LAMOR BOW COLLECTOR LBC-B

OPERATION AND SERVICE MANUAL

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1. INTRODUCTION

Congratulations with your new Lamor Bow Collector LBC-B and thank you for choosing Lamor

We have put a lot of efforts into this product for the sole purpose that it will serve you in the best possible way under even very difficult working conditions. Should you, however, observe any problem that you cannot solve yourself, Lamor will be backing the product through its world-wide net of subsidiaries, distributors, and agents.

The purpose of this manual is to provide safety and operating guidelines for a successful performance of the product.

THEREFORE IT IS ESSENTIAL THAT THE OPERATOR IS FAMILIAR WITH THIS MANUAL AND ALL OF ITS SAFETY INSTRUCTIONS PRIOR TO ANY OPERATION OR SERVICE WORK.

We have placed a type plate on the body of the bow collector which provides the following information

TYPE:	Type of the bow collector
MODEL:	LBC-B
CODE:	Code for bow collector
WEIGHT:	[kg]
DATE:	Date
S/N:	Serial number
CUST. ID:	Customer specified identification number

2. SAFETY

2.1 Symbols and safety instructions

Throughout this manual you will find warnings and safety instructions wherever deemed necessary in order to draw the operator's attention to safety issues related to a particular handling, operation, or maintenance of the bow collector. We believe we have covered all possible situations, but it is nevertheless in all cases the responsibility of the operator and the owner to use common sense and to follow the safety instructions so that the bow collector causes no harm to man or property.

DANGER! Negligence of this warning may cause serious damage or danger to life

DANGER! The wrong way of handling and/or operating the equipment may cause injuries or severe damage to property.

Negligence of this sign will weaken the operating safety, using reliability and may cause severe damage.

This sign, calling on your attention, is in all safety instructions of this instruction book and has to be followed.

Dangerous electricity!

Touching devices connected to the electric network may cause immediate death. After switching off the supply current, only skilled and/or trained person is allowed to open shutter or box marked with this sign.

All equipment are dangerous if you not have studied the operating and safety instructions carefully or you do not follow them.

Read this manual and other manufacturer's manuals carefully before you start the operation.

IMPORTANT NOTICE:

DO NOT OPERATE THE EQUIPMENT PRIOR TO STUDYING THIS MANUAL CAREFULLY.

IMPORTANT NOTICE:

IT IS THE RESPONSIBILITY OF THE OWNER OF THIS EQUIPMENT THAT THE OPERATOR IS FAMILIAR WITH THIS MANUAL AND ALL OF ITS SAFETY INSTRUCTIONS PRIOR TO ANY OPERATION OR SERVICE WORK.

IMPORTANT NOTICE:

THE OWNER IS RESPONSIBLE FOR ACCIDENTS CAUSED BY THE EQUIPMENT, IF THE SAFETY INSTRUCTIONS ARE NOT BEING FOLLOWED.

2.2 Notice during operation

- If the belt stops due to debris, always stop the power unit before lifting and cleaning the collector
- Don't add any fuel or oil when the power unit is on
- Don't remove any hydraulic or oil transfer hoses during operation
- Don't use the oil transfer pump without oil or fluid. Don't start the pump before you have filled it up by using the brushes.
- Before you start the oil recovery, make sure the working area is free of explosive gases
- Check the temperature of the equipment on a regular basis
- Bigger particles such as wooden pieces, bottles etc. should be collected manually from the water before starting the operation
- Don't put any heavy load on the equipment
- Safety equipment should be used while operating
- Protective clothing and glasses are recommended to the users of the equipment

2.3 Risk caused by misuse

Defective installation, careless or wrong operation, or insufficient maintenance will be a safety risk

Safety devices are not to be removed!

