A. York refrigerant compressor (engine 110)

Data

Designation	York aluminum, 2 cylinders, 164 cc	model no. DA 210
Max speed 1/min (rpm)		5000
Power input at max compressor speed KW (HP)		approx. 5 (7)

Oil filling capacity

Oil grade Cold-flowing oil (for approved cold-flowing oils refer to specifications for service products page no. 362)

Oil level		min	normal	max
Oil quantity in cc		180	240	300
Refrigerant compressor	dipstick depth mm	22	25	28

Tightening torques	Nm	(kpm)
Pipe line to refrigerant compressor	40–45	(4.0–4.5)
Cylinder head cover	20–32	(2.0–3.2)
Flange cover front	10–18	(1.0–1.8)
Flange cover rear	15–20	(1.5–2.0)
Oil pan bottom	19–30	(1.9–3.0)
Oil check plug	6–8	(0.6–0.8)

Special tools

Screwdriver insert (system Torx) 1/4" hex head with 1/4" square head drive		000 589 00 10 00
Pulling screw for pulley		100 589 00 35 00

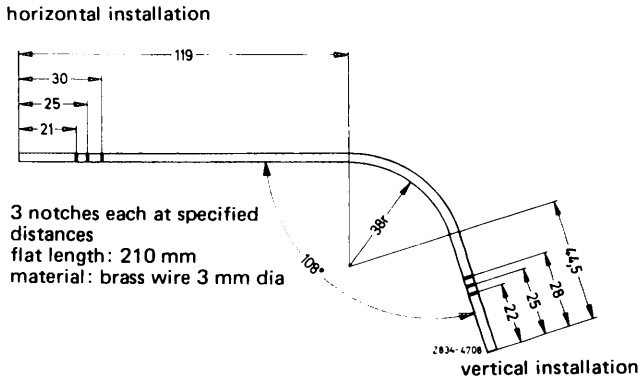
Conventional tools

Double open-end wrench 1/2" x 9/16", 1" x 1 1/8"

Socket 5/16" (double hex), 1/4", 3/8", 1/2" (hex)

Self-made tools

Oil dipstick for refrigerant compressor



Note

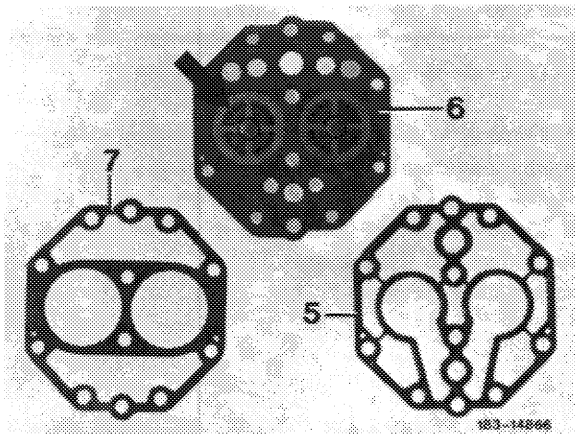
All threaded bores and screws on refrigerant compressor are inch dimensions.

While working on refrigerant compressor, proceed with particular care and max cleanliness.

a) Cylinder head and valve plate

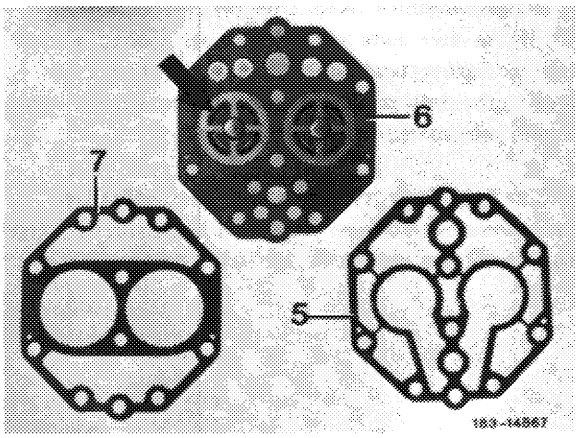
Note: The two gaskets for cylinder head cover, the strainer for suction end in cylinder head cover and the valve plate are supplied together only and should also be replaced together.

Reconditioning of valve plate is not possible. If the poppet valves are damaged or the cold-flowing oil on valve plate is burned, completely renew valve plate and insert strainer (refer to arrow) into suction end in refrigerant compressor. Only the 2nd version is now generally installed.

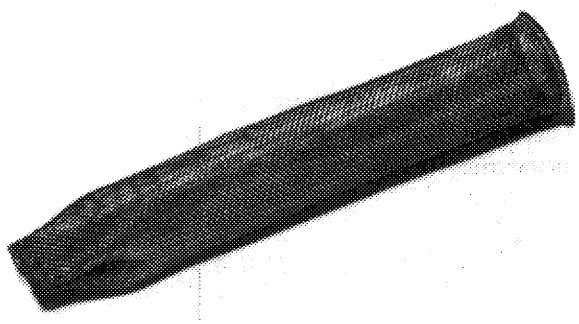


1st version

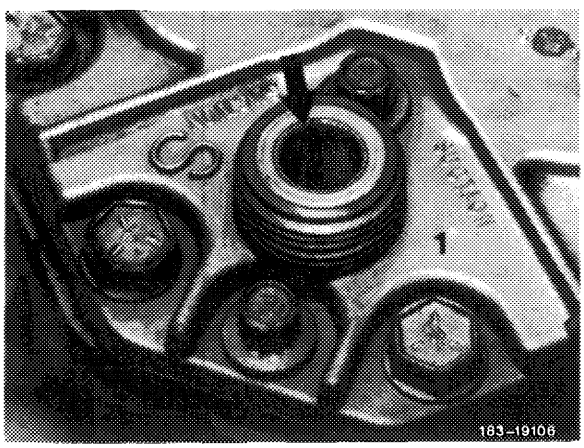
5 Metal gasket between valve cover and valve plate
6 Valve plate
7 Gasket between valve plate and crankcase



2nd version



Strainer



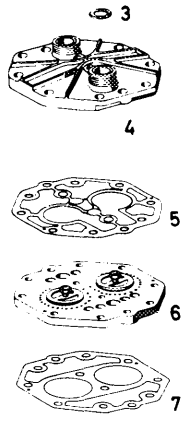
1 Refrigerant compressor

Removal

1 Drain air conditioning system (83–516).

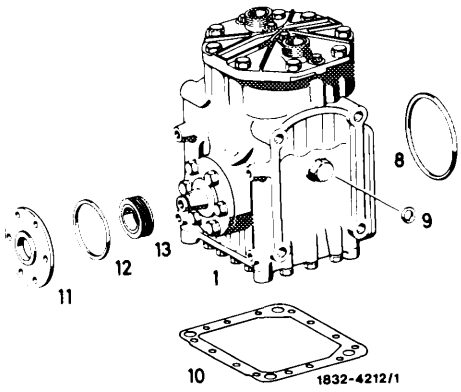
2 Unscrew hose or pipe line from refrigerant compressor and close connections with plugs.

3 Unscrew hex and double hex screws on cylinder head cover (4). (Hex screws SW 1/2", double hex screws SW 5/16").



4 Remove cylinder head cover (4) and valve plate (6). If the valve plate and the cylinder head cover are tightly sticking together, apply a screwdriver or a lever to the projecting parts of the **valve plate** or apply careful blows with a rubber hammer.

