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Owner's responsibility

It is the responsibility of the owner and the user to observe the safety information and to ensure that the maintenance work is carried out in accordance with the specified guidelines.

HURTH is not liable for incorrect installation, improper handling or insufficient maintenance and the resulting damage.

Important information on technical reliability and operating safety is emphasised with the following symbols:



Note Applies to instructions which must be paid particular attention when carrying out work.



Important Indicates work and operating procedures which must be followed exactly in order to avoid damage to or destruction of the unit.



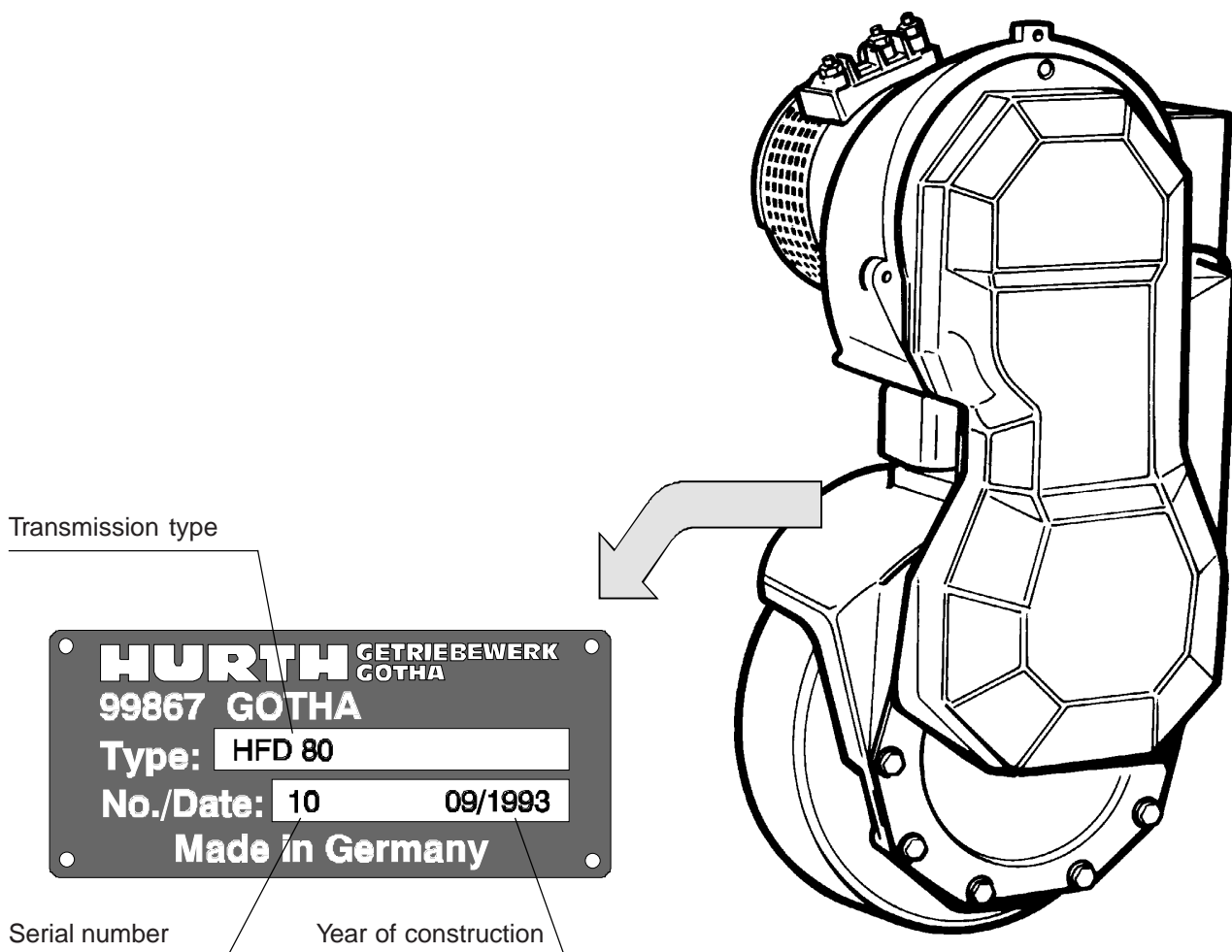
CAUTION Indicates work and operating procedures which must be followed exactly in order to prevent danger to persons.

Particular attention must be paid to the following safety information:

- ⚠ **The belt spur-gear transmission of the HFD 80 line is constructed in accordance with the most modern technology and is operationally reliable. However, this transmission may be a source of danger if used incorrectly or for other than the specified purpose by untrained personnel.**
- ⚠ **Proper use also includes the observance of the installation, dismantling and reassembly, commissioning and maintenance as specified by the manufacturer.**
- ⚠ **Each person concerned with the installation, dismantling and reassembly, commissioning and maintenance of the transmission in the user's plant must have read and understood the entire operating instructions, and in particular the safety information.**
- ⚠ **Any work procedure which reduces the safety of the transmission must be avoided.**
- ⚠ **Unauthorised conversions and changes may influence the safety of the transmission and are not permitted.**
- ⚠ **Use only original HURTH spare parts or spare parts approved by HURTH. We expressly point out that spare parts and accessories that were not supplied by HURTH were also not tested or approved by us. We will not accept any liability or guarantee for damage resulting from the use of spare parts or accessories that did not originate from HURTH.**
- ⚠ **The work described may only be carried out by authorised, trained and specially instructed personnel.**
- ⚠ **Do not allow cleaning agents to come into contact with skin, do not drink or inhale fumes. Wear protective gloves and goggles. If cleaning agent has accidentally been drunk, contact a physician immediately. The manufacturer's information must also be observed.**
- ⚠ **Do not allow cleaning agents and gear oil to flow into the sewerage system.**
- ⚠ **The wheels must be blocked before working on an installed or mounted transmission.**
- ⚠ **Before working on an installed transmission or its attached parts, the voltage supply to the motor must always be disconnected or switched off.**
- ⚠ **The local safety and accident prevention regulations must be observed.**

Identification plate

The identification plate is mounted on the transmission housing.



The transmission of the series HDF 80 is a belt/spur-gear transmission with an integrated spring-loaded brake. The transmission is used in shaft-guided industrial vehicles. The drive concept is characterised by the motor arranged horizontally above the drive wheel and the swivel bearing.

The first stage is the belt drive, and the second is designed as a spur-gear stage. The gear ratio can be selected via the drive pinion of the belt drive. The drive pulley, which at the same time serves as the brake drum, is mounted on the pinion shaft. The spring-loaded brake is integrated in the drive pulley. The drive torque reaches the running wheel via a pulley shaft, which is linked to the drive pulley of the spur-gear stage.

If the handle root is in the rest position, the vehicle is braked. By actuating the handle root, the brake is released and the vehicle is ready for operation and can be moved.

