Disassembly, Inspection and Assembly of Tandem Master Cylinder

42.0

Revision: Inclusion into Group 42.0 and revision of assembly instructions.

Data

Dia.	inch	$^{15}/_{16}$
	mm	23.81
Housing bore dia.		$\frac{23.81}{23.86}$
Wear limit		23.92
Perm. out-of-round of bore		0.03
Piston dia.		$\frac{23.77}{23.74}$
Wear limit		23.66
Piston clearance		0.06–0.2
Stroke	push rod circuit	13
	floating circuit	19

Lubricants

Silicone grease
Brake cylinder paste

Tightening Torque	Nm	(kpm)
Stop screw	5–8	(0.5–0.8)

Note

For reconditioning, use the following repair kits:
Teves-tandem master cylinder 001 586 92 43 (Fig. 1)
Bendix-tandem master cylinder 001 586 55 43 (Fig. 2)

The sequence for reconditioning the tandem master cylinders is for both makes (Teves or Bendix) the same. Note that the Bendix-tandem master cylinder sprayed blue may not be reconditioned.

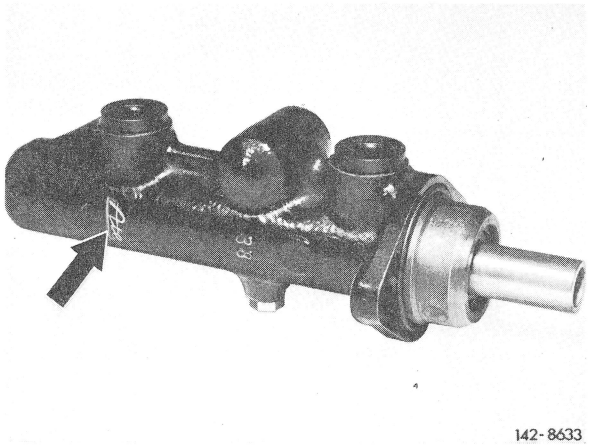


Fig. 1
Teves-tandem master cylinder

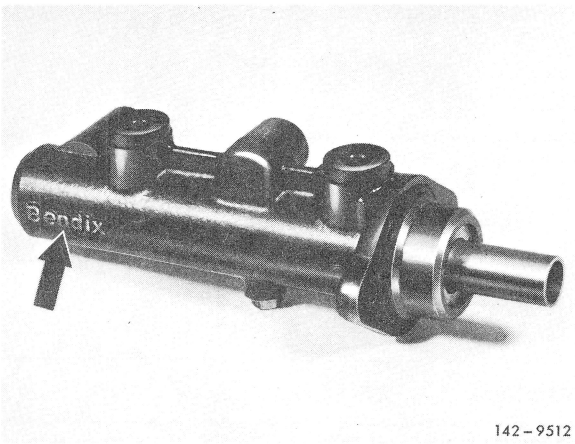


Fig. 2
Bendix-tandem master cylinder

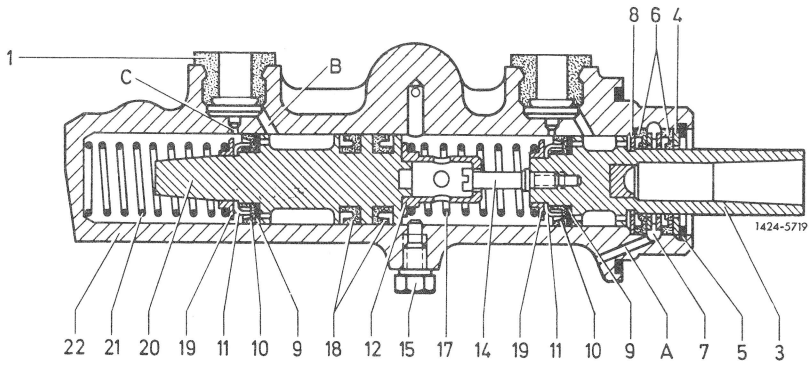


Fig. 3

1 Tank plug
3 Piston (pushrod circuit)
4 Stop washer
5 Locking ring
6 Vacuum seal
7 Intermediate ring
8 Stop washer
9 Filling washer
10 Primary sleeve
11 Supporting ring
12 Spring retainer
14 Connecting screw
15 Stop screw
17 Compression spring
18 Ring sleeve
19 Spring retainer
20 Piston (intermediate piston)
21 Compression spring
22 Housing
A Leak bore
B Filling bore
C Compensating bore

Disassembly

1 Pull compensating tank out of tank plug of tandem master cylinder.

2 Apply a mandrel to push piston (3) slightly inwards, then unscrew stop screw (15) from housing and remove together with sealing ring (Fig. 4).

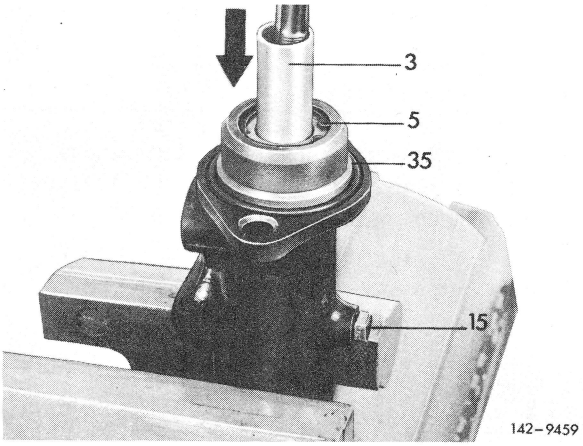


Fig. 4

3 Piston
5 Locking ring
15 Stop screw with sealing ring
35 O-ring

3 Remove locking ring (5) from housing. Then remove piston (3) together with washer (4), both vacuum seals (6), the intermediate ring (7) and stop washer (8) from housing (Fig. 3 and 5).