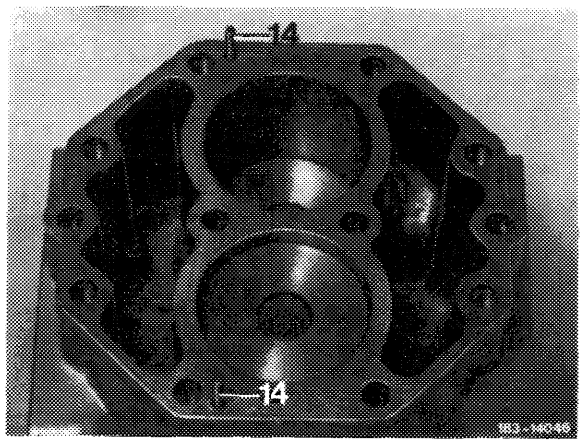
5 Carefully clean cylinder head cover, valve plate and crankcase from gasket residue. Make sure that the sealing surfaces are not scratched or damaged.



Installation

6 Insert set pins (14) into respective bores in crankcase.

7 Coat surfaces of crankcase and of gasket (7) with cold-flowing oil. Place gasket on crankcase in such a manner that it is fixed by the set pins.



8 Also coat valve plate (6) and cylinder head cover gasket (5) with cold-flowing oil. Place valve plate (6) on crankcase in such a manner that the pressure valve unit (valve holder with valve tongue) is facing in upward direction and that the valve plate is guided with the set pins through the respective bores.

9 Place cylinder head cover gasket (5) on valve plate (6). Coat sealing surfaces of cylinder head cover (4) with cold-flowing oil and place on valve plate with gasket in such a manner that the set pins are entering into the respective bores in cylinder head cover (4).

Note: The cylinder head cover gasket is now installed in an improved metal version. This gasket can also be used on compressors with paper gasket.

10 Insert hex or double hex screws and tighten crosswise.

11 Check oil level in compressor (83–520).

12 Insert new gasket (3), mount pipe lines.

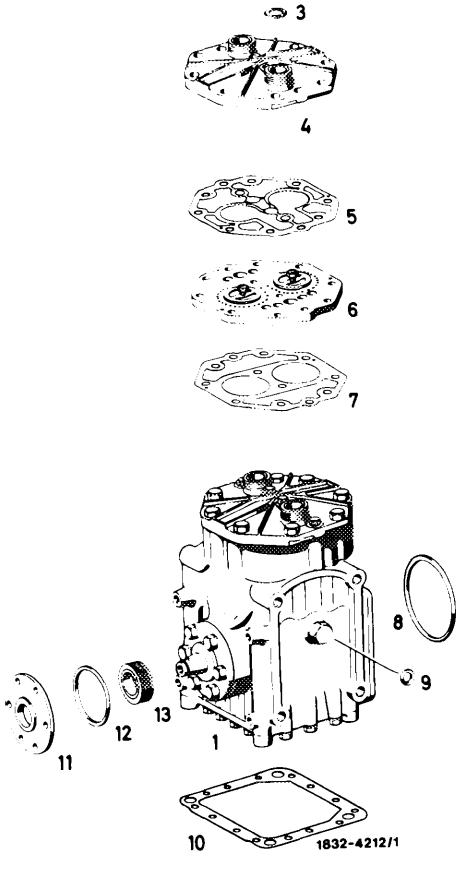
13 Evacuate air conditioning system and fill up again (83-512 and 514).

14 Check air conditioning system for leaks and function (83–510 and 512).

b) Crankshaft gasket

Note

The crankshaft gasket at clutch end of refrigerant compressor is supplied as a complete unit only and should also be installed as such. Never install new and old parts together.



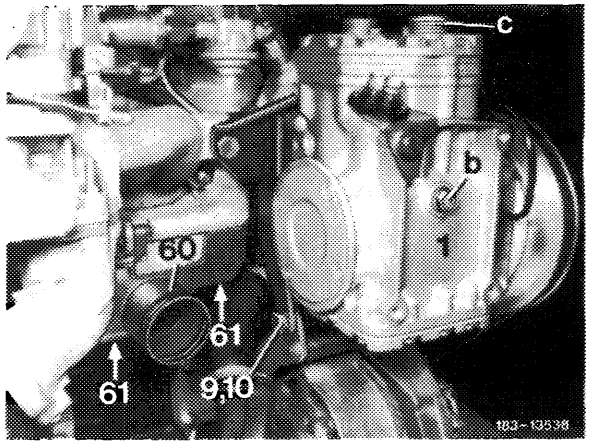
The new shaft sealing pack has two paper gaskets and one sealing ring (12). The new gasket should correspond to the old, removed gasket. But it is important that only one gasket or one sealing ring is used.

Newly installed shaft sealing assemblies should not be immediately removed again because of a minor leak. The carbon ring is lapped together with sealing plate (13). The close fit will improve during running-in period of shaft sealing assembly.

Removal

15 Drain air conditioning system (83–516) and slowly unscrew oil check plug (6).

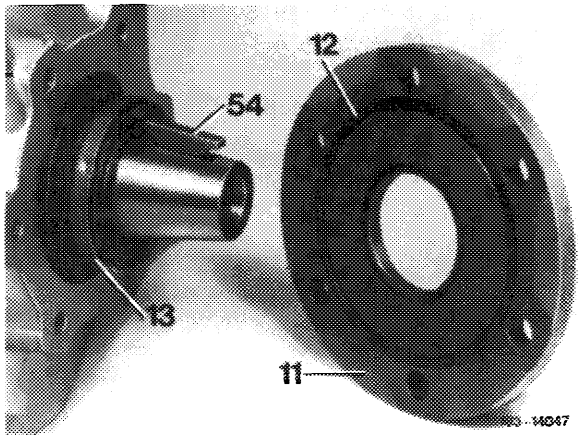
16 Remove electromagnetic clutch (83–526).



17 Remove Woodruff key (54) from crankshaft.

18 Unscrew hex inch screws (SW 1/4") on flange cover (11). Do not use the drained cold-flowing oil again.

19 Remove flange cover (11) with sealing ring or paper gasket (12) and force gasket (13) from crankshaft by means of two screwdrivers. Make sure that the sealing surfaces on crankcase and on crankshaft are not damaged.



Installation

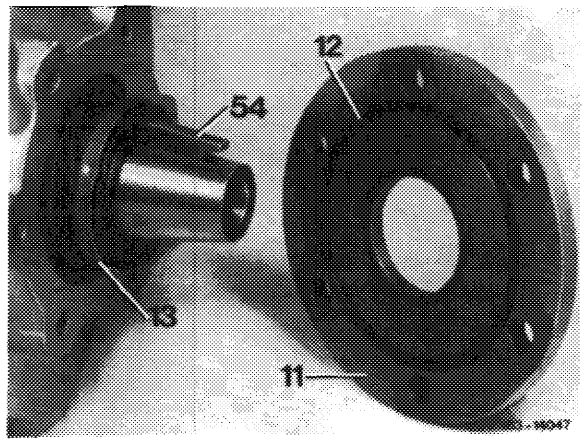
20 Wash seal (13) with cold-flowing oil and slip on crankshaft in such a manner that the carbon ring is on external side.

Note: If the carbon ring is loose from shaft seal (13), slip shaft seal on crankshaft in such a manner that the holder is coming to rest in outward direction. Then insert carbon ring into holder, with its polished surface facing outwards. The recesses on circumference of carbon ring should enter into the drive lugs of holder and be well seated.