Transmission design:

- | | | | |
|---|----------------------|----|----------------------|
| 1 | Transmission housing | 7 | Cover |
| 2 | Electric motor | 8 | Drive wheel |
| 3 | Drive pinion | 9 | Brake actuation unit |
| 4 | Drive belt | 10 | Swivel bearing |
| 5 | Brake drum | 11 | Handle root |
| 6 | Tensioner | | |

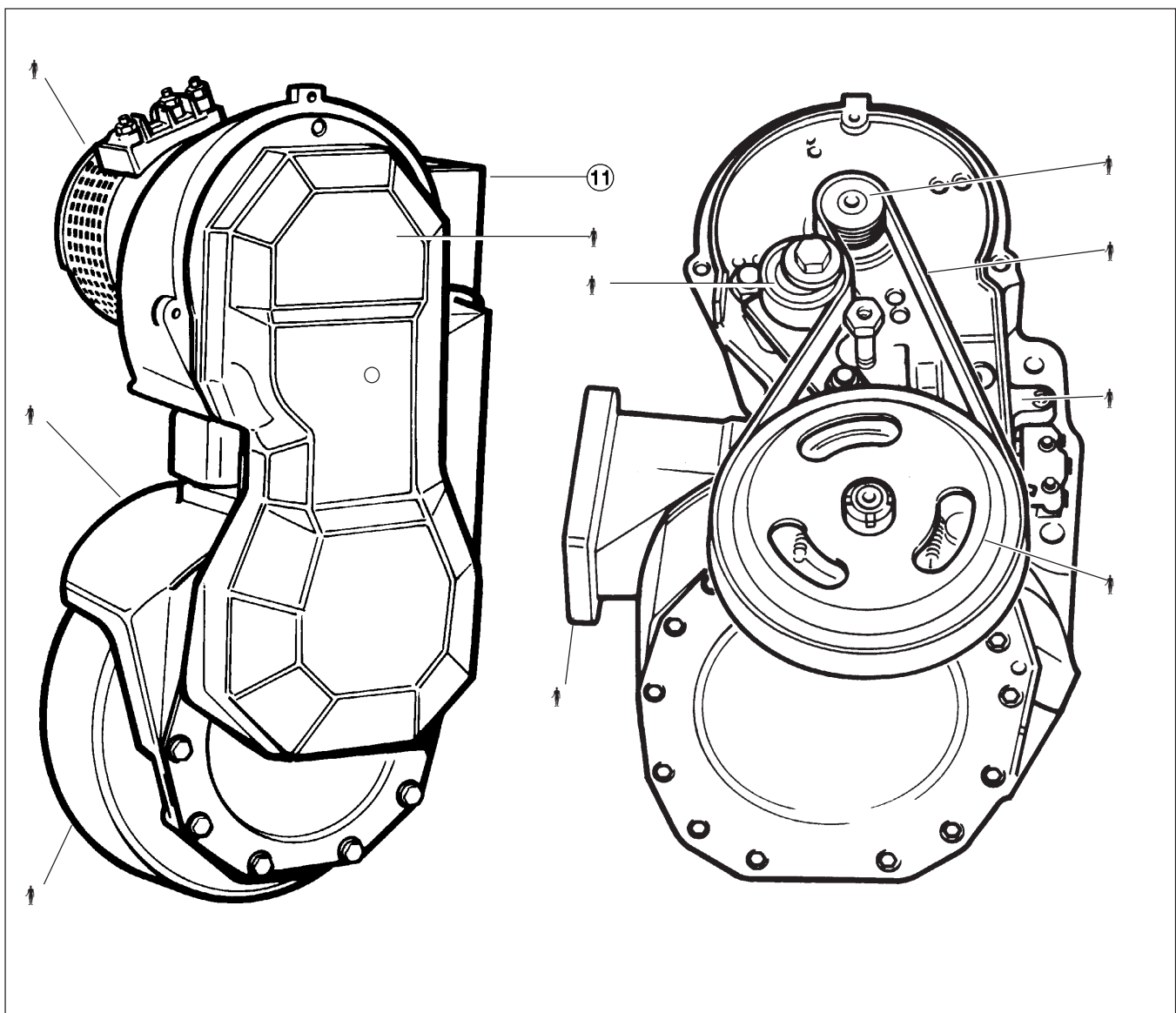


Fig. III-1

1. General information

1.1 Delivered condition

The HFD 80 transmissions are shipped from the factory completely assembled and filled with lubricating grease. The scope of delivery is dependent on the order and can be:

- with or without an electric motor
- with or without a drive wheel
- with or without a handle root

The drive pinion, drive belt and swivel bearing are part of the standard equipment.

1.2 Storage

If the installed transmission is to be shut-down for a longer period of time, the transmission must be stored in a closed, dry room.

For longer storage periods (longer than 1 year), the drive belt should be relaxed in order to prevent deformation. The transmission should not be laid on its plastic cover. Cover the brake actuation unit and the motor ventilation.

1.3 Transport

During transport of the transmission or of the motor/transmission unit it must be ensured that the transmission is protected from jolts. Do not lay the transmission on its plastic cover or the brake actuation unit.

1.4 Painting transmission

The pulley-shaft bearing, the centring and connection surface for the drive wheel on the wheel shaft, the threaded wheel bolt holes and the connection surfaces for the motor and the vehicle frame must be covered before painting. No paint may penetrate into the inside of the transmission.

The brake actuation unit must not be painted. The attached plates must remain clearly legible.

2. Mounting transmission to motor

2.1 General information

Motors with a diameter of 125 mm and 150 mm can be attached. Carefully clean the connection surfaces on the transmission and the electric motor (e.g. with LOCTITE Quick Cleaner No. 706) and inspect for damage before mounting. Remove minor damage with an oil stone.



Do not allow cleaning agents to come into contact with skin, do not drink or inhale fumes. Wear protective gloves and goggles. If cleaning agent has accidentally been drunk, contact a physician immediately. The manufacturer's information must also be observed.

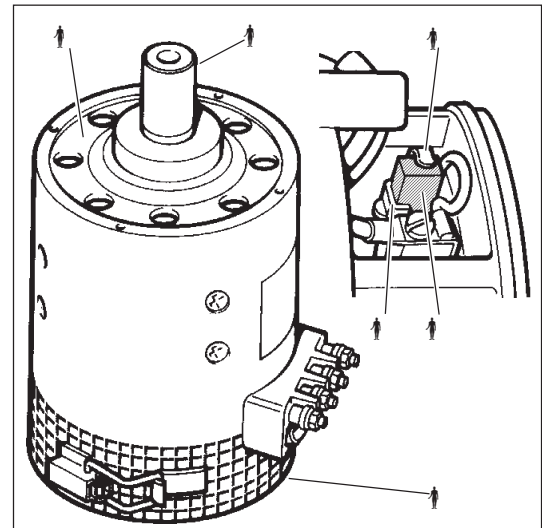


Fig. IV2-2a

2.2 Mounting drive pinion on armature shaft



Only for HURTH drive pinion and only for HURTH motors with a taper of 1:100.

To mount the drive pinion on the armature shaft, it is advisable to remove the armature. This work should be carried out carefully at a clean, dry workplace in order to prevent damage to the motor.