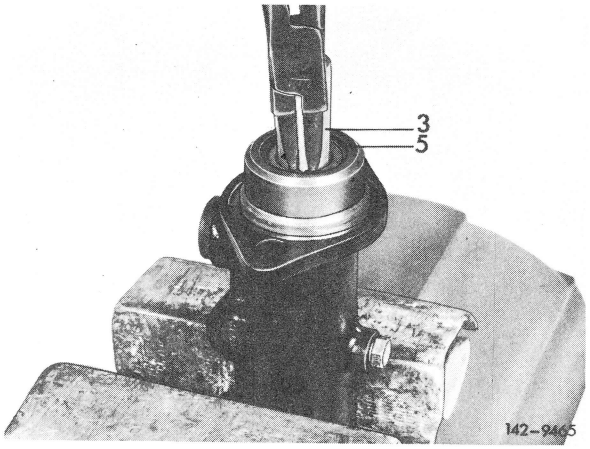


Fig. 5
3 Piston
5 Locking ring

4 Apply light blows against wooden shim placed on housing to knock out complete intermediate piston.

5 On Teves-compensating tank, unscrew closing cover (25) and both end covers (29). Remove strainer (24), splash guard (23) and both contact inserts (27) together with O-rings (31) (Fig. 6).

Note: The splash guard is installed only in compensating tanks of 1st and 2nd version (Fig. 22 and 23).

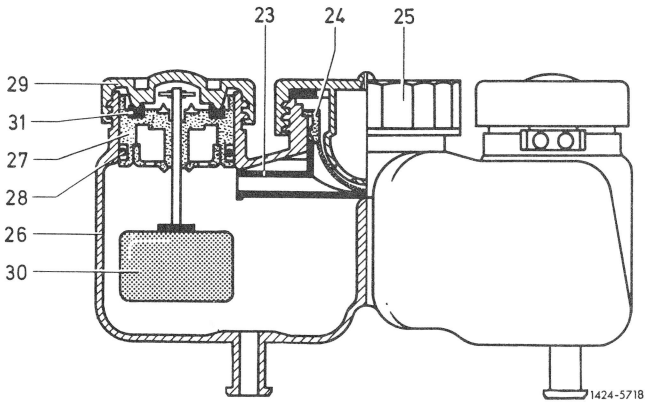


Fig. 6
Teves-compensating tank

23 Splash guard
24 Strainer
25 Closing cover
26 Compensating tank
27 Contact insert
28 O-ring
29 End cover
30 Float
31 O-ring

6 On Bendix-compensating tank, unscrew closing cover and remove strainer (Fig. 7).

Note: The contact inserts of a Bendix-compensating tank cannot be removed.

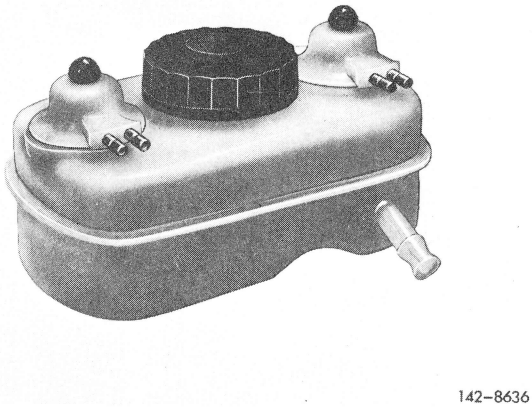


Fig. 7
Bendix-compensating tank

Inspection

7 Clean all parts well in spirit, making sure that all residue will be flushed out of housing and compensating tank.

8 Check bore in housing for score marks and rust. Slightly rusted areas may be polished with fine emery cloth.

Do not refinish scored or badly rusted housings.

Assembly

Bendix-tandem master cylinder

9 Slightly rub bore of housing with brake cylinder paste.

10 Remove vacuum seals, stop washers, intermediate ring, O-ring and copper sealing ring from assembly sleeve.

11 Place assembly sleeve (040) on housing and slip complete piston assy into housing by means of a mandrel from sleeve (041) (Fig. 8).

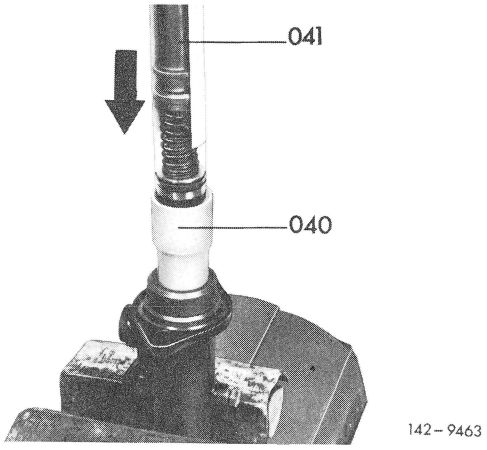


Fig. 8
040 Assembly sleeve
041 Sleeve

12 Remove sleeve (041).

13 Apply a mandrel to push piston (3) completely into housing, screw-in stop screw (15) with new copper sealing ring and tighten to specified torque. Remove assembly sleeve (Fig. 9).

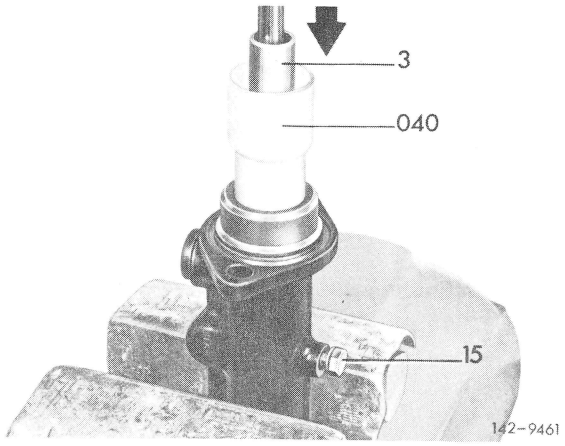


Fig. 9
3 Piston (push rod circuit)
15 Stop screw with copper sealing ring
040 Assembly sleeve

14 Place stop washer (8) on piston (3) (Fig. 10).

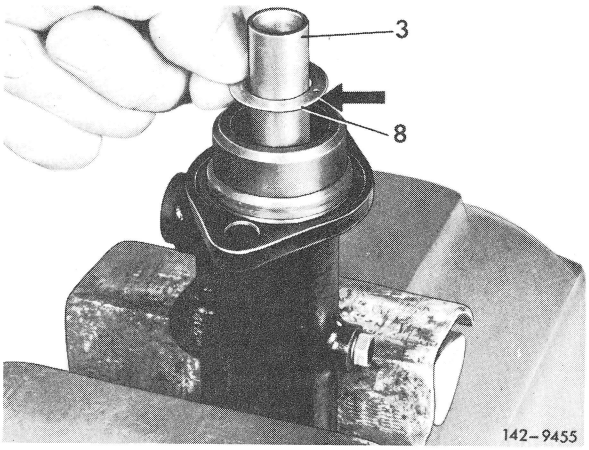


Fig. 10
3 Piston (push rod circuit)
8 Stop screw

15 Slightly coat shaft of piston (3) with silicone grease.

16 Coat one vacuum seal (6) with silicone grease and place on shaft of piston with sealing lip facing piston. Then insert plastic foil (042) into bore of housing and push vacuum seal into housing by means of assembly sleeve (040). Pull plastic foil out of housing and remove assembly sleeve (Fig. 11 to 13).