- Safety devices are not to be ignored or removed
- Safe and reliable operation of the Power Pack is guaranteed only if it is used to what it is designed for
- Limits that are specified in the technical description are not to be exceeded
- Wrong or careless use may cause danger to life or financial loss
- Damage caused by abuse or negligence is the responsibility of the user

2.4 Risks related to operating conditions

- Wave height max. 1 m
- Temperature of air –20C°....+60C°
- Temperature of water + 0C°.....+60C°
- If the air temperature drops below +0° C, make sure no water remains in the equipment, to prevent freezing damages

2.5 Emergency stop

The Lamor Bow Collector LBC-B can be emergency stopped by cutting off the power from the power unit.

3. GENERAL DESCRIPTION

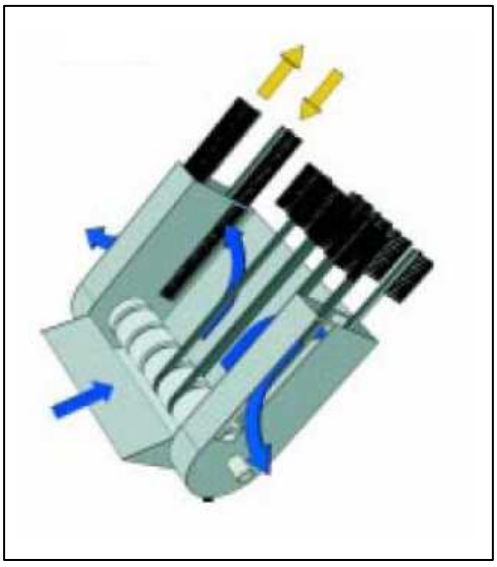
The development of the new system was the result of some clients' demand of a collector for debris and oil. Lamor's normal brush wheel system is more effective with respect to oil recovery while a brush belt collects debris more efficiently. Our goal is to combine the good characteristics in one system.

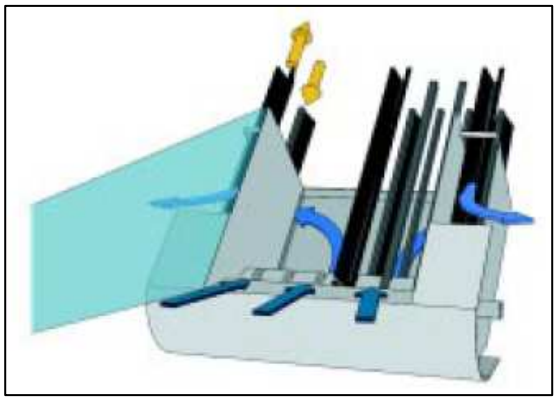
Tests have shown that a brush belt creates a wave at the water surface, caused by the direction of rotation. The belt can be eliminated by letting the water go through the brush belt, but at the same time oil (especially light oils) are lost through the brush belt and behind the collector.

Lamor Brush Belt

A standard polythene belt is used in the Lamor Brush Belt. Brushes in V-formation are attached on the belt. Brushes are connected side by side on the same shaft. The bristles are attached very densely on the belt and the belts are connected closely to each other in order to create a thick brush surface and to prevent oil from passing the brushes. In the Lamor brush wheel system we have separated the outer side belts from the belts that are in the middle of the brush with the aid of aluminum plates. We thus have a total of 8 belts on the brush belt; water and oil are only directed to the 6 middle brushes. If oil passes the first brush and goes further through the second brush it hits the wall that prevents water and oil from disappearing behind the system. Water and any eventual oil are steered back over the aft through the side brushes and have to further pass one brush before the water comes out of the system right behind where the attachment of sweep plates are (see attached drawing).

The advantage is that we can drive the system with 3 knots through current with minimal emission of oil behind the brush belt. This is not possible with competing systems.





