the main shaft (B) on which It is located.

2. Synchro Springs (C) a synchro spring (spring ring) is attached to each side of the synchrobody. They press the pressure pieces (D) lightly on the sliding sleeve (H).

3. Pressure Pieces (D) They are axially displaced on selection of the sliding sleeve (H) and thus press the synchro rings onto the cone of the clutch body (J).

4, Synchro Rings (F) these are placed loosely between gear wheel (G) and synchrobody (A),

These components permit establishing of uniform angular speeds between the gear wheel to be coupled and the shaft before the sliding sleeve (H) and its internal teeth enter the clutch teeth of the pertinent gear wheel.

Operation of Synchronizer Assembly

1. Idling (Fig. 2)
Sliding sleeve (H) is in the centre position. It is held in this position by a shift fork which is located by the selector of the detent bolt. The gear wheels (G) can rotate freely on the main shaft.

2. Shifting Operation (Figs. 3 and 4)
The sliding sleeve (H) is pushed forward axially in one direction (in the example shown to the left). The pressure pieces (D) are taken along by the sliding sleeve, as the pressure pieces are pushed by the preloaded synchronizer springs (C) with their trapezium shaped tops into the somewhat wider annular groove of the sliding sleeve.

The 2 synchro rings (F) lie to the left and right of the pressure pieces. When the sliding sleeve moves to the left after passing through the free travel between the sliding sleeve and the pressure piece, the left synchro ring will be moved to the left side in the same way by the pressure piece.

After approx 0, 5 mm (0.020”) the synchro ring with its conical surface is adjacent to the similar conical surface of the clutch body (J). This will rotate the, synchro ring by approx 2 mm (0.079”) in relation to the sliding sleeve and the synchrobody (A) until the synchro ring and its lugs are resting in the slots of the synchrobody.

The position of the synchro ring In relation to the sliding sleeve is therefore such that the teeth on the outer diameter of the ring are offset in relation to the tooth gaps of the sliding sleeve (Fig. 3).

When the sleeve is pushed on further, its teeth will rest against those of the synchro ring and submit an axial force against the ring. The flat adjoining angle on the sliding surface of the clutch body (1) and the blocking ring will establish forces in radial direction which are stronger than the forces which are transmitted to the sliding sleeve in axial direction. This will continually reduce the difference in speed between the gear to be engaged and the main shaft (as well as the sliding sleeve).

Only when the 2 speeds are synchronized will the synchro ring and the gear wheel turn back approx 1-2 mm (0.040 to 0.080”) until the teeth of the sliding sleeve are in line with the tooth gaps of the synchro ring. At this moment, the resistance which has prevented any further movement of the sliding sleeve during the shifting operation will be overcome and the sleeve is now pushed into the coupling teeth of the appropriate gear wheel (Fig. 4).

This is the end of the shifting cycle.