Form.: 977.607

FEB.1998

HYDRAULC CONTROLLABLE PROPELLER

SABB HVP-15

DESCRIPTION-
MAINTENANCE-REPAIR-
PARTS LIST.

SABB MOTOR A.S

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WARNING

Always follow these health and safety recommendations carefully:
Loose or baggy clothing can be extremely dangerous when working or running engines or machinery.
So far as possible work on or close to engines and machinery only when stopped. If this is not practicable, remember to keep tools, test equipment and all parts of the body well away from moving parts of the engine and or its equipment. Avoid contact with hot exhaust pipe, manifold and silencer. These can be very warm and cause severe burns.

Many liquids used in engines and for cleaning are harmful if accidentally swallowed or splashed into the eyes. In the event of swallowing diesel fuel, rinsing liquid, lubricating oil or similar liquids ALWAYS OBTAIN MEDICAL ASSISTANCE IMMEDIATELY.

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SPECIFICATION, HVP 15

Model	HVP 15
Reduction ratio	1,7:1, 2.14:1 and 3.05:1
Nominal reduction ratio	1,7:1, 2:1 and 3:1
Maximum input torque	147 Nm (15kpm)
Rotation output shaft	Right hand
Oil pressure	22 ± 2 bar
Oil type	Engine oil SAE 15W/40
Oil quantity	2.25 litres, excl. oil cooler
Movement of pull rod	26 mm
Torque settings for bolts	M 8: 2.5 kpm
	M10: 5.0 kpm
Weight	43 kgs (95 lbs.)

DESCRIPTION OF GEARBOX

The gearbox is available with alternative reduction ratios 2.14:1 and 3.05:1. The direction of rotation for the input shaft is LH (viewed from rear) and for the output shaft RH (right hand turning propeller).

The gearbox contains following main components:

1. Hydraulic operated disc clutch.

2. Slide valve housing and hydraulic pump housing.

3. Pitch control crank and oil inlet parts.

4. Reduction gear with incorporated pitch control system.

5. External system consisting of filter, oil cooler (extra supply) with hoses and pipes.

MAINTENANCE

The routine maintenance of the HVP 15 gearbox is limited to regular check of the oil level, and changing the oil and filter as well as greasing of the oil seals at gearbox output flange.

GEARBOX OIL (Hydraulic and lubrication)

To drain the oil remove the nipple 142 (close to dipstick) at the oil return from oil cooler. Insert the hand pump suction pipe or hose, making sure that this reaches sump bottom so that any dirt or sediments are drained completely. It is recommended that the pull rod is in forward position.
To fill clean oil remove the breather filter 141 from top of gear housing. Fill through the opening.

Change the oil first time after 50 hours of operation of the new or reconditioned gearbox. Later oil changes every 300 hours of operation, at least once a year.

REPLACING THE OIL FILTER

The oil filter is installed in the pressure line between the oil pump and pitch control unit. A by-pass valve is included in the filter, thus the oil may pass through the filter housing even if the filter element becomes clogged up.

Replace the filter element 155 after the first 50 hours of operation of the new or reconditioned gearbox in connection with oil change. Later filter change every 300 hours of operation.

The element is replaced as follows:

The previous type of gearbox HVP 15 has a hexagon shape of the filter housing lower part. Unscrew the filter bowl by means of a spanner. Use another spanner to hold the filter top in position to avoid damaging the pipe connection.

Later type filter has two bolts 150 which should be unscrewed for access to the element.

Replace the filter element 155 (paper element). Check that O-rings 153 and 154 are correctly installed before fitting the bowl again.

GREASING GEARBOX OIL SEALS

The oil seals 101/102 at output shaft should have 5 shots grease weekly, or until some grease is pressed out at the oil seal lip. Sea water and condensate at the output flange may lead to rust damage and subsequent oil leakage. Apply a thin layer of grease or rust protection oil to the clutch slide ends (20) and to the remote control fittings at cable ends.