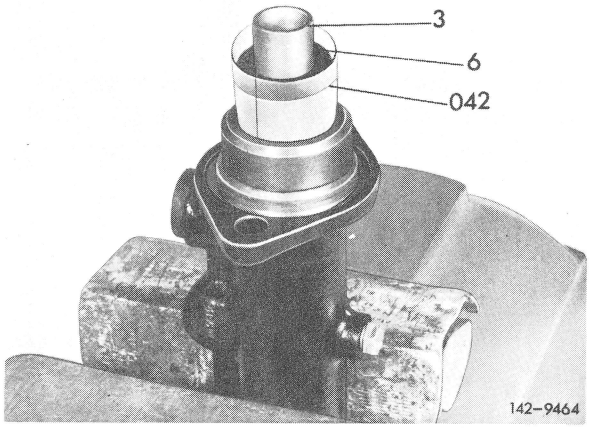


Fig. 11
3 Piston (push rod circuit)
6 Vacuum seal
042 Plastic foil

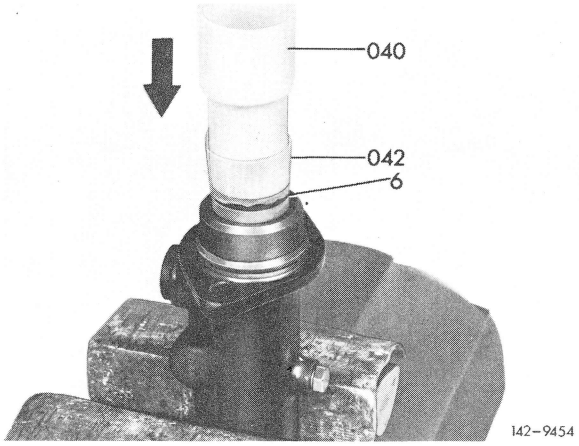


Fig. 12
6 Vacuum seal
040 Assembly sleeve
042 Plastic foil

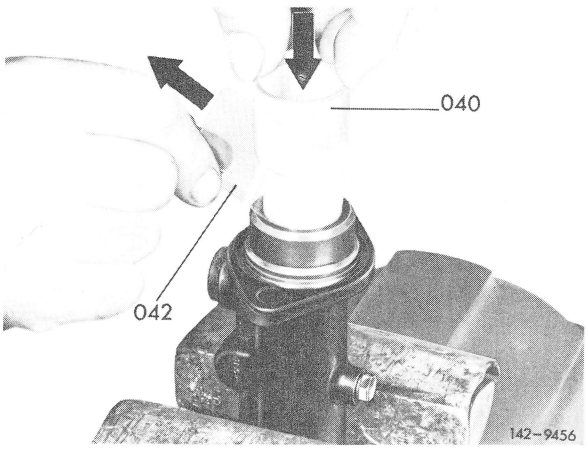


Fig. 13
040 Assembly sleeve
042 Plastic foil

17 Insert intermediate ring (7) into housing, making sure that the bore in intermediate ring faces the leak bore (A) in housing while pushing-in assembly sleeve (Fig. 3 and 14).

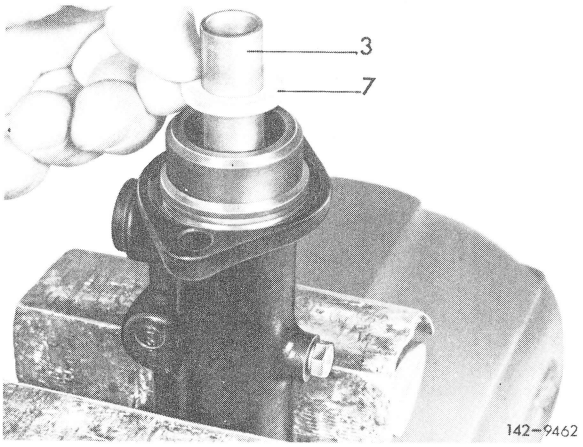


Fig. 14
3 Piston (push rod circuit)
7 Intermediate ring

18 Install second vacuum seal (6) as described in item 16.

19 Install stop washer (8) as described in item 14.

20 Insert locking ring (5), making sure that ring is correctly seated in groove of housing (Fig. 4).

Teves-tandem master cylinder

21 Lightly coat bore of housing with brake cylinder paste.

22 Remove vacuum seals, stop washers, intermediate ring, O-ring, copper sealing ring, locking ring and silicone grease from assembly sleeve.

23 Clamp housing at a slight angle with bore in downward direction. Move assembly sleeve (040) forward toward end of sleeve (041) and insert into housing. Slip complete piston assy up to stop into housing by means of a mandrel from sleeve (041). Screw-in stop screw with a new copper sealing ring (Fig. 15).

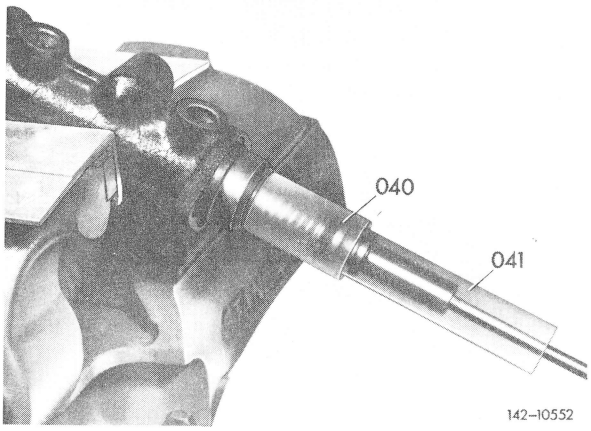


Fig. 15
040 Assembly sleeve
041 Sleeve

24 Remove sleeve (041) and assembly sleeve (040).

25 Change clamped position of tandem master cylinder in such a manner that the piston shaft is pointing upwards. Tighten stop screw (15) to specified torque (Fig. 16).