4. TECHNICAL INFORMATION

Dimensions

Frame length	3750 mm
Frame width	605 mm
Frame height	1257 mm
Frame weight	320 kg
Brush belt diameter	420 mm
Brush belt length	6975 mm

Construction

Frame and float	Aluminium AlMg3
Brush belt	Polyurethane
Brush	Polypropylene 0,5-0,7 mm
Brush cleaner	AlMg3 / Polyurethane
Brush amount	6 PCS
Brush speed	0 – 20 rpm
Hydraulic motor	Danfoss OMP-200
Connection	Camlock 4" male
Hydraulic connectors	TEMA 7500 female/male or Aeroquip
Capacity	30 000 liter

Connections

Suction connection	Camlock 4" male
Hydraulic connectors	TEMA 7500 female/male or Aeroquip

Hydraulic flow	Max. 15 liter/min
Hydraulic pressure	Max. 150 bar
Power	4 kW

Oil/water content	98 % oil, < 2 % water
Working conditions	Max wave height 1 meter Air temperature -20 ℃ - + 60 ℃ Water temperature 0 ℃ - + 50 ℃

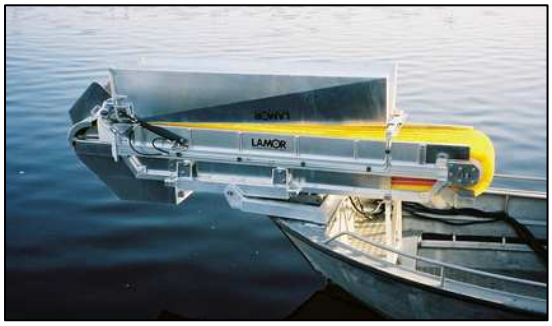
4.1 Additional equipment

The Lamor Bow Collector LBC-B requires for functioning:

- Power pack
- Transfer pump
- Container for the collection of recovered oil

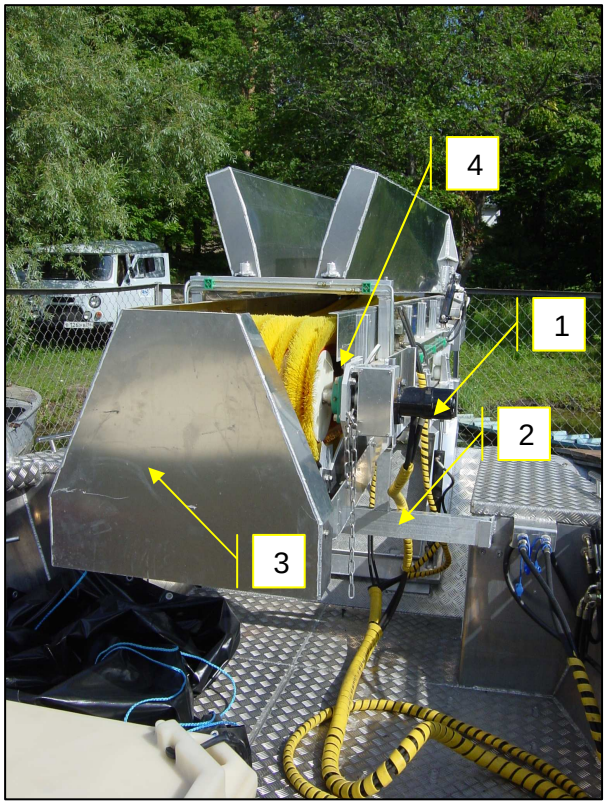
5. TRANSPORTATION AND LIFTING

5.1 The equipment in transport position



During transportation of the equipment to or from the work site, the Bow Collector must be secured in transport position by checking the following:

- the ramp is closed
- the Bow Collector is properly assembled
- the detachable control panel is situated on the rails (1) on the right side of the Bow Collector
- the supporting crossbar is situated under the Bow Collector (2)
- the oil collecting hopper (3) is in vertical position and fastened with chains on both sides (4)
- the Bow Collector is fastened with transport straps to the deck of the vessel