REMOVING GEARBOX FROM ENGINE

1. Unscrew the shaft coupling bolts and push propeller shaft backwards.

2. Undo oil hoses between cooler and gearbox.

3. Remove cover 119 on right hand side, and drain lub.oil using a sump drain pump.

4. Unscrew the 6 bolts securing gearbox to engine. The 6th bolt is accessible through the cover opening. Pull gearbox backwards and lift it out.

Further dismantling depends on which parts are to be checked.

Note that the gearbox includes a number of parts machined to close tolerances and with very smooth surface. Be careful not to damage the parts and harm the surfaces during repair. During dismantling the removed parts should be placed on clean and dry rags, and before assembly all parts should be scrupulously cleaned and inspected for damage of the surface.

DISMANTLING THE CLUTCH

The clutch unit 54 is a hydraulic operated disc clutch, i.e. the clutch is engaged by means of oil pressure forcing the discs (plates) together and thus permitting the engine torque to be transmitted to the gearbox. The oil comes from the pump 31, via the slide 20 through the hollow drive shaft 76 to the clutch. The oil is acting on the piston 56 which is pressed against the disc pack. During de-clutching the oil pressure is released to the oil sump and the disc springs 63 forces the piston backwards.

Repair of the clutch unit may be replacing of worn or burnt discs or changing the seals.

1. Loosen the four bolts 138 securing the front cover 69. Pull off cover by means of a suitable screw driver or similar under the flange.

2. Extract the input flange 73 by using two bolts M6 which should be threaded at least 40mm. For this purpose there are two M6 holes in the flange. Tighten the two bolts evenly until the flange comes off.

3. If the ball bearings stick on the drive shaft 76, use a ball bearing extractor to pull them off after the flange has been removed.

4. Open the lock washer 80 and unscrew the ring nut 79.

5. The clutch is now loose and can be removed for inspection.

6. Check the discs, oil seals and sealing surfaces for wear or damages (scratches). Replace where necessary. When installing new teflon rings 58 and 60 use tapered sleeves to fit the rings over the rubber O-rings. A certain sluggishness of the piston is normal after the oil seals have been replaced. This will hamper the piston movement and cause propeller to "follow" with clutch disengaged. After short time however, the clutch will free completely.

7. When re-assembling the clutch, follow opposite sequence to the dismantling. Observe that the centre discs 62, springs 63 and periphery discs 61 are correctly fitted: Start with no.1 centre disc against the piston, then fit the spring washer 63 and then the periphery disc. The complete disc pack consists of 6 centre discs, 5 springs and 5 periphery discs. When fitting the last centre disc make sure that it is correctly positioned in the grooves of the hub 64 before the cover 65 is pressed on and the nut 79 tightened. Check that the discs can move, using a screw driver or similar tool.

A special tool for re-assembling the disc pack is recommended (MVS-F-16) and available from the factory.

8. Bend the lock washer lip to lock the ring nut 79, and finally fit the ball bearings 75.

9. Before fitting the input flange 73, extract the oil pump drive shaft 68 to check the end grooves for wear. When fitting the drive shaft again make sure that the groove is in mesh with the pins 35 of the pump bolt 34.

   When fitting the input flange 73 check carefully that the periphery discs enter the slots of the flange, and finally that the pin 74 enters its slot in the drive shaft fore end. When the input flange is correctly positioned it can be pressed fully home against the bearings 75.

10. Use new oil seal 70 and gasket 71 and press on the front cover 69. Note that lub.oil slots are in vertical position.

11. Fill up with fresh engine oil of correct quality. Fit the gearbox to the engine.

SEE: STARTING ENGINE.

DISMANTLING HYDRAULIC PUMP HOUSING AND CLUTCH SLIDE VALVE HOUSING

1. Loosen the suction hose 124 and pressure pipe 132. Remove the hollow screw 136. Use a spanner on the nipple 135 when unscrewing the hollow screw. Remove the pressure oil filter.

