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**MINOR rudder controller**

**ASSEMBLY**

SERVICE MINOR is a simple rudder controller for smaller fishing vessels and pleasure boats. The machine bolted to the deck with four screws and rudder cult with a chrome nickel bolt, for example, one Allen screw. The holes for deck fasteners are undersized and must be drilled with rudder controller that adaptation should be good. The location of the machine covered is very Important.

Figure 1.1.1 and 1.1.2 shows two common mounting methods. Transverse mounting, Fig. 1.1.1 is space saving and most used. Rudder controller cylinder is mounted with ball head aft and can therefore rotated 360 in the horizontal plane during assembly. Note that the machine is slightly tilted relative to boat when the rudder is in the neutral position. Such a location provides greatest force on the rudder when it’s in the ship.

On deck mounted chocks that can hold the rudder controller of other modes. Tiller stopped 2-3 mm before the piston in rudder controller when packing boxes. Wheel chocks are not required on smaller boats. Rudder stock must be stored close to the rudder, Fig. 1.1.3.

**MINIMUM POWER DIMENSIONS**

<table>
<thead>
<tr>
<th>Hormaskin</th>
<th>Skruer Brakett</th>
<th>12</th>
<th>16</th>
<th>20</th>
</tr>
</thead>
<tbody>
<tr>
<td>MS 50</td>
<td>M 10</td>
<td>M 12</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MS 120</td>
<td>M 10</td>
<td>M 16</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MS 200</td>
<td>M 12</td>
<td>M 20</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Screws
Rudder controller bracket Cool

**MAINTENANCE**

SERVICE MINOR is shown in section in Publication No. 211 ~ 01-30-03. It has grease nipple 218, where it periodically pressed In water-resistant grease of recognized brand.

Lubrication interval:
The monkeys tire fitting: max. 1 month.
Below deck: max. 3 months.
Table 1.1.2 provides the main mounting dimensions at 2 X 40 degree or 2 X 45 rudder. The dimensions A, T and V are the same for both rudder angles.
<table>
<thead>
<tr>
<th>Type</th>
<th>A</th>
<th>$R_{40}$</th>
<th>$R_{45}$</th>
<th>T</th>
<th>V</th>
</tr>
</thead>
<tbody>
<tr>
<td>MS 60</td>
<td>385</td>
<td>115</td>
<td>105</td>
<td>95</td>
<td>187</td>
</tr>
<tr>
<td>MS 120</td>
<td>481</td>
<td>150</td>
<td>140</td>
<td>130</td>
<td>236</td>
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<tr>
<td>MS 200</td>
<td>507</td>
<td>150</td>
<td>140</td>
<td>130</td>
<td>245</td>
</tr>
</tbody>
</table>

Fig. 1.1.1.

Feste for nødstyring
Parting for Emergency Steering

Fig. 1.1.2.

Key for steering
Nøkkel for nødstyring

Key Grip
PACKAGE SHIFT

The gland seals.
Pheonix gland, 2, taken out by removing the retaining ring, 209
To get to the rear stuffing box must forward the gland solved and piston rod with piston and gland extract.

Piston seals.
The plunger rod, 4, with the piston 1, can be pulled out after the forward gland is loosened. Seals, 203, flip-out and new pushed into place. O-rings 212 are not subjected to wear and should not be changed. It is available after bolt, 211, is pushed out.
Ensure that the piston is mounted on the rod as it was originally fitted.

The emergency controls
Tiller.
Any mechanical device, also rudder controller may fail.
It must therefore be ensured that the assembly is constructed such that the emergency control is possible.
Tiller should be designed with a projection, Fig. 1.1.1. So that an extension tube can be threaded replacements.
By longitudinal assembly being tiller transverse fig.1.1.2, and emergency controls can be performed with a key piece of the rudder tribe top that must have key grip.
To emergency rule must bypass valve opens or hoses loosened.
OIL
To control the machine must be used only good quality oil and intended for hydraulic lines. In FIG. 1.1.4 is given an over-term of suitable oils from some major oil companies.

There is a peace of mind to have a little extra oil of the proper type for machine control board. Replenishment is normally necessary, but there may be a leak in the system, not immediately be rectified. In an emergency, the other hydraulic oil or lubricating oil used. If the situation is precarious, can be topped with solar oil. The oil is a very important part of their computer and have everything to say operational safety. Use of lubricant/solar mixtures, other than as pure relief, discouraged determined.

