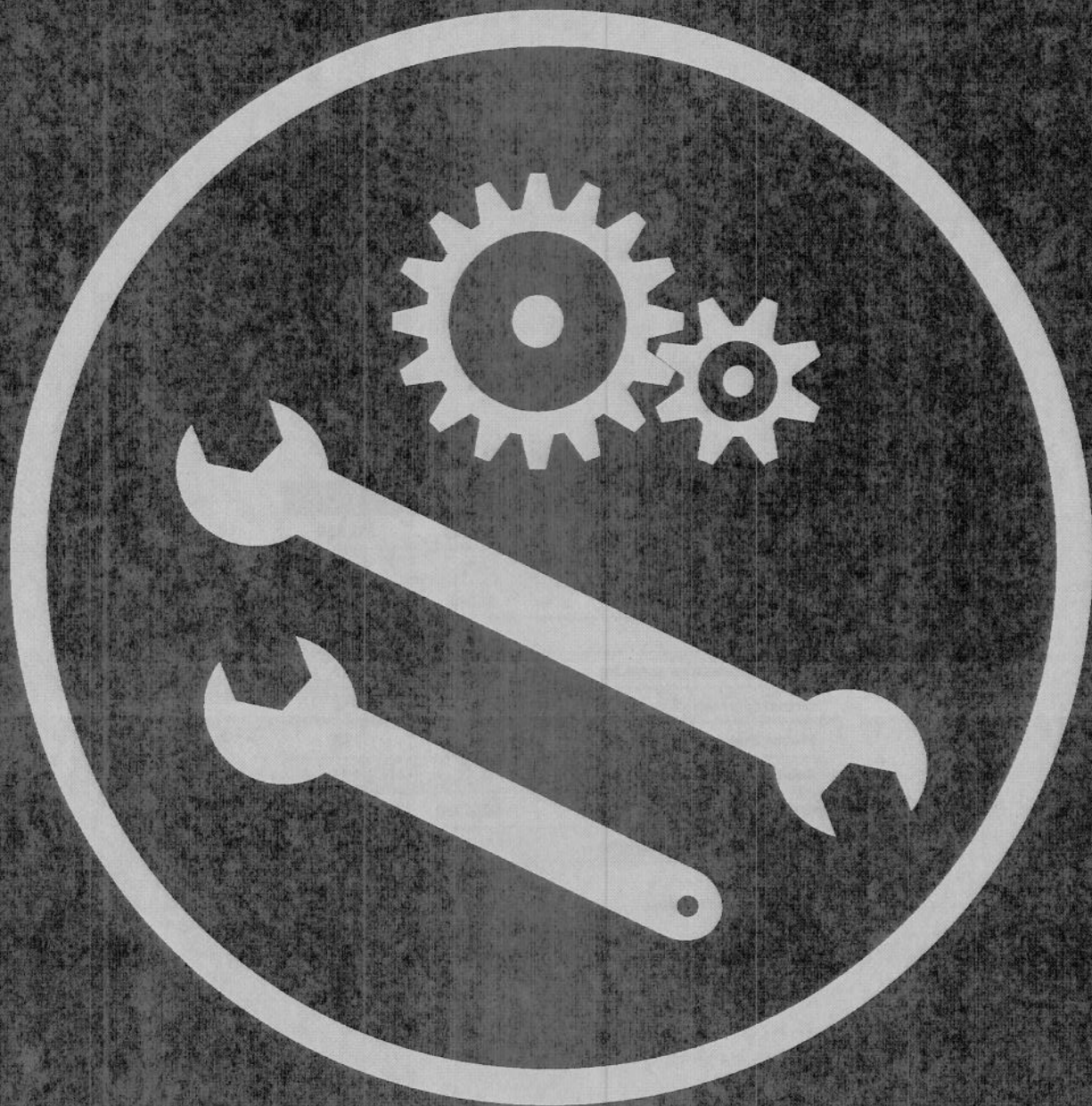


 **Husqvarna**



**GB**

**Workshop manual**  
**PG 680/820**



**HUSQVARNA CONSTRUCTION PRODUCTS**

### Technical data

Feature	Data	
	PG 680	PG 820
<b>Model</b>		
<b>Grinding width, mm</b>	680	820
<b>Grinding disc, mm</b>	3×240	3×270
<b>Weight, kg</b>	385	440
<b>Grinding pressure total, kg</b>	300	335
<b>Grinding pressure per disc, kg</b>	100	112
<b>Motor Power, kW</b>	12.5	12.5
<b>Power per grinding disc, kW</b>	4.15	4.15
<b>Grinding disc speed, rpm</b>	600–1200	250–1100
<b>Planetary head speed, rpm</b>	5–70	5–65
<b>Direction of rotation</b>	Independent FWD/REV direction control on both grinding discs and planetary head	
<b>Power supply</b>	380–480V   3-phase   32A	

# **HUSQVARNA**

## **PG**

### **680/820**

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**Chemical substances**

When performing service tasks involving the use of chemical substances (such as silicone or retainer compounds), please refer to the instructions from the manufacturer.

**Workshop Manual**

The Workshop Manual includes virtually all workshop procedures that can come into question on the PG 680/820. Some very simple and self-evident repairs have been omitted.

**OUTLINE**

An introductory section with the title "Dismantling into Basic Modules" shows how the machine is dismantled into large component units, for example, Chassis/Frame section, comprising: handle bars, electrical cabinet, steel frame, wheels and the Head, comprising: motors, cover, grinding/satellite/planetary heads and internal components.

The manual goes on to describe in detail through the different chapters how work on the basic modules should be carried out.

This arrangement means that as a mechanic, at least until you have learnt the basic composition of the machine, you need to start with the chapter "Dismantling into Basic Modules" to then move on to the chapter covering the specific service work.

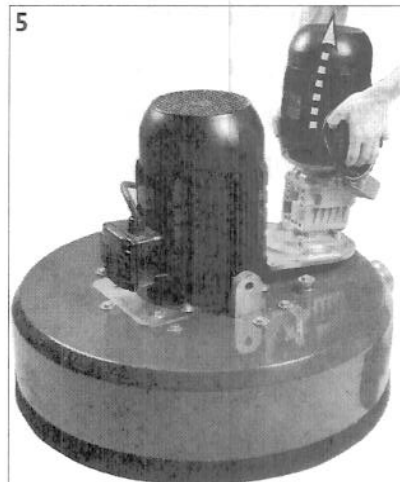
**LAYOUT - PICTURES AND TEXT**

The pictures are mostly enough to guide the mechanic through the various procedures. The text on the right hand column has further references and explanations for the repair work on the planetary grinder.

**CONTENTS**

The manual is divided into numbered chapters with chapter headings that are stated in bold at the top of each page.

The list of contents also has page references at the start of each chapter.

**"Dismantling into Basic Modules"**

## Service & Maintenance check

### MECHANICAL CHECKS | EXTERNAL

Description	Time required
Tilt unit back check for and remove any Diamond tools	2 min
Check Shroud for damage affecting planetary rotation, satellite rotation, planetary seal efficiency and extraction efficiency.	5 min
Unplug the planetary drive to reduce operating noise and Run the discs through the range of speeds listening for any bearing noises that may be caused by bearings that are deteriorating	5 min
Unplug small motor and run discs at low speed to assess how true discs are running	5 min
Remove belt inspection cover plates to assess condition of belt, cleanliness of inside of machine and moisture levels inside machine.	10 min
Check head locks for tightness and tighten where required using a medium bond thread retaining compound / 3 per satellite	5 min
Check satellites for excess movement or inconsistent movement in relation to other satellites. If one or more heads are not running true, disassemble all heads.	15 min if dismantling required
Check spring steel leaf for cracking or inconsistent wear on each head, inspect spring cushion for tears or excess deterioration	10min
Reassemble Satellites	15 min
Check V70 dust seals for condition and wear. ( replace each service)	5 min
Unplug large motor and plug small motor back in. Run planetary head through a range of speeds to and listen for smoothness of operation.	5 min
Remove planetary drive gearbox from gearbox mounting bracket and check condition of sprocket and chain-ring.	5 min
Replace sprocket if required (abnormal wear or rounding teeth)	30 min
Replace chain ring if packed with debris or chain worn out (opening of rollers)	30 min
With planetary drive removed, check for presence of dust on top surface of machine. If large amounts of dust is present, remove machine cover and check condition of planetary head seal and replace if necessary.	20 min if cover needs removal
Reassemble	20 min

### MECHANICAL CHECKS | INTERNAL

Description	Time required
Tilt unit back check for and remove any Diamond tools	2 min
Check Shroud for damage affecting planetary rotation, satellite rotation, planetary seal efficiency and extraction efficiency.	5 min
Unplug the planetary drive to reduce operating noise and Run the discs through the range of speeds listening for any bearing noises that may be caused by bearings that are deteriorating	5 min
Unplug small motor and run discs at low speed to assess how true discs are running	5 min
Remove belt inspection cover plates to assess condition of belt, cleanliness of inside of machine and moisture levels inside machine.	10 min
Check head locks for tightness and tighten where required using a medium bond thread retaining compound / 3 per satellite	5 min
Check satellites for excess movement or inconsistent movement in relation to other satellites. If one or more heads are not running true, disassemble all heads.	15 min if dismantling required
Check spring steel leaf for cracking or inconsistent wear on each head, inspect spring cushion for tears or excess deterioration	10 min
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Unplug large motor and plug small motor back in. Run planetary head through a range of speeds to and listen for smoothness of operation.	5 min
Remove planetary drive gearbox from gearbox mounting bracket and check condition of sprocket and chain-ring.	5 min
Replace sprocket if required (abnormal wear or rounding teeth)	30 min
Replace chain ring if packed with debris or chain worn out (opening of rollers)	30 min
With planetary drive removed, check top surface of machine for presence of dust. If large amounts is present, remove machine cover and check condition of planetary head seal and replace if necessary.	20 min if cover needs removal

## Service &amp; Maintenance check

## ELECTRICAL CHECKS

Description	Time required
Follow all leads for damage, pulled or exposed wires be sure to check inside both motor terminal boxes and lead hoods.	10 min
Inspect all glands- motor, drive cables, control panel, cabinet	5 min
Inspect control panel for damaged or broken switch gear.	5 min

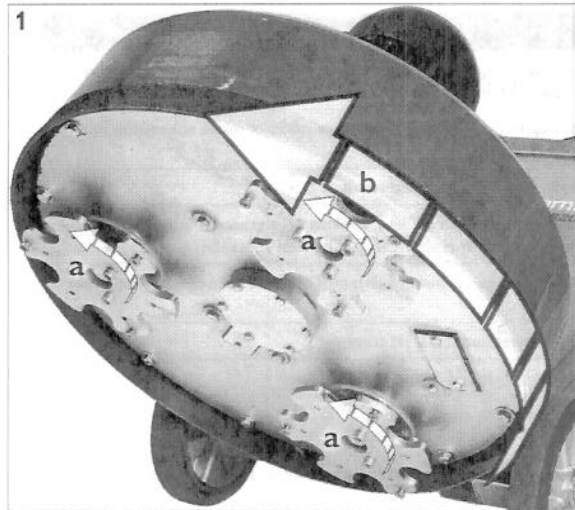
With motors disconnected, power-up drives in standby mode (using power button near handle bars).

Check both cooling fans are running on top of drives.	5 min
Set displays to Output Frequency mode and run drive using STOP/RUN switch near handlebars. Small drive should ramp up to 120Hz with speed dial set to full and large drive should ramp up to 80Hz with speed dial set to full. Check in both directions.	5 min
Check fault history to assess recent faults to make sure there are no abnormal faults in history (normal faults are F9 undervoltage & F16 motor overtemp).	5 min
Power down drives and blow out with compressed air. Make sure airline is drained of moisture.	5 min
Re-check and operate all switch gear with unit tilted back and plugged in	10 min



## Faults and troubleshooting

Fault indication	Possible cause	Suggested action
<b>[1] Over current</b>	Motor being worked too hard and drawing extra current.	Check current being drawn when machine is running. Reduce speed setting and current draw back into acceptable limits as described on previous page.
	Short circuit on output side of variable speed drives or frequency converters.	Check wiring in plugs connected to motor cables or inside connection boxes on motors.
	Motor failure (very rare)	Have motor tested and replace if required.
	Poor voltage supply to machine will result in excess current draw	Poor mains supply (under 220V)   Working off a generator Using light duty power leads   Using more than 20m (65ft) power leads
<b>[3] Earth fault</b>	Short circuit on output side of variable speed drives or frequency converters.	Check wiring in plugs connected to motor cables or inside connection boxes on motors.
	Motor failure (very rare)	Have motor tested and replace if required.
<b>[9] Under voltage</b>	Insufficient voltage supply to machine.	Check power supply and ensure correct voltage.
	Power supply to variable speed drives or frequency converters has been turned off.	Re-connect power to grinder.
<b>[11] Output phase supervision</b>	Short circuit on output side of variable speed drives or frequency converters.	Check wiring in plugs connected to motor cables or inside connection boxes on motors.
	Motor failure (very rare)	Have motor tested and replace if required.
<b>[14] Unit over temperature</b>	Variable speed drives or frequency converter over temperature due to high temperature working environment or faulty temperature sensor.	Open door on electrical cabinet to increase ventilation. Have variable speed drives or frequency converter tested by service agent.
<b>[15] Motor stalled</b>	Motor being worked too hard and drawing extra current.	Check current being drawn when machine is running. Reduce speed setting and current draw back into acceptable limits as described on previous page.
	Mechanical jam preventing motor from turning.	Try rotating grinding discs and planetary head by hand to see if jam exists
<b>[16] Motor over temperature</b>	Motor being worked too hard, drawing extra current.	Check current being drawn when machine is running. Reduce speed setting and current draw back into acceptable limits as described on previous page.
<b>Grinder is hard to hold onto</b>	Not enough diamonds under the machine (if grinding thick glue or soft floors, too few diamonds under the machine will greatly increase the load on grinder and operator). Usually also accompanied by high current draw by large motor.	Increase number of diamonds under machine to reduce load on grinder and operator.
	Large motor not working (this can be caused by fault with motor, fault with wiring to motor, or fault with large variable speed drive or frequency converter).	Check large motor is plugged in. Check there are no faults on larger variable speed drive or frequency converter. Check that large variable speed drive or frequency converter is on. Check that large variable speed drive or frequency converter is functioning properly (unplug both motors, set display on keypad to Output Frequency, switch machine to RUN, see if numbers on screen change from zero and begin counting up. If numbers stay on zero, large variable speed drive or frequency converter is not receiving run command from switch on control panel. Machine needs to be checked by an electrician or by Husqvarna Construction Products.
	Drive belt is slipping.	Remove belt tensioner cover plate on bottom of machine and check for water or dust on the inside of the machine that may be causing the belt to slip on the drive pulleys.
	Drive belt is broken (try turning one of the grinding heads by hand; if all rotate together, belt is not broken, if only one turns, belt is broken).	Replace internal drive belt.
<b>Grinder sounds like it is over revving</b>	Small planetary drive motor not plugged in.	Check small planetary drive motor is plugged in.
	Small motor not working (this can be caused by fault with motor, fault with wiring to the motor, or fault with large variable speed drive or frequency converter).	Check small motor is plugged in. Check there are no faults on small variable speed drive or frequency converter. Check that small variable speed drive and frequency converter is on. Check that small variable speed drive or frequency converter is functioning properly (unplug both motors, set display on keypad to Output Frequency, switch machine to RUN, see if numbers on screen change from zero and begin counting up. If numbers stay on zero, small variable speed drive or frequency converter is not receiving run command from switch on control panel. Machine needs to be checked by an electrician or Husqvarna Construction Products.
<b>Grinder is jumping around</b>	Grinding heads may be worn-out or damaged.	Check grinding heads for broken parts or excess movement.
	Diamonds may not be fitted correctly or different height diamonds may be on the grinding heads.	Check to ensure all diamonds are fitted correctly and are the same height.
	Head locks may be loose or missing.	Check to ensure all head locks are present and tight.

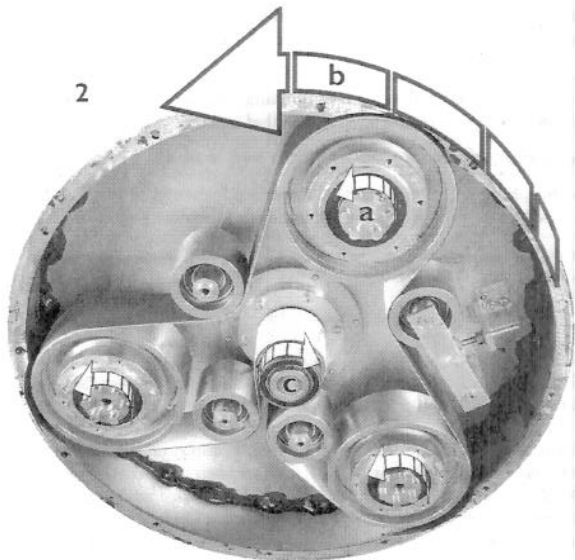


### Dual Drive Technology™

- Dual Drive Technology™ – a unique patented twin motor arrangement with separate motors for grinding discs and planetary system, which enables total control of grinding performance.