2. Remove the 2 Allen screws fixing the pump housing 25 to the gearbox. Pull off pump housing. Oil pressure valve 38 and spring 39 are now free to be removed.

3. Remove the oil pump element 31 (external and internal impellers). Check the parts for wear. The axial end play of the element in its housing is checked by a feeler gauge. Normal clearance is 0.025-0.060 mm (.001-.002 in.). Too great play (above 0.10mm .004 in.) may cause loss of pressure and subsequent sluggish operation of the clutch.

4. Unscrew 2 bolts 4 and pull the clutch slide valve housing 10. Take care of the shims 33. (On 3:1 reduction gear).

5. Pull out pump bolt 34.
   Check the pins 35 and their slot in the shaft 68. Replace if worn.
   If only the elastic pins 35 are worn or broken, and the slot still undamaged, fit new elastic pins 35 (3.5x24) and additional elastic pins (2x24 DIN 1481) inside. After fitting the pin ends must be filed flush with the pump shaft 34.
   Be careful not to harm the shaft when filing.

   Check the needle bearings 21 and 67 for wear. If necessary also replace the pump shaft.

NOTE: The hydraulic pump is a vital part of the gearbox, and the gearbox will not function properly if the pump is defective. The utmost care is required during check and work on this part.

6. If wear is suspected of the oil inlet sleeve 22 and/or the clutch slide 20, the parts are removed such:

   Unscrew set screw 50 and the extension 51. Pull off the pin 13. Remove the circlips and washers 17-18 both ends and remove the clutch slide. Unscrew the allen bolt 98 below the clutch slide. The sleeve is now free to be extracted by means of a socket wrench or similar tool.

7. Check the sleeve 22 by sliding it on to the shaft. No noticeable slack is permitted. Correct measures are ø 30mm f5 for the shaft and ø 30mm H6 for the sleeve. Replace the sleeve if worn or damaged. Sleeves are available with undersize dimensions -0.25, and 0.50mm for which the shaft should be ground correspondingly, and to same tolerance H6.

8. Inspect the clutch slide 20 for rust or wear, and replace if required. If the new slide proves to be too stiff, use a fine lapping compound to lap the slide into the bore.

9. Assembling of the parts should be done opposite to the described dismantling procedure. Use new O-rings and circlips. Take care that the grooved pin 13 is fitted correct way, otherwise the clutch slide will be 180 degrees wrong. Use "liquid gasket" to the threads of the socket screw 11 before fitting. Use new O-rings and circlips for the slide and fit O-rings from both sides to prevent damage to the O-rings when passing through the slide housing.

10. **IMPORTANT**

    If the oil pressure valve has been off, the oil pressure must be readjusted. Unscrew nipple 42, fit an oil pressure gauge (40 bar). Unscrew the dome nut 44. Screw out the adjusting screw completely before start. When the gearbox oil has reached normal working temperature, adjust oil pressure by screwing in the adjusting screw until 22 plus/minus 2 bar on the gauge at full speed.

    When the gearbox is cold, the oil pressure will be a little higher. Fit the gasket 45 and dome nut 44 and tighten securely. Finally remove the pressure gauge and fit the nipple 42 again.

NOTE: The engine should not be started first time unless the oil pressure valve is released by means of the adjusting screw being completely unscrewed. Too high oil pressure will destroy the oil pressure gauge and perhaps also damage internal parts in the gearbox.

DISMANTLING PITCH CONTROL CRANK AND OIL INLET PARTS

1. The prop. shaft should rest in rearmost position, i.e. the pitch control lever 105 in foremost position. If the engine can not be started it will be possible to push piston 86 backwards by careful pressure to the lever. The

piston may also be pulled backwards by using a suitable tool at the gearbox flange.
The safest method however will be to start the engine and stop it with the rod in rearmost position.