21 Coat paper gasket or sealing ring (12) with cold-flowing oil and insert at crankcase.

22 Check lapped inner surfaces on flange cover for scratches. Then slip flange cover (11) over end of crankshaft and push shaft seal (13) completely on crankshaft into its correct position with the assistance of the flange cover.

23 Insert hex inch screws and tighten uniformly crosswise. Make sure that the distance between the crankshaft and the shaft bore of the flange cover is the same all around. If required, move flange cover (11) into correct position. Then tighten hex screws.



24 Install electromagnetic clutch (83–526).

25 Check oil level in refrigerant compressor (83–520).

26 Evacuate air conditioning system and fill up again (83–512 and 514).

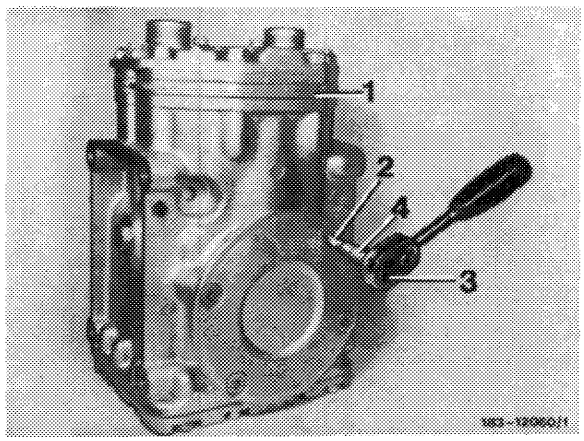
27 Check air conditioning system for leaks and function (83–510 and 512).

c) Sealing ring in compressor flange at rear

Removal

28 Drain air conditioning system (83–516).

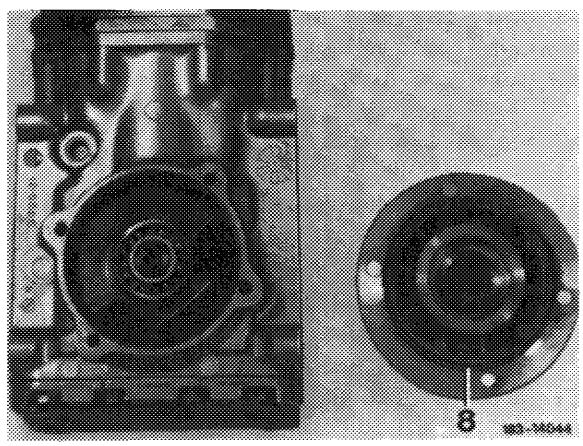
29 Remove fastening screws for rear compressor flange by means of socket wrench (ratchet [3]), one socket 1/4" (4), as well as screw turning insert (2). Do not use drained cold-flowing oil again.



Installation

30 Clean compressor flange and check for distortion and damage.

31 Exchange sealing ring (8). Coat new sealing ring with cold-flowing oil and screw compressor flange on again.



32 Fill up with cold-flowing oil and check oil level in compressor (83–520).

33 Evacuate air conditioning system and fill up again (83–512 and 514).

34 Check air conditioning system for leaks and function (83–510 and 512).

d) Gasket on oil pan cover at bottom

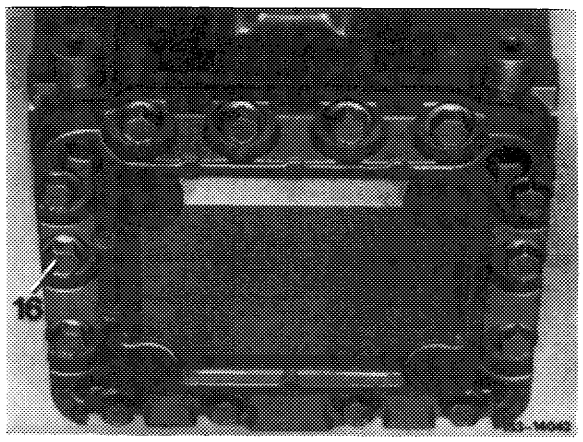
Removal

35 Remove refrigerant compressor (83–522).

36 Unscrew hex inch screws (16-SW 3/8") on floor plate bottom out of crankcase.

37 Carefully press floor plate from cylinder crankcase.
Do not use drained cold-flowing oil again.

38 Carefully clean sealing surfaces on compressor cover and on crankcase from gasket residue. Check compressor cover for distortion.



Installation

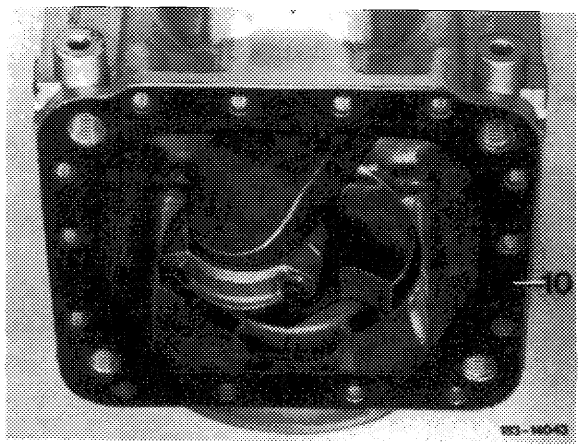
39 Coat gasket (10) and sealing surfaces with cold-flowing oil and screw back compressor cover with a new gasket, while tightening hex inch screws crosswise.

40 Install refrigerant compressor.

41 Add cold-flowing oil and check oil level (83–520).

42 Evacuate air conditioning system and fill up again (83–512 and 514).

43 Check air conditioning system for leaks and function (83–510 and 512).



B. Frigidaire refrigerant compressor (engines 100.985, 116 and 117)

Data

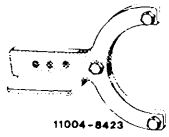
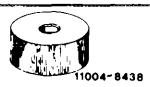
Designation Frigidaire, 6-cylinder swashplate compressor, 206.5 cc, model no. 59 10 763		
Max speed	1/min	6400
Required input at max compressor speed	kW (HP)	approx. 6.3 (8.5)

Oil filling capacity

Oil grade Cold-flowing oil (for approved cold-flowing oils refer to specifications for service products, page 362)		
Oil quantity with new refrigerant compressor	in cc	300
Oil quantity with refrigerant compressor removed and air conditioning system flushed with R 11	in cc	300
Oil quantity with refrigerant compressor removed and air conditioning system not flushed	in cc	200

Tightening torques		Nm	(kpm)
Suction hose on pipe line	with Cu seal	60 ± 5	(6.0 ± 0.5)
	without Cu seal	70 ± 5	(7.0 ± 0.5)
Pressure hose on pipe line	with Cu seal	45 ± 5	(4.5 ± 0.5)
	without Cu seal	55 ± 5	(5.5 ± 0.5)
Pipe line to refrigerant compressor		17	(1.7)
Oil check plug		15–17	(1.5–1.7)
8 mm screws		35	(3.5)
10 mm screws		30–35	(3.0–3.5)
12 mm screws		40–45	(4.0–4.5)
Hex nuts on threaded bolt		25–30	(2.5–3.0)

Special tools

Holding device for refrigerant compressor	 11004-8423	109 589 00 31 00
Support for inner mechanism	 11004-8438	109 589 01 31 00
Pressure test plate	 11004-7632	109 589 00 25 00

Conventional tool

Double open-end wrench 3/8" x 7/16" for oil check plug

Removal

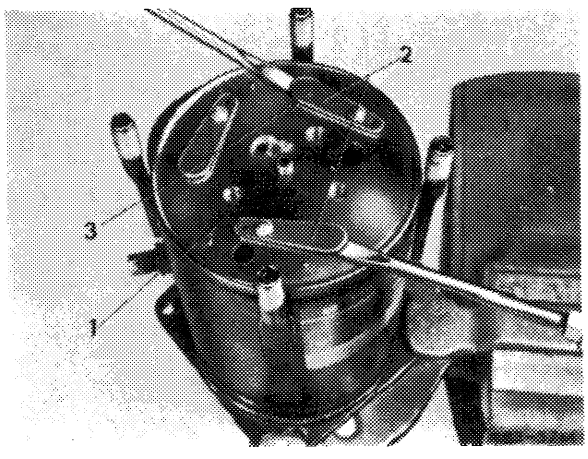
1 Remove refrigerant compressor and clean outside surfaces (83–522).