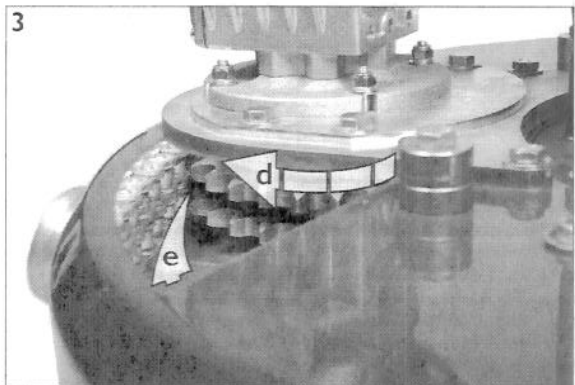
#### 1. SATELLITE HEADS – GRINDING BY ROTATION

- The diamond grinding tools are attached to the satellite heads. These heads are grinding by rotation, and can be controlled to operate with variable speed in both directions.
- The satellite heads are working together as a planetary system. This is achieved by rotating the entire planetary head to which the satellites are attached.



#### 1. SATELLITE ROTATION – BELT TRANSMISSION

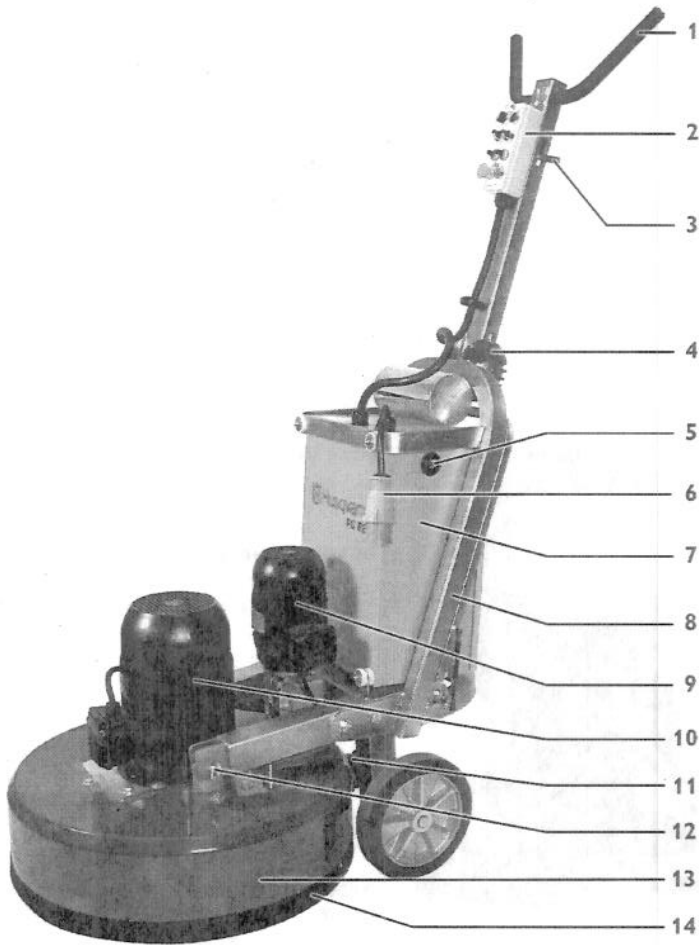
- Rotation to each of the three satellite head shafts is transmitted by a belt.
- The entire planetary head is rotated to achieve a better controlled grinding process.
- The satellite motor shaft is directly driving the belt. The motor can operate in both directions with various speed.



#### 1. PLANETARY ROTATION – SPROCKET TRANSMISSION

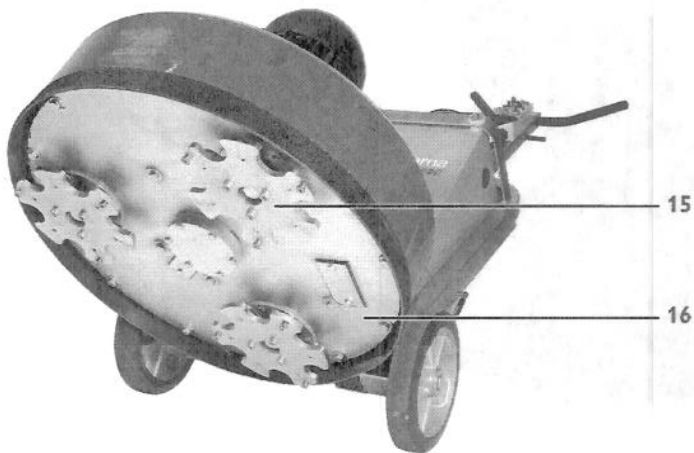
- The planetary motor power is transmitted by means of a sprocket on the motor shaft.
- The sprocket drives a chain ring, which is fixed to the planetary head, which will then rotate. Both speed and direction can be adjusted to achieve optimum grinding results.



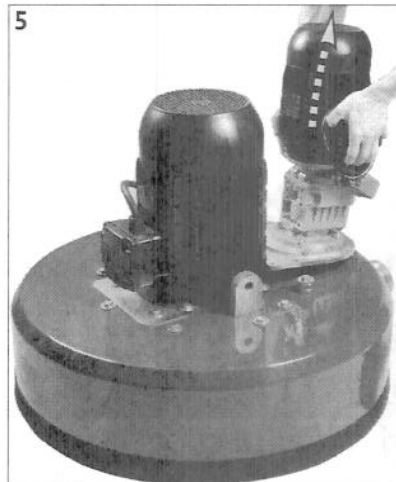
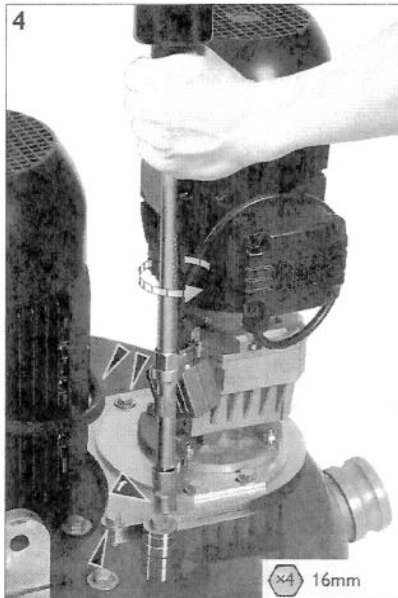
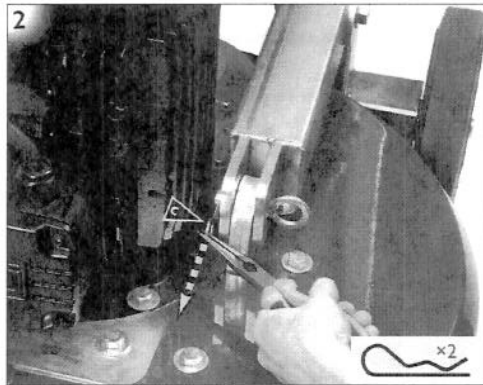
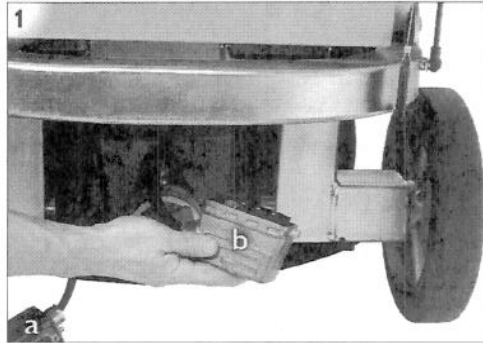


## Components

1. Handle bars
2. Control panel
3. Handle bar release
4. Handle bar adjuster
5. Hour counter
6. Electrical power connector
7. Electrical cabinet
8. Chassis / frame
9. Planetary head motor
10. Grinding/satellite heads motor
11. Dust extraction port
12. Lifting lug (attached to frame with lifting shaft with R-clips)
13. Cover / shroud
14. Velcro for attaching skirt



15. Grinding / satellite head
16. Planetary head



### Basic modules

This chapter shows how the machine is built up of basic modules, for example, the chassis / frame unit and the grinding unit and how the latter is set up in a service rack.

The purpose is to illustrate how you can easily and effectively dismantle and assemble the machine in its basic modules.


Service work on a component level, for example, the satellite / grinding drive belt, is described in detail in respective chapters.

### THE CHASSIS / FRAME UNIT

The chassis / frame unit is designed to carry, control and manoeuvre the grinding unit, which is attached by two shafts through the lifting lugs.

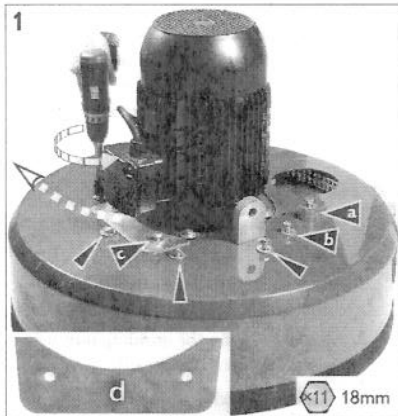
### DETACH THE GRINDING UNIT

1. Unplug the power cables for the planetary motor (a) and the satellite / grinding motor (b).
2. Remove the R-clip (c) from the lifting lug shaft on both sides.
3. Hold on to balance the chassis / frame unit (d). Pull out the lifting lug shaft (e) on both sides.

 **Attention!** The frame / chassis unit is heavy!

### REMOVE THE PLANETARY DRIVE UNIT

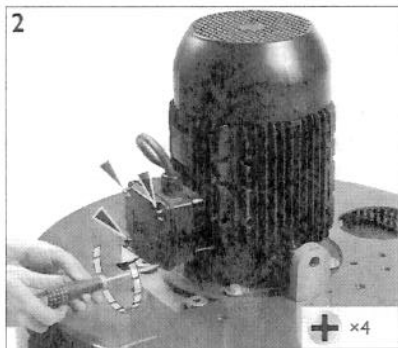
4. Remove the 4 planetary drive positioning bolts (f). Two on either side.
5. Lift off the planetary drive unit.



### THE COVER / SHROUD

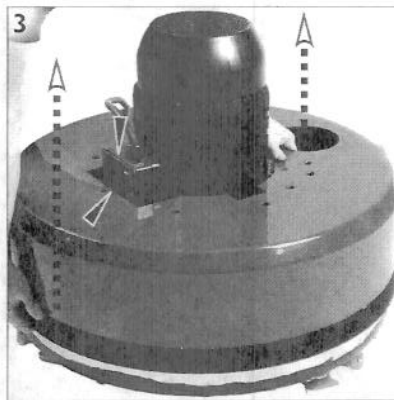
The cover / shroud protects the interior from dirt and the user from moving parts. It is fitted with high precision and a tight seal to ensure a clean environment for the gear sprockets and other moving parts.

1. Remove the following 18mm bolts:
  - (a) 2 bolts with spacers.
  - (b) 7 bolts with washers.
  - (c) 2 terminal plate bolts with washers.
  - (d) Remove the terminal cover plate.

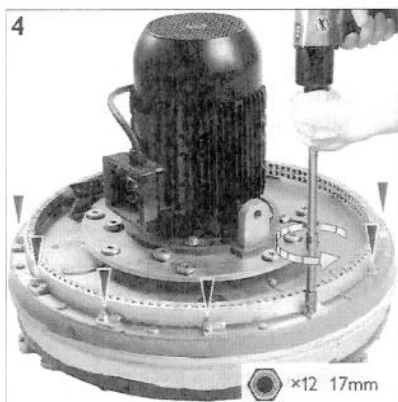


### Remove the terminal box cover

2. Loosen the 4 Phillips screws.
  - Remove the terminal box cover.

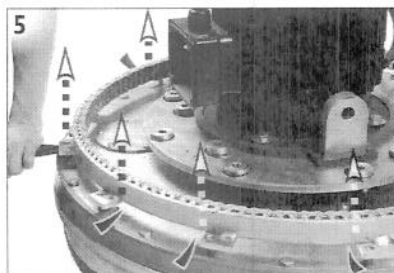


3. Turn the motor so that the electric box is straight over the slot.
  - Lift off the cover / shroud.

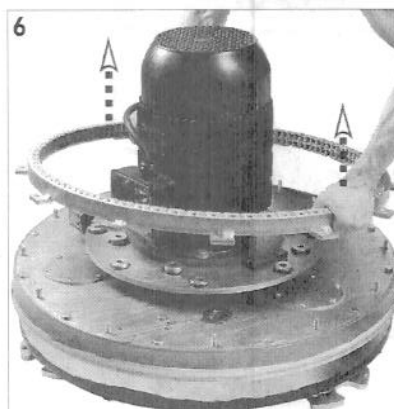


### THE CHAIN RING

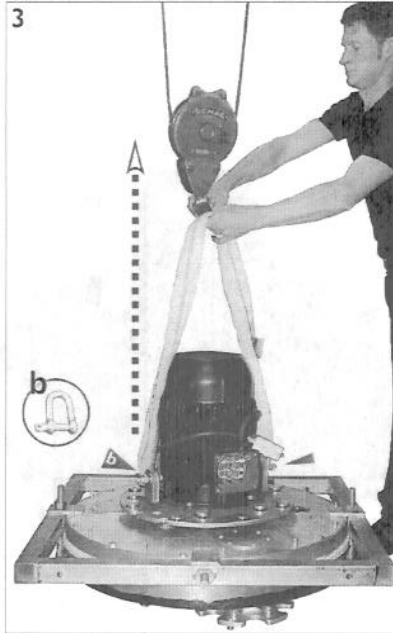
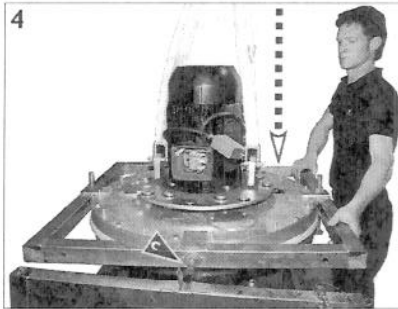
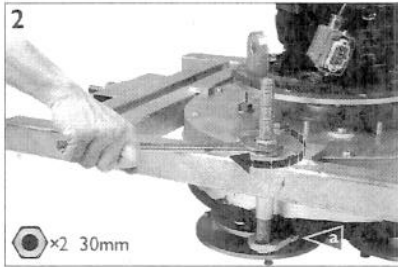
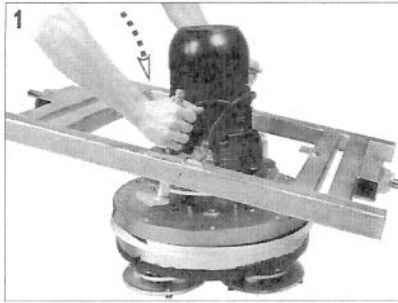
4. Remove the 12 chain ring nyloc nuts (M10):



5. Use crow bars to evenly work the chain ring off the 12 locating threads.



6. Lift off the chain ring.



### MOUNTING THE GRINDING UNIT IN A SERVICE RACK

The grinding unit is a complex piece of technology and requires various types of high precision service. This is most easily done if the unit is mounted in a service rack in which the grinding unit can be tilted around and fixed in an ergonomic position.

#### Fit on the pivoting cradle

1. Place the pivoting cradle over the grinding motor.
  - The square should fit tightly around the grinding unit's circular shape.
2. Secure cradle on the grinding unit using the clamps (a) on either side.
  - Tighten the clamp nuts with a spanner.

#### Use a power lift

Due to the weight of the unit, it should be lifted by means of a power lift.

3. Attach a lifting cable to the lifting lugs using two shackles (b).
  - Hoist the cradle up.
4. Roll the service rack in position under the grinding unit, so that the pivoting pins (c) fit in the slots on either side.
  - Lock the rack roller wheels and lower the pivoting frame in position.

### WORKING WITH THE SERVICE RACK

5. Whenever the motor is on top, the pivoting cradle is unstable due to the weight of the motor.
  - (d) Secure the cradle with one of the two corner lock pins to safely move the rack or work on the machine.



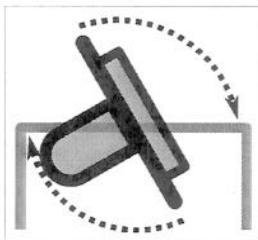
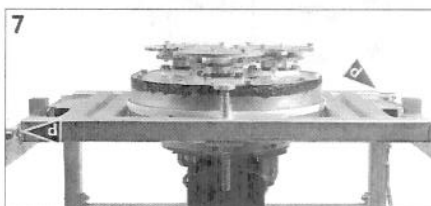
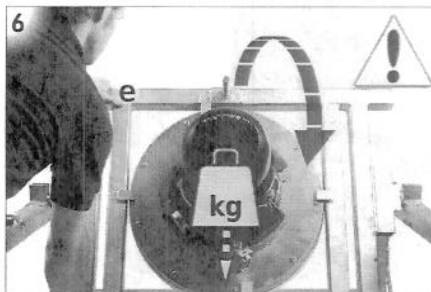
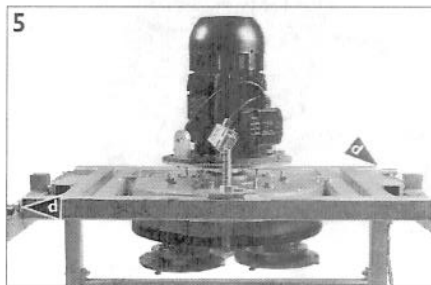
6. The motor weight will cause the pivoting cradle to tilt over rapidly! Counter this by pushing on the further side of the cradle (e).

- Remove the lock pin. Hold on and gently lower the near side of the cradle.
- Reach forwards and hold on to the further side of the cradle (e).
- Gently lower the approaching upper cradle side (e) until the cradle reaches the horizontal position.



Always draw the weight towards yourself.  
Never push the weight away as a means to pivot the cradle.