2. Remove cover 119.

3. Unscrew the socket screw 53 and remove the pitch control lever 105.

4. Unscrew the gland 108.

5. Use 14mm spanner to hold the nipple 111 in position while loosening the hose 112.

6. Lift the crank 110 enough to come off the block 115, turn it, pull down and out. Remove the block 115.

7. Remove the circlip 17 and spacer 18. The oil inlet block 114 is pushed forward to come off (provided the piston is in rearmost position, see 1. above).

8. Check all parts for wear. Belonging parts should move smoothly but without any slack. Replace the oil inlet block 114 if worn. Note that the slide 84 and the shaft 86 are lapped together (lap fit) and can not be replaced individually.

9. The assembly is done in reverse direction to dismantling. Note that both spacers 17 are fitted against the oil inlet block 114. Use new circlip 18. Be careful not to over-stretch the circlip when fitting it, and make sure it comes perfectly into its groove. The nipple 111 is not tightened, but permitted to turn together with the hose 112. Use a 14 mm spanner to hold the nipple when tightening the hose nut. Do not twist the hose. The pitch control crank 110 must not bend or lock when the gland 108 is tightened. A small axial movement should be felt after tightening the gland. When the control lever is fitted a certain slack is felt when the slide moves the permitted distance limited by the dowel (elastic pin) 85. The movement must be easy.

DISMANTLING GEARBOX

1. Remove oil pump housing, clutch slide housing, clutch and oil inlet block following previous instruction.

2. Undo the lock washer 159 and unscrew the ring nut 158. Clamp off the coupling flange 103.

3. Unscrew seven bolts 5 and 7 for the gear housing cover 3. To extract the cover first fit three M10 socket set screws (without head) into the upper and the two lower holes. These screws are screwed only 4-5 turns into the gear housing, and thus forming the base for three M12 bolts by which the cover now can be extracted. Tighten evenly the three bolts until the cover comes off.

4. The driver shaft 76 and the complete intermediate shaft 96 assembly with gears and servo mechanism can be lifted out of the gearbox.

DISMANTLING SERVO CYLINDER

5. Unscrew six countersunk head screws 93.

6. Let the unit rest on the gear 91 and hammer carefully with rubber mallet against the end of the shaft 86 until the parts separate.

   Removing the slide is usually not necessary. The pitch control shaft 86 and the slide 84 fit together and must be replaced as a set.

7. Check all parts for wear, including gears and bearings. Inspect the chrome layer on coupling flange 103. Damage or wear of the chrome surface might cause leakage. Replace worn parts.

8. Rinse the strainer 130 and gearbox internally before assembling the parts.

NOTE: THROUGHOUT CLEANLINESS IS REQUIRED DURING THE ASSEMBLY. ANY DIRT OR FOREIGN PARTICLES MAY CAUSE LEAKAGE OR BREAK-DOWN.

9. When assembling fit new O-rings and gaskets. The piston ring 94 is cut and removed. Fit new piston ring using a tapered tool to expand the ring over the piston. All O-rings should be covered with thick oil or grease before fitting.

10. The assembly is carried out in reverse procedure to the dismantling. The countersunk head screws 93 should be tightened to 2.5 kpm and locked by punch marks.

11. Insert the complete shaft assemblies from rear and check that the shims 33 (only for R 3:1 and tapered roller bearings, not shown on drawing) are replaced.

12. Replace the oil seals 101 and 102 applying grease into the cavity between the rings.

13. Fit gear housing cover 3 using new gasket 2. Be certain that the dowels come into position before carefully knocking home the cover by means of a mallet. Tighten all bolts evenly.

NOTE: Gear housing and cover are machined as a unit, thus one of the parts can not be replaced individually.

14. Only for R 3:1 and tapered roller bearings :
After assembly check the axial clearance by means of dial gauge. Use a rubber mallet to knock the two shaft ends, making sure they are fully home. No noticeable clearance should be felt, but the shafts should turn freely and without undue resistance.