2 Unscrew oil check plug (3) and drain all the cold-flowing oil in compressor.

To accelerate draining of cold-flowing oil, rotate drive shaft several times. **Do not use drained cold-flowing oil again** (83–520).

3 Remove spring plate, pulley, clutch coupler and shaft seal (83–526).

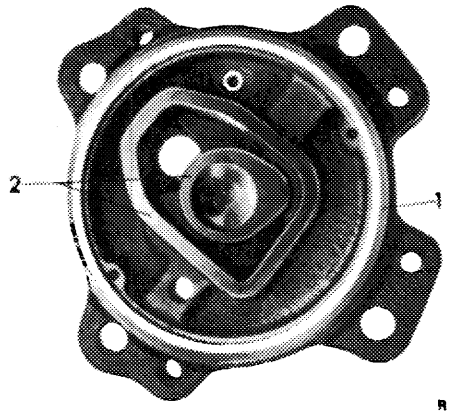
4 Turn compressor around in holding device, with front end down. Unscrew hex nuts on compressor housing and remove rear head member. If head membe is stuck, apply uniform blows against head member with a rubber hammer.



Removal of rear exhaust valve plate

1 Exhaust valve plate
2 Spring holder
3 Exhaust valve

5 Wipe cold-flowing oil from sealing surfaces of rear head member and check surfaces. In the event of damage, replace head member.



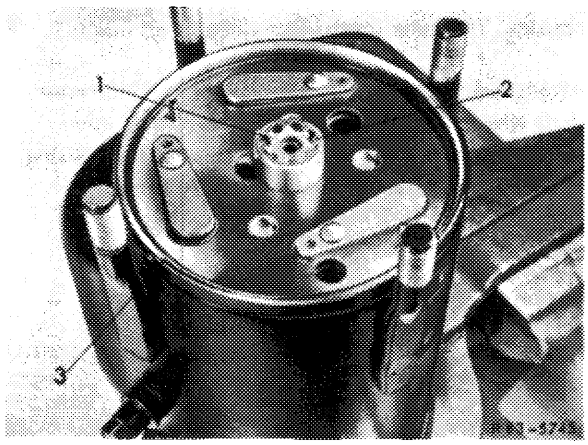
1 Head member rear
2 Sealing surface

R83-5746

6 Remove suction strainer, check and clean, if required.

7 Apply an identification to outer surface of inner and outer oil pump gear wheel. Then remove gears.

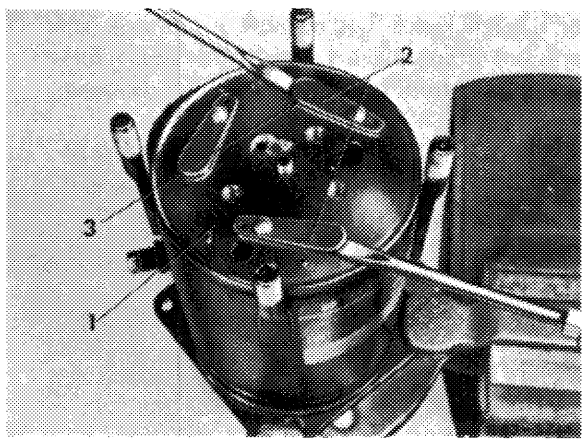
8 Remove sealing ring between head member and housing.



1 Inner gear wheel
2 Outer gear wheel
3 Sealing ring

9 Carefully remove rear valve plates by positioning two screwdrivers under spring holders – not between spring and spring seat – and force out valve plates.

10 Check valve springs and valve seats. In the event of damage, renew entire valve plate.

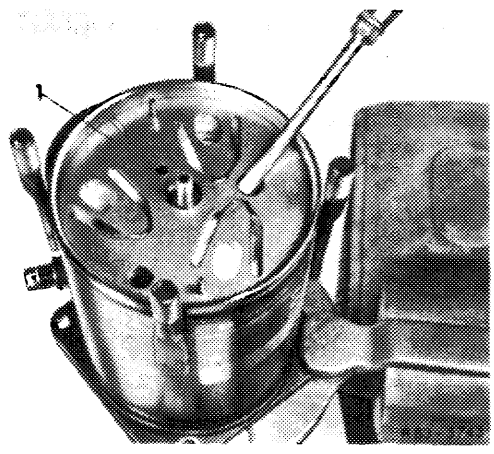


Removal of rear exhaust valve plate

1 Exhaust valve plate
2 Spring holder
3 Exhaust valve

11 Lift-out rear intake valve plate by means of two screwdrivers, but do not apply force against leaf spring valves.

12 Check leaf springs of valve plate for damage and replace, if required.

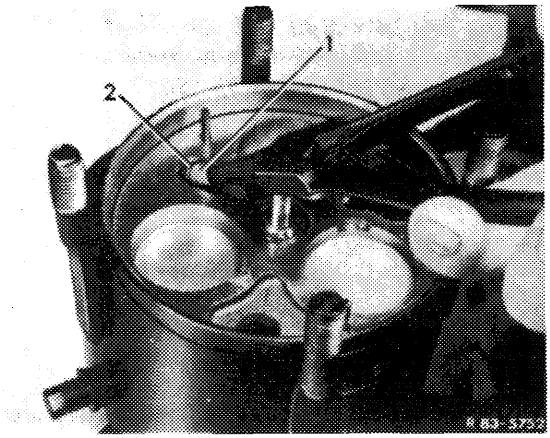


Removal of rear intake valve plate

1 Intake valve plate

13 Remove oil intake pipe (1) and sealing ring from oil intake.

14 Release compressor from holder, place support for inner assembly group over oil pump shaft. Lift compressor from holder. Turn compressor around and place on work bench in such a manner that the support for the inner assembly group rests on work bench.



Removal of oil intake pipe

1 Oil intake pipe
2 O-ring
3 Removing tool

15 Lift off front head member and compressor housing. The inner mechanism remains on support.

Attention! Do not knock against end of compressor shaft when pushing out inner mechanism. If inner mechanism is not slipping out of compressor housing, blow with a plastic hammer against front head member.

16 Place compressor housing with front head member on side and knock head member out through compressor housing, making sure that the sealing surfaces on inside of front head member are not damaged.

17 Wipe cold-flowing oil from sealing surface of front head member and inspect sealing surface. If damage shows up, replace head member.