26 Place stop washer (8) on piston (3) (Fig. 10).

27 Slightly coat shaft of piston (3) with silicone grease.

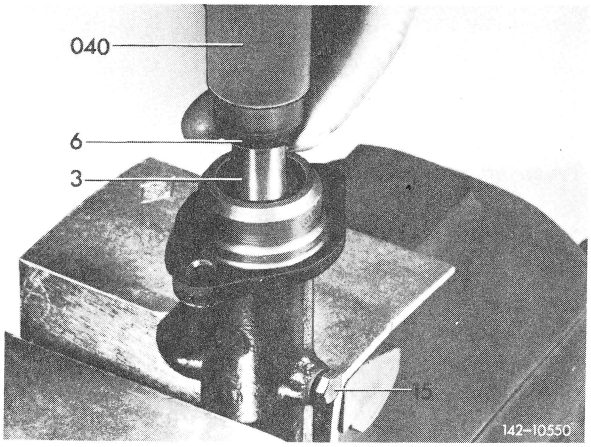


Fig. 16
3 Piston (push rod circuit)
6 Vacuum seal
15 Stop screw
040 Assembly sleeve

28 Adjust sleeve and assembly sleeve in such a manner that the end of the sleeve (041) is in alignment with the inner edge of the smaller diameter of the assembly sleeve (040). Coat one vacuum seal with silicone grease and place on shaft of piston with sealing lip facing piston, hold in position and insert assembly sleeve (040) with inserted sleeve (041) over sleeve up to stop (Fig. 16 and 17).

29 Slip both sleeves with vacuum seal into bore of housing and push seal downwards by means of sleeve (041). Pull up assembly sleeve (040) for height of sleeve first and then remove both sleeves (Fig. 17).

30 Insert intermediate ring (7) into housing, making sure that the bore in the intermediate ring is facing the leak bore (A) in housing and push in by means of sleeve (041) (Fig. 3 and 14).

31 Install second vacuum seal (6) as described in item 28 and 29.

32 Mount stop washer (8) as described in item 26.

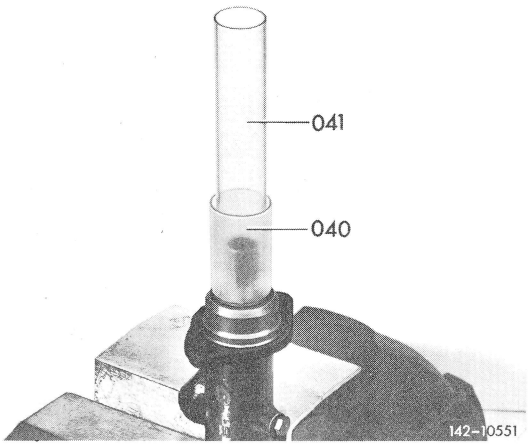


Fig. 17
040 Assembly sleeve
041 Sleeve

33 Insert locking ring (5), making sure that the ring is correctly seated in groove of housing (Fig. 4).

Mounting compensating tank

34 Coat tank plug (1) lightly with brake cylinder paste and push into housing (Fig. 18).

35 First insert compensating tank (26) into housing by means of a pipe connection, then turn by 180° and push second pipe connection into housing.

Make sure of perfect seat (refer to arrow) (Fig. 18 and 19).

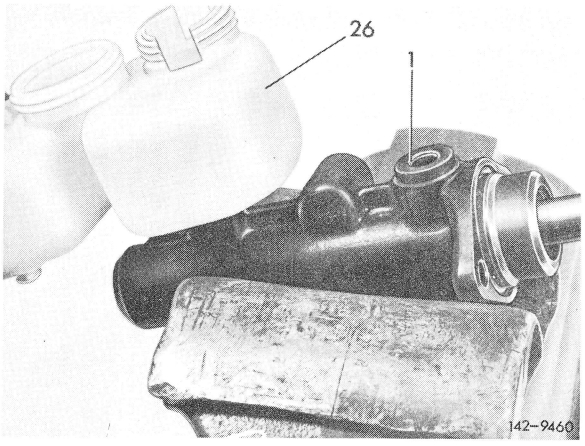


Fig. 18
1 Tank plug
26 Compensating tank

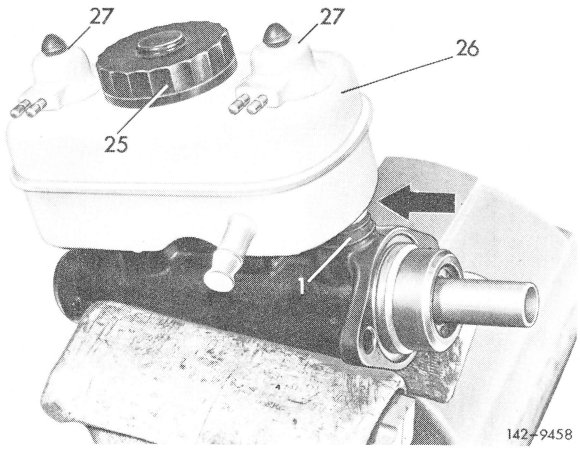


Fig. 19
Bendix-compensating tank

1 Tank plug
25 Closing cover
26 Compensating tank
27 Contact insert

36 On Bendix-compensating tank, insert strainer into tank and screw-on closing cover.

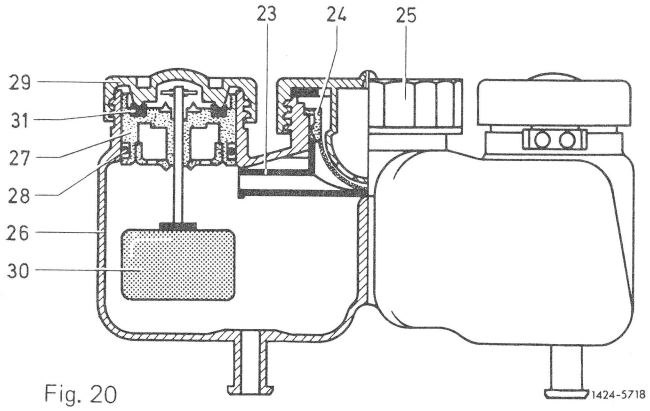


Fig. 20
Teves -compensating tank

23 Splash guard
24 Strainer
25 Closing cover
26 Compensating tank
27 Contact insert
28 O-ring
29 End cover
30 Float
31 O-ring

37 On Teves-compensating tank 1st and 2nd version, insert both contact inserts (27) into compensating tank with new O-rings (28), mount O-rings (31) and screw on end cover (29) (Fig. 20).