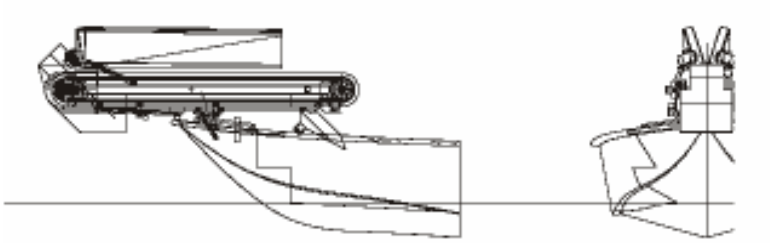
5.2 Lifting points

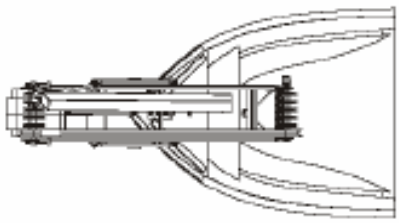
The Bow Collector can be lifted and carried from the 4 lifting eyes situated on the sides of the collector.

6. INSTALLING THE BOW COLLECTOR

6.1 Installing

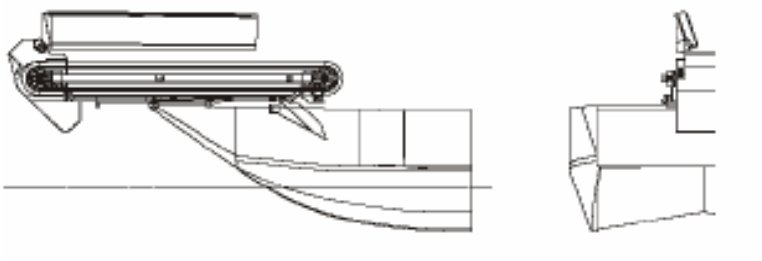
The Lamor brush belt can be installed in different integrated systems: as an In-Built, Over-the-side or as a Bow Collector. The Bow Collector is a dimensioned to be installed on a workboat.

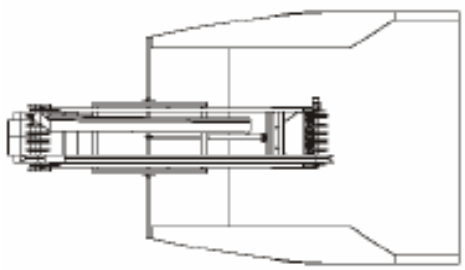




Transport mode for
V-type vessel

The Bow Collector is installed in a horizontal position lying partly on the boat´s bow. The leading, floating swep plates are horizontally installed on the brush belt and thus form a compact system in its entirety.





Transport mode for landing craft

6.2 Deploying and retrieval of the system

Before start, check that all hydraulic connectors are firmly attached. Check hydraulic oil level. If low, add hydraulic oil type ISO VG 32. Adjust the RPM to 1500, start the hydraulic pump by the electric switch installed on the electric main board.

When hydraulic is turned on, the skimmer can be deployed to recovery position. The three hydraulic valves are pushed out. The skimmer automatically adjusts to recovery position, this operation takes about 20 seconds.

The sweep arms are deployed automatically by the hydraulic cylinders.