- Remove protective screen (item 1).
- Pull all carbon brushes (item 2) out of carbon-brush holder (item 3) until pressure spring (item 4) clamps carbon brushes in place.
- Carefully pull centring plate (item 5) and armature (item 6) out of motor housing. Fig. IV2-2a
- Thoroughly clean armature shaft and tapered bore of drive pinion (e.g. with LOCTITE Quick Cleaner No. 706). Fig. IV2-2b

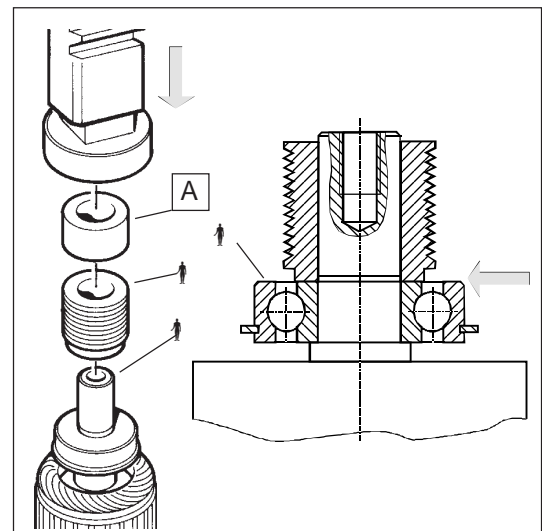
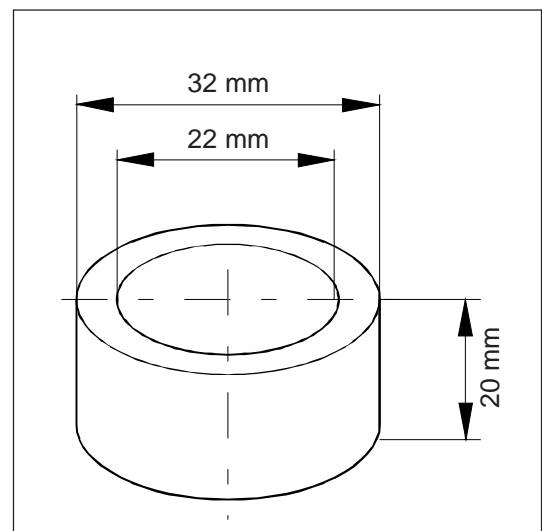


Fig. IV2-2b



Tapered bore and armature shaft must be grease and oil-free.

- Coat armature shaft with glycerine. Push drive pinion (item 1) onto armature shaft (item 2) until it begins to fit firmly.
- Check push-on distance with feeler gauge. Push-on distance: min. 1.5 mm/max. 4.3 mm. If push-on distance lies outside the specified values, a different drive pinion must be used.
- Position mounting sleeve "A" and carefully press on drive pinion using hand press until it rests on motor bearing. Theoretical press-on force: 30 kN. Fig. IV2-2b



Mounting sleeve "A"



Check that pinion is resting on motor bearing (item 3). No joint gap (†) is permitted. Remove pressed-out glycerine.

- e) Before inserting armature (item 1), check whether corrugated washer (item 2) is lying in bearing seat of B end plate. Carefully guide armature into motor housing and insert into end plate. Fig. IV2-2c
- f) Push carbon brushes (item 3) against commutator. Make sure that pressure springs (item 4) are positioned on carbon brushes.
- g) Mount protective screen (item 5).
- h) Mount centring plate.

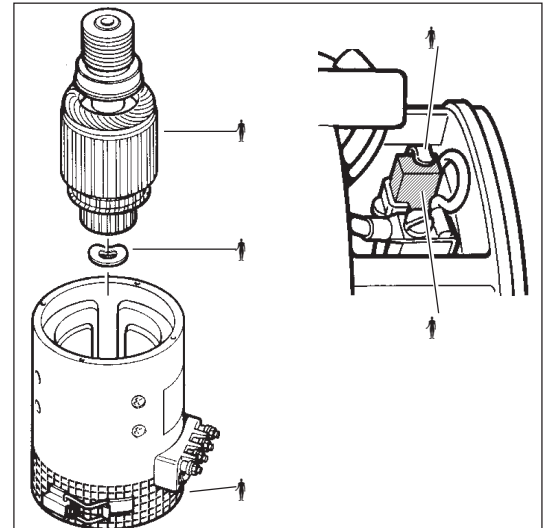


Fig. IV2-2c

2.3 Mounting motor



Swivel bearing must be mounted on transmission before mounting electric motor.

- a) Unscrew transmission cover.
- b) Carefully thread motor bearing into transmission bearing seat. Push together motor and transmission until they make contact.



Motor must be mounted carefully to transmission in order not to damage motor bearing and bearing seat in transmission. Do not strike motor or transmission with hammer or similar tools!

- c) Turn motor housing so that hole pattern from transmission to motor is aligned.



Ensure proper positioning of cable terminal strip.

- d) Screw together motor and transmission with 4 hexagon bolts (item 1) - M5x25 for 125 mm dia. or M6x25 for 150 mm dia. - and washers (item 2).
Tightening torque:
M5 - 5.4 Nm for 125 mm dia. electric motor
M6 - 9.3 mm for 150 mm dia. electric motor
Fig. IV2-3

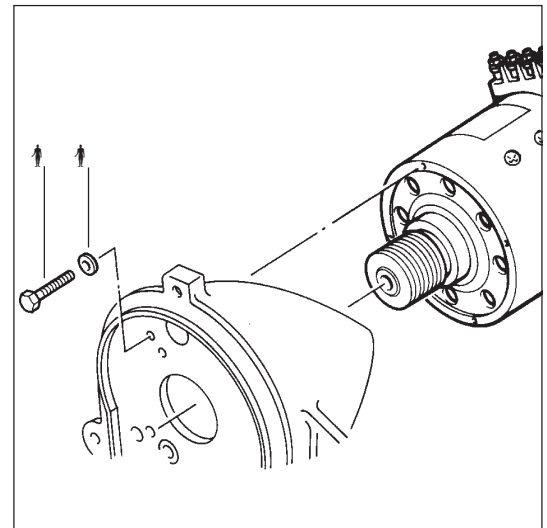


Fig. IV2-3

2.4 Mounting Poly-V-belt



In order to be able to carry out subsequent work, transmission must be set up and secured so that wheel shaft or mounted drive wheel can turn. Electric motor must be electrically connected. See connection diagram in Section 7.1.



Increased accident danger!
To tension belt, transmission must be driven by motor. Do not allow fingers or clothing to come near unit with transmission running! Wear close-fitting clothes!

- a) Remove hexagon bolt (item 1) and washer (item 2).
 Fig. IV2-4a



The profiles of drive pinion and brake drum must be free from rust and grease.

- b) Lay belt (Poly-V-belt) (item 3) around drive pinion (item 4) and output pulley (item 5).
- c) Pretension the drive belt using a torque wrench with 17 mm socket by tightening the tensioner pulley nut (item 1) (turning in clockwise direction) to a torque of 15 Nm. Tensioner pulley (item 2) is pressed against the drive belt. Fig. IV2-4b



Tensioner is held in place by detent pawl (item 3).

- d) Read off the number of the notch in which detent pawl (item 3) is engaged (e.g. 14).
- e) From the diagram below, determine the necessary tightening torque corresponding to the notch number read off. Example: Notch number 14 corresponds to a tightening torque of 50 Nm for the initial tensioning.