Note: The Teves-compensating tank is provided with the following contact inserts:

Compensating tank 1st and 2nd version (Fig. 22 and 23).

Production up to spring 1972:
Both chambers with contact inserts 58 mm high and metal float rod.

Production spring 1972 to spring 1974:
Front axle brake circuit with contact insert 58 mm high and rear axle brake circuit with insert 42 mm high with metal float rod.

Compensating tank 3rd version (Fig. 24).

Production starting spring 1974 (three-chamber compensating tank):
Both chambers with contact insert 58 mm high and metal or plastic float rod.

No splash guard may be installed into this compensating tank.

36 Insert splash guard (23) and strainer into tank and screw-on closing cover (Fig. 21).

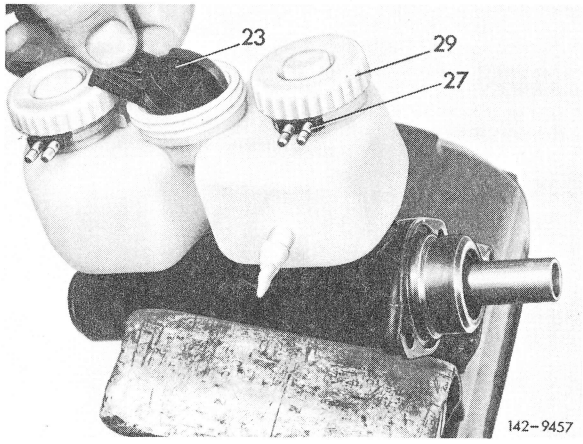


Fig. 21
23 Splash guard
27 Contact insert
29 End cover

Fig. 22
Teves-compensating tank 1st version

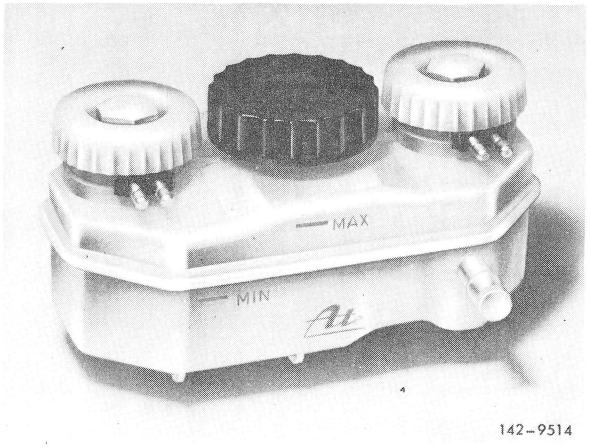


Fig. 23
Teves-compensating tank 2nd version

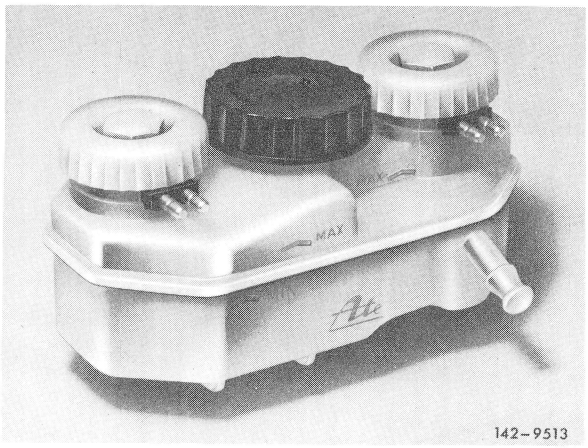


Fig. 24
Teves-compensating tank 3rd version

37 Insert O-ring (35) into flange of housing (Fig. 4).

Stepped Tandem Main Cylinder

Data

		Push rod circuit	Floating circuit
Dia.	inches	15/16	3/4
	mm	23.81	19.05
Housing bore dia.		23.81 23.86	19.05 19.10
Wear limit		23.92	19.16
Permissible out-of-round of bore		0.03	
Piston dia.		23.77 23.74	19.01 18.97
Wear limit		23.66	18.90
Piston clearance		0.06–0.26	
Stroke		15	17

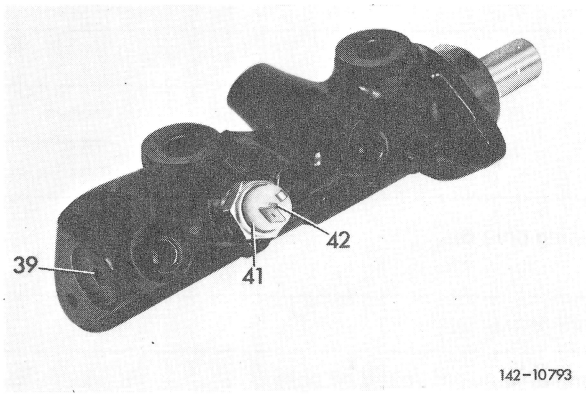
Lubricants

Silicone grease
Brake cylinder paste

Tightening torques	Nm	(kpm)
Stop screw	5–8	(0.5–0.8)
Closing plug	15–30	(1.5–3)
Switch	15–20	(1.5–2)