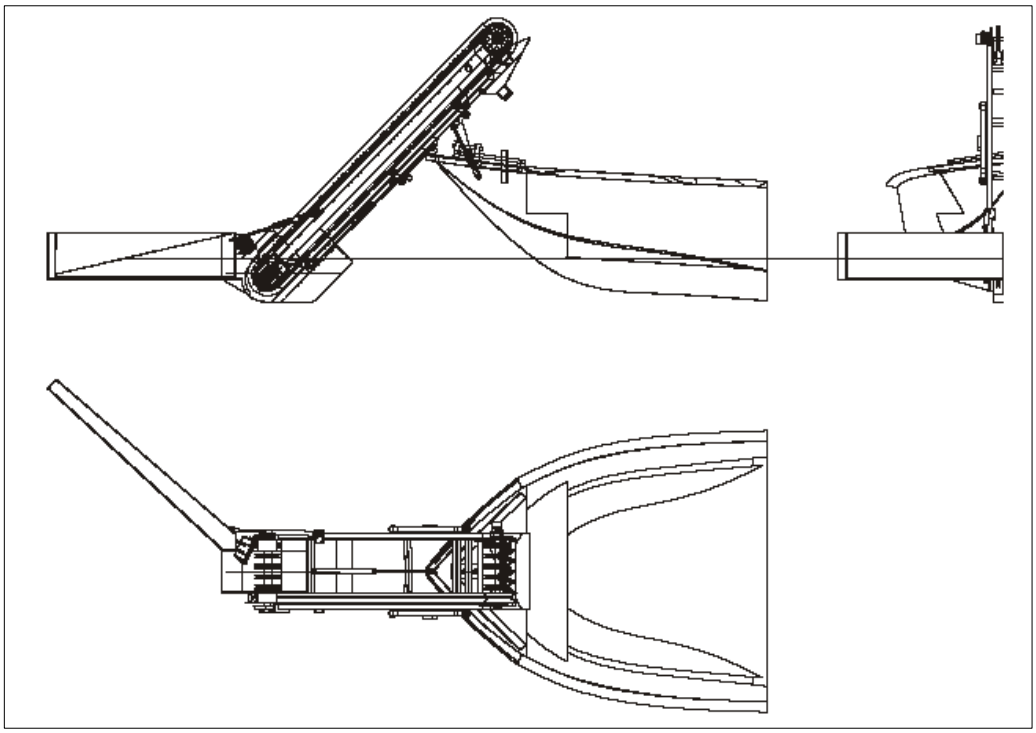
The brush belt is equipped with an additional floating body, which enables the brush belt and the sweep plates to float and thus will not affect the trim of the boat during collection.

The hydraulic valve plate is equipped with a position lock, which allows free flow for the turn engine. Thus the system flows and can freely operate up and down in a specified wave height during oil recovery.

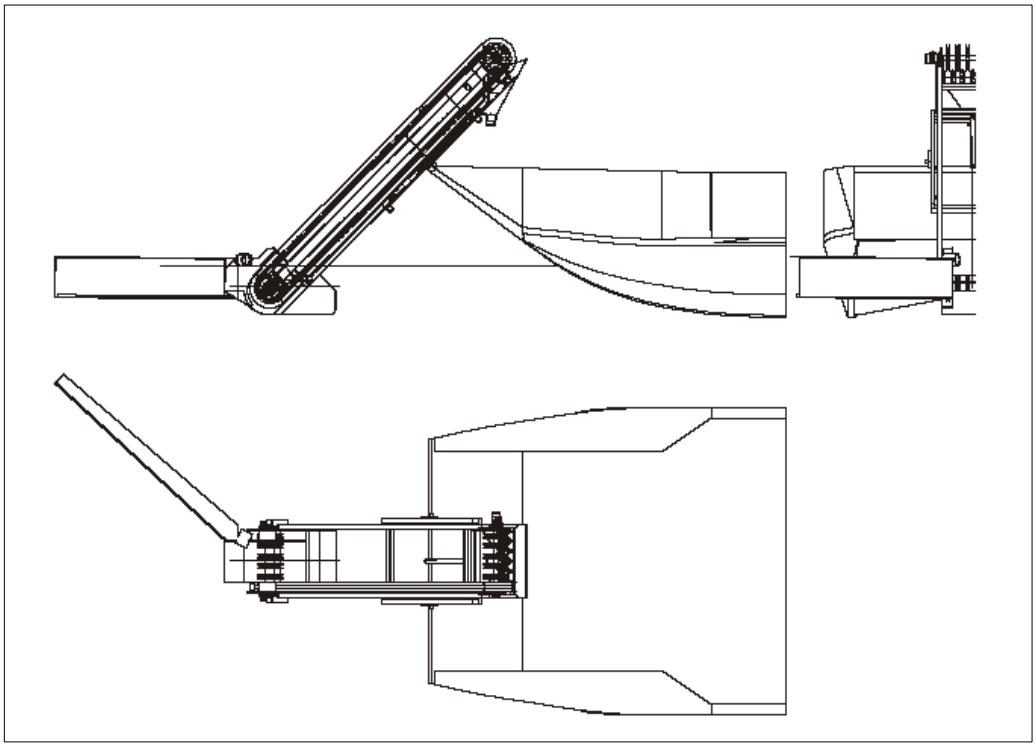
6.3 Oil Recovery

The hydraulic engine of the brush can be started and the speed can step less be adjusted. The boat can now be driven at a speed of 0.5 – 3knots. The brush now recovers oil and the brush cleaning takes place before a new turn. The oil flows down into an intermediate tank.