18 Remove front exhaust and intake valve plate. Inspect leaf springs and their seats. Replace these parts, if required.

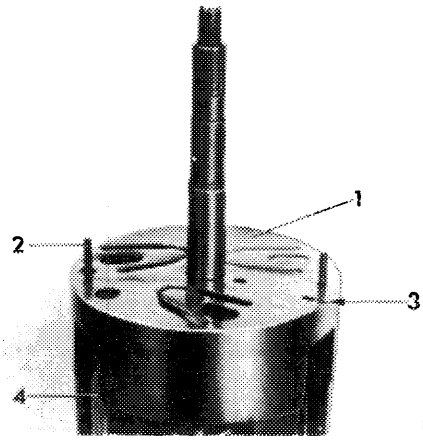
19 Check inner mechanism for damage. If damage is essential (e.g. seized cylinder liner) caused by a shortage of refrigerant or oil, a complete exchange or a new refrigerant compressor is recommended.

Installation

20 Place inner mechanism on support.

21 Insert new guide pins (2) into front cylinder half, if previously removed.

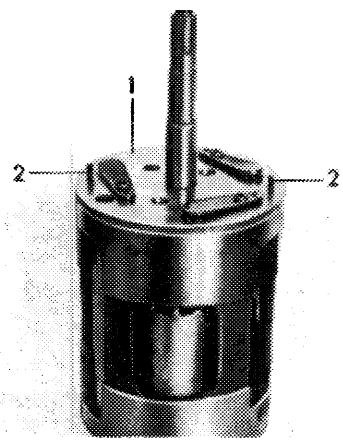
22 Mount front intake valve plate (1) on front cylinder half. Align oil return slot and overflow pipe with guide pins (2).



Installation of front intake valve plate

1 Intake valve plate
2 Guide pins
3 Oil return slot
4 Overflow pipe

23 Install front exhaust valve plate while aligning bores in valve plate with guide pins.

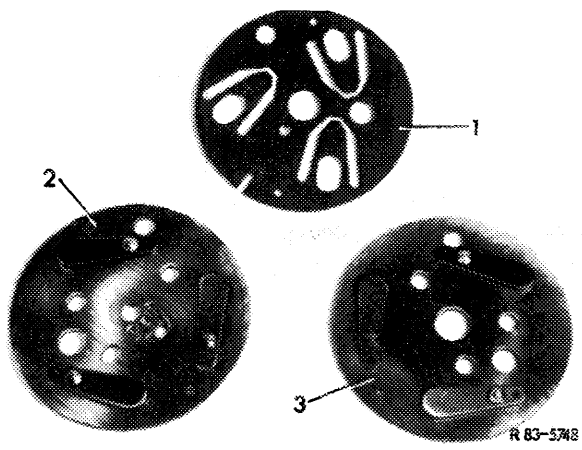


Installation of front exhaust valve plate

1 Exhaust valve plate
2 Guide pin

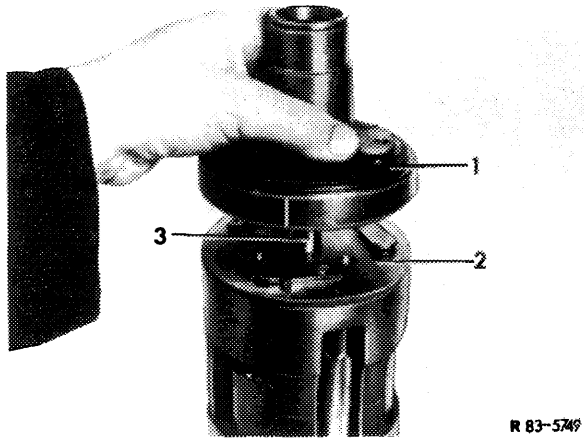
Note: The front exhaust valve plate (1) is recognized by a large diameter hole in center of plate.

24 Coat sealing surfaces on ribs of front head member with cold-flowing oil.



1 Intake valve plate
2 Exhaust valve plate rear
3 Exhaust valve plate front

25 Determine position of head member (1) in relation to guide pins (2) on inner assembly group. Mark location of bores on outside of front head member. Place front head member carefully into correct position, while making sure that the sealing surfaces around center bore of head member are not touching shaft (3) when the head member (1) is lowered. In addition, do not rotate head member to engage the guide pins, since this would result in the sealing surfaces touching the valve bores.

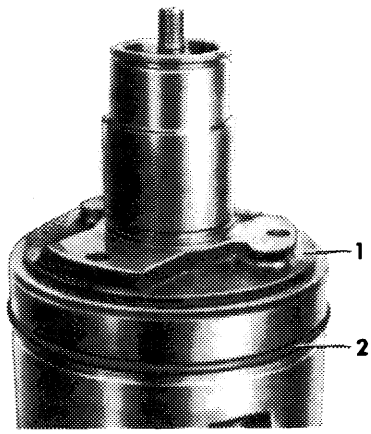


R 83-5749

Installation of front head member

1 Head member front
2 Exhaust valve plate
3 Shaft

26 Provide chamfered groove on lower end of head member (1) well with cold-flowing oil and insert a new sealing ring (2) into groove.

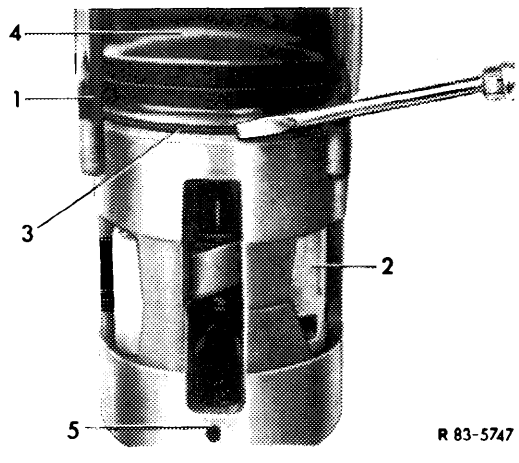


R 83-5750

1 Head member front
2 Sealing ring

27 Coat inner surface of compressor housing with cold-flowing oil and then slip housing over inner mechanism until housing rests on sealing ring (3).

28 Carefully push sealing ring (3) around circumference of inner mechanism (2) until housing (1) slips down over mechanism. Align oil pan (4) with bore (5) when housing is sliding down.

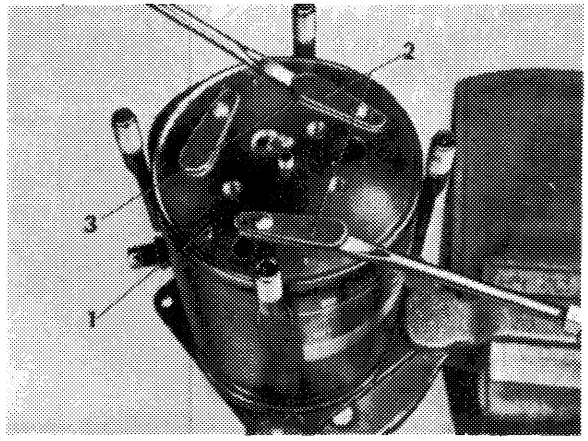


R 83-5747

29 Hold support in position, turn compressor around and into holding fixture. Then remove support.

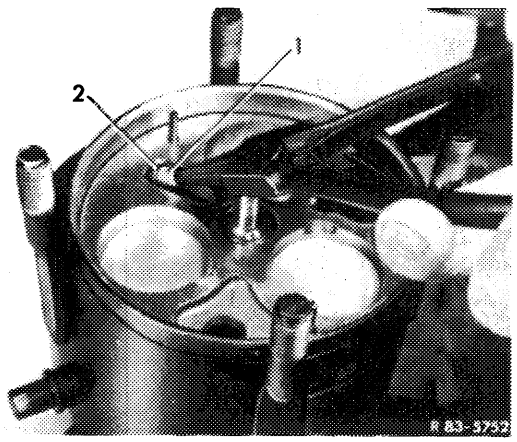
30 Insert new guide pins into rear cylinder half, if previously removed.