NB: If lubricating oil or solar oil used, the pump on any electrical unit or motor unit stopped.

After intervention by improper oil, the system must urgently be done clean and fill with correct oil.

<table>
<thead>
<tr>
<th>Marken</th>
<th>Handaustypen</th>
<th>Maschinentypen</th>
</tr>
</thead>
<tbody>
<tr>
<td>BP</td>
<td>Enmorel 100</td>
<td>Enmorel 85-100</td>
</tr>
<tr>
<td>Capella 44</td>
<td>Capella 44</td>
<td></td>
</tr>
<tr>
<td>Sato 55</td>
<td>Sato 55</td>
<td></td>
</tr>
<tr>
<td>FINA</td>
<td>Hydran 12</td>
<td>Hydran 21</td>
</tr>
<tr>
<td>GULF</td>
<td>Hydraulic 011 A</td>
<td>Hydraulic 011 A</td>
</tr>
<tr>
<td>Mobil</td>
<td>Teillus 17</td>
<td>Teillus 17</td>
</tr>
<tr>
<td>Esso</td>
<td>Alumina Teillus 17</td>
<td>Jora Hydraulic 011 BP</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
PIPING
Pipe dimensions.
 Pipelines are transferring power from the hand or rudder controller under high pressure and with minimum loss. Tube sizes must adapted to this.
Figure 1.1.5 Shows commonly used pipe sizes. It is assumed set used precision steel, stainless steel or copper.

<table>
<thead>
<tr>
<th>Pump type</th>
<th>L</th>
<th>d</th>
</tr>
</thead>
<tbody>
<tr>
<td>E 185, D 185, D 225</td>
<td>under 6</td>
<td>12</td>
</tr>
<tr>
<td>E 227, D 189</td>
<td>over 6</td>
<td>12</td>
</tr>
<tr>
<td>E 285</td>
<td>under 15</td>
<td>16</td>
</tr>
</tbody>
</table>

L = distance from håndpumpe to rudder controller alongPipeline measured in meters.
d = minimum outside diameter in mm.
Larger pipes can be used.
The pipes must be laid in straight as possible lines from the pump to rudder controller.

All bends are stealing power and more the sharper the kink is . It should be used as little as possible sharp bends ( elbows ) . The pipes will succumb the buck unit and spliced straight lines , Fig . 1.1.6 .

12 mm tubes can with some caution hot bent easily without buck apparatus over a 60 mm tubes or the like.
The pipes must never be heated to glowing with a blowtorch and fluffy nor filled with sand before _ Inflection. Mill scale and fine sand particles will even with the - nice cleaning remain again . Only after a period of use they dissolve and may accumulate in the pump , Valves 0.1. , Where the light does _ Great damage , reduces life Fig 1.1.6 component functions.
Tubes for hydraulic systems shall be bent cold, preferably with
proper equipment.

**HAND PUMP**

**STRUCTURE**
SERVI hand pumps are built in axial piston version. The steering axle, 3, pull the cylinder block, 8, 5, 7 or 9 stamps, 10, around. The protruding piston end being of springs 11, the pressure at an oblique axis bearing, 102, under suction of oil and pushed back by the store when pressurized oil is delivered. The oil is headed and the cylinder block through a round drain (fordelertapp), 7, with drilled channels. Outside the pump is Oil Lock, 28, Sec. 6.3, either mounted on the pump or connected thereto by piping.

**DISASSEMBLY AND COMPOSITION OF THE PUMP**
In the event of pump malfunction, leaking seals, etc., it may be necessary to open it. Necessary tools are an Allen wrench 6 mm wrench size. Also be sure to have clean rags on hand, so that parts can placed safe and clean after they are taken out.

1 All screws except two diametrically oppositely disposed screws, 105, in front, 4 removed. Ensure sealing washers, 118, shall be one under each screw. The last cover screws screwed evenly so that there are bends in the cover. Hold against when the cover is almost lost, so that there bounce off.

2 Once all screws are removed, the front cover with shaft, 3, pulled straight out. Stamps, 10, and cylinder block, 8, can also extracted and needle bearing, 108, is provided.

3 To get the oil seals, 104, must shaft with stock, 103 à pulled out of the cover.

4 Lip and groove in the shaft sealing rings should face inward.

5 To facilitate assembly, the ball joints 110, and the rings of the bearings, 102 and 108, inserted with little ball bearing grease. Be aware that the ring with the least internal diameter (stock 102) should face the pistons.