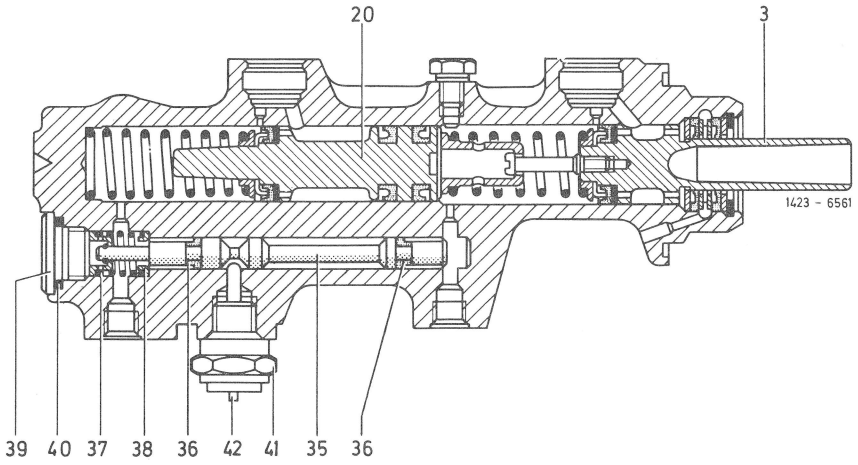
Self-made tool

Assembly pin	refer to illustration item 17, note



Stepped tandem main cylinder with pressure difference warning indicator

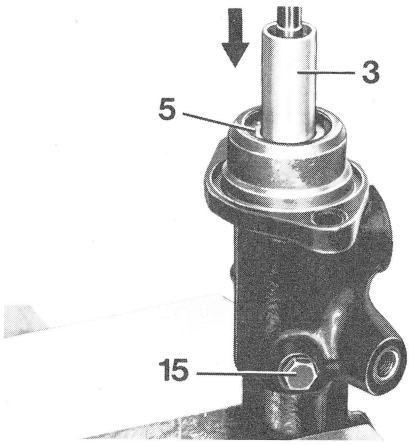
3 Piston (push rod circuit)
20 Piston (floating circuit)
35 Control piston
36 Ring sleeve
37 Spring
38 Spring retainer
39 Screw
40 Sealing ring
41 Switch
42 Release pin



Disassembly

1 Pull expansion tank and container plug from tandem main cylinder.

2 Push piston (3) slightly inwards by means of a mandrel, then unscrew stop screw (15) from housing and remove together with sealing ring.

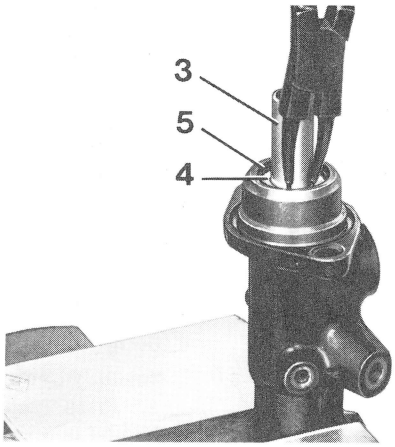


142-11753

3 Take locking ring (5) out of housing. Then remove piston (3) from housing together with stop washer (4), the two vacuum seals (6), the intermediate ring (7) and the stop washer (8).

4 Remove complete intermediate piston by knocking housing lightly against a wooden board.

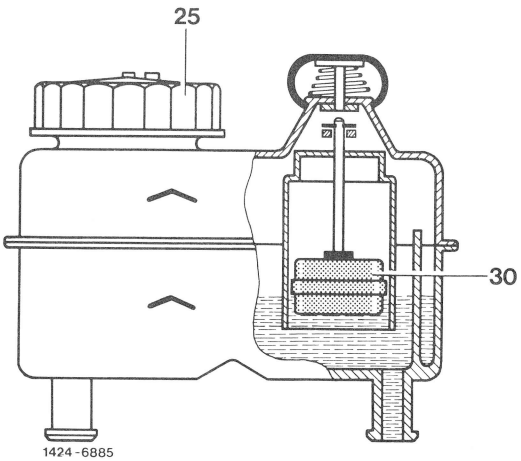
5 On tandem main cylinder with pressure difference warning indicator, unscrew closing plug (39) and knock out control piston (35) as shown under item 4.



142-11752

6 Unscrew closing cover (25) and remove strainer.

Note: The contact insert (30) cannot be removed.



1424-6885

Inspection

7 Clean all parts well with spirit of alcohol, make sure that all residue is flushed out of housing and expansion tank.

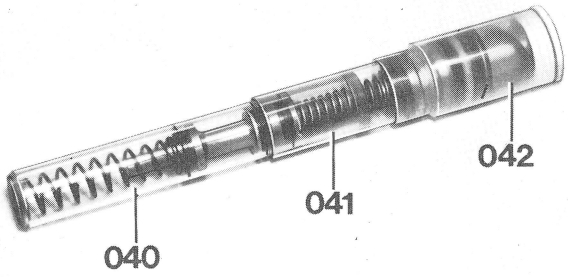
8 Check bore in housing for score marks and rust. Slightly rusted spots may be cleaned with polishing cloth.

Housing showing score marks and badly rusted spots should not be machined for reuse.

Assembly

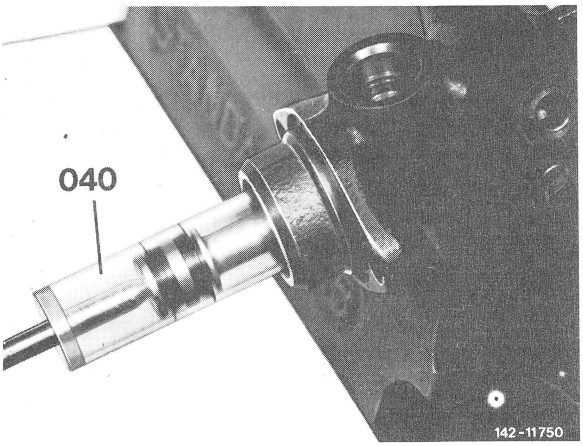
9 Slightly coat bore of housing with brake cylinder paste.

10 Remove vacuum seals , stop washers, intermediate ring, O-ring and copper sealing ring from assembly sleeve.



142-12081

11 Clamp housing slightly tilted with bore in downward direction. Remove assembly sleeve (040) including floating piston (19.05 dia.) from assembly sleeve (041) for push rod piston (23.81 dia.). Place assembly sleeve (040) into housing and slide piston into housing up to stop by means of a mandrel.