31 Insert new sealing ring into bore for oil intake pipe.



1 Exhaust valve plate
2 Spring holder
3 Exhaust valve

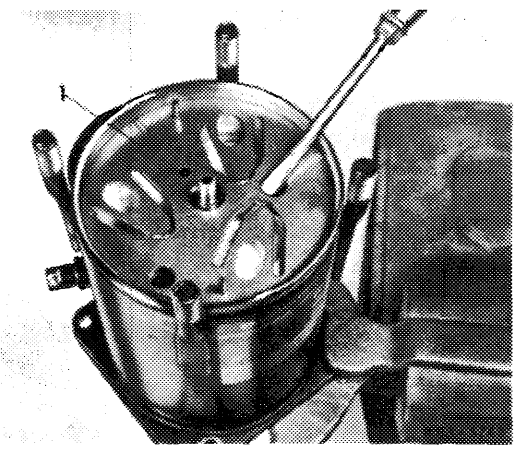
32 Provide oil intake pipe with cold-flowing oil and install, while turning compressor mechanism until oil intake pipe (1) is in alignment with hole in housing wall.



Removal of oil intake pipe

1 Oil intake pipe
2 O-ring
3 Removing tool

33 Insert rear intake valve plate over guide pins with oil return slot in direction of oil pan.



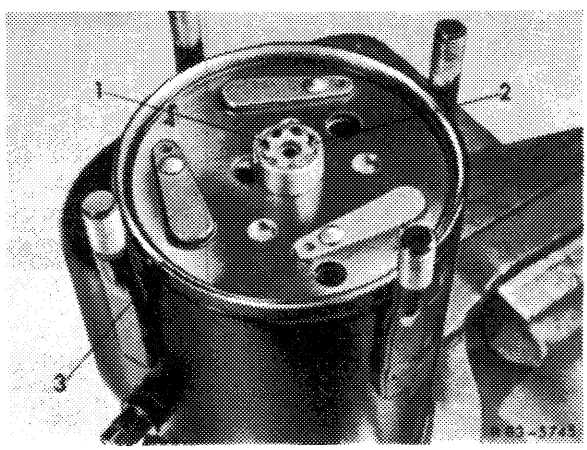
Installation of rear intake valve plate

1 Intake valve plate

34 Install rear exhaust valve plate over guide pins.

35 Slip inner oil pump gear wheel (1) on shaft so that the previously applied identification is pointing upwards.

36 Slip outer oil pump gear wheel (2) over inner gear wheel (1), with the previously applied identification in upward direction.



1 Inner gear wheel
2 Outer gear wheel
3 Sealing ring

37 Provide complete rear exhaust valve plate and around outer diameter between housing and valve plate with cold-flowing oil.

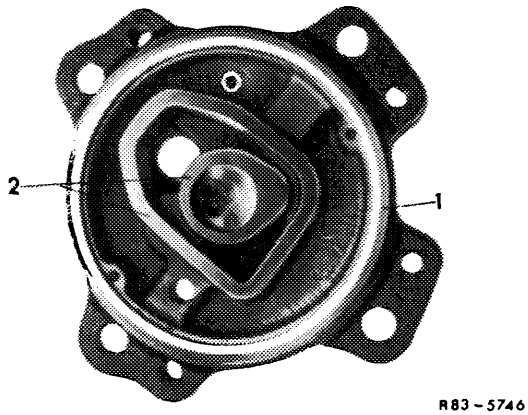
38 Provide the new sealing ring (3) between head member and housing with cold-flowing oil and place on exhaust valve plate or into housing.

39 Carefully insert suction strainer into rear head member.
Caution! Do not damage.

40 Provide sealing surfaces on ribs of head member with cold-flowing oil.

41 Slip rear head member over stud, making sure that the strainer is not falling out of its seat and that the teflon seal is not damaged.

Note: If the rear head member is not engaging in guide pins, turn front head member and push manually.



R83-5746

1 Head member rear
2 Sealing surface

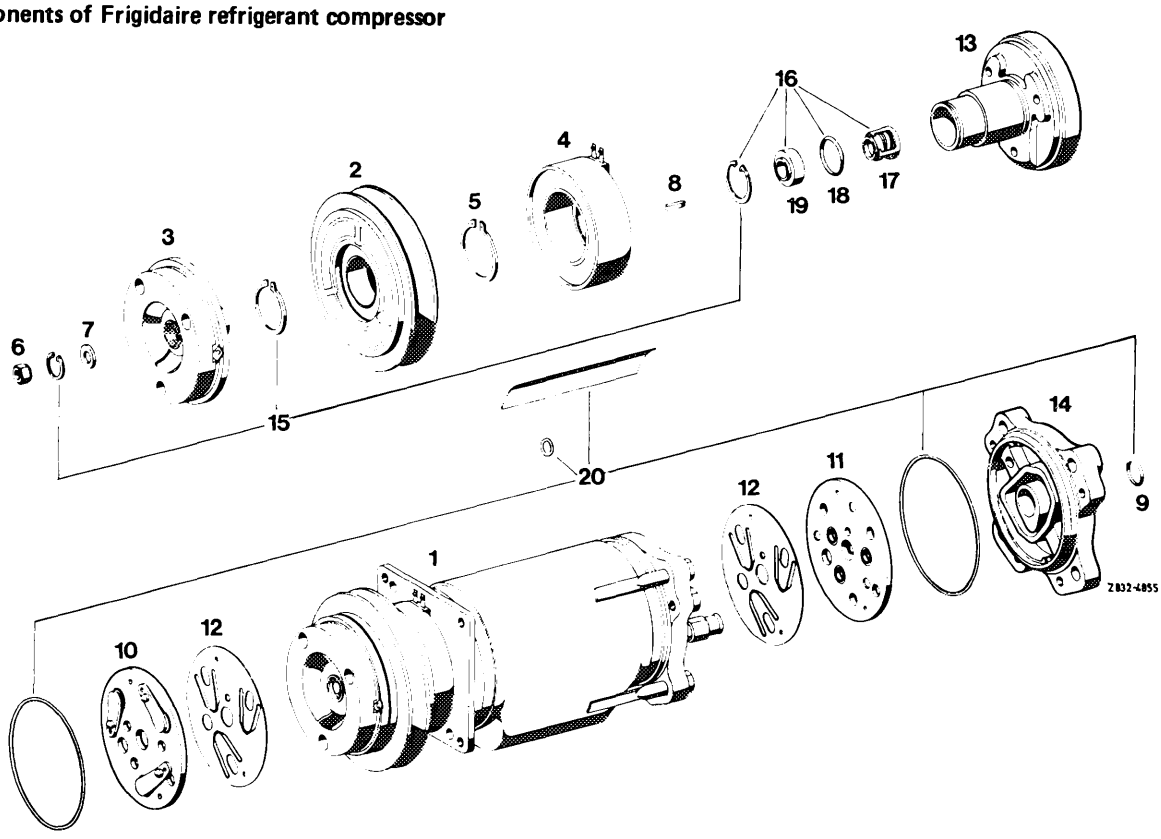
42 Screw hex nuts on threaded bolt and tighten uniformly.