15. The coupling flange 103 is pressed on. Apply some silicone into the key way before fitting. This will prevent oil leaking at the key. (Heating of the coupling flange to appr. 150 gr.C. will facilitate fitting).

    Tighten the ring nut 160 and lock with the lock washer.

16. Follow previous instruction for fitting clutch slide housing 10, oil pump housing 25, clutch 54 and pitch control crank 110.

17. Before mounting the gearbox to the engine make sure the damper plate is in order. Replace the damper plate in case of wear and slack of springs and spline.

18. Mount the gearbox, connect all houses and pipes. Replace oil filter element (see special instruction) and fill up to max. level with correct oil.

STARTING ENGINE

If the oil control valve has been touched unscrew completely the adjusting screw before start.

Start the engine and adjust the oil pressure as described in "Dismantling hydraulic pump housing and clutch slide housing". Rotate the screw forward until the manometer reaches 22 bar. Permit engine to run until gearbox oil become warm. Then adjust oil pressure to 22 plus/minus 2 bar.

When the engine has reached normal working temperature the oil pressure may decrease to appr. 15-20 bar at idling speed. That is normal and will not cause any trouble for the operation. Check that clutch and pitch control operate satisfactorily. During full speed trial check the gearbox for undue heat and noise. Tighten all hose- and pipe connections.

OIL COOLER

The gear oil temperature should not exceed 70 degrees C. Maximum allowable temp. is 80 degrees C. Higher temps. will cause increased wear and reduce the life of gaskets and seals. The internal leak will cause sluggish and delayed control of the entire system.

The oil cooler capacity depends mainly on water temperature and water flow through cooler. In general our standard gearbox oil cooler is adequate. As a rule of thumb calculate necessary capacity of oil cooler to be 10% of engine rating.

The cooler is installed in the sea flow line from water inlet, at pump suction and before the heat exchanger, and the sea water flow should be opposite to the oil flow. The gearbox oil temperature should be checked after the cooler has been installed to make sure the temp. is below 70 degrees C.

INSTALLATION OF PROPELLER SHAFT AND STERN GEAR

The propeller shaft should be straight and undamaged. If possible check the shaft before starting the installation work. If the shaft protrudes more than 1.4 m (40 times dia.) ahead of the stuffing box, a support bearing should be inserted about halfway between stuffing box and shaft coupling.

The propeller system is delivered from the factory as an assembly, i.e. the propeller boss, the blades, the stern bearing, the stern tube and the stuffing box are assembled. The propeller shaft is usually cut and shaft coupling mounted when the blades are set for full pitch astern.

Mounting procedure:

1. Adjust the gearbox output flange to its rearmost position.
2. Unscrew the stuffing box.
3. Mount the propeller assembly through the hole in the stern post. (Also remember hole for the stern greaser tube).
5. Measure the distance "A", see the drawing.
6. Cut off the propeller shaft in front end "A" + 5 mm, 5 mm being the air gap between the propeller shaft and the gearbox shaft, when the stern gear is mounted.
7. Screw in the stern greaser tube and mount the stern gear.

If the propeller shaft is going to be fitted when stern gear is previously mounted, it should be done as follows:

1. Move the gearbox shaft to its rearmost position.
2. Enter the propeller shaft until it meets the gearbox shaft.
3. Cut the shaft so the measure "X" corresponds with the figure in the table.
4. Assemble the propeller boss with blades after greasing with water resistant grease.

Tightening torque for the split shaft-coupling bolts:
Clamp bolts, M12 acid proof: 8.8 +- 0.5 kpm
Flange bolts, M10 acid proof: 5.0 +- 0.5 kpm

Note: The holes for 8 mm tension pin must be bored through after final aligning.
Mount the pin with the open end in engine rotation.