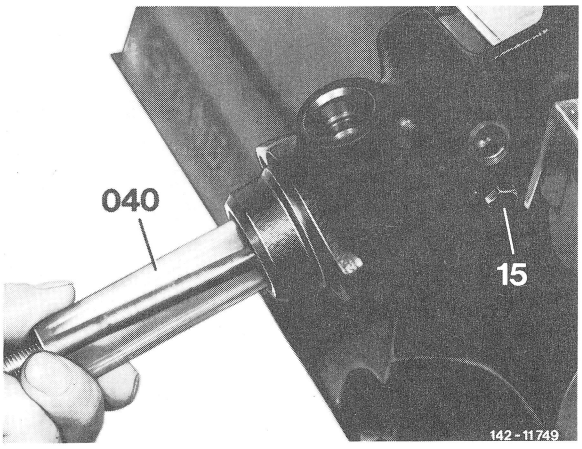


142-11750

12 Hold piston in place with mandrel, pull assembly sleeve (040) out until the stop screw (15) can be screwed in with a new copper sealing ring.

Tighten stop screw (15) to 5–8 Nm (0.5–0.8 kpm).

13 Remove assembly sleeve (040).

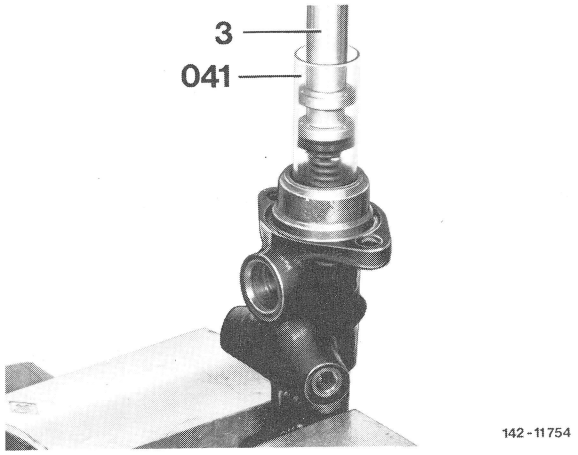


142-11749

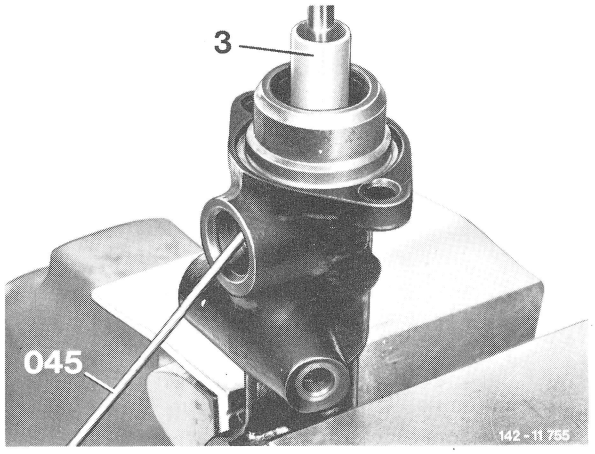
14 Clamp tandem main cylinder in such a manner that cylinder bore is pointing upwards.

15 Remove assembly sleeve (041) including push rod piston (23.81 dia.) from assembly sleeve (042) for secondary seal. Insert assembly sleeve (041) into housing and slip piston (3) into housing by means of a mandrel.

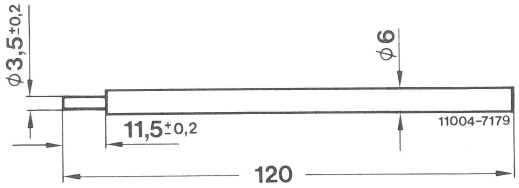
16 Remove assembly sleeve (041).



17 Push piston (3) in until the second collar of the push rod piston is behind the filler hole. Then insert assembly pin (045) into filler hole up to stop. Make sure that the push rod piston is not damaged.

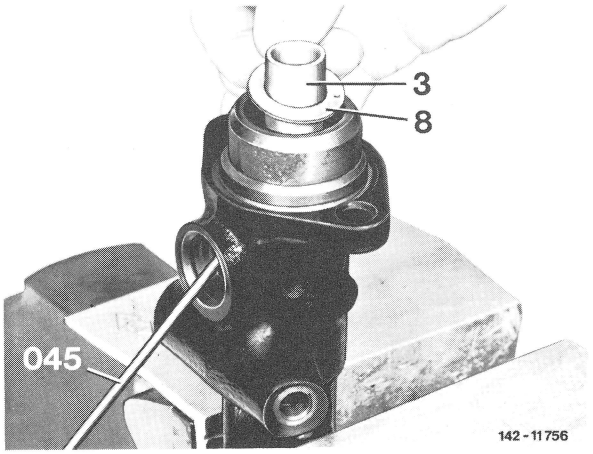


Note: The assembly pin (045) serves as a stop and must be self-made from steel according to the dimensions shown in illustration.

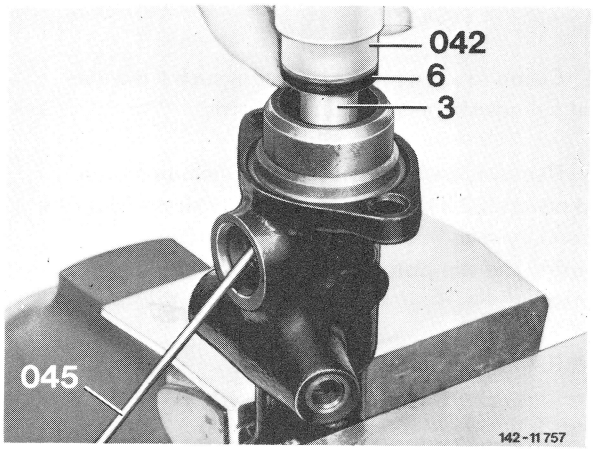


18 Place stop washer (8) on piston (3).

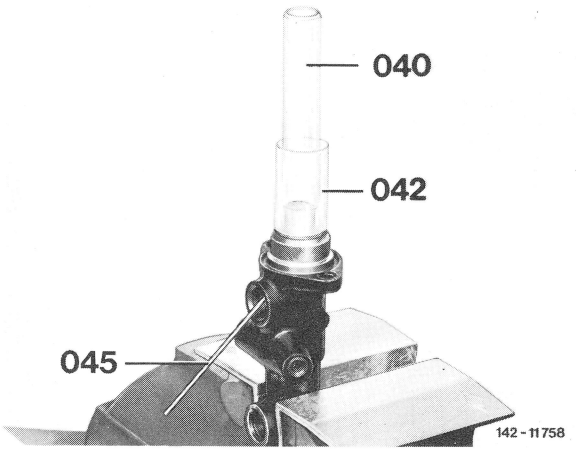
19 Slightly coat stem of piston (3) with silicone grease.