43 Turn compressor in holding fixture around and install shaft seal, clutch coupler, pulley and spring plate (83–526).

44 Fill new cold-flowing oil into compressor (83–520).

45 Check frigidaire refrigerant compressor for leaks (83–525).

Components of Frigidaire refrigerant compressor



1	Frigidaire refrigerant compressor	8	Key	15	Locking ring (set)
2	Pulley	9	O-ring	16	Sealing assembly
3	Spring plate	10	Exhaust valve plate front	17	Shaft seal
4	Clutch coupler	11	Exhaust valve plate rear	18	O-ring
5	Locking ring	12	Intake valve plate	19	Ceramic ring
6	Counternut	13	Head member front	20	Sealing assembly
7	Spacing washer	14	Head member rear		

C. Delco refrigerant compressor (engine 617.950)

Data

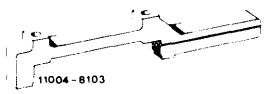
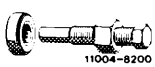
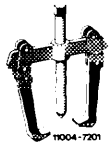
Designation	Delco (frigidaire) radial 4-cylinder	
Max. speed 1/min	7000	
Power input at max. compressor speed kW (HP)	approx. 6.3 (8.5)	
Displacement	164 cc	

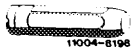
Oil capacity

Oil type: cold-flowing oil (for approved types of cold-flowing oil refer to specifications for service products page no. 362)		
Oil capacity, new, in refrigerant compressor	170 cc	

Tightening torques	Nm	(kpm)
Screws (8) pulley-clutch body	11	(1.1)
Screw M 10 x 30 pipe line to refrigerant compressor	50±3	(5±0.3)
Nut (1) on drive shaft	13	(1.3)
Screws (5 and 6) M 12 refrigerant compressor to carrier	60+10	(6+1)
Hose line (14) from evaporator to pipe line 7/8"	29–37	(2.9–3.7)
Hose line (15) from pipe line to condenser 3/4"	24–28	(2.4–2.8)

Special tools

Holding device for refrigerant compressor		116 589 14 31 00
Holding wrench for clutch		116 589 04 40 00
Remover for clutch plate		000 589 07 35 00
Installer with spacer for spring plate		000 589 49 43 00
Guide piece		116 589 05 63 00
Double-claw puller		000 589 88 33 00
Punch		115 589 02 35 02

Remover and installer for slip ring		000 589 21 61 00
Remover and installer for shaft seal		000 589 65 63 00
Pressure test plate for refrigerant compressor		109 589 00 25 00

Conventional tools

Socket 14 mm, 3/8" square	e.g. made by Hazet, D-5630 Remscheid
Feeler gauge (set)	e.g. made by Hazet, D-5630 Remscheid Order no. 2147
Langbeck pliers 72 A (internal lock)	e.g. made by Hazet, D-5630 Remscheid Order no. 1846 a-1
Pliers for locking ring J 2 (external lock)	e.g. made by Hazet, D-5630 Remscheid Order no. 1846 c-2
Double open-end wrench 1/2" x 9/16", 5/8" x 3/4", 7/8" x 15/16", 1" x 11/8"	

Self-made tool

Remover for O-ring

a) Renew shaft seal of refrigerant compressor

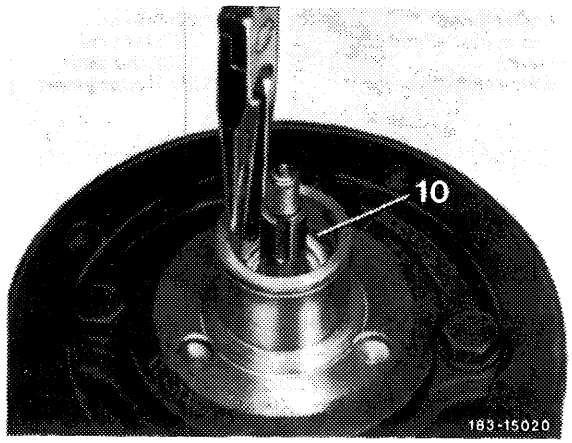
Removal

1 Drain air conditioning system (83–516).

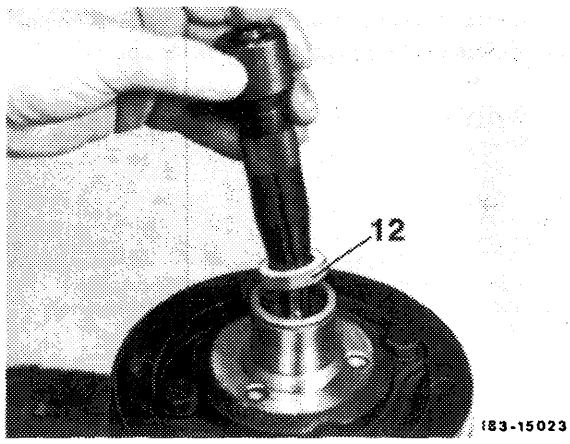
2 Remove refrigerant compressor (83–522).

3 Remove spring plate (83–526).

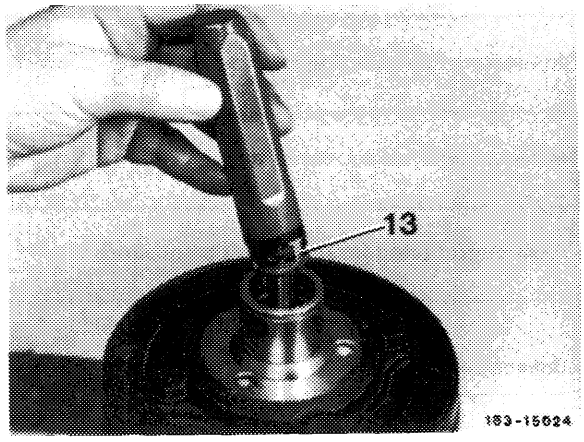
4 Remove locking ring (10) for shaft seal.



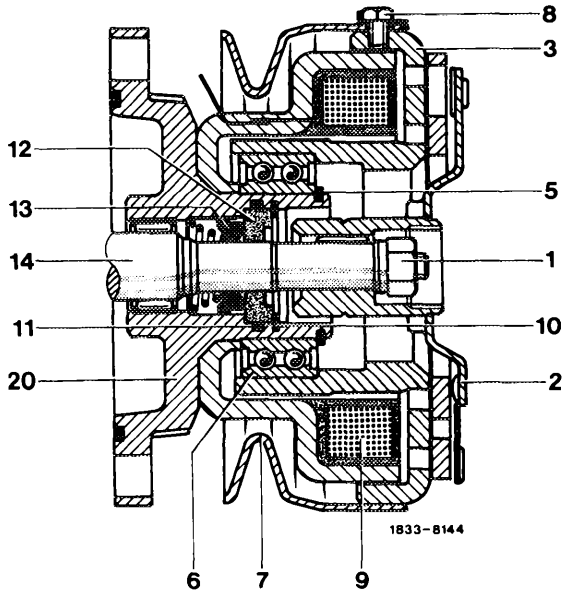
5 Remove slip ring (12) by means of remover and installer.



6 Remove shaft seal (13) by means of remover and installer. For this purpose, push against tool, turn tool to the right to seize lug of shaft seal with detent on tool. Remove complete shaft seal by pulling straight from shaft.