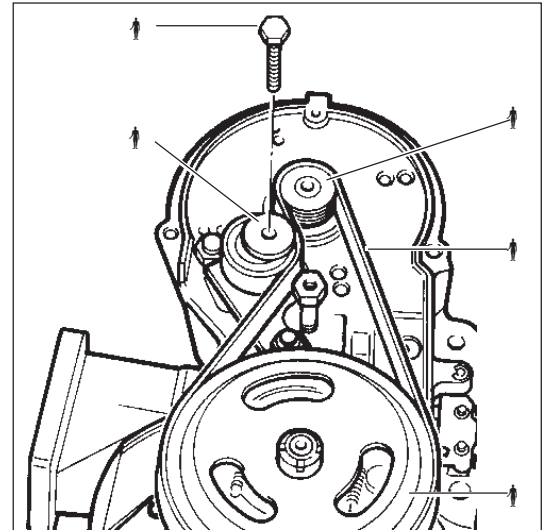


Fig. IV2-4a

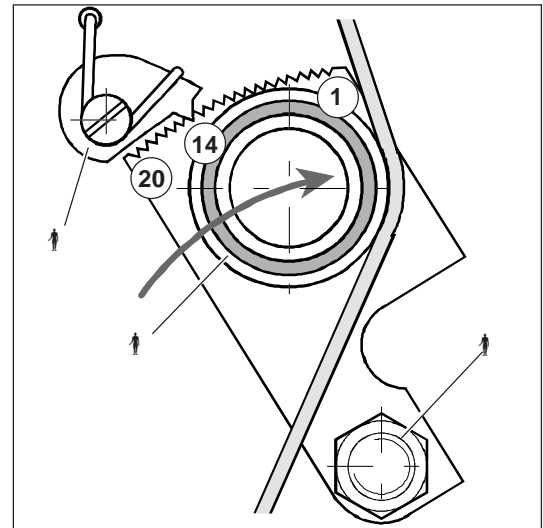
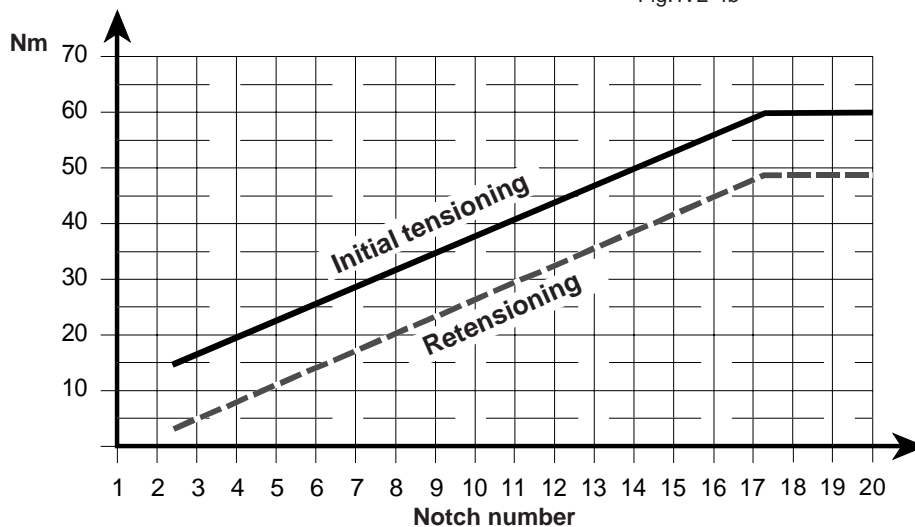


Fig. IV2-4b



- f) Run the motor at approx. 100 to 200 rpm. Tension the drive belt by tightening tensioner pulley nut (item 1) (turning in clockwise direction) to the determined torque using a torque wrench with 17 mm socket. Tighten further until the detent pawl engages in the next higher notch number. Fig. IV2-4b



Detent pawl (item 3) must be properly engaged.

- g) After completing assembly, stop motor and disconnect.
- h) Screw in hexagon bolt (item 1) with washer (item 2). Tightening torque: 23 Nm.
Fig. IV2-4c
- i) Mount cover on housing with 2 flange-head bolts. Tightening torque: 10 Nm

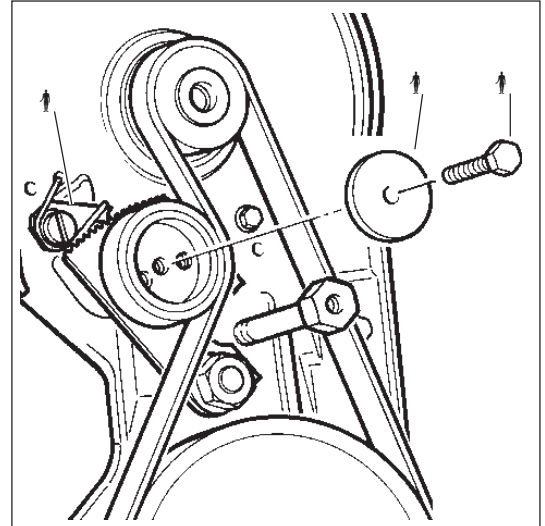


Fig. IV2-4c

3. Mounting drive wheel



Before mounting drive wheel, make sure that swivel bearing (item 1) is mounted.

The drive wheels listed in chapter *Technical Data* can be used.

Centring and mounting of drive wheels takes place via centring diameter of wheel shaft and with M12 hexagon bolts.

- a) Thoroughly clean contact surfaces on wheel shaft (item 2) and drive wheel (item 3) (e.g. with LOCTITE Quick Cleaner No. 706) and check for damage.



Do not allow cleaning agents to come into contact with skin, do not drink or inhale fumes. Wear protective gloves and goggles. If cleaning agent has accidentally been drunk, contact a physician immediately. The manufacturer's information must also be observed.

- b) Align hole pattern of drive wheel with hole pattern of wheel shaft and position drive wheel on centring device.
- c) Screw on drive wheel with 4 hexagon bolts (M12x30) (item 4). Tighten bolts diagonally.
Tightening torque: 77 Nm
Fig. IV3-1