6 Cylinder block with pistons, springs, 11, and bullets set in place with keyway up.

7 Cover with shaft and stocked gently and pressed in place so that the two screws from taking hold. Tighten screws alternately so that the cover is not bent.

8 All screws tightened to but not used force.
For D - pumps also apply:

9 To get to the shaft seals, 112, on the secondary tab, Remove the flange 13, by loosening the four screws, 105.
**INSTALLATION INSTRUCTIONS**

**MINOR**

Upon assembly must also be taken into account that boats, especially wooden boats, working in the sea and also lends itself due moisture wood.

Cutting Ring Fittings.
In luminaire catalogue is shown the common cutting ring couplings. Cutting Ring Fittings require no special tools when splicing pipes, but to ensure good links work must be performed with care and follow the instructions below.

![Figure 1.1.7](image)

The first condition for a tight joint is that the pipe is cut most as perpendicular, Preferably in the jig, Fig. 1.1.7. Degrees by cutting file removed from both the interior and end sanded lightly. Under this work will always get steel particles into the tube. These must iron pipe installed. First blown through with compressed air, then rinse in white spirit etc. and pull a brush or clean rags.

![Figure 1.1.8](image)

Figure 1.1.9 and 1.1.10 shows cutting ring fittings intersected with all parts. Note which way the cut ring should face. The further method are:

1 Nut and cutting ring threaded onto the pipe, Fig. 1.1.8.
2 The tube is inserted into the fitting until it bottoms and held there while the nut is pushed forward and screwed up cut ring torn against the cone, Fig. 1.1.9. Before the nut screwed on, threads should be oiled slightly - do not use grease or other fat.

3 Now pulled nut to lay - 2 turns, so that the ring cut into the pipe, Fig. 1.1.10. Be careful that the tube constantly females. Loosen the coupling and inspect the cut-ring has gone into the tube. There should be a distinct edge front ring. If no edge exists, drawn to the outer is exceptionally situated 1/2 - 1 turn and link -examined. When working with plumbing pipes must be cut to the correct length, so that the fixture without further fits. The fixture should not draw together two pipes that are too short, or correct a crooked bends. Such must be addressed in advance.

Save your energy by not tightening - After operation has been in use for a few days, goose it over for pulling the it may be necessary.

**HAND CONTROL SYSTEMS**

**A HAND PUMP**
Hand pump with or without columns and rudder controlleren must placed so that they are easily accessible for rudder laying. Between the pump and rudder controller fed two rudders, see page 3.

**MINOR and Major / Pump Series 22**
This arrangement is shown in A. The tubes, 14, connected to Oil Lock, 28, underside and fed in the direction of the helm, 34 Bypass, 36, about to be used, mounted in an easily accessible place. With it you helm disconnected from the pump.

As close as possible helm mounted sjokkven - valve, 37 Shock valve prevents overloading of helm. Oil orientation in the bypass and shock valve indifferent.

**Major / Pump Series 28**
This arrangement is shown in B. Oil Lock, 28, is connected to the hand pump 19, with three pipes which can shortened if necessary. Continued 2 distributor, 14, to rudder controller, 34.

Current Cock, 36, mounted in a readily available place. With it you rudder controller suspension of pump. As close as possible rudder controller mounted shock valve, 37 Shock valve prevents over burden of rudder controller. in Oil orientation in Current Cock (bypass channels tap) and shock valve indifferent.

**Rudder controller P and S / Pump Series 28 and 40**
This arrangement is shown in C. Oil Lock, 28, is connected to the hand pump 19, with three pipes which can shortened if necessary. Continued 2 distributor, 14 to rudder controller, 34, current cock, 36, mounted in an easily accessible place. with the can rudder controller disconnected from the pump. From the current crane fed pipes straightest path to rudder controller.

Oil orientation in bypass channels tap is indifferent.
**TWO OR MORE HAND PUMPS**

By using two or more manual pumps are pipe work essentially as described in section 3.1. It or the pumps that are in addition to the main pump, connected to the piping system with branch pipe, see All pumps are connected directly together with a riser 13. This tube connects the pump houses and are not under pressure. Only the highest pump has air holes the oil filler plug, 17, and all oil refills going through this jack. The other plugs are dense.

Only at larger facilities are required expansion tank, 16. The tank is mounted freely or columns.

The tank should be placed above all pumps, but can be up to 0.6 meters lower than the highest mountain pump.