Align engine as follows:
Disconnect the shaft coupling flanges and press together the flanges firmly by hand. Use feeler gauge in 4 positions around the flange, up/down and left/right. The flanges must be true within 0.1mm (.004 in.) i.e. the feeler blade should not enter in any of the four positions.

Rotate the shaft coupling with the gearbox flange at ease, and repeat the check every ¼ turn all the way round.

After the final alignment tighten the connecting bolts to 5 kpm for the stainless steel bolts. The alignment should be checked again later:
After the boat has been launched and then again after the first 150 hours of operation. At the same time tighten engine foundation bolts.

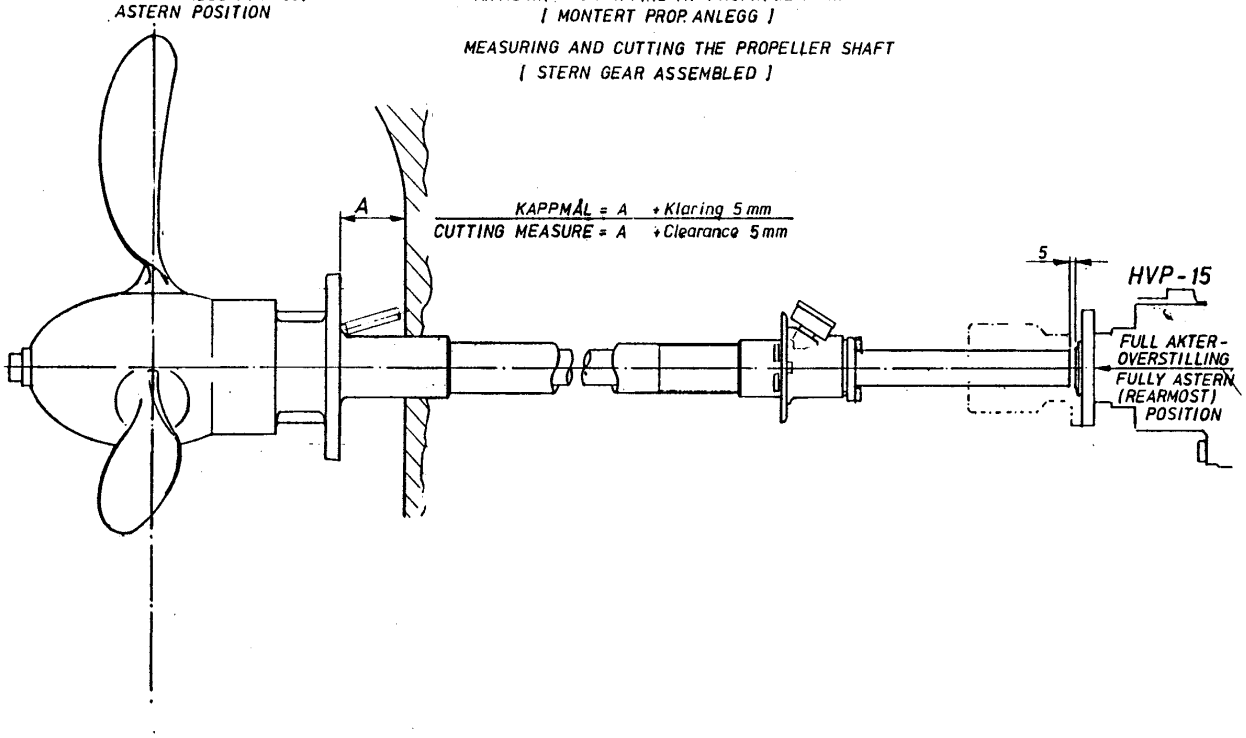
977.315

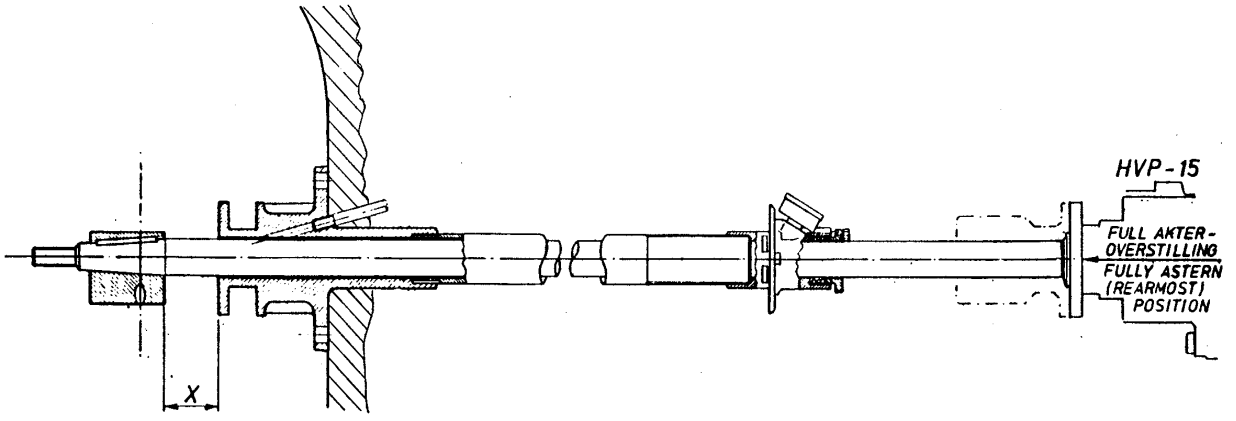
PROPELLERBLAD I FULL AKTEROVERSTILLING

PROP. BLADES IN FULLY ASTERN POSITION

TILPASSING OG KAPPING AV PROPELLEAKSEL.
[MONTERT PROP. ANLEGG]

MEASURING AND CUTTING THE PROPELLER SHAFT
[STERN GEAR ASSEMBLED]





TYPE	2JHVP	2JHVP	M4.140HVP	M4.140HVP
Propellanlegg : Stern Gear :	2 Vinget 2 Blade	3 Vinget 3 Blade	2 Vinget 2 Blade	3 Vinget 3 Blade
RED.:	2 : 1	2 : 1	2 : 1	3 : 1
Aksel dia.: Shaft dia.:	ϕ32	ϕ35	ϕ25	ϕ35
X Mål i mm.: X Measure in mm.:	47	62	40	62

TILPASSING OG KAPPING AV PROPELL-AKSEL [DEMONTERT PROP. ANLEGG]

MEASURING AND CUTTING THE PROPELLER SHAFT
[STERN GEAR DISMANTLED]

FITTING THE REMOTE CONTROLS

The operator unit (Pilot house, "TWIN S" or "S") has different sets of holes in the control arm to which the cable end is fixed. Thus the cable travel can be chosen for different installations. For HVP 15 the total travel of the gearbox fitted pitch control lever 105 amounts to 58 mm, (outer hole) for pitch adjustment full astern/ahead. However, this total travel is seldom required, but may vary from one boat to another. The gearbox lever as well has the choice of three holes. From the point of view of accurate pitch control, as large sector as possible should be used for the operator unit. The selection of holes will permit the most favourable cable travel in each type of boat.

The clutch control lever 52 needs 65mm cable movement to operate correctly.

After the boat has been tested at sea the maximum ahead and astern pitch should be set by means of the set screws in the operator. Sometimes it will be advisable to alter the position of the two pull rods: Propeller shaft pull rod and gearbox rod, to optimise the pitch control function dependant on type of boat or duty. Then the clamp nut is made loose and rods adjusted accordingly. The longer astern the rod is permitted, the more ahead pitch will be available, and vice versa.

Ahead pitch should usually be set corresponding to the max. engine rpm. For certain duties, however, such as trolling, a slightly heavier pitch will be favourable in order to benefit from the higher torque available, and then reduce the pitch when running at full speed.