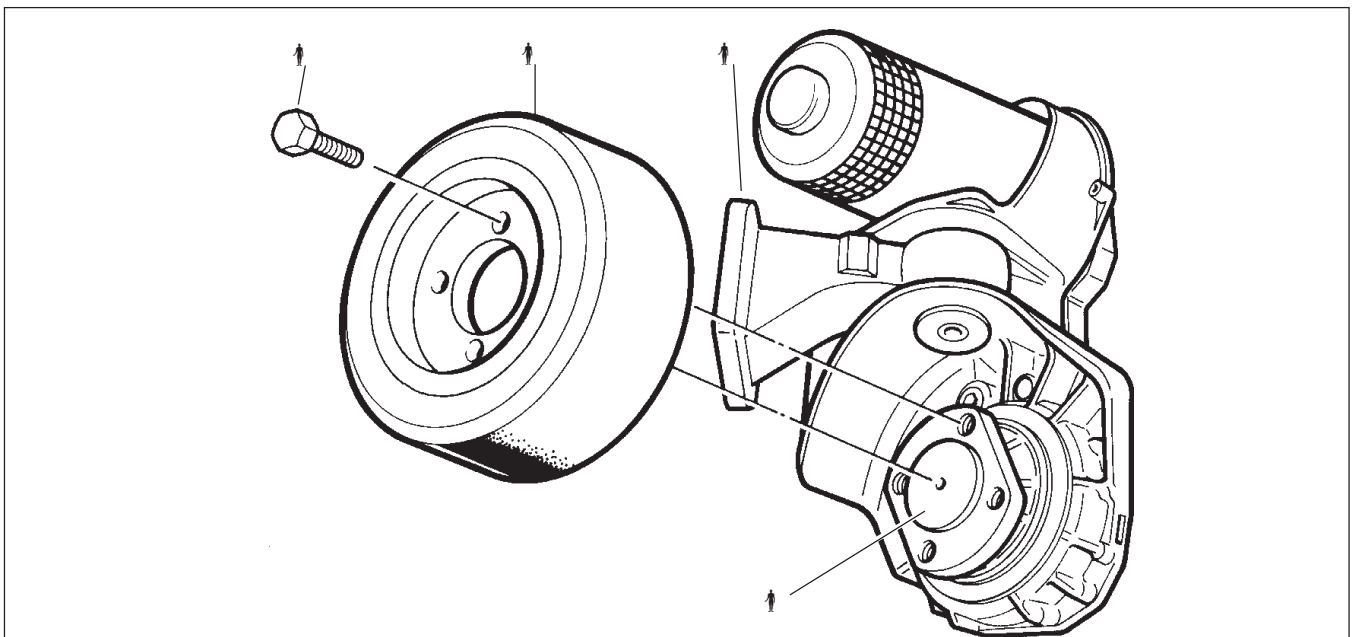


Fig. IV3-1

4. Adjusting Brake

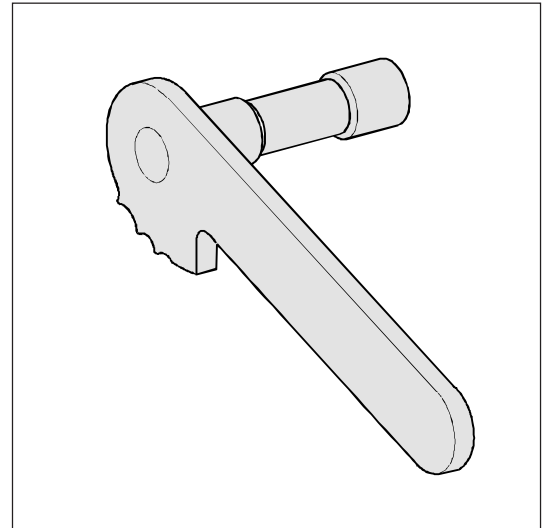


The brake unit has already been adjusted at the factory. However, should readjustment be necessary for any reason, the following points must be observed. The adjustment cam "B" is required for adjustment.

Adjustment cam

Special tool "B", Ident No.: 490319

- a) Insert adjustment cam "B" in corresponding housing hole. Position cam on sleeve of actuating lever (item 1).
- b) Turn adjustment cam to position III. Fig. IV4-1
- c) Loosen lock nut (item 2) and adjust set screw (item 3) until brake jaws rest firmly on brake drum. Brake drum cannot be turned in this position.
- d) Turn back set screw until brake drum can be turned with slightly scraping brake jaws.
- e) Lock set screw hand-tight in this position with nut.
- f) Turn adjustment cam to position IV. Brake jaws may no longer scrape on brake drum.
- g) Remove adjustment cam.



Adjustment cam "B"

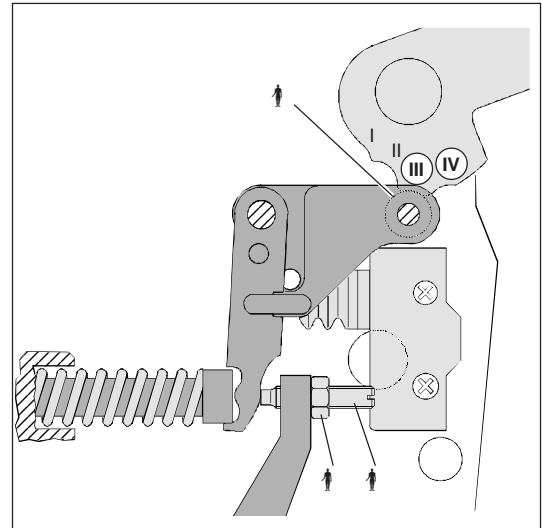


Fig. IV4-1

5. Adjusting electric switch



The brake unit has already been adjusted at the factory. However, should readjustment be necessary for any reason, the following points must be observed. The adjustment cam "B" is required for adjustment. See Section 4. Adjust mechanical brake actuation unit before adjusting electric switch.

- a) Insert adjustment cam "B" in corresponding housing hole. Position cam on sleeve of actuating lever (item 1).
- b) Turn adjustment cam to position III.
- c) Loosen screw (item 2) a few turns and move electric switch (item 3) until switching point can be heard.
- d) Tighten screw hand-tight. Fig. IV5-1
- e) A functional check is possible using a connected test lamp. Switching function must lie between cam positions II and III.
- d) Remove adjustment cam. Mount shaft foot and switching cam, see Section 6.

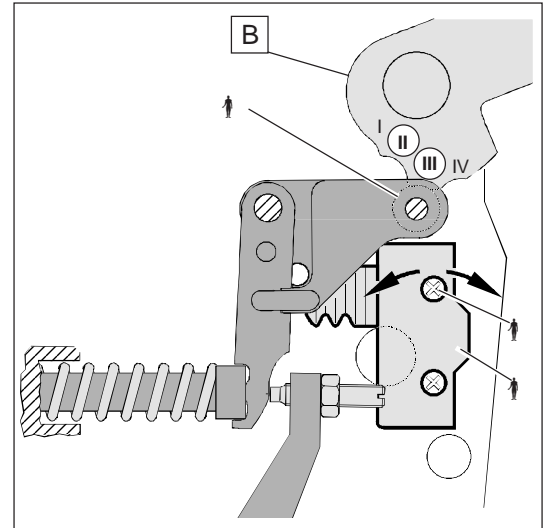


Fig. IV5-1

6. Mounting handle root



Check whether sliding flange sleeves (item 1) are fitted in mounting holes on housing and flanges contact housing.

- a) Align hole of handle root (item 2) to corresponding hole on transmission housing.
- b) Insert switching cam (item 3) through hole on housing and into handle root.
- c) Align hole on switching cam with threaded hole in handle root.
- d) Mount switching cam on handle root with M6x12 hexagon bolt (item 4). Tightening torque: 9.3 Nm Fig. IV6-1

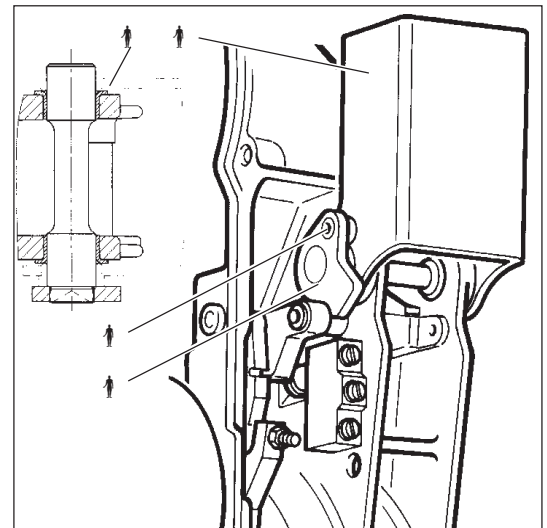


Fig. IV6-1

7. Installing motor/transmission unit in vehicle

The motor/transmission unit is bolted to the vehicle via the swivel bearing and must not be subjected to any impermissible twisting forces.

The motor/transmission unit can be turned in the horizontal direction to both sides by 90°. A corresponding gap on the vehicle frame must be provided. The cable must be routed accordingly.



Please observe the corresponding regulations of the vehicle manufacturer.

7.1 Connecting electric motor

The electric motor must be connected to the vehicle electrical system as shown in the circuit diagram.