In both cases, all the oil filling and venting be through the expansion tank. filler plugs in all pumps must be sealed if the expansion tank used.

Make sure all pumps are completely filled. This should also checked when the machine has been in operation for a few days after mounting or changing the oil.

---

![Diagram](image_url)

17. Oil Filler Plug    28 Oil Lock
3. HAND CONTROL MACHINES

A. MINOR PUMPSEERIE 11-12

B. MAJOR PUMPSEERIE 21

C. FLORE SYNTREEXE

D. TYPE P CO 5
OIL LOCK

OIL Lock is mounted on or immediately after the hand pump. OIL Lock automatically keeps the rudder fixed when the wheel stops and remains until the wheel turned again. The system's suction valves are built with OIL Lock.

NB: OIL Lock must not tilted more than 30° from the vertical position. Suction valves may otherwise leak.

Follow locks are used:

<table>
<thead>
<tr>
<th>Lock</th>
<th>Hand Pump Series</th>
<th>Hand Pump Series</th>
</tr>
</thead>
<tbody>
<tr>
<td>HL-06</td>
<td>E 18 HL-08</td>
<td>E 28 HL-12</td>
</tr>
<tr>
<td>HL-08</td>
<td>D 18</td>
<td>E 28</td>
</tr>
<tr>
<td>HL-12</td>
<td>E 22</td>
<td>E 40</td>
</tr>
</tbody>
</table>

**Lock HL-06**

OIL Lock is bolted to the pump with 4 screws. The slide, 1, is displaced by the pressure of the pump and is cantered by springs 2. Replenishment of oil going past the spheres, 101. Figure 6.3.1.

**Lock HL-08 and HL-12**

OIL Lock is connected to the pump over 3 tube. The slide, 1, shifted the pressure of the pump and is cantered by springs 2. Topping oil going past the spheres, 101 Fig 6.3.2 (HL-08) and 6.3.3 (HL-12).

Figure 6.3.1
Shock valve should ensure rudder controller overload and positioned as close to this as possible.

**Shock valve type TD 15**
Shock valve has two continuous run. Flow direction is indifferent. One side connected rudder controller and the other hand pump / control valve. Figure 6.4.1

Behaviour.
Valve B and allow oil to flow from the lop 1 to 2, valve A conversely, from 2 to 1 Spring-loaded cones, 2, determines the flow pressure.

Setting.
Pressure adjustment is made by tightening the springs, 4 cap nuts, 101, removed, nuts, 102, and loosen the screws, 105, tightened or loosened. Valves set at a pressure between 80 and 90 kp/cm².

**Shock valve series VS.**
Shock valve VS has two continuous run. Flow direction is indifferent. One side connected rudder controller and the other hand pump / control valve. Figure 6.4.2

Behaviour.
Valve B and allow oil to flow from races 1 to 2, valve A conversely, from 2 to 1 Spring loaded balls, 103, determines the flow pressure.

Setting.
Pressure adjustment is made by tightening the springs, 5. Cap nuts 108, removed and screws, 105, tightened or loosened. Valves set at a pressure between 80 and 100 kp/cm².

**Shock / Bypass Valve, VL series.**
Shock bypass valve VL is built up and has the same behaviour and setting relief valve VS. In addition, the valves one bypass valve. It is used to decouple rudder controller.
Fig. 6.4.1. Sjokkv ventil, type TD 15

Fig. 6.4.2. Sjokkv ventil, type VS
CLOSE AND CURRENT TAPS.
As closing taps and separate circulation taps use taps manufactured by Ginge.

Gasket Shift.
Seals, 4, and 0-rings, 6 and 8, are available by Unscrewing the connection spigots and remove the bullet. Tappen, 9, pressed into the housing, 2, after the lock ring 10 is removed.

<table>
<thead>
<tr>
<th>Type</th>
<th>2652/10</th>
<th>2652/13</th>
<th>2652/20</th>
<th>2652/25</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rangl. dim.</td>
<td>3/8&quot;</td>
<td>1/2&quot;</td>
<td>3/4&quot;</td>
<td>1&quot;</td>
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<tr>
<td>a</td>
<td>30</td>
<td>56</td>
<td>43</td>
<td>63</td>
</tr>
<tr>
<td>b</td>
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<tr>
<td>d</td>
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<td>e</td>
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<table>
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<td>1</td>
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<td>10</td>
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<tr>
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<td>Stopper</td>
</tr>
<tr>
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