7. Secure the cradle with one of the two corner lock pins (d) to safely work with the grinding unit.



Manual symbol: Flip unit 180°

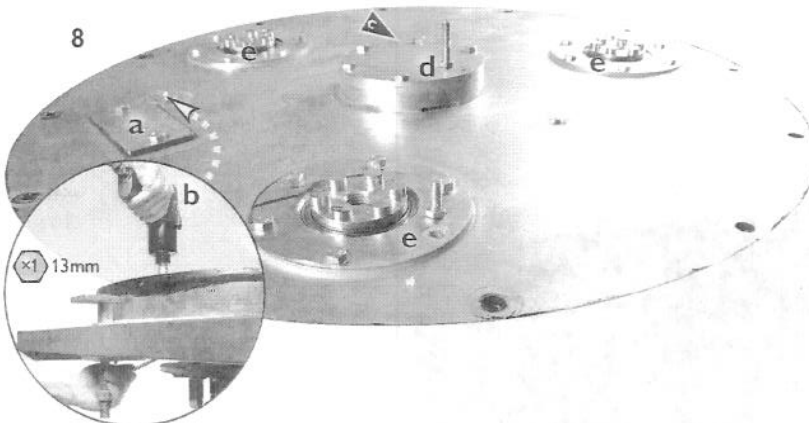
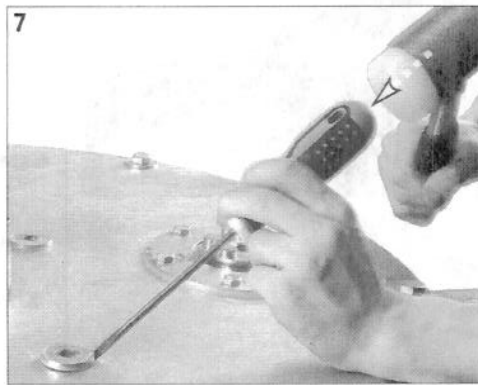
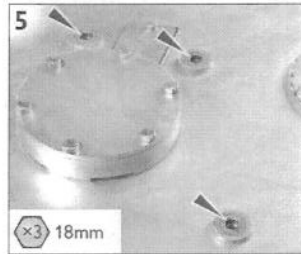
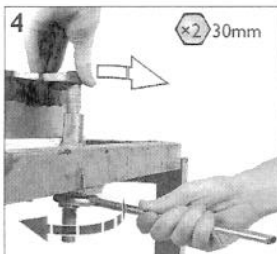
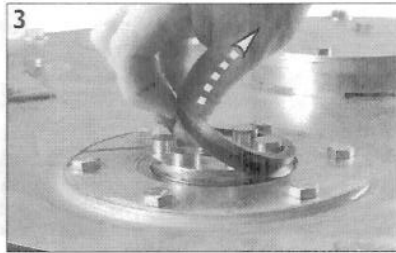
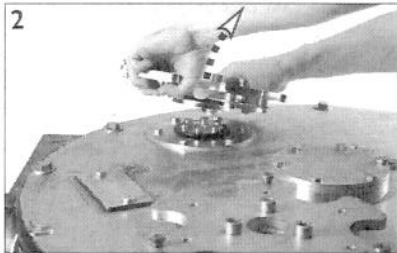
Always start rotation by pressing down the near cradle side!



### The satellite heads

Secure the diamond tools while in operation.

Must be in good condition to ensure a smooth floor when grinding.



### REMOVE THE HEADS

1. Remove the M20 centre bolt from each of the three satellite heads.
  - Take care of the spring washers.

2. Lift off the satellite heads.

3. Remove the V70 seal from each head boss.

### Remove all bolts, washers and cover plates

4. Unclamp unit from cradle.

- This step is necessary when opening up the belt compartment.

5. Use a 18mm socket to remove the idle pulley bolts.

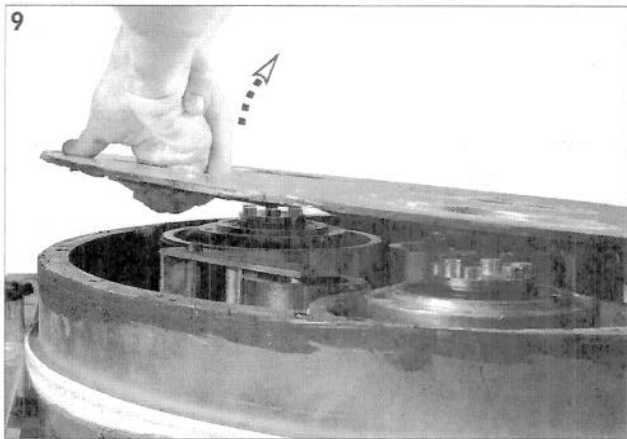
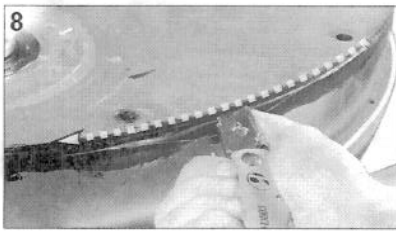
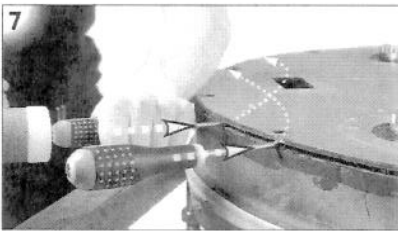
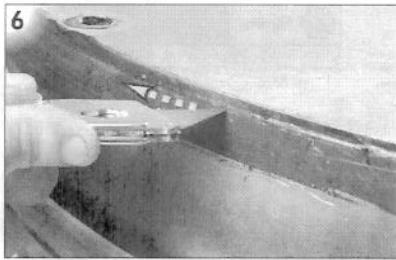
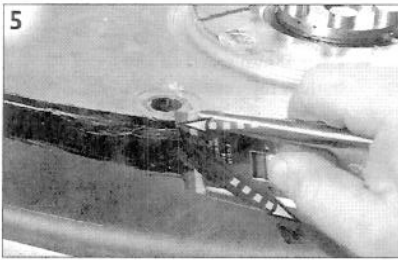
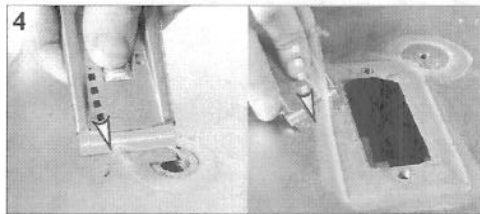
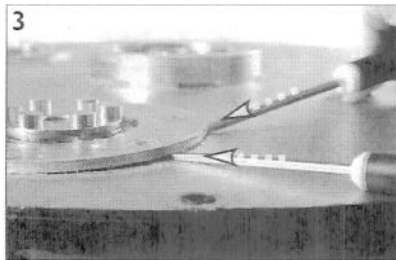
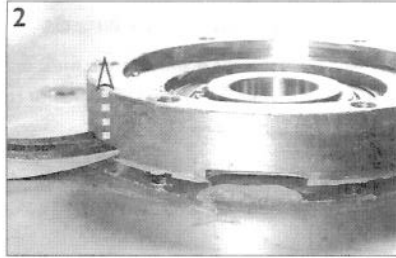
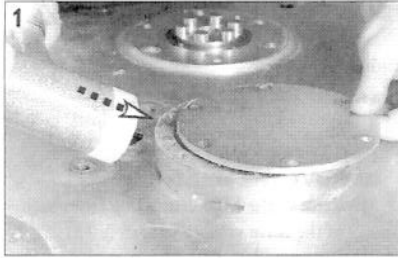
6. Use a 18mm socket to remove all 12 bottom plate exterior bolts.

7. Use a mallet and a flat blade screwdriver to remove siliconed washers.

8. Remove the following bolts and plates:

- (a) M8 × 2 | 13mm socket: belt tensioning inspection cover.
- (b) M8 | 13mm socket: belt tensioning pivot shaft.
- (c) M6 × 2 | 10mm socket: belt tracking inspection cover.
- (d) M8 · 45 × 6 | 13mm socket: bolts for the centre bearing housing.
- (e) M8 × 20 | 13mm socket: bolts for the 3 oil seal housings.

## Opening belt compartment



### REMOVE HOUSINGS

1. Use a soft mallet to knock off the silicone sealed centre bearing housing plate.
2. Lift off the centre bearing housing evenly by means of two crow bars.
3. Remove the three oil housing plates by carefully working flat blade screwdrivers under the edge to break the seal.

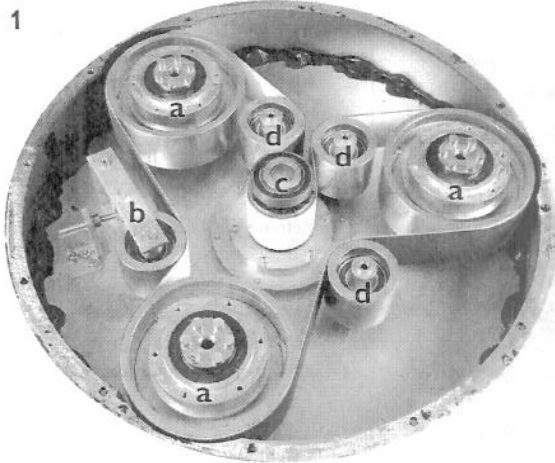
### REMOVE SILICONE

4. Remove remaining silicone elastomer using a razor scraper.
5. Remove the excess sealing compound all around the bottom plate.
6. Cut with a razor around the sealed bottom plate.

### REMOVE THE BOTTOM PLATE

7. Use flat blade screw drivers to systematically break apart the silicone elastomer seal all around the bottom plate.
8. Use a knife to cut any remaining seal.
9. Lift off the entire bottom plate.
  - Grab the bottom plate by the belt tensioning opening.





## The belt drive compartment

Before proceeding with cleaning up the belt compartment; open up the belt compartment as described in the previous chapter.

Always check that the machine is secured in the cradle before turning!

### REMOVE THE BEARINGS

1. Start with a detailed inspection on why the unit has failed, removing any belt debris.

- The following pieces are to be removed:

- (a) 3 satellite head pulley assemblies.
- (b) Belt tensioning assembly.
- (c) Centre drive pulley with bearing.
- (d) 3 idle pulleys.

2. Lift out all the satellite head pulley assemblies.

- Take care of the top bearing wave washers.

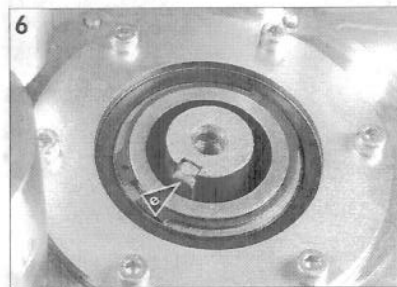
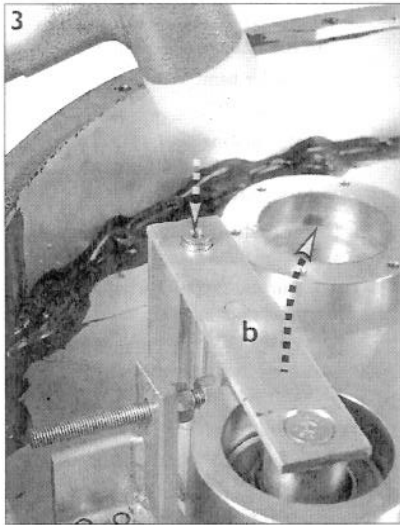
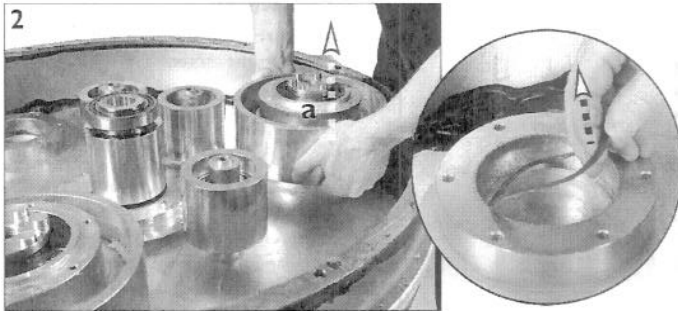
3. Lift out the belt tensioning assembly (b).

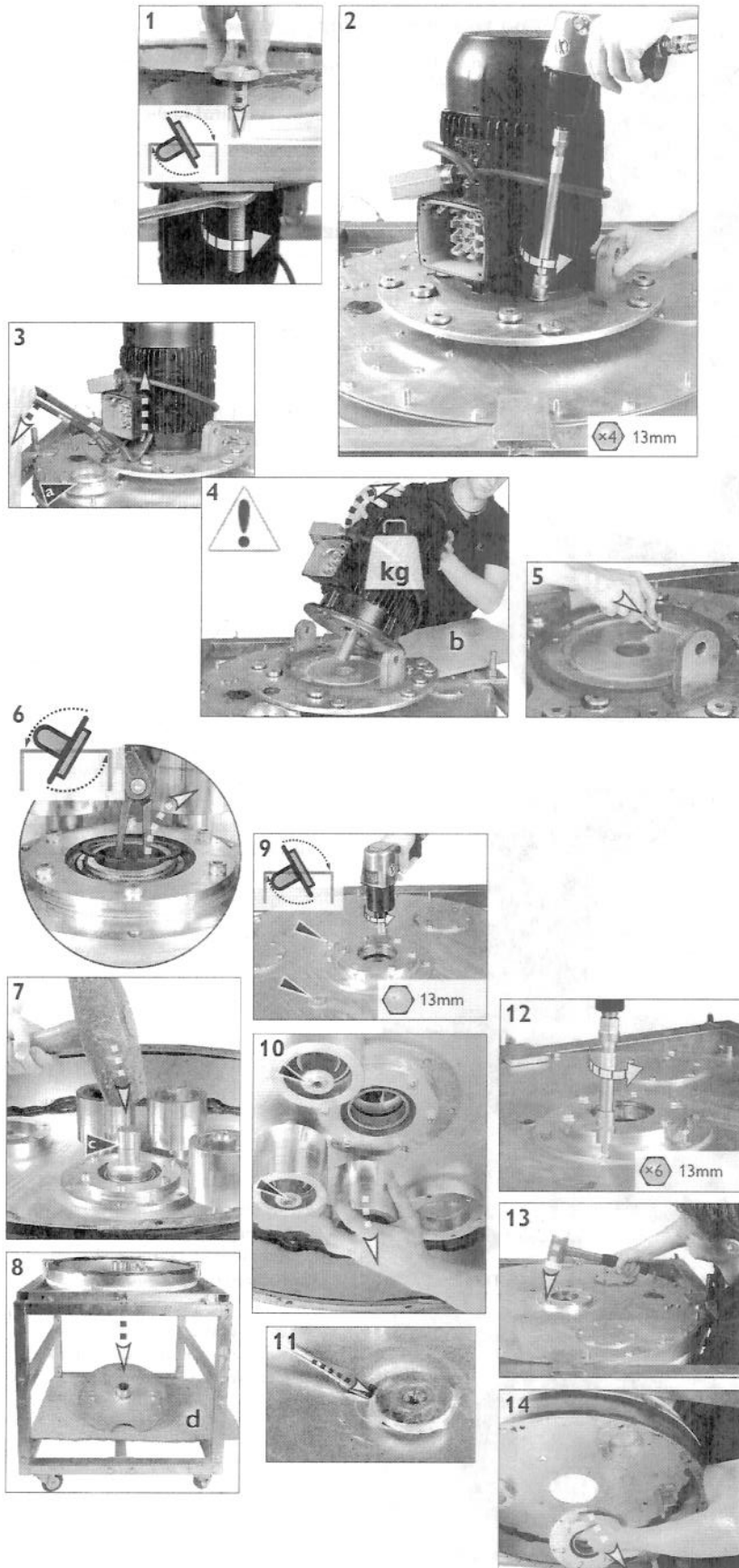
- Use a soft mallet to help releasing it.

4. Undo the centre drive pulley with the speciality tool: 10mm deep socket Allen key.

5. Evenly lift off the centre drive pulley and bearing by means of two crow bars. Optionally, use a bearing puller (see Tools chapter).

6. When the centre drive pulley is removed, the motor drive shaft with key (e) is visible.



**REMOVE THE SATELLITE MOTOR**

1. Clamp the unit to the cradle on both sides.
  - Tilt the cradle 180° (the opening downwards) and secure it with a corner pin.
2. Remove the four motor plate bolts.
3. Use crow bars to apply enough pressure to detach the motor plate from the rubber seal.
  - (a) Support the motor mounting plate to prevent warping
4. Carefully lift the motor away.
  - ⚠ Heavy weight – take proper precautions!
  - (b) Prepare cradle side with padding to support the motor.
5. Remove remaining silicone with a razor scraper.

**REMOVE THE MOTOR MOUNTING PLATE**

6. Tilt the cradle 180° (the opening upwards) and secure it with a corner pin.
  - Remove the cir-clip that holds the motor mounting plate shaft.
  - Place a board under the cradle to catch the motor mounting plate (8d).
7. Use a sledge hammer and Tool kit:
  - (c) Press tool 10
8. Motor mounting plate will fall down on the board (d) placed underneath.

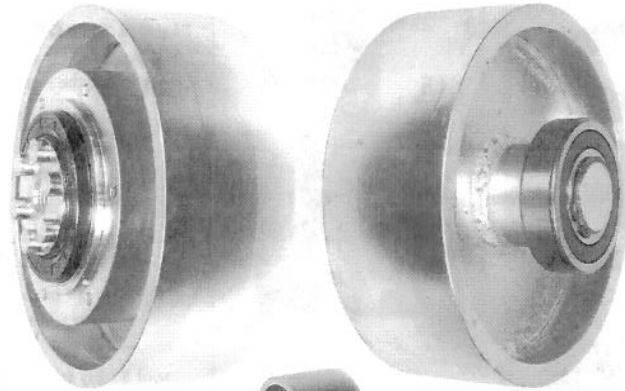
**Remove the idle pulleys**

9. Tilt the cradle 180° (the opening downwards) and secure it with a corner pin.
10. Reach in and support each one of the idle pulleys beneath the cradle while removing the three idle pulley bolts.
11. Knock off the siliconed washers with a flat blade screwdriver.