Fig. IV7-1

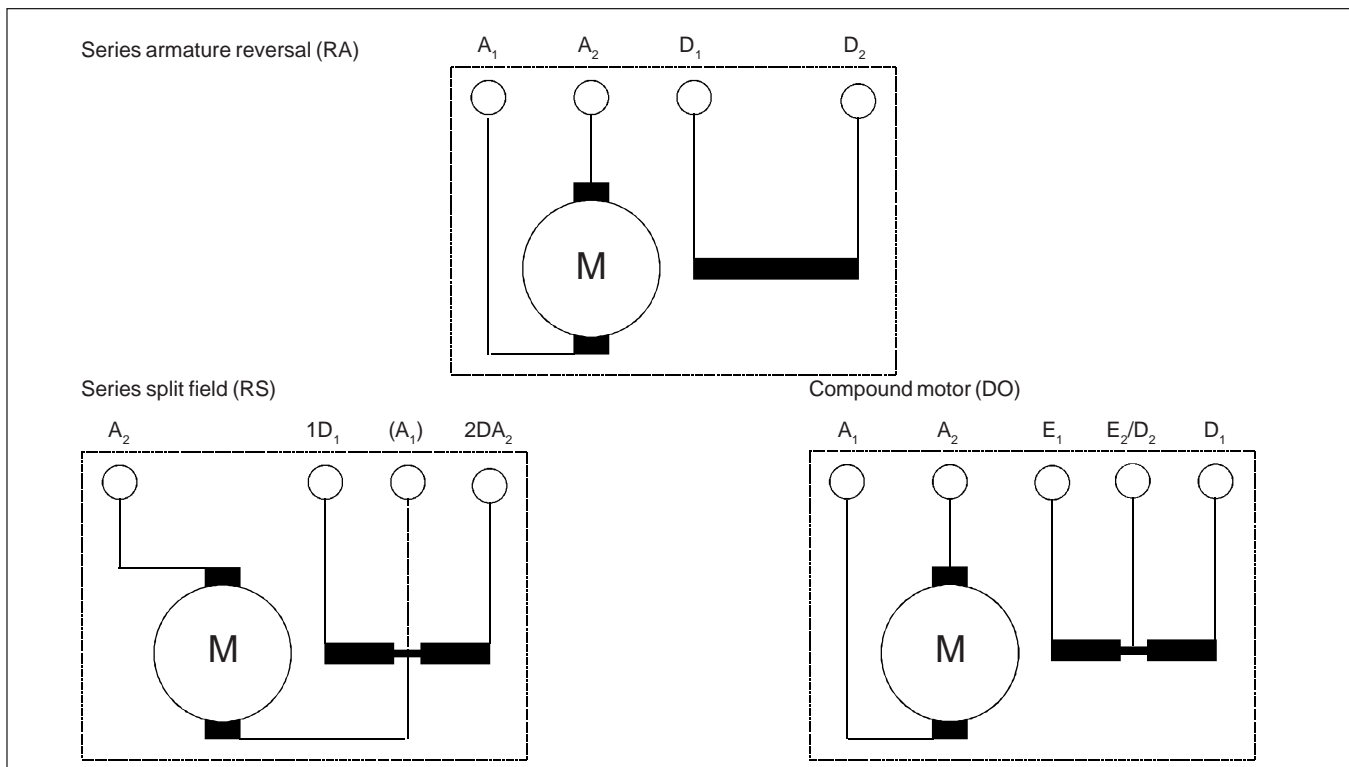


Fig. IV7-1

7.2 Connecting the electric switch

The electric switch must be connected to the vehicle electrical system as shown in the circuit diagram.

Connection 1 - 2

Electric circuit is closed

Electric switch is pressed - Electric circuit will be interrupted

Connection 1 - 3

Electric circuit is interrupted

Electric switch is pressed - Electric circuit will be closed

Fig. IV7-2

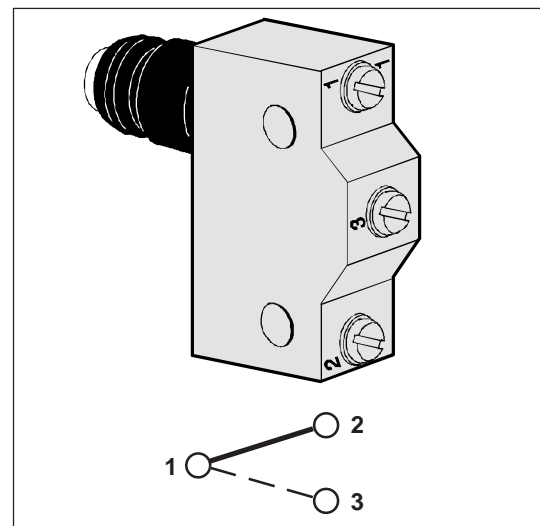


Fig. IV7-2

1. Maintenance intervals

The transmission and the bearings are lubricated for the life of the unit.

The drive belt requires no special maintenance. Care products of grease or wax may not be used. In order to prevent damage to the profile by foreign bodies, the cover must always be mounted. Sufficient belt tension ensures a high level of operating safety and long service life.

See the corresponding maintenance instructions to perform maintenance on the electric motor.

After every 200 operating hours or every 3 month

- Visual inspection for damage
- Check operation of brake actuation unit and electric switch
- Check electrical connections
- Check tension of belt

After every 400 operating hours or every 6 month

- Inspect mounting bolts
- Tightening torques:
- | | | |
|--------------------------------|-----|----|
| Drive wheel: | 77 | Nm |
| Electric motor 125 mm dia.: | 5,4 | Nm |
| Electric motor 150 mm dia.: | 9,3 | Nm |
| Cover: | 10 | Nm |
| Transmission to vehicle frame: | 46 | Nm |

After every 800 operating hours or every 12 month

- Check drive wheel wear

2. Checking electrical connections

Check before initial start-up whether the electrical connections of the motor and the electric switch have been made as shown in the circuit diagram. See *Installation chapter, Fig. IV7-1 and IV7-2*.

The vehicle remains braked with the handle root folded up. The electric switch which intervenes in the control of the driving motor has interrupted the current supply.

By tipping the handle root, the brake is vented and the vehicle can be moved.

3. Checking belt tension



It must be ensured before beginning work that the voltage supply to the electric motor is disconnected.

- a) Unscrew cover.
- b) Unscrew bolt (item 1) and washer (item 2). Fig. V3-1a



The profiles of drive pinion and brake drum must be free from rust and grease.

- c) Read off the number of the notch in which detent pawl (item 1) is engaged (e.g. 14). Fig. V3-1b
- d) From the diagram below, determine the necessary tightening torque corresponding to the notch number read off. Example: Notch number 14 corresponds to a tightening torque of 38 Nm for retensioning.