Recovery position for V-vessel

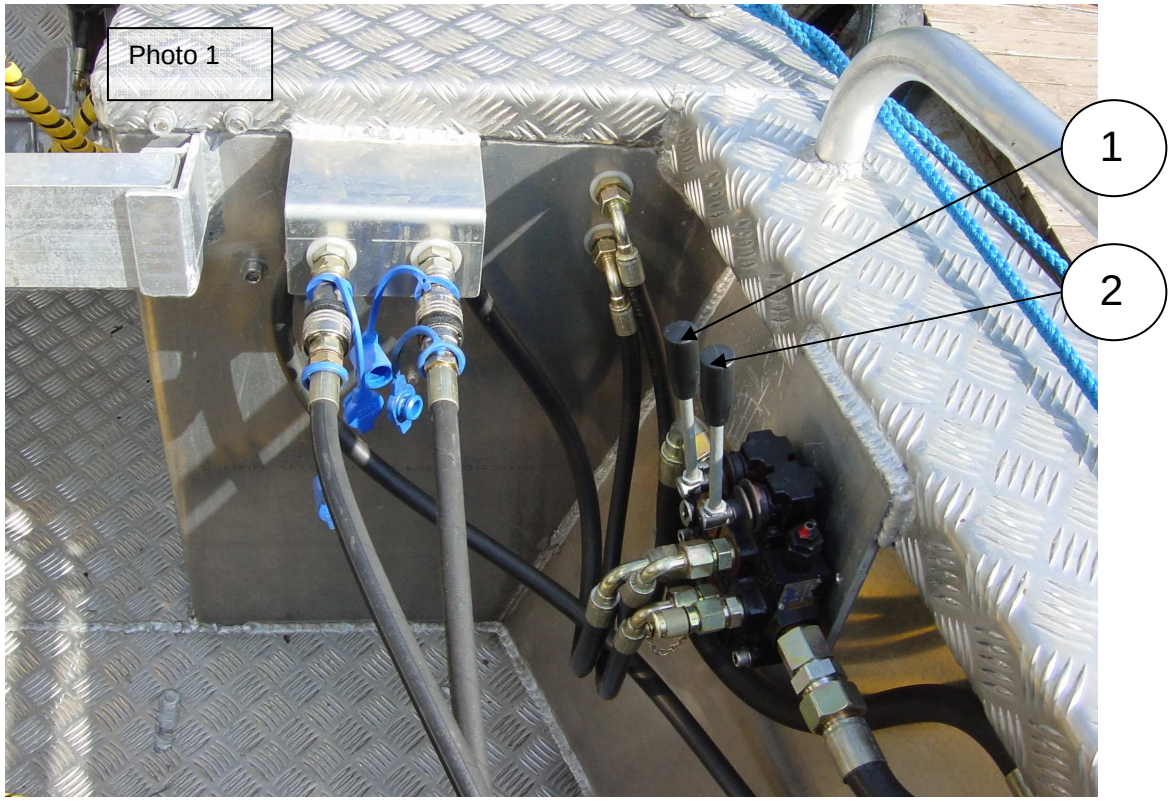


Recovery position for landing craft



6.4 Control panels for Lamor Bow Collector LBC-B

Lamor Bow Collector LBC-B can be operated with two separate control panels: the fixed control panel and the detachable control panel.



The fixed control panel has 2 operational levers:

1. Lever for switching the hydraulics to the detachable control panel
2. Lever for opening/closing the ramp