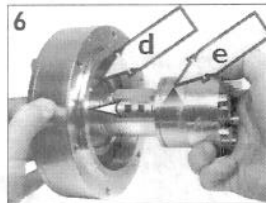
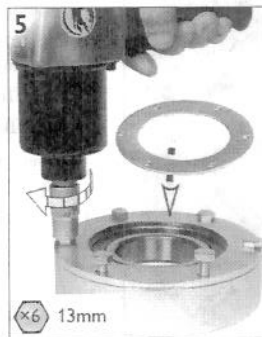
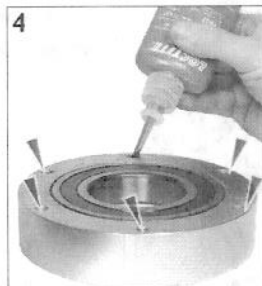
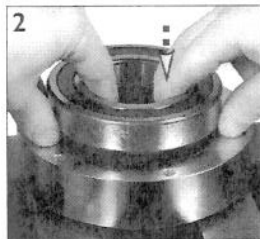
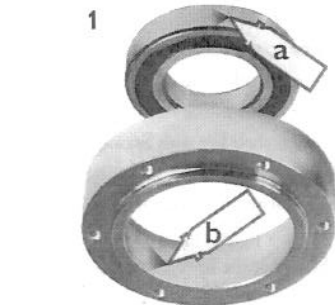
**Remove the main bearing assembly**

12. Undo the six bolts in the main bearing assembly.
13. Use a soft mallet to remove the main bearing assembly (d).
14. Support and remove the main bearing assembly from beneath the cradle.

Fly pulley



Fly pulley - disassembled



## Assembling

Before assembling or applying bearing adhesive compound or lubricants, all the parts should be well cleaned with a solvent. Use compressed air to remove particles and dust.

### FLY PULLEY ASSEMBLY

#### Order of assembly:

- bottom bearing housing
- bottom bearing
- bottom bearing retainer plate
- fly pulley shaft
- bottom bearing circlip
- fly pulley
- fly pulley and top bearing circlips
- top bearing
- top bearing circlip
- oil seal

#### Fit bearing into bearing housing

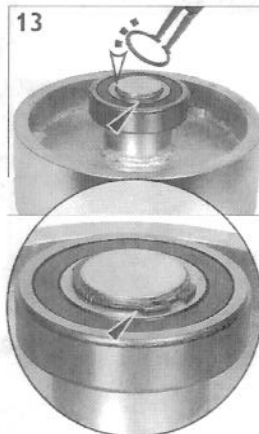
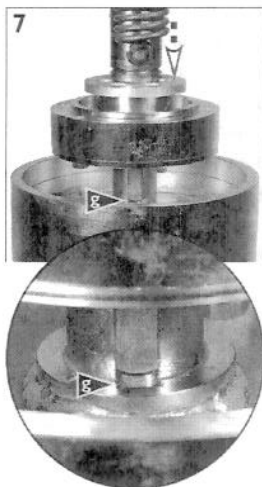
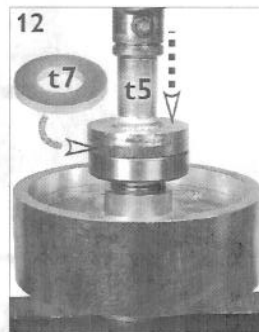
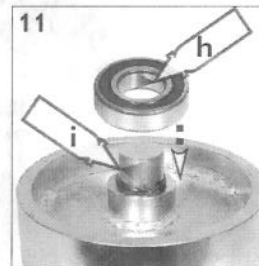
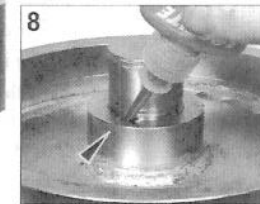
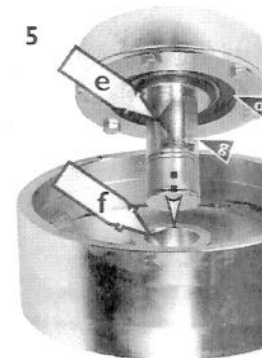
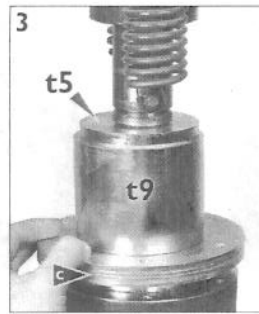
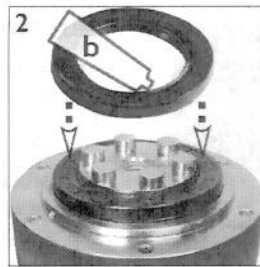
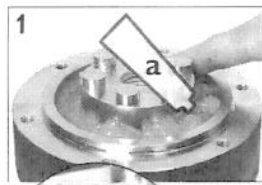
1. Apply a layer of bearing retainer compound to the contact surfaces:
  - (a) The outside of the bearing.
  - (b) The inside of the bearing housing.
2. Place the bearing housing in a press and fit the bearing over the opening.
3. From tool kit; place on top of bearing:
  - tool 5 Bottom bearing tool.
  - tool 2 Press shaft.
  - Press the bearing fully down inside the bearing housing.

#### Attach the bearing retainer plate

4. Apply thread-lock compound to all bolt holes.
5. Fit in and tighten the six M8 bolts.

#### Fit in the shaft

6. Apply a layer of bearing retainer compound to the contact surfaces:
  - (d) The inside of the bearing (in the bearing housing).
  - (e) The fly pulley shaft.
  - Fit in the shaft through the bearing.
7. Place in a press and fit on the following press tools:
  - tool 3 Drive lug protector.
  - tool 5 Bottom bearing tool.
  - Press down the shaft inside the mounting plate bearing.
8. Turn the housing and shaft around.
  - Secure the shaft by fitting an external circlip.
  - Check that the circlip is properly fitted in its slot.



#### FIT ON THE OIL SEAL

- Use grease (a) to fill up half the space between the shaft and bearing housing.
    - Smooth the surface of the grease.
  - Apply a thin coat of grease (b) around the inside of the oil seal ring.
    - Fit on the oil seal ring.
  - Fit the press and use the following press tools on top:
    - (c) three oil housing rings over the seal ring (to secure even pressure to the oil seal ring).
- tool 9 Fly pulley support block.  
tool 5 Bottom bearing tool.
- Top of oil seal ring should be level with bearing housing.

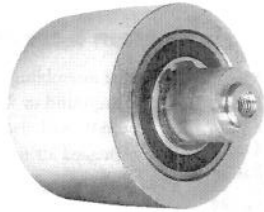
#### FIT FLY PULLEY SHAFT THROUGH FLY PULLEY

- Check bearing seal for any excess grease.
    - (d) Check that no excess grease has bled from the bearing. Clean if necessary.
- Apply a layer of bearing retainer compound to the contact surfaces:
- The outside of the bearing.
  - The inside of the bearing housing.
  - Align shaft key with keyway.
- Fit in a press with the following tools:
    - tool 3 Drive lug protector.
    - tool 9 Fly pulley support block.
  - Check that the key and keyway align and fit cleanly (g).
    - Press the shaft fully down inside the pulley.
  - Turn the pulley assembly around.
    - Fill up keyway with retainer compound.
  - Fit on two external circlips to the two lowest slots (next to the pulley).

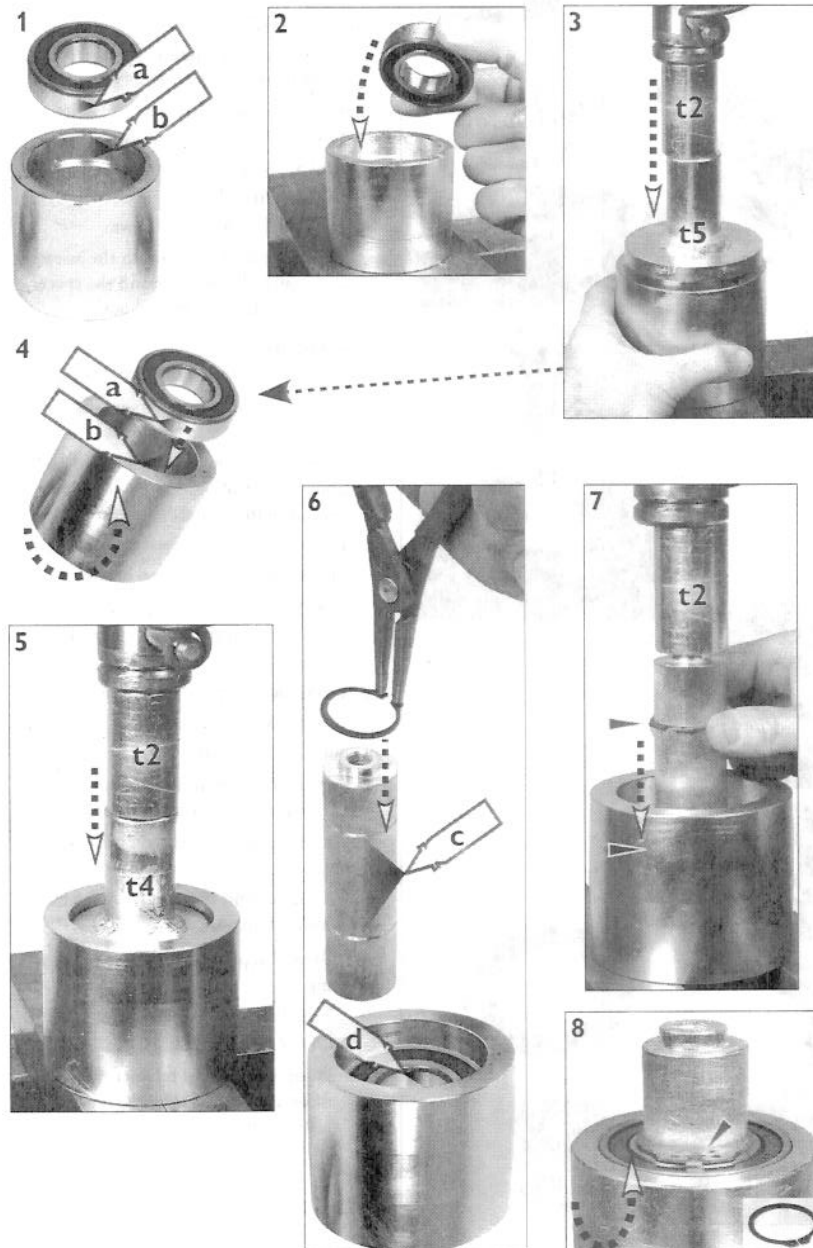
#### FIT ON THE LAST BEARING

- Check that the circlip is properly fitted.
- Place in a press on the drive lug protector (tool 3).
  - Apply a layer of bearing retainer to the contact surfaces:
    - (h) The bearing inside.
    - (i) Around the fly pulley shaft, above the circlips.
  - Fit the top bearing on the shaft with the following press tools on top:
    - tool 7 Top bearing assembly plate.
    - tool 5 Bottom bearing tool.
    - Press the bearing fully down on the shaft.
  - Secure the top bearing by fitting the last external circlip.

Idle pulley



Idle pulley - disassembled



### Assembling idle pulleys

Before assembling or applying bearing retainer compound or lubricants, all the parts should be well cleaned with a solvent. Use compressed air to remove particles and dust.

#### idle pulley - order of assembly:

- idle pulley bearing
- idle pulley
- bearing 2
- circlip
- idle pulley shaft
- circlip 2

### IDLE/BELT TENSIONING PULLEY ASSEMBLY

#### Fit bearing into idle pulley

1. Apply a layer of bearing retainer compound to the contact surfaces:
  - (a) The outside of the bearing.
  - (b) The inside of the pulley.
2. Place the pulley on a flat surface and fit the bearing in position.
3. From tool kit; place on top of bearing and pulley:

tool 5 Multi purpose press tool.

tool 2 Extra press tool.

- Press the bearing fully down inside the pulley - flush surface.

4. Turn pulley around 180°.

- Apply a layer of bearing retainer compound to the contact surfaces:

- (a) The outside of the bearing.
- (b) The inside of the pulley.

5. From tool kit; place on top of bearing and pulley:

tool 4 Multi purpose press tool.

tool 2 Extra press tool.

- Press the bearing fully down inside the pulley - depressed.

#### Fit in the idle pulley shaft

6. Fit a circlip to the short side of the pulley shaft.

- Apply a layer of bearing retainer compound to the contact surfaces:

- (c) Around the pulley shaft.
- (d) The inner surfaces of the two pulley bearings.

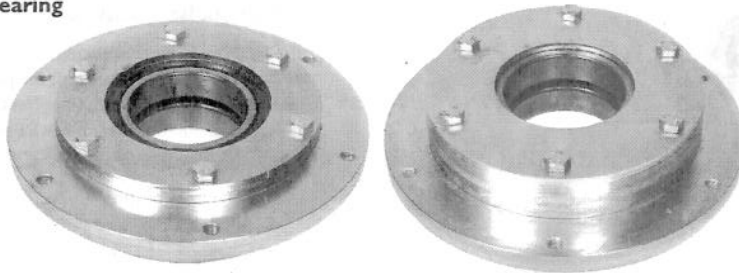
7. Press the shaft through the pulley bearings, (until the circlip reaches the depressed bearing).

8. Turn the pulley around.

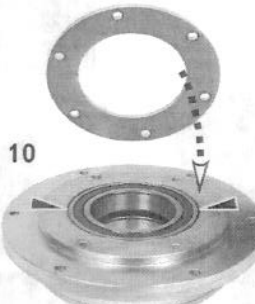
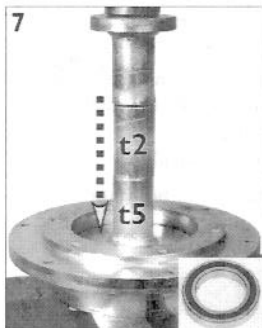
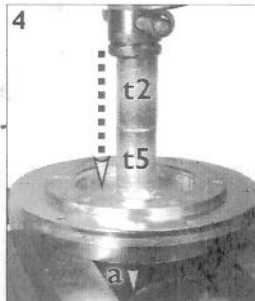
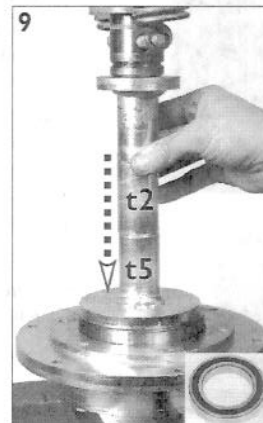
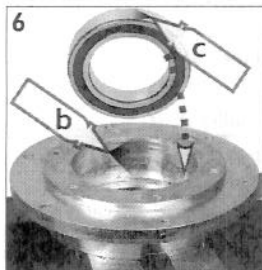
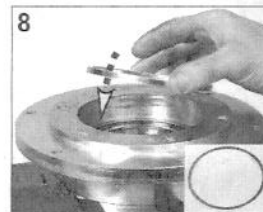
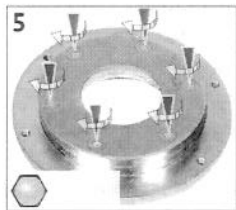
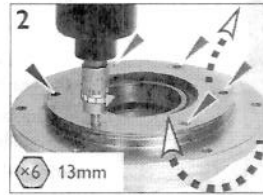
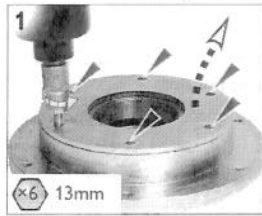
- Secure the shaft by fitting the second circlip.



## Main bearing



## Main bearing - disassembled



## Main bearing assembly

Before assembling or applying bearing retainer compound or lubricants, all the parts should be well cleaned with a solvent. Use compressed air to remove particles and dust.

## Main bearing - order of assembly:

- external retainer plate
- main bearing housing
- main bearing
- spacer ring
- second bearing
- internal retainer plate

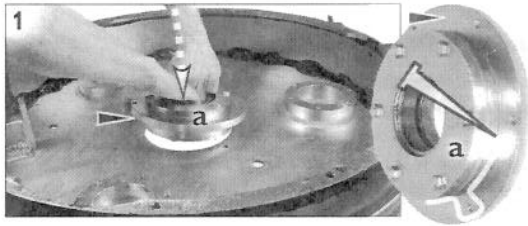
## DISASSEMBLING

1. Remove the six external retainer plate M8 bolts and remove the plate.
2. Turn assembly around.
  - Remove the six internal retainer plate M8 bolts and remove the plate.
3. Place the main bearing assembly in a press and use the press tools:
  - tool 5 Main bearing tool.
  - tool 2 Press shaft
4. Press the bearings fully down.
  - (a) Place something beneath the assembly to catch the bearings and the spacer ring as they are pushed out.