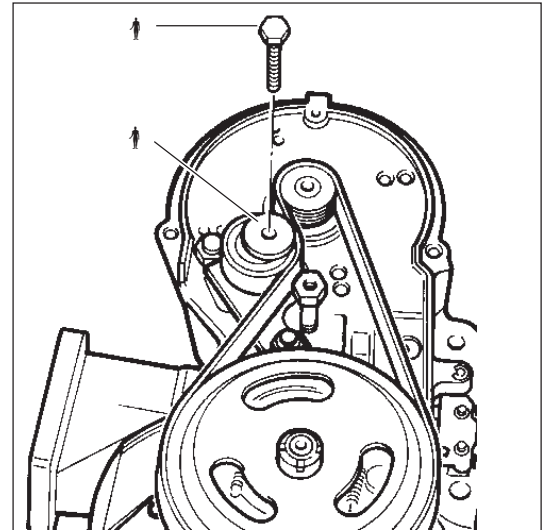


Fig. V3-1a

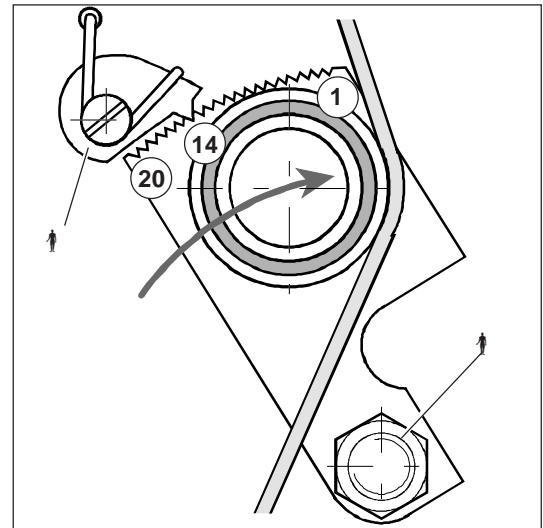
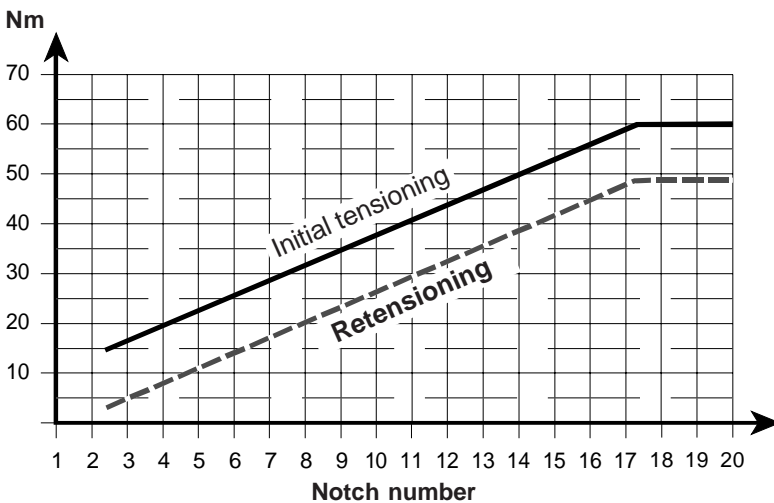


Fig. V3-1b

- e) Retension the drive belt using a torque wrench with 17 mm socket by tightening the tensioner pulley nut (item 2) (turning in clockwise direction) Fig. V3-1b



Detent pawl (item 1) must be engaged. Fig. V3-1b



If a new drive belt is fitted, follow the sequence of steps described in chapter *Installation, paragraph 2.4.*

- f) Screw in hexagon head bolt (item 1) with washer (item 2). Tightening torque: 23 Nm Fig. V3-1c
- g) Screw plastic cover to the housing with 2 screws. Tightening torque: 10 Nm

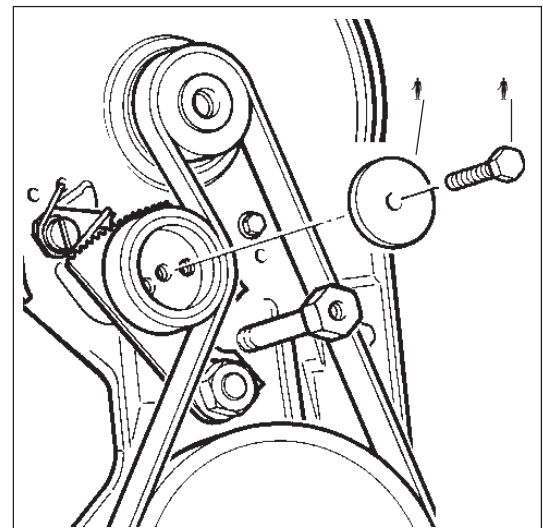


Fig. V3-1c

4. Readjusting brake actuation unit

If the brake effect drops, the brake must be adjusted.

The necessary procedure is described in the *Installation chapter, Section 4*.

After completing brake adjustment, the electric switch must also be readjusted. To do this, follow the work procedure in the *Installation chapter, Section 5*.



If the required brake effect is still insufficient, then the position of the brake lever to the brake T-screw in the wedged toothing can be changed by one tooth toward the transmission.

Procedure:

- Move actuating lever (item 1) toward transmission centre until 5 mm dia. drift can be inserted through housing hole and levers can be held in this position.
Fig. V4-1
- Mark position of brake lever (item 2) to brake T-screw (item 3). Loosen clamping screw (item 4) of brake lever and press brake lever off brake T-screw using screwdriver.
- Move brake lever one tooth toward transmission centre, fit brake lever on brake T-screw and tighten clamping screw.
Tightening torque: 13 Nm
- Hold actuating lever (item 1) in place, pull drift out of hole and slowly move actuating lever against brake lever.



Brake and electric switch must be readjusted.

The necessary procedures are described in the *Installation chapter, Sections 4 and 5*.