TROUBLE SHOOTING

Under-mentioned points may be of value in tracing and repairing errors and malfunctions:

1. Low oil pressure is noticed by the operation becoming slow and sluggish. At very low oil pressure the clutch will slip and the clutch discs will wear out within short.
   When checking the points below, a 40 bar pressure gauge is required.
   The manometer is fitted after nipple 42 has been removed.

   The cause of low oil pressure:

   A: Insufficient amount of oil in the gearbox. This must be checked first.

   B: Leaky suction house. Check hose clamps tension and inspect hoses for damage.

      Fine-foamed oil indicates suction leakage. Such fine bubbles or foam will cause fluctuation of a manometer pointer, if fitted.

   C: Oil pressure valve loose. Adjust pressure and tighten dome nut securely.

   D: Defective oil pressure valve. Remove clutch slide housing and check if the valve has stuck or if the spring is broken.

   E: Wear of oil pump. Check this in the following way:

      Loosen the pressure hose 132 from oil filter 145 and plug the hole in the filter with an ¼" BSP plug. Run the engine with clutch disengaged. If the pressure remains low, the fault is likely in the oil pump. Remove the pump and check it according to instruction in "DISMANTLING HYDRAULIC PUMP HOUSING AND CLUTCH SLIDE VALVE HOUSING".

   F: Leakage in clutch.
      Follow the instruction under point E above.
      If the pressure is normal, engage the clutch. A pressure drop indicates an abnormal clutch function. Remove the clutch for inspection, see instructions given in "DISMANTLING THE CLUTCH".

G: Wear in the parts of the pitch control system. Remove the plug in the filter and connect the pressure hose in its place.

Wear of the parts at the pitch control unit, or defective internal seals.

If the pressure drop is caused by internal leaks at the pitch control unit, the pressure will remain nearly constant with clutch engaged and disengaged. If the pressure drop is caused by internal leaks at the pitch control unit, the pressure will remain nearly constant with clutch engaged and disengaged.

The pressure should read 22 bar ± 2 bar with a new (or reconditioned) gearbox at full speed and at working temperature. The oil pressure will gradually sink as the gearbox gets older. The clutch will work properly even if pressure sinks below 15 bar. The pitch control, however, will not work safely if pressure gets below 15 bar. Low oil pressure gives slow and sluggish pitch operation.

If oil pressure sinks below 15 bar the gearbox should be checked for possible reconditioning or replacement.

2. If the pitch control becomes sluggish and the pressure still remains normal, the defect is likely in the propeller. Particularly so if the pitch can only be adjusted with clutch disengaged.

The boat should be beached for control of the propeller. Inspect blades for damage, or check internal parts for possible wear or bend. If a propeller blade hits a floating object or strikes the bottom, the shock may sometimes cause internal damage. Slow pitch control is sometimes caused by lack of lubricant in the propeller boss, or use of incorrect grade of grease. Use recommended water resistant grease for lubrication of the propeller.

3. Gearbox noise.

If the engine is operated at low rpm a certain noise is often noticeable. This noise comes from the interference between the gears and the damper plate. Such noise may be annoying to the operator but is harmless to the gearbox. Increase the engine speed some to avoid or reduce this noise. If this interference noise tends to increase in

time, the damper plate should be inspected for wear or damage. When fitting the damper plate use new lock washers for the bolts and tighten securely to 2.5 kpm.

ORDERING SPARE PARTS

For ordering spare parts please see SPARE PARTS CATALOGUE for correct part name and part number. When ordering always state full details:

1. Gearbox type and Serial no.

2. Part name and part no.

3. Quantity.

4. Full address, name of ship, port of call, marking and forwarding instructions (air freight, air mail, by ship, by mail).

Most parts are available from stocks in Bergen.

Bergen, February 1998
SABB MOTOR A/S