20 Coat one vacuum seal (6) with silicone grease, then mount on stem of piston with sealing lip facing piston, hold in place and insert assembly sleeve (042) over sleeve up to stop.



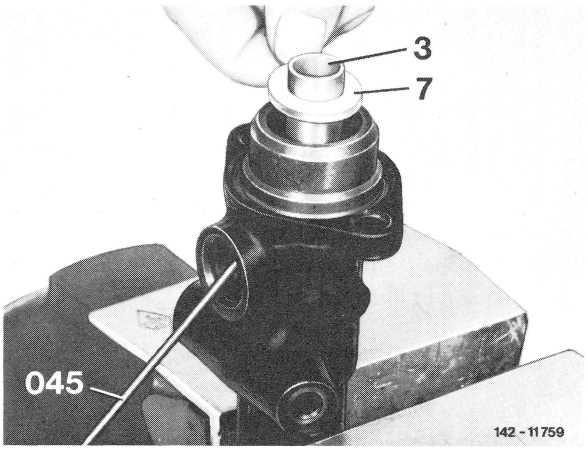
21 Slip assembly sleeve (042) with vacuum seal (6) into housing bore. Push vacuum seal upwards with blunt portion of assembly sleeve (040). Pull up assembly sleeve (042) first by height of sleeve, then remove both sleeves.



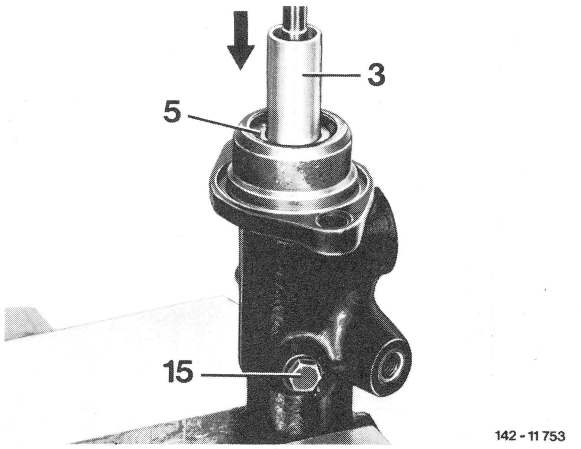
22 Insert intermediate ring (7) into housing, making sure that the bore in intermediate ring faces leak hole (A) in housing and push inwards with sleeve (040).

23 Install second vacuum seal (6) as described under item 20 and 21.

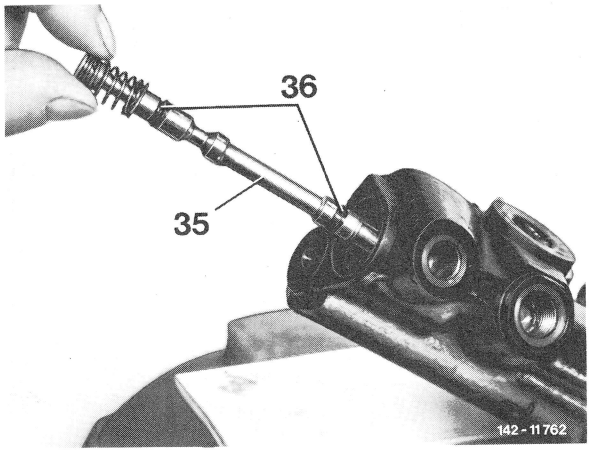
24 Mount stop washer (8) as described in item 18.



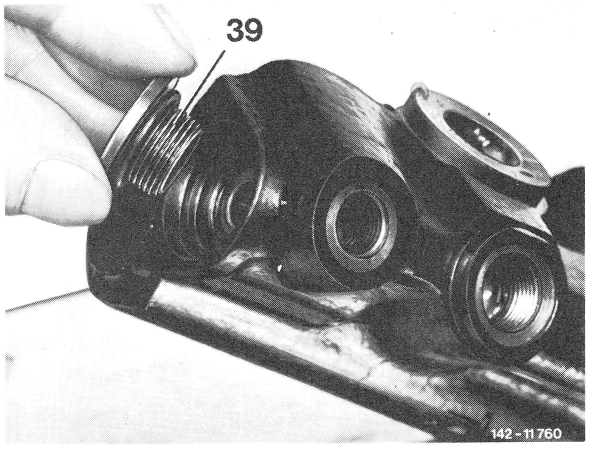
25 Insert locking ring (5), making sure that the ring is correctly seated in groove of housing. Then push piston downward and pull out assembly pin.



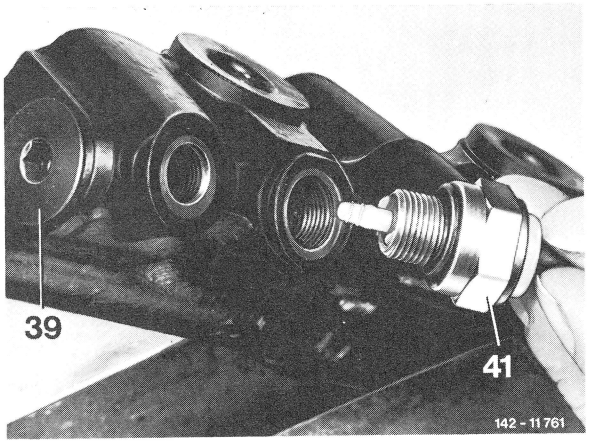
26 On tandem main cylinder with pressure difference warning indicator slip control piston (35) into housing. Make sure that the ring sleeve (36) is not damaged.



27 Screw-in closing plug (39) and tighten to 15–30 Nm (1.5–3 kpm).



28 Screw switch (41) into housing and tighten to 15–20 Nm (1.5–2 kpm).



Mount expansion tank

29 Insert strainer into container and screw-on closing cover.

30 Lightly coat container plug (1) with brake cylinder paste and push into housing.

31 Insert expansion tank (26) first into housing by means of a pipe connection, turn by 180° and push second pipe connection into housing. Watch out for perfect seat.