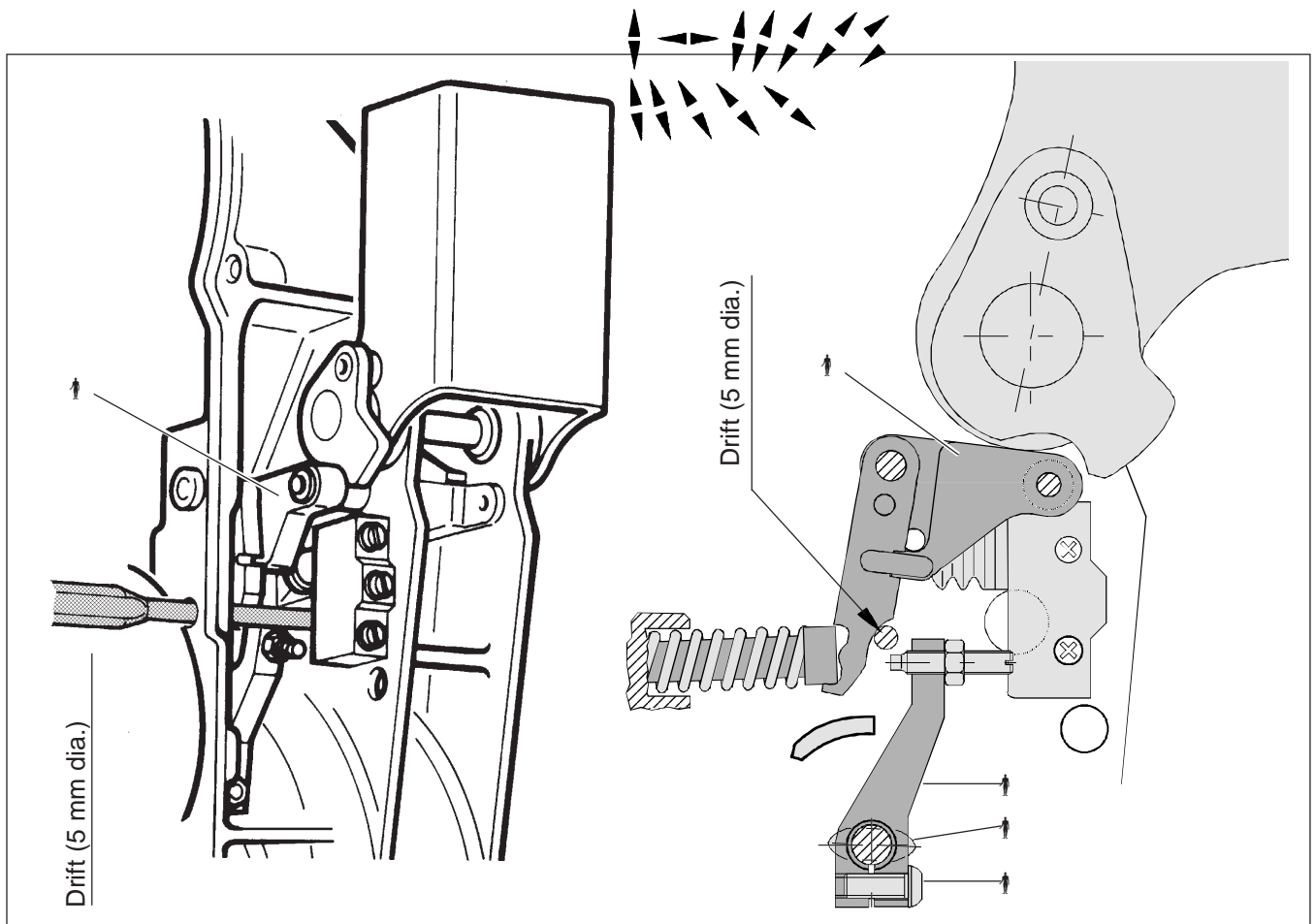


Fig. V4-1

5. Checking brake jaw wear and replacing brake jaws



Brake jaws are only subjected to a certain degree of wear, as brake is not used during normal driving.



Make sure that power supply to electric motor is disconnected before beginning work.

- a) Remove cover.
- b) Remove bolt (item 1) with washer (item 2).
- c) Move detent pawl (item 3) out of tensioner tothing (item 4) with screwdriver. Belt is relaxed.
Fig. V5-1a
- d) Move handle root into "brake actuated" position. Unscrew slotted nut (item 1).
Fig. V5-1b
- e) Move handle root into "brake released" position. Brake drum (item 2) can be turned.
- f) Pull brake drum off pinion shaft with three-arm puller.
- g) Brake jaws (item 3) must be replaced if:
 1. lining thickness is only approx. 1 mm
 2. brake lining is glazed
 3. brake lining is heavily worn on one side



Brake jaws may only be replaced as a pair.

- h) Unhook tension springs (item 4). Take off brake jaws.
Fig. V5-1b
- i) Remove O-ring (item 5).
- j) Completely remove LOCTITE residue on wedge tothing of brake drum and pinion shaft (item 6). Clean brake drum thoroughly. Fig. V5-1b



Do not use cleaning agents which contain mineral oil.



Do not allow aggressive cleaning agents to come into contact with skin, do not drink or inhale fumes. Wear protective gloves and goggles. If cleaning agent has come into contact with skin, flush immediately with plenty of water. If it has accidentally been drunk, contact a physician immediately. Observe accident prevention regulations.

- k) Remove all grease from wedge tothing and push on new O-ring (item 5) until it contacts ball bearing (item 7) on pinion shaft (item 6).
Fig. V5-1b

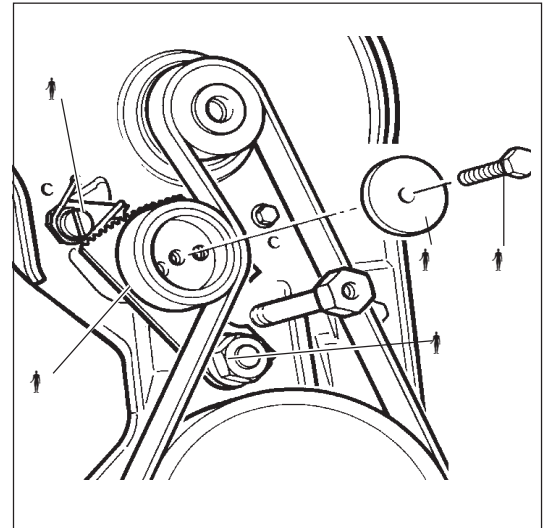


Fig. V5-1a

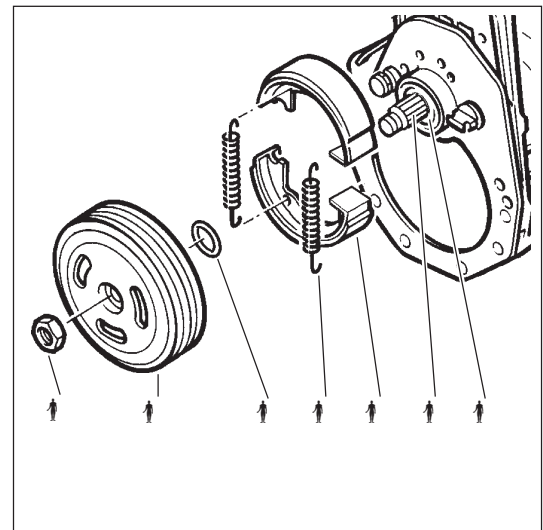


Fig. V5-1b

- l) Fit brake jaws (item 3) on proper side. Hook in tension springs (item 4) so that opening of spring eye faces toward transmission.
- m) Moisten wedge toothing of brake drum (item 2) all round with LOCTITE No. 245 and push on brake drum until it rests on ball bearing on pinion shaft. Completely remove any excess LOCTITE.
- n) Screw on new slotted nut (item 1). Move shaft foot to "brake actuated" position and tighten slotted nut. Tightening torque: 30 Nm
Fig. V5-1b
- c) Fit drive belt as described in chapter *Installation, paragraph 2.4.*

6. Cleaning

Do not bring cleaning agents, such as water stream or hot steam, into direct contact with the motor/transmission unit. Use compressed air if necessary.

Soften stubborn dirt on transmission housing with a suitable cleaning agent, e.g. LOCTITE Quick Cleaner No. 706 and allow to work for some time. Then remove with a brush, cleaning cloth and/or cleaning brush.



Do not allow cleaning agent to get into motor ventilation.



Do not allow aggressive cleaning agents to come into contact with skin, do not drink or inhale fumes. Wear protective gloves and goggles. If cleaning agent has come into contact with skin, flush immediately with plenty of water. If it has accidentally been drunk, contact a physician immediately. Observe accident prevention regulations.

1. Transmission

Max. drive output	kW	0.9
Max. wheel load	kg	800
Acceleration torque at drive wheel	Nm	350
Constant torque at drive wheel	Nm	140
Brake torque at drive wheel	Nm	450
Weight with motor 125 mm dia.	kg	35
Weight with motor 150 mm dia.	kg	38

2. Gear Ratios

Serial No.	Gear ratio i	Drive pinion d ₀ [mm]
1	22.6	41.4
2	23.1	40.4
3	25.0	37.2

3. Drive wheels

Type	D/B-do mm	X* mm	Loading capacity empty V 6km/h kg
All rubber	230/90	+5	800
Vulkollan	230/80	0	800

* See installation drawing

4. Electric Motors

There are four DC motor models with the related assembly parts to choose from

	Series connection					Compound motor (DO) 125 mm dia.
			Amature reversal (RA)			
			Splitfield (RS)			
		125 mm dia.	125 mm dia.	150 mm dia.		
Output	S2 60'	kW	0.90	0.56	0.90	0.70
	S2 5'	kW	1.50	1.50	1.50	2.30
Torque	S2 60'	Nm	4	4	4	2.50
	S2 5'	Nm	14	14	14	11.50
Speed	S2 60'	rpm	2050	2050	2050	3095
	S2 5'	rpm	1000	1000	1000	1900
Power consumption max. permissible at 20°C	S2 60'	A	55	55	55	37.20
	S2 5'	A	136	136	136	136
		A	180	180	180	
Nominal voltage		V	24	24	24	24