## ASSEMBLING

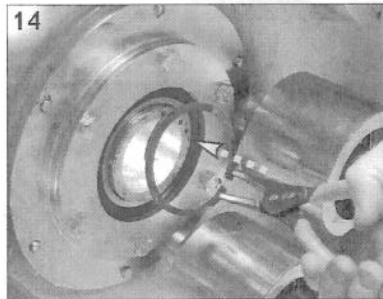
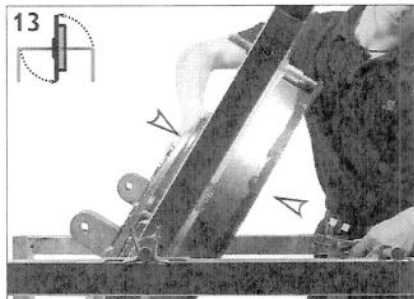
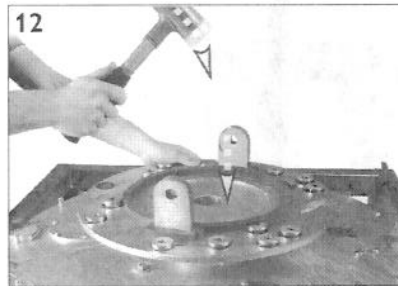
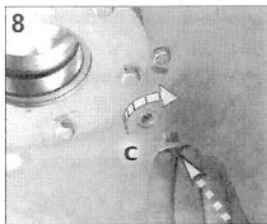
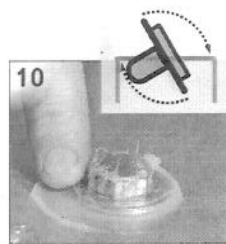
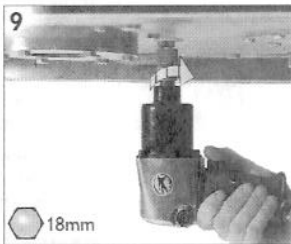
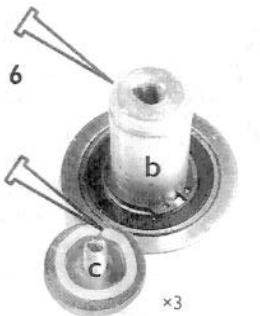
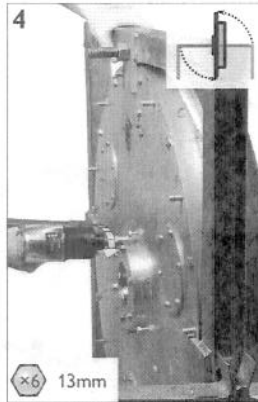
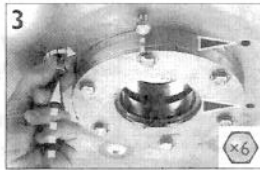
5. Fit back on the external retainer plate.
  - Fit in the six bolts reversing illustration 1.
6. Turn the bearing housing around and apply a layer of bearing retainer compound to the contact surfaces:
  - (b) The inside of the bearing housing.
  - (c) The outside of the two bearings.
    - Place in press and fit one bearing on top of the main bearing housing.
7. From tool kit; place on top of bearing:
  - tool 5 Main bearing tool.
  - tool 2 Press shaft.
    - Press the bearing fully down inside the main bearing housing.
8. Fit in the spacer ring over the bearing.
9. Fit the second bearing over the main bearing housing.
  - Repeat step 7 to fit in the other bearing.
10. Check that the second bearing is level with the housing.
  - Fit on the internal retainer plate and fit on its bolts by reversing what is illustrated in step 2.





## Assembling

Before assembling or applying silicone sealing, thread lock compound or lubricants, all the parts should be well cleaned with a solvent. Use compressed air to remove fine particles and dust.



## MOUNT THE CENTRE BEARING HOUSING

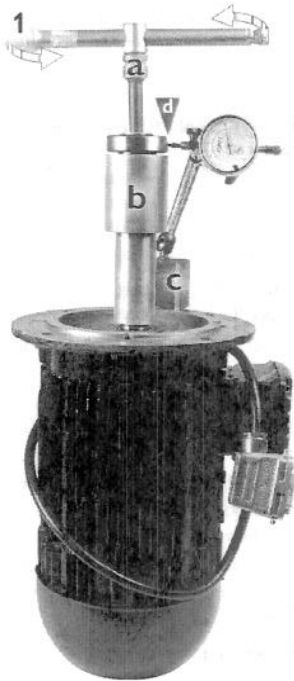
1. Apply a fine bead of silicone seal compound all around the contact surface of the bearing assembly (a) (with the deeper part of the housing facing down).
  - Put the bearing housing into place, keeping the bolt holes aligned.
2. Use a soft mallet to knock the bearing housing in place.
3. From underneath the cradle, fit in each of the six centre bearing assembly M8 bolts.
4. Tilt the cradle 90° to more easily tighten the 6 M8 bolts, while holding the bearing assembly in position.
5. Secure the cradle with the opening upwards and smooth the excess silicone compound.

## FIT ON THE IDLE PULLEYS

6. Clean all three idle pulleys and apply silicone seal compound:
  - (b) The idle pulley shaft contact surface edge (the long end).
  - (c) The idle pulley bolt washer (with the bolt through).
7. Fit the silicone applied end of the idle pulley into the mounting hole.
8. From underneath the cradle, fit on the idle pulley bolt with the washer.
9. Tighten the idle pulley M12 bolt.
  - Smooth the silicone compound around the pulley shaft.
  - Repeat step 7–9 for all idle pulleys.
10. Tilt the cradle 180° (with the opening downwards) and secure it with a corner pin. Smooth the silicone compound.

## FIT IN THE MOTOR PLATE

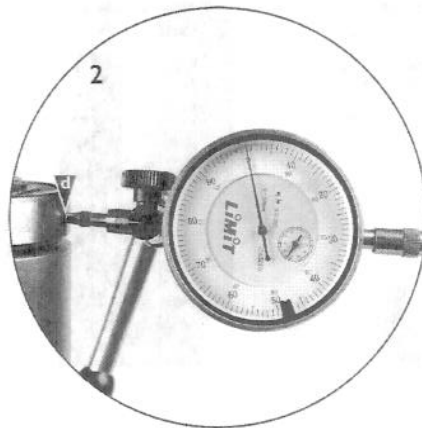
11. Apply a thin layer of bearing retainer to the contact surfaces of:
  - (d) The motor plate shaft.
  - (e) The inside of the two bearings.
  - Fit the motor plate shaft into the motor bearing housing.
12. Use a soft mallet to knock the motor plate shaft fully down.
13. Tilt the cradle 90° to access the end of the motor plate shaft with a cir-clip.
14. Fit the cir-clip in position to secure the shaft.



### Motor shaft alignment

To test the alignment of the motor shaft, the centre drive pulley should be mounted as instructed on next page (step 3–5, “Fit centre drive to motor shaft”).

⚠ Before final assembly, it is important to add a layer of antiseize compound (Copper paste) to shaft and bore.



### TEST THE ALIGNMENT THROUGH ROTATION

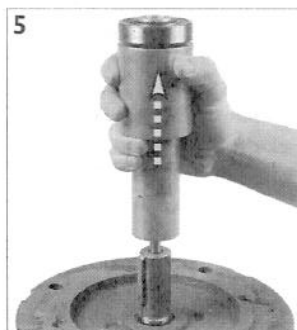
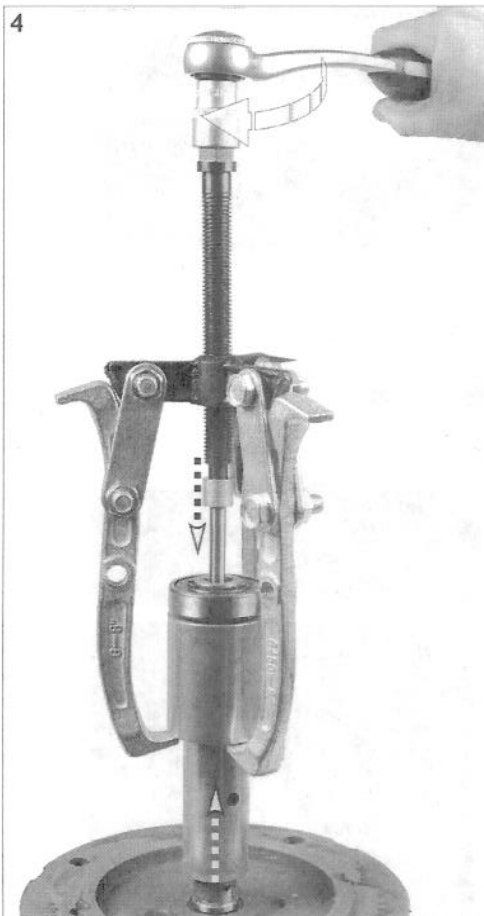
- Put the motor upside down on a stable flat surface with the following setup:
  - Use the speciality tool - 10mm deep socket Allen key - in the shaft bolt as a means to rotate the centre drive pulley (b).
  - The centre drive fitted on the motor drive shaft.
  - A magnetic foot attaching the dial indicator to the motor unit.
- Fix the reading point next to the centre bearing (d).
  - Rotate the shaft (b) to find the smallest reading. Calibrate the dial indicator at this point and rotate another turn.
  - The maximum tolerance should not exceed 0.05mm.

If the tolerance is exceeded

- Use a marker to indicate on the shaft base:
  - the spot with the minimum reading.
- Follow step 3–5 below and continue with “Aligning the planetary motor shaft” on next page.

### REMOVE THE DRIVE PULLEY ASSEMBLY

- Fit in the speciality tool - 680/820 centre drive pulley push rod (c) - through the centre drive pulley.
- Use a bearing puller to remove the centre drive pulley from the motor shaft.
- Lift off the centre drive pulley and the press tool from the motor shaft.

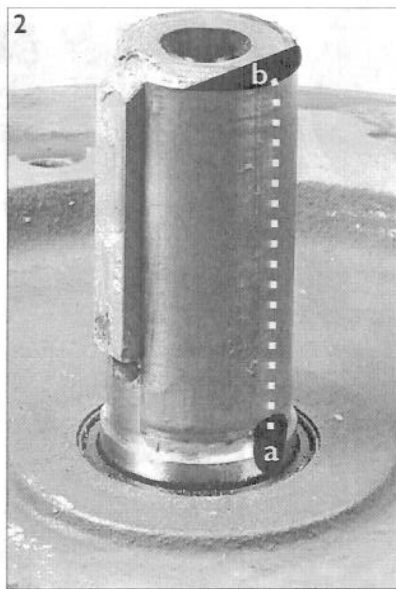




### Aligning the planetary motor shaft

The principal reason for misalignment are the contact surfaces between the motor shaft and the burr of the centre drive pulley.

- The picture exaggerates a misaligned fit of the centre drive pulley, to illustrate the need to clean or adjust the contact surfaces.
  - Your marking of the measurement point indicating the maximum deviation from tolerance at (c) (see "If the tolerance is exceeded" on previous page).
  - The principal contact surfaces causing the misalignment.
  - Adjustments of the contact surfaces should align shaft (adjusting point (c) in the direction indicated).

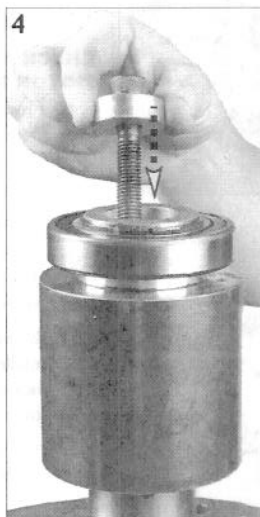
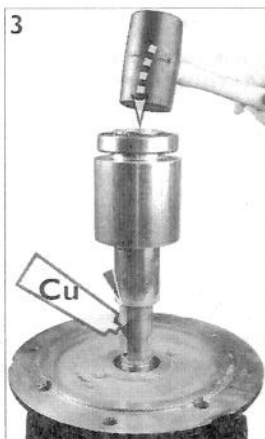


#### Start by checking the following:

- The edge of shaft end and corners in burr should be smooth and free from grades. (This also apply to the key and keyway).
  - Polish with a fine emery-cloth or use a precision file.
- Make sure that all contact surfaces are absolutely clean - use a solvent.
- Repeat the alignment test on previous page to see if this fixed the misalignment within the tolerance.

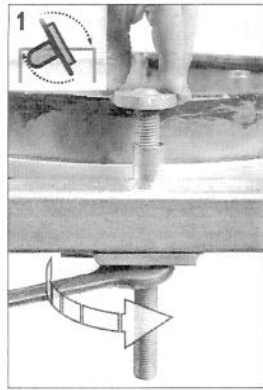
#### IF ALIGNMENT IS STILL NOT WITHIN TOLERANCE

- The shape of the shaft end needs to be adjusted to make it fit with better alignment in the bearing assembly burr:
  - Your shaft base marking indicating the point of minimum dial reading.
  - Mark the part of the shaft end which is straight above your shaft base marking (a).
  - Use a fine file to slightly file the marked shaft end (b).
  - Repeat the alignment test on previous page to see if you need to adjust the shaft end further.
  - Keep good track of your markings to better control the alignment process. File on a slightly larger area (b) for each step taken.



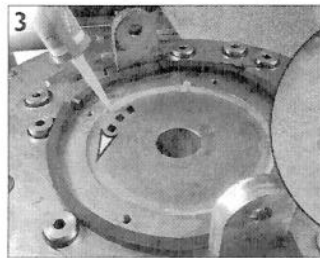
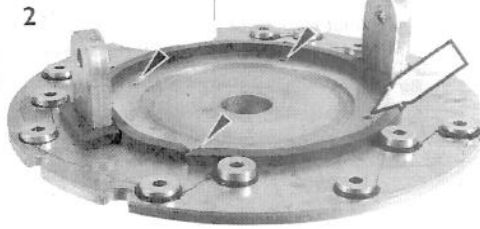
#### FIT CENTRE DRIVE TO MOTOR SHAFT

- Add antiseize (copper paste) to shaft and bore.
  - Fit on the centre drive, aligning the keyway to the shaft key.
  - Use a soft mallet to knock the drive all the way down. Think of centering the mallet.
- Insert the centre drive pulley bolt with heavy duty washer.
- Tighten the bolt with speciality tool: tool-kit 10mm deep socket key.



### Assembling the satellite motor and pulleys

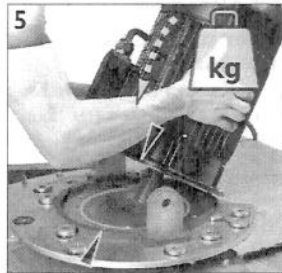
Be careful to attach the machine to the cradle (1). Clean all parts well with a solvent. Use grease as lubricator and threadlock (medium). Use silicone sealing compound to protect internal parts from dust and water.



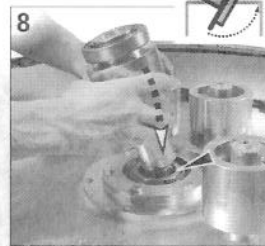
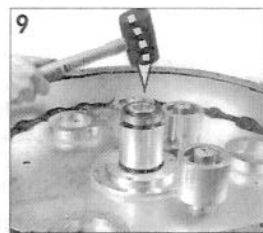
### MOUNTING THE SATELLITE MOTOR

1. Check that the machine is properly clamped to the cradle on both sides.
  - Tilt the cradle 180° (the opening downwards) and secure it with a corner pin.
2. Add threadlock compound to the four motor bolt holes.
3. Add a bead of silicone seal compound around the motor mounting plate.
4. Lift the motor in position and lower the shaft through the centre shaft hole.
  - Terminal box must face away from flat face on motor mounting plate.

**!** The motor is heavy – take proper precautions!



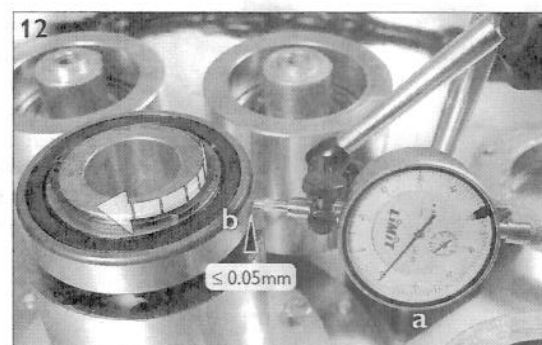
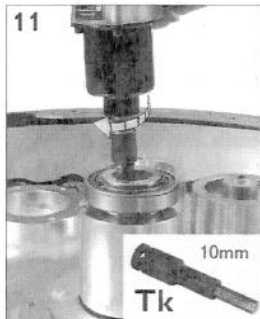
5. Align the four motor bolt holes and fit the motor shaft down the centre.
6. Fit in the four motor bolts with washers and tighten.
7. Check the adhesive rubber strip around the motor plate (repair or replace if necessary).
8. Tilt the cradle 180° (the opening upwards) and secure it with a corner pin.
  - Fit in the centre drive pulley aligning its keyway with the motor shaft key.
9. Use a soft mallet to knock down the centre drive pulley on the motor shaft.
10. Fit in the motor shaft bolt.
11. Tighten the bolt using the speciality tool: 10mm extended key.

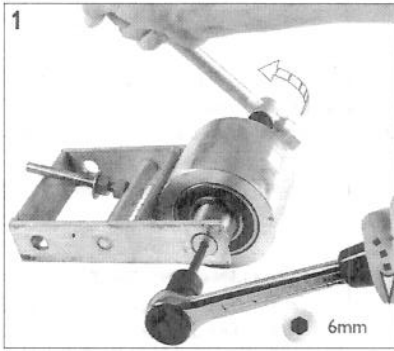


### CHECK ALIGNMENT OF THE MOTOR SHAFT/DRIVE PULLEY

Fix the motor (see page 24, picture 3). This prevents motor from turning while checking alignment.

12. Use the following setup:
  - (a) A magnetic foot fixing a dial indicator to the machine.
  - (b) Fix the reading point next to the shaft drive bearing.
  - Rotate the shaft one turn to find the smallest reading. Calibrate the dial indicator at this point and rotate another turn.
  - The maximum measured tolerance should not exceed 0.05mm.



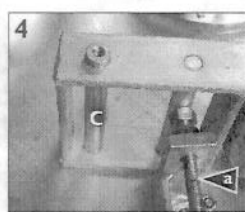
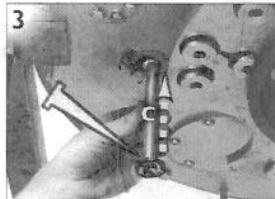
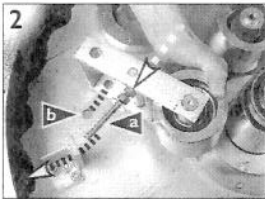


### MOUNT THE BELT TENSIONING ASSEMBLY

1. Use two 6mm Allen keys to mount the tension pulley with two bolts to the tensioning bracket.
2. Check that the backing washer is on the tensioning bolt (a).

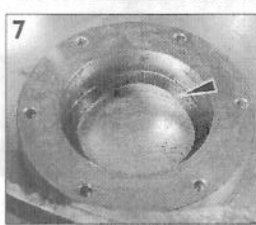
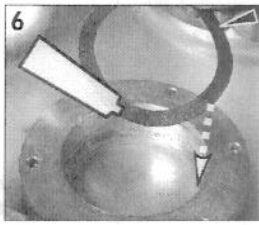
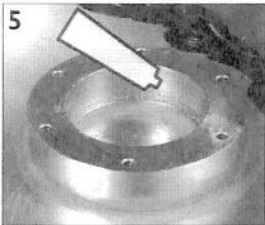
  - Fit bolt through tensioning nut backing and align the pivoting shaft holes (b).

3. Seal the bolt washer with some silicone seal compound and insert the pivoting shaft (c) from underneath - up through the pivoting shaft holes.
4. Belt tensioning bolt (a) through its backing and pivoting shaft (c) through belt tensioning frame.

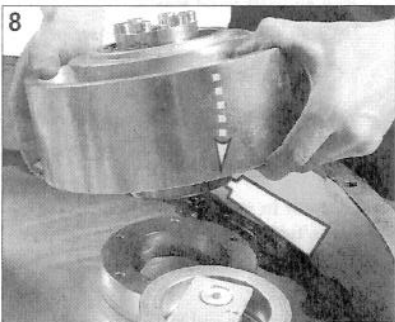


### FITTING THE FLY PULLEY ASSEMBLIES

Use a high temperature grease as bearing lubricator.



5. Apply a thin layer of grease to the contact surfaces inside the fly pulley bearing housing.
6. Apply grease to the wave washer.
7. Greased wave washer in position.



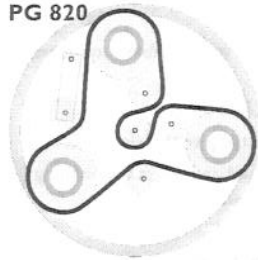
8. Apply a thin layer of grease around the bearing outside.
  - Place the fly pulley assembly in the fly pulley bearing housing.
9. Repeat the steps 5–8 until all the three satellite pulleys are mounted.
  - Be sure not to have excess grease on the pulley as this will become exposed to the belt.



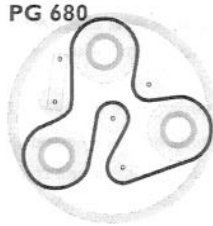
10. Use compressed air to clean the interior of the unit and wipe clean with a solvent.



PG 820

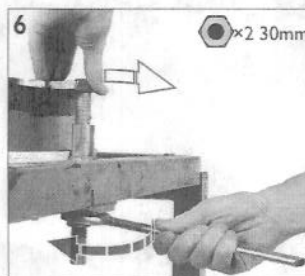
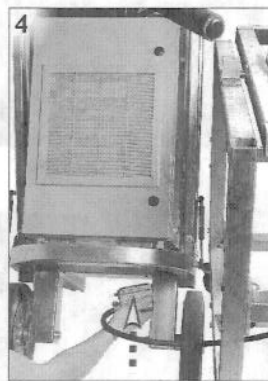
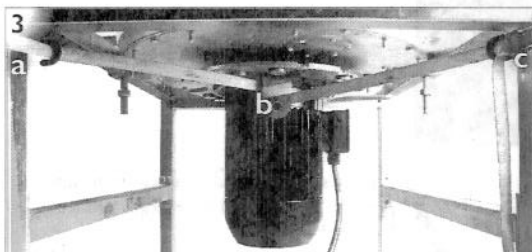
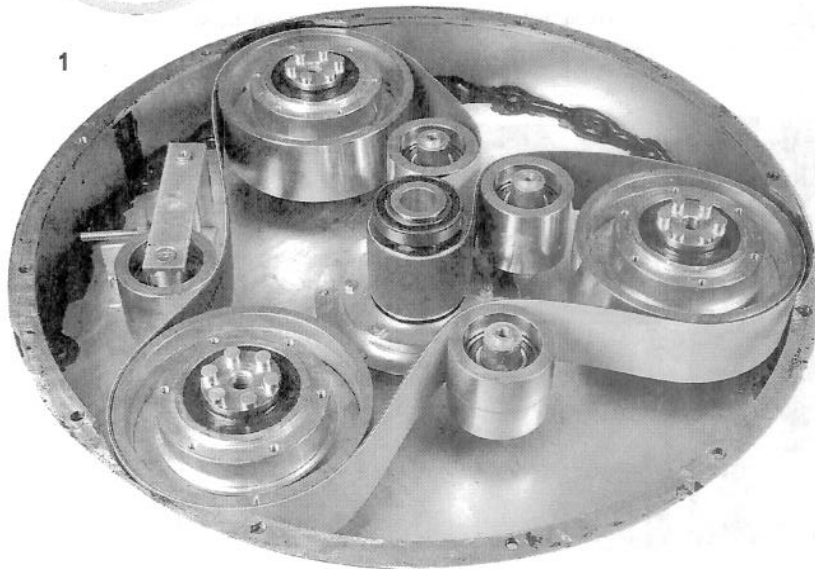


PG 680

**First time?**

If you are performing this task for the first time, it is highly recommended that you do a "dry" belt setup - skip all silicone sealing or thread-lock and make sure that you control the process - before you redo this properly with Silastic and thread lock compound.

All pulleys—belt contact surfaces should be well cleaned with a solvent and compressed air.

**INSTALLING THE BELT**

- Install the belt according to the corresponding diagram; PG 820 or the smaller PG 680.

1. Overview of belt compartment with fitted belt (PG 820).

**PREPARATIONS BEFORE CLOSING THE BELT COMPARTMENT**

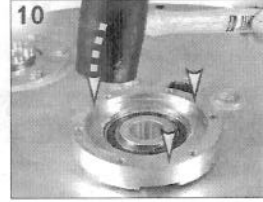
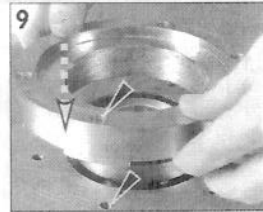
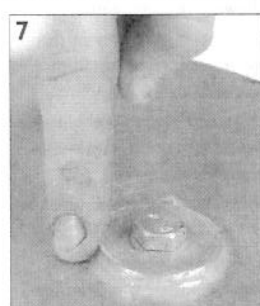
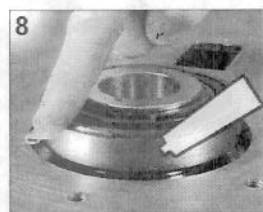
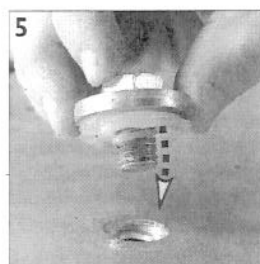
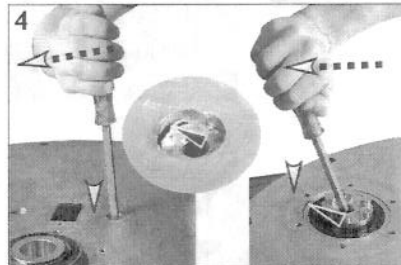
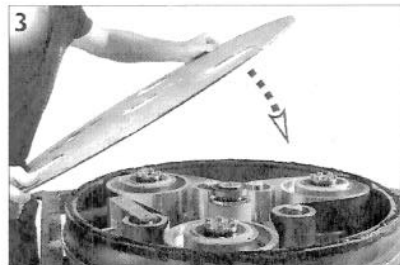
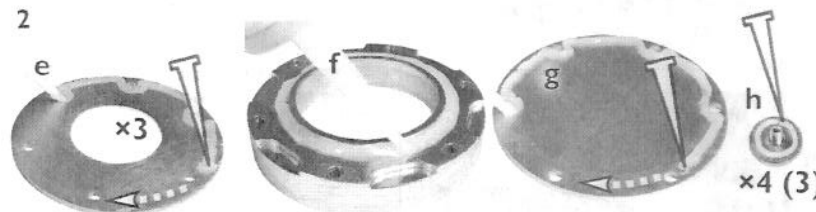
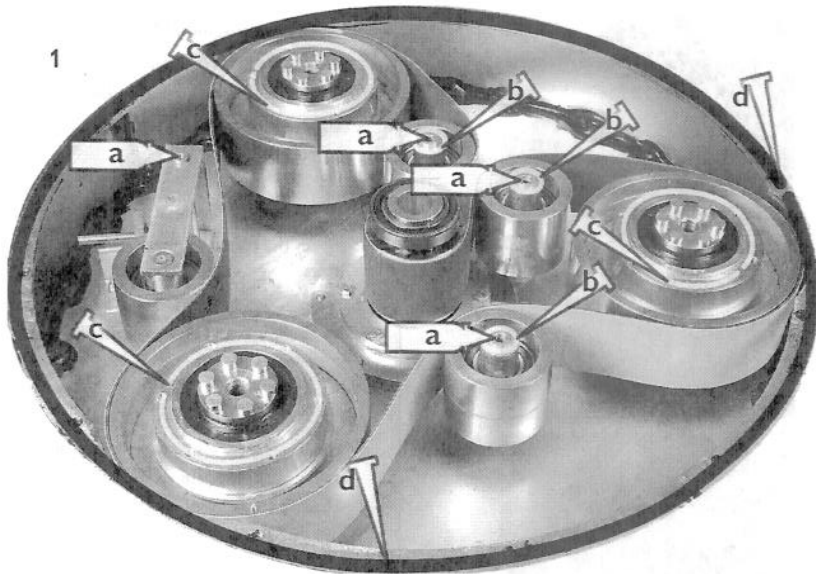
Clean all parts to be sealed:

2. Clean all plates using a razor scraper and a solvent, including the entire bottom plate.
  - Apply grease inside the centre bearing housing.

**Fix motor in rack and position chassis/frame**

3. Fix the motor in the cradle using a strap.
  - (a) Attach one end to a rack corner.
  - (b) Wrap around a lifting lug.
  - (c) Attach and tighten to the other rack corner.
4. Plug in satellite motor electrical cable to the chassis/frame power outlet.
5. Position the grinding control panel within reach from the cradle work area.
6. Check that the side wall is unclamped from the rack on both sides.





### SILICONE SEALING AND THREAD LOCK

If you have never performed a belt replacement before, please make a dry setup first, and then redo the process from this point.

1. Add the following before proceeding:
  - (a) Thread lock to the idle pulley shaft and the tension pivoting shaft holes.
  - (b) Seal the contact surfaces with silicone.
  - (c) Seal around the contact surfaces of the satellite heads.
  - (d) Seal around the entire belt compartment with a bead of polyurethane Silastic (recommended Sikaflex 212).
2. Prepare the following pieces with a silicone bead on the contact surfaces:
  - (e) The three oil housing rings.
  - (f) The bottom bearing housing.
  - (g) The bottom bearing cover.
  - (h) The washers of the idle pulleys and tensioning lever shaft bolts. (There are 2 idle pulleys for PG 680 and 3 for PG 820).

### FITTING THE BOTTOM PLATE

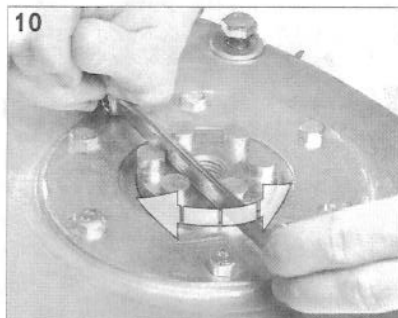
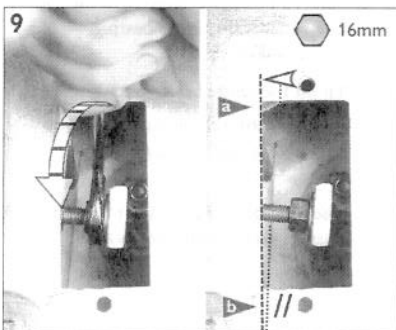
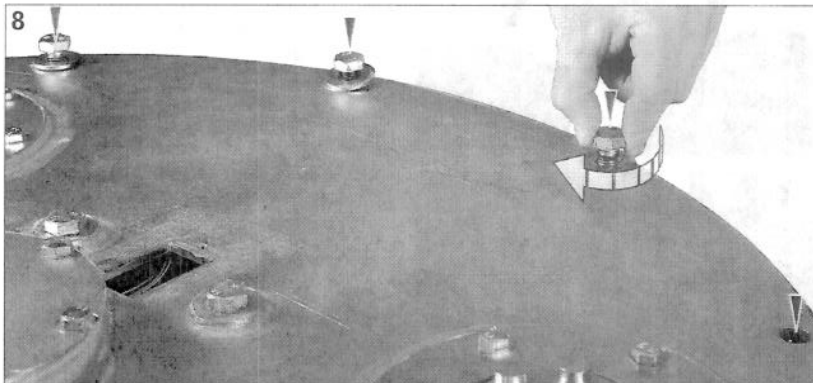
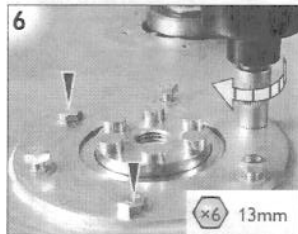
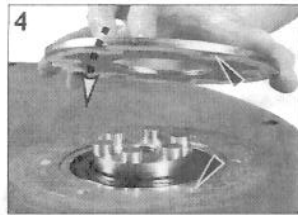
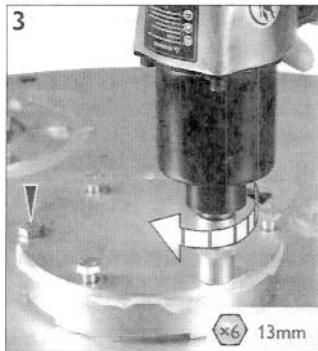
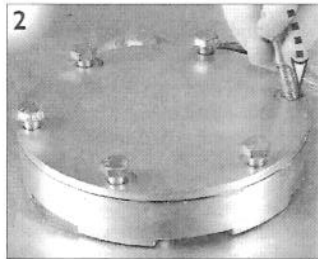
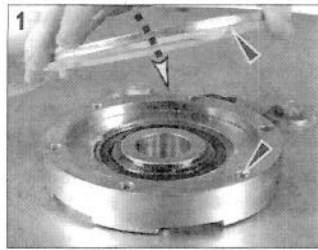
3. Align all holes and gently lay down the lid over the three fly pulley shafts.
4. Help the plate down by drawing the fly pulley shafts into alignment by means of a large screw driver.
  - Use the same technique for the satellite heads.

### Mounting idle pulley and tensioning shaft bolts

5. Fit in the bolts with silicone prepared washers in the idle pulley and spacer shaft holes.
6. Tighten the bolt with a 18mm socket.
7. Smooth the excess silicone.

### Mounting the centre bearing housing

8. Apply a thin film of grease to the contact surfaces the centre bearing.
9. Fit on the centre bearing housing.
  - Pay attention to prevent any excess grease entering internals.
10. Use a rubber mallet to tap the centre bearing housing into position.



#### The centre bearing housing cover plate

1. Mount the centre bearing housing cover.
2. Insert the six centre bearing bolts.
3. Tighten the six bolts evenly with a 13mm socket.

#### The satellite cover plates

4. Fit on the plates, aligning the screw holes
5. Fit in the six bolts for each satellite cover plate.
6. Tighten the six satellite shaft plate bolts evenly with a 13mm socket.

7. Smooth excess silicone from centre bearing housing and satellite cover plates.

#### Fit in the exterior bolts

8. Fit in all the exterior bolts except for the one next to the belt tensioner.

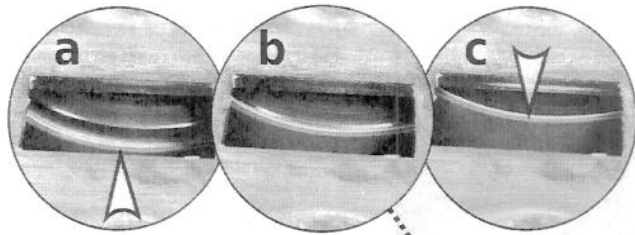
#### TIGHTEN THE BELT

9. Reach in with a 16mm spanner through the belt tensioning service hole and do a rough belt tension adjustment by the following means:

- Turn the belt tensioning nut with the following two guidelines:
  - (a) The tensioning pulley in the upper left corner should just disappear to the left.
  - (b) The tensioning assembly frame should be parallel with the inspection hole side.

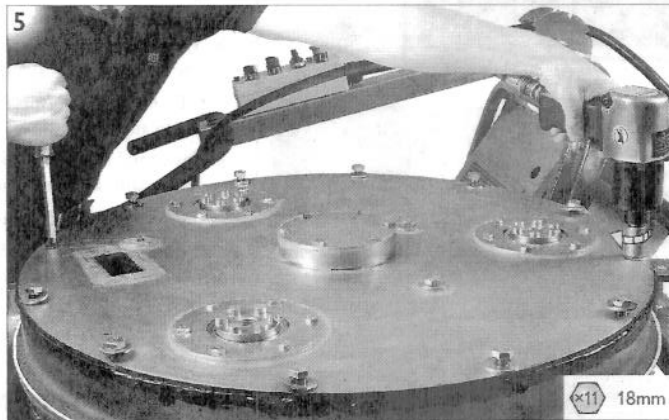
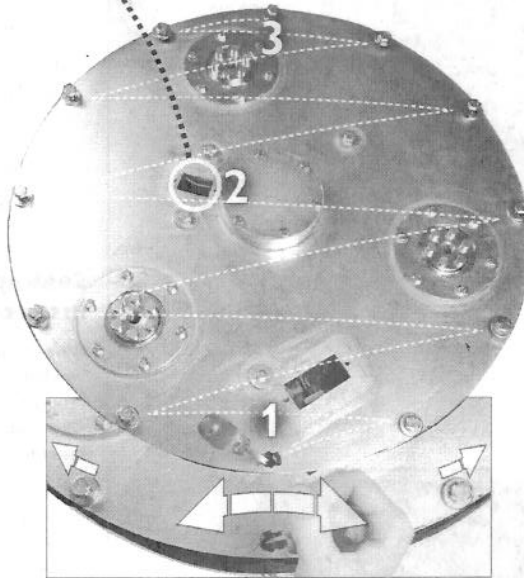
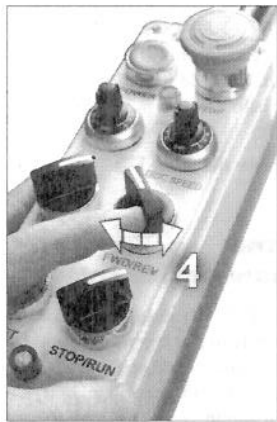
10. To evenly distribute belt tension over all pulleys:

- Rotate the belt a little bit clockwise and counter-clockwise, while tightening.



### Tracking the belt

It is necessary that the belt is properly balanced and set to run in its accurate position, to assure maximum reliability and performance of the machine. It is important to balance the belt so that it stays well centred on the pulleys, in both directions of operation.



### CONTROLS AND PROCEDURE

Plug in the chassis/frame unit to power mains.

- Switch the satellite motor on at low speed. Increase the speed as you find the balance.

1. Skew the pulleys to control the belt position:

- Fit a suitable screw driver in the last exterior bolt hole.
- With belt running; apply enough pressure to lightly skew the bottom plate with the pulleys. This will control the belt tracking; up, down or ultimately in the accurate position.

2. Check the position of the belt:

- (a) Too low: Adjust the skew so the belt runs higher on the pulleys.
- (b) Accurate: This position assures maximum contact area over the pulleys and minimum wear of the belt - in both directions.
- (c) Too high: Adjust the skew so the belt runs lower on the pulleys.

3. Use air gun to tighten the most distant exterior bolt (with reference to the screw driver).

4. Use the direction switch, to reverse the belt rotation after tightening the bolt.

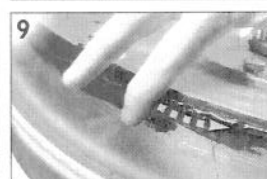
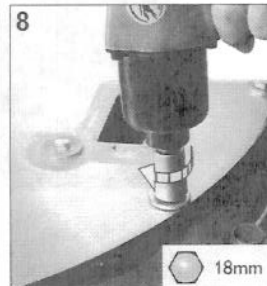
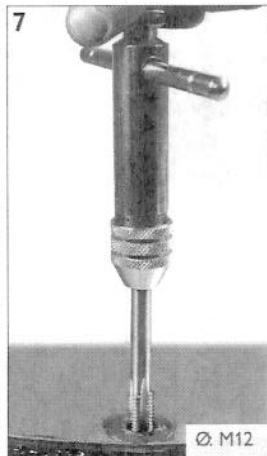
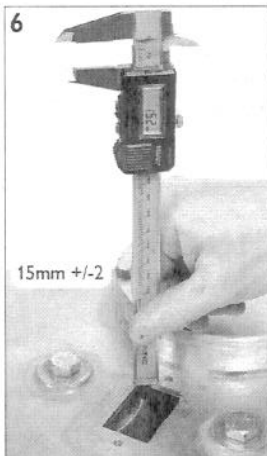
- Repeat step 1-4 above until eleven exterior bolts are tightened, and the belt stays running in its accurate position. Tighten each bolt in the manner described in picture 5.

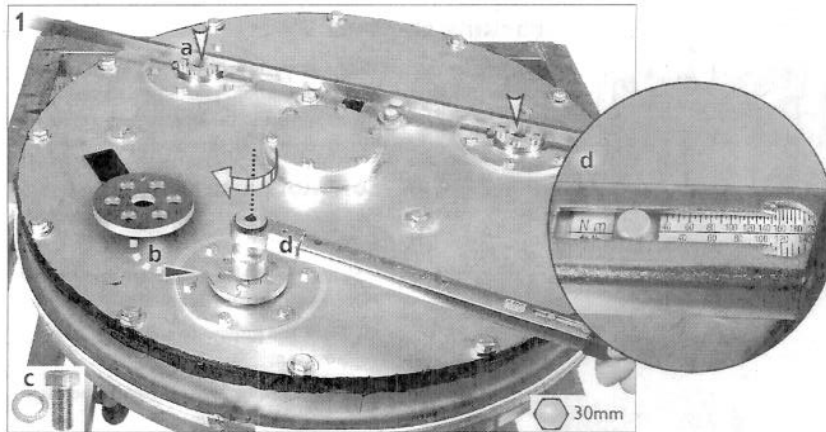
5. Here tightening a bolt, while tracking the belt by maintaining proper skew with the screw driver.

**!** Be sure to change the direction of the belt after each bolt is tightened!

### Final checks

6. Verify that the belt setup is correct and that the belt runs accurately balanced.
  - As a last measure, the distance between belt and the top of the plate should be 15mm +/-2mm. However, the float in the belt between directions should never exceed a total of 2mm.
7. Recondition the internal threads of the 12<sup>th</sup> exterior bolt hole, using an M12 tap and a T-wrench.
8. Fit in the last exterior bolt with washer and tighten it.
9. Spread the Sikaflex main seal evenly to achieve a more compact layer.

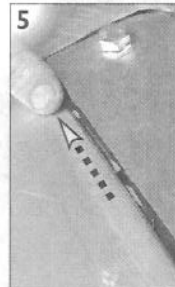
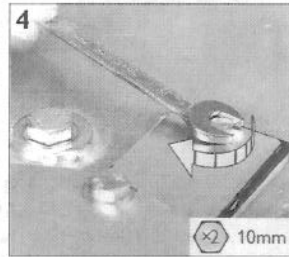
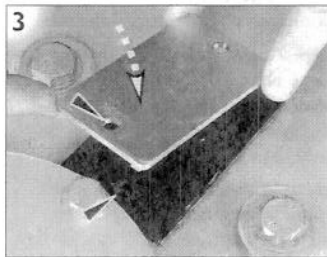
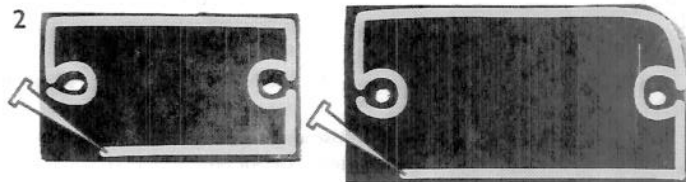


**ADJUSTING THE BELT TENSION**

1. Use a torque wrench to set up the proper belt tension using the following method:
  - (a) Block rotation by fitting in a steel bar through the lugs of the further two fly pulley shafts.
  - (b) From tool kit; use the fly pulley lug protector on the shaft to be tightened.
  - (c) Fit in the fly pulley centre bolt.
  - (d) Apply tension with with the torque wrench. It should reach 155 Nm (115 ft • lb) before the fly pulley slips on the belt.
    - Remove the centre bolt.

**Sealing the inspection/service holes**

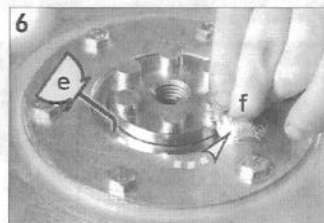
When fitting on the last inspection and service holes, be sure to seal everything up properly with a silicone seal compound. Smoothing excessive silicone will make it easier to clean and inspect the machine.

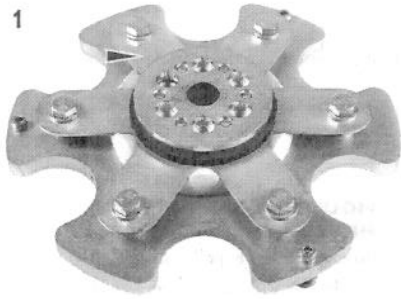


2. Apply a bead of silicone compound all around the belt inspection cover seal and the belt tensioning cover seal.
3. Fit on the belt inspection seal, aligning the bolt holes.
  - Fit on the belt inspection cover plate, also aligning the holes.
4. Insert and tighten the two cover plate screws with a 10mm spanner.
  - Repeat step 2–3 for the belt tensioning seal and cover plate.
5. Smooth the excess silicone around the two cover plates.

**CLEANING THE SHAFTS**

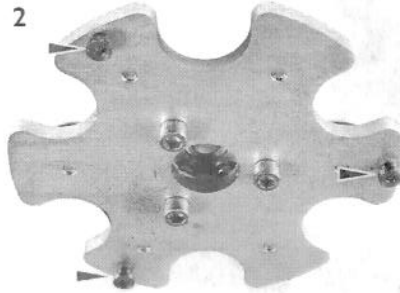
6. Apply lubricant oil (e) to the three fly pulley shafts.
  - Run the machine at low speed to expel any excess silicone from the oil seal.
  - Clean afterwards with a cloth (f).





**Assembling**

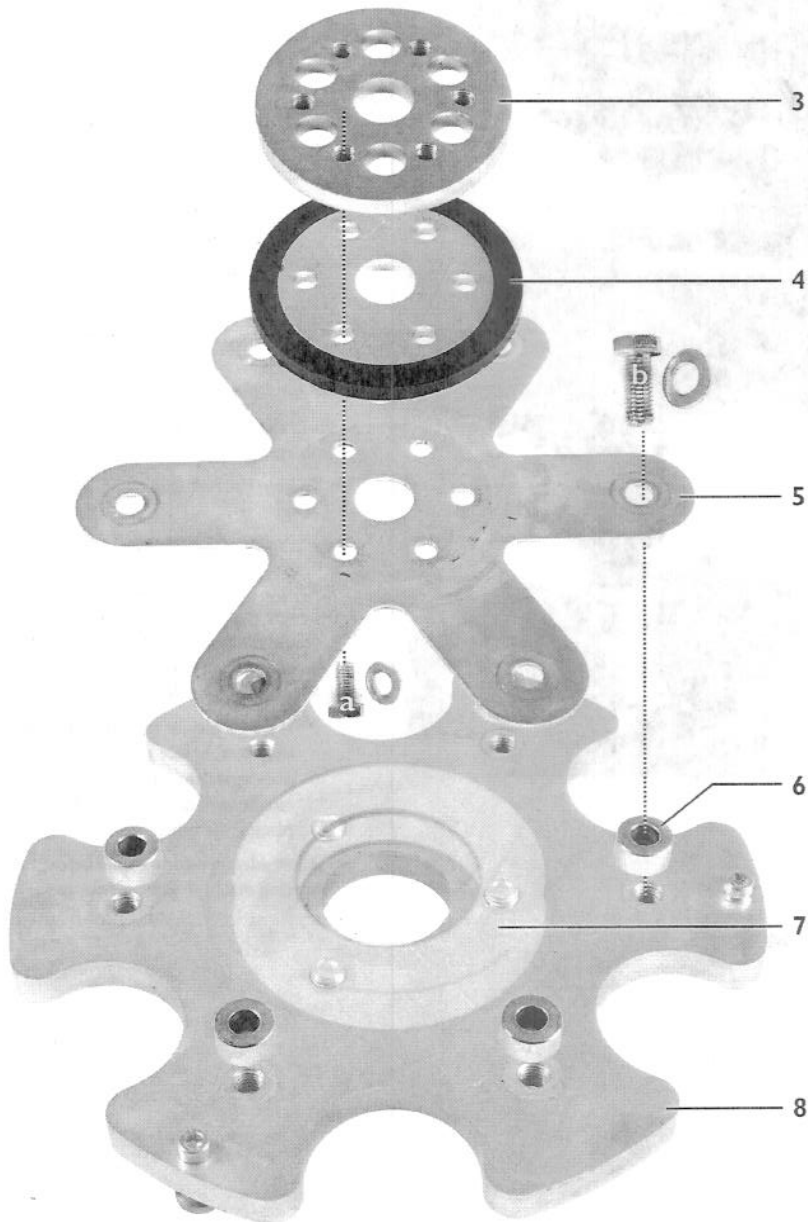
Check spring steel leaf for cracking or inconsistent wear on each of the three heads, inspect spring cushions for tears or excess deterioration.



**MOUNTING THE SATELLITE HEADS**

To each of the fly pulley shafts:

1. Spring steel head assembly.
2. Head assembly with safety head locks.
  - For fitting diamond tools.



3. The drive hub.
  - Couples with the lugs of the satellite head boss.

4. The drive hub spacer cushioning ring

5. Spring steel leaf
  - (a) x6 M8 x 16 bolt with washer
    - Securing the drive hub.
  - (b) x6 M10 x 25 bolt with washer
    - Securing springsteel to head plate.

6. Spring steel spacers

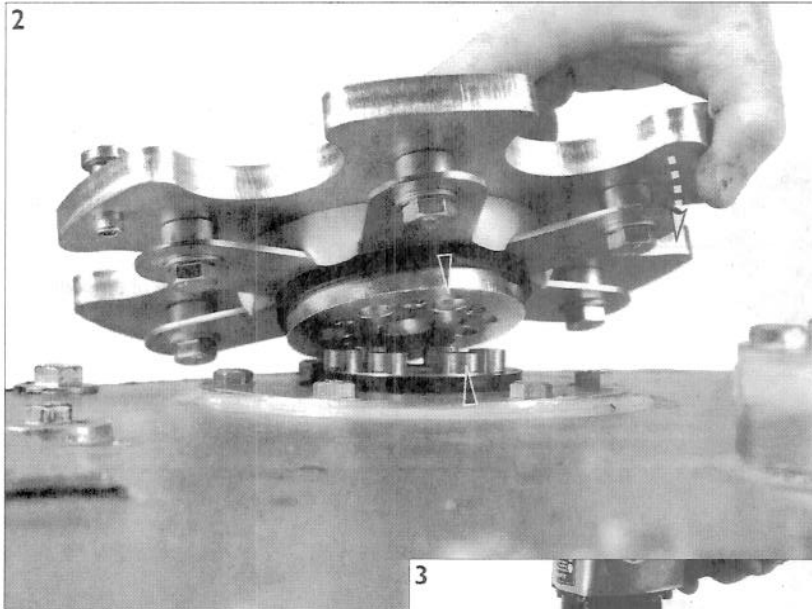
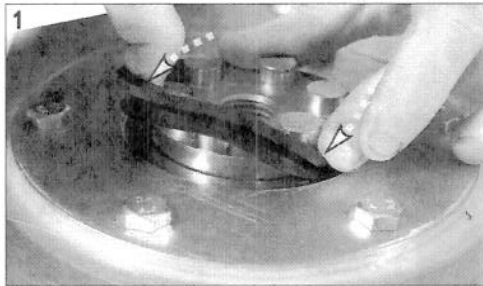
7. Silicone ring - spring cushion

8. Head plate



**Head boss**

The satellite heads are attached to the shafts by means of the head boss with six locating lugs and a centre bolt.

**MOUNTING THE SATELLITE HEADS**

To each of the fly pulley shafts:

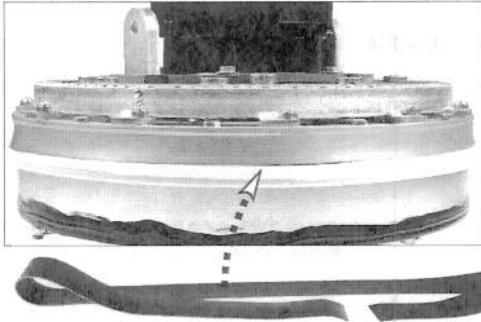
1. Fit the V70 dust seal ring on the three head bosses.
  - Stretch on one side of the seal and work your way around, ensuring the skirt of the seal is facing away from the head boss.
2. Align the drive lugs to the corresponding holes of the satellite heads.

3. Fit in the M16 satellite head centre bolt with spring washer.
  - Tighten the bolt using a 30mm socket.

**Note:**

- Ensure that the bottom plate is clear of any tools and run the three satellites looking for misalignment as a result of wear, both vertically and horizontally.
- If excess play or misalignment exists, then replace all three satellites (it is most uncommon that one satellite will be replaced without replacing the other two).
- Allow adequate curing time before removing machine from service rack.

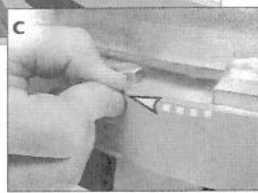
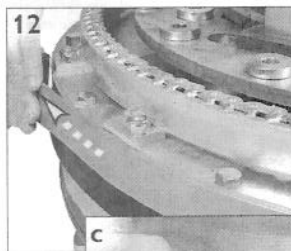
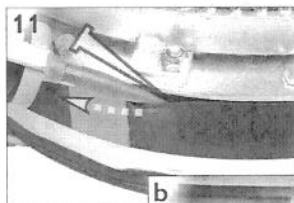
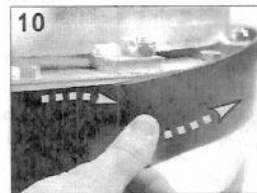
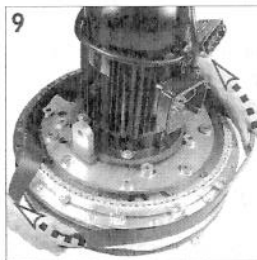
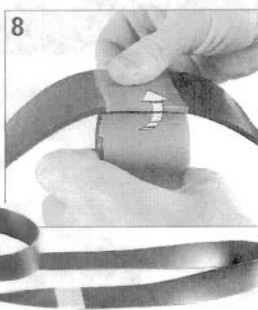
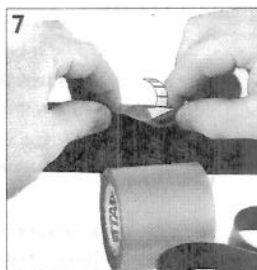
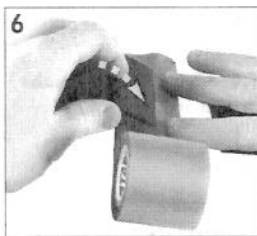
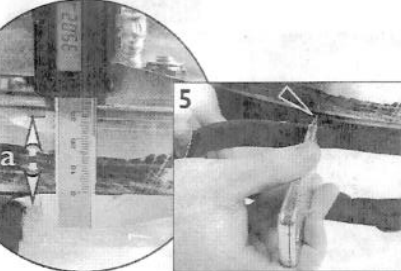
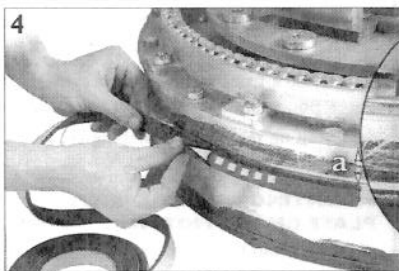
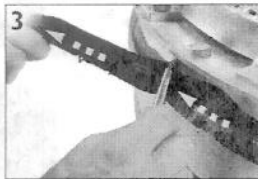
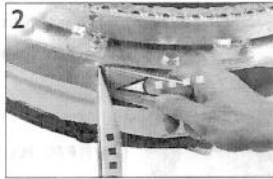
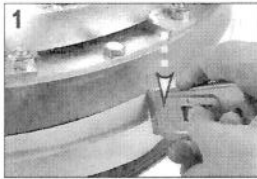




## Replace the planetary seal

The planetary seal should seal the gap between the cover and the side wall. No dust should reach the chain ring. If the chain ring is dirty, the seal should be replaced.

The planetary seal can be fitted with or without the chain ring in place.



### REMOVE THE OLD SEAL

1. Cut the old seal.
2. Remove the entire seal.
3. Remove the old silicone glue compound.
  - Use solvent to remove any remaining debris.

### PUT ON NEOPRENE TAPE

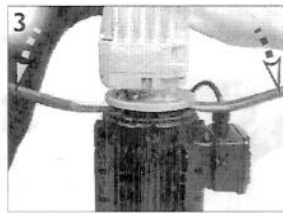
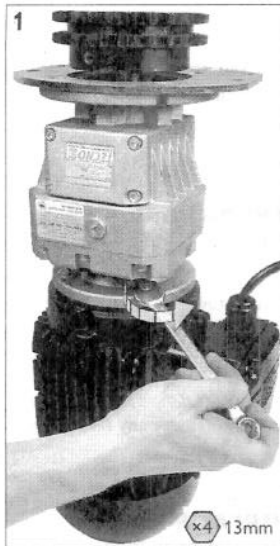
4. Fit on a self adhesive neoprene tape around the planetary unit.
  - (a) Measure and mark a line 35 mm below the lip of the top plate. Then fit on the tape with its upper edge along the line.
5. Have a clean fit with no gaps when returning to the starting point.

### PREPARE THE PLANETARY SEAL

6. Roll out some duct tape on a table and fit on the rubber seal, end to end (approximately half a seal width from the tape end).
7. Fold the tape end over and attach it evenly.
8. Roll on two turns of tape.
9. Fit the rubber seal around the planetary top plate.
  - This may require a small amount of stretching.
10. Adjust the planetary seal edge under the lip of the top plate.

### FIX THE PLANETARY SEAL

11. Insert a heavy bead of Sikaflex between the rubber seal and the underlying side wall.
  - (b) The bead should be concentrated to above the neoprene strip.
12. Put on duct tape to secure the seal while the Sikaflex is curing.
  - (c) Tidy the tape edge.



**Maintenance work**

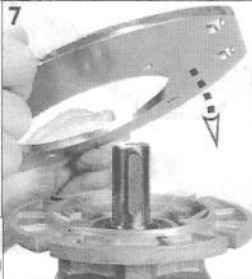
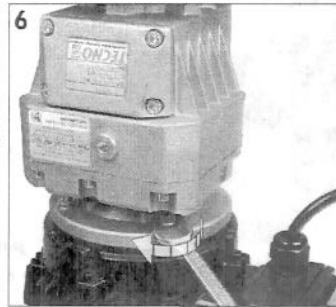
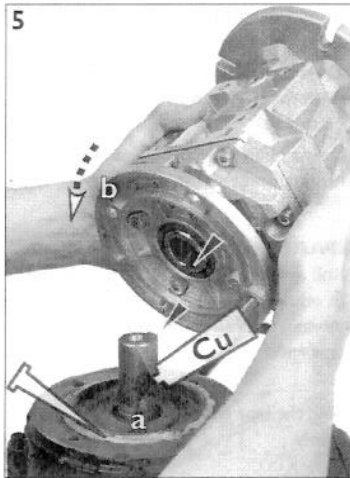
The gear box assembly should be checked on a regular basis..

**REMOVE THE GEAR BOX**

1. Remove the four gear box bolts.
2. Fit in a couple of bladed screwdrivers and work the gear box upwards.
3. Fit in two crow bars to break the silicone seal compound.
4. Lift up and remove the gear box.

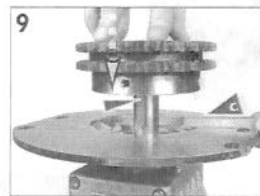
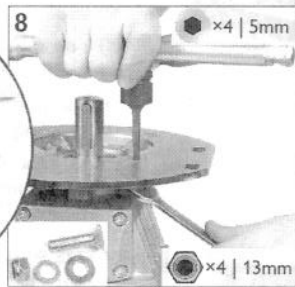
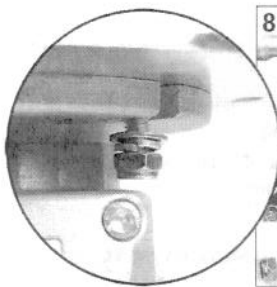
**PREPARE THE MOTOR SHAFT**

5. Clean the shaft with a solvent and remove all silicone compound.
  - (a) Smear copper paste on the shaft. Add a string of silicone seal compound around the motor plate ridge.
  - (b) Fit on the gear box aligning key seat and key.



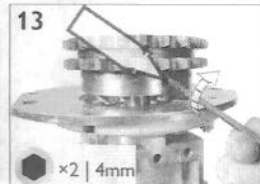
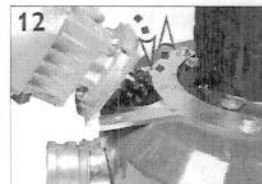
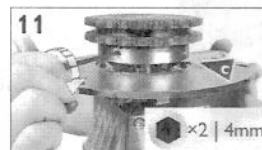
**MOUNTING GEARBOX WITH PLATE ON THE MOTOR**

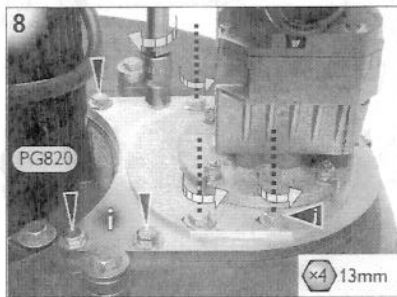
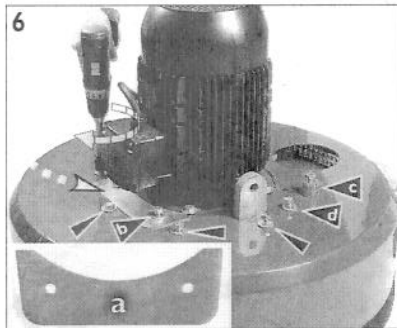
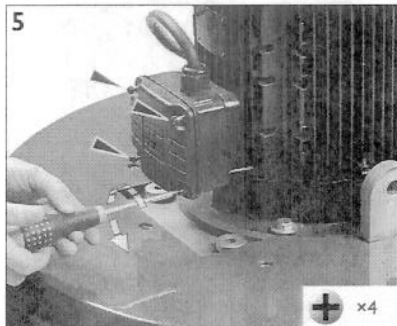
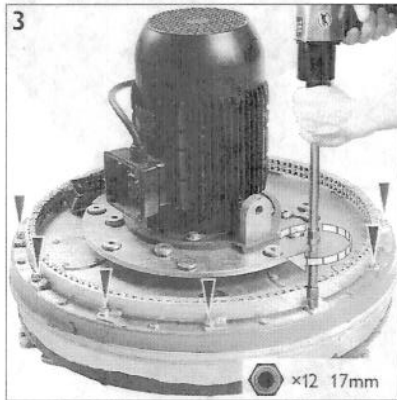
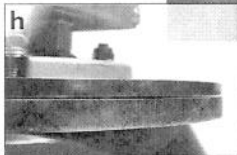
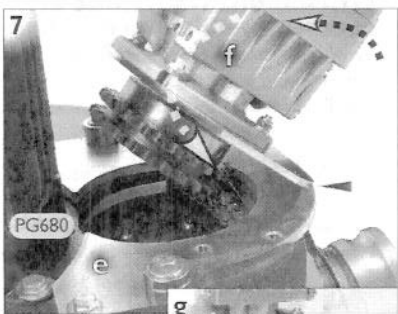
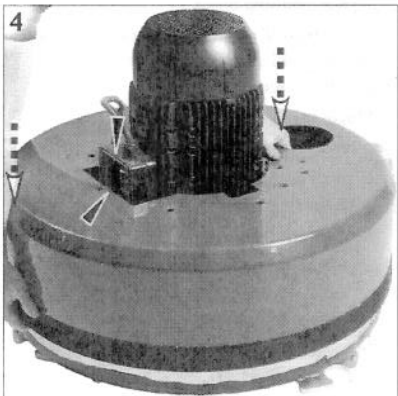
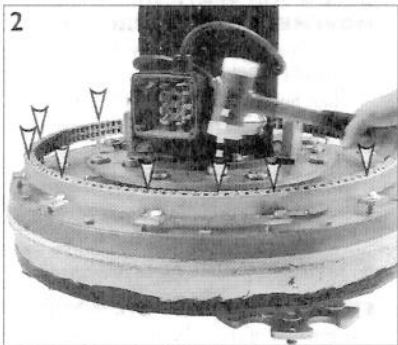
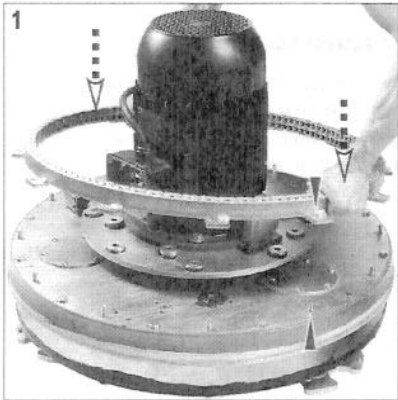
6. Attach and tighten the four gear box screws.
7. Fit on and align the screw holes of the gear box top plate.
8. Insert the four Allen screws with washers, spring washer and nyloc nuts.
  - Use a 5mm Allen key and a 13mm standard spanner.



**MOUNTING SPROCKET TO GEAR BOX SHAFT**

9. Fit on the sprocket, aligning key seat and key.
  - (c) Use an 8mm spacer tool to secure proper positioning on the shaft.
10. Use a soft mallet to knock the sprocket down until it touches the 8mm spacer tool (c).
11. Secure the sprocket by tightening the two internal Allen screws.
12. Fit the sprocket in the chain ring to assure that the sprocket is positioned at the proper place on the shaft.
  - See next chapter; "Mount the motor/sprocket"; 7.
13. When the sprocket position is accurate; remove one internal Allen screw at a time and fit it back with thread-lock retainer.
  - Repeat for the other positioning screw.





## Chain ring and sprocket

The power from the planetary motor is transmitted to the main planetary head by means of a shaft and sprocket to a chain ring.

### THE CHAIN RING

1. Lower the chain ring over the motor.
2. Align the 12 attachment tab holes over the corresponding bolts and press down.
  - Use a soft mallet to evenly knock the chain ring in position.
3. Fit on by hand, all the M10 nyloc nuts.
  - Tighten the chain ring nyloc nuts with a 17mm socket.

### COVER AND PLATES

4. Put on the cover / shroud.
  - Take care of the cable and rotate the motor so the cover fit over the electric box.
5. Fit on the electric box cover.
  - Tighten its four screws with a Philips screw driver.
6. Fit on the cover plate and its four bolts with washers.
  - (a) Fit on the terminal cover plate.
  - (b) 2 terminal plate bolts with washers.
  - (c) 2 bolts with spacers.
  - (d) 7 bolts with washers.

### MOUNT THE MOTOR SPROCKET

The gear assembly should be checked – see previous chapter!

Fit on the fastening plate (which is different for PG680 and PG820, as in 7e and 8i).

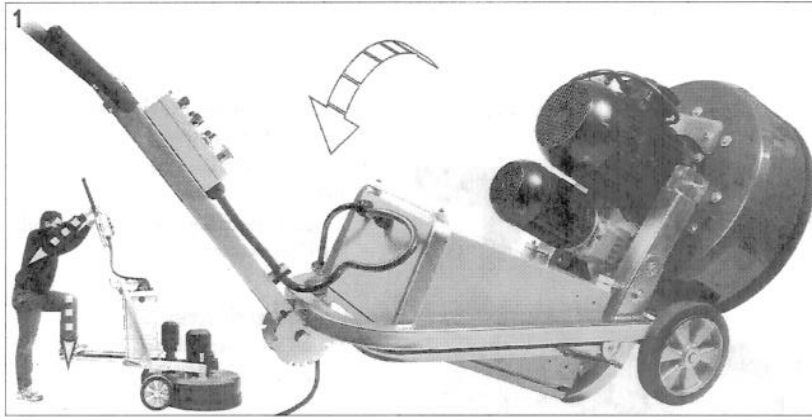
7. It is important that the sprocket fits cleanly into the chain ring, without the presence of any debris.
  - (f) Lift the planetary motor into position.
  - (g) Tilt into place allowing the sprocket to meet with the chain ring as it stands up into position.
  - (h) Hold the planetary drive into the chain ring and check that the sprocket aligns well with the chain ring.
    - Bad fit with no space between the plates indicate that sprocket is not deep enough on the shaft.
    - A gap indicates that sprocket is fit too deep. (see step 12–13 in previous chapter for adjustment).
8. Secure the planetary motor:
  - (i) Tighten the 4 fastening plate bolts.
  - (j) Lightly tighten the 4 motor plate bolts (allow for movement in the oval bolt holes, see next page).

## Mounting planetary motor

### Optimising sprocket pressure to chain ring

The motor attachment procedure as described here will ensure best possible power transmission, while maintaining a minimum of wear and friction.

The process of tightening the satellite motor while running "loose", will ensure an efficient adjustment of the sprockets into the chain ring.



#### TILT THE MACHINE

1. Use the foot step frame and the handle bar to tilt down the machine.
  - The machine should rest on its wheels and the chassis / frame.

#### ALLOW FOR VERTICAL MOVEMENT OF THE SPROCKET

2. The planetary motor plate bolts (a-d) should only be hand tightened. The oval bolt holes will then allow the sprocket to slide down all the way into the chain ring.
  - The motor weight and the near vertical position will cause steady pressure on the chain ring.
  - Plug the power cable to power mains.

#### START THE PLANETARY MOTOR

The rotation of the chain ring will cause a typical grinding noise.

During the chain ring rotation cycle you will be looking for the following signs of pressure points:

#### Noise (peak)

- The grinding noise will have a noticeable pitch as the pressure builds up (where the chain ring radius is slightly lower).

#### Movement (upwards)

3. There will be a slight movement of the planetary motor as the sprocket will oscillate up and down.

Increased speed will accentuate the pressure points.

#### SYNCHRONISE TIGHTENING WITH MAXIMUM SPROCKET PRESSURE

Synchronise noise peak and maximum upward position with each tightening of the four bolts (a-d) in the order as illustrated to the left:

1. Tighten bolt (a)  
(a) will now act as a pivot point.
2. Tighten bolt (b)  
(b) will now act as a pivot point.
3. Loosen bolt (a)
4. Tighten bolt (c)
5. Tighten bolt (a)
6. Tighten bolt (d)