7 Remove O-ring (11) from inside bore in housing cover. For this purpose, a wire bent into a hook may be used.

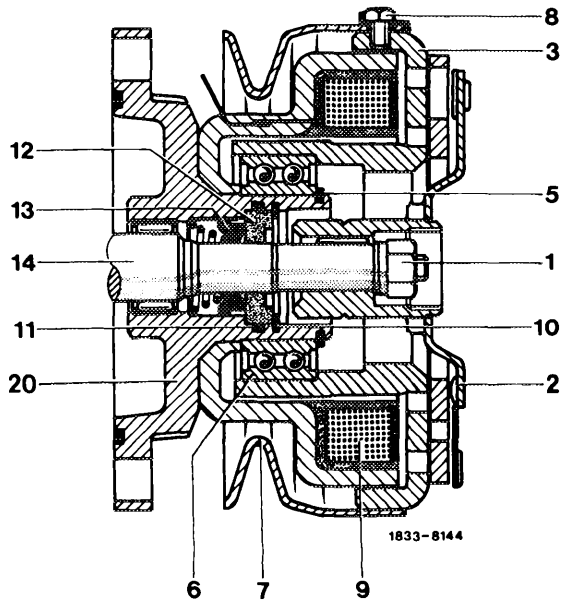


1 Nut on drive shaft
2 Spring plate
3 Clutch body
5 Locking ring
6 Bearing for clutch body
7 Pulley
8 Screw with lock
9 Solenoid
10 Locking ring
11 O-ring
12 Slip ring
13 Shaft seal
14 Drive shaft
20 Housing cover

Installation

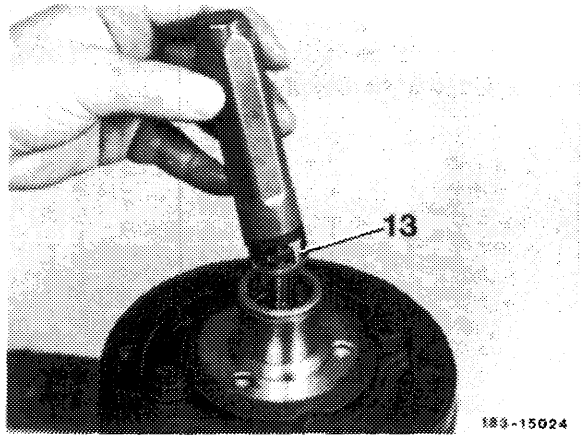
8 Check whether parts of old shaft seal are still in bore of housing cover. Clean bore prior to inserting new gasket.

9 Immerse new gasket parts in clean cold-flowing oil. Insert O-ring (11) into groove of housing cover.



1 Nut on drive shaft
2 Spring plate
3 Clutch body
5 Locking ring
6 Bearing for clutch body
7 Pulley
8 Screw with lock
9 Solenoid
10 Locking ring
11 O-ring
12 Slip ring
13 Shaft seal
14 Drive shaft
20 Housing cover

10 Insert shaft seal (13) into tool and slip in shaft. Keep turning tool to the right until shaft seal engages in shaft. Only then turn tool to the left for disconnection from lugs of shaft seal and remove.

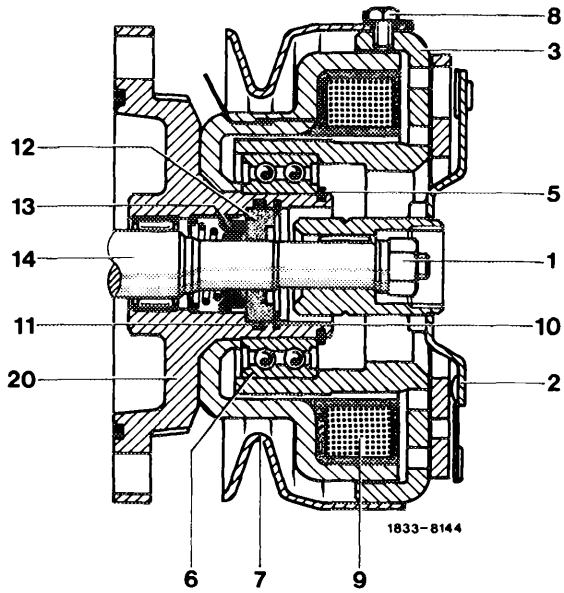


11 Introduce slip ring (12) into bore with assistance of tool until slip ring touches shaft seal. Make sure that the O-ring (11) is not pushed out of groove.

Attention!
Protect sealing surface of slip ring (12) against any damage, such as scratches.

12 Insert locking ring (10) with flat side in downward direction into bore until locking ring rests on slip ring. Then push against locking ring by means of locking pliers or a screwdriver until locking ring snaps into groove.

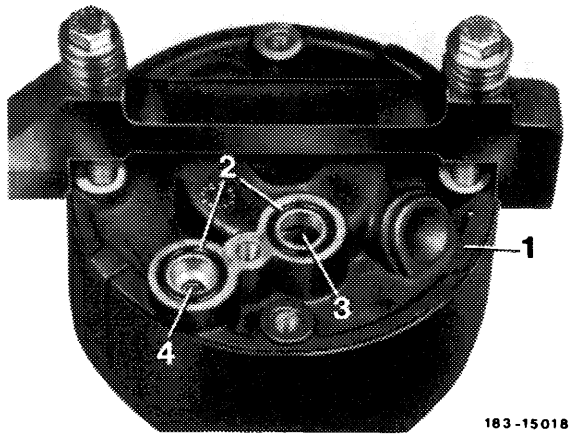
13 Install spring plate (83–526).



b) Checking refrigerant compressor for external leaks.

Note: When working on shaft seal, it is recommended to drain all the cold-flowing oil from refrigerant compressor. Measure drained quantity of cold-flowing oil and fill the same quantity of fresh cold-flowing oil into refrigerant compressor. For details refer to Checking oil level in refrigerant compressor (83–520).

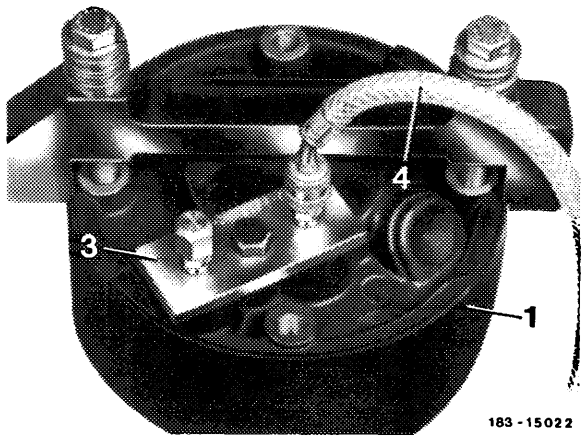
14 Check installed sealing rings (2) on refrigerant compressor (1) for condition, renew if required and provide with cold-flowing oil.



1 Refrigerant compressor
2 Sealing ring
3 Suction connection
4 Pressure connection

15 Screw pressure test plate (3) to refrigerant compressor (1) with hex. head screw provided.

16 Connect inner connection of pressure test plate with hose line (4) of service unit.



17 Let refrigerant vapor flow into refrigerant compressor. A bottle or filling cylinder pressure of above 4 bar gauge pressure is required.

18 In installation position of refrigerant compressor, rotate compressor shaft several times in direction of rotation manually.

19 Check refrigerant compressor for leaks with leak tester.

20 Reconnect valve to service unit for filling cylinder and remove hose line on pressure test plate.

21 Remove pressure test plate again, but directly prior to mounting pipe line.

22 For details concerning oil capacity of refrigerant compressor refer to "Checking oil level in refrigerant compressor" (83–520).

23 Install refrigerant compressor (refer to section "Removal and installation of refrigerant compressor" 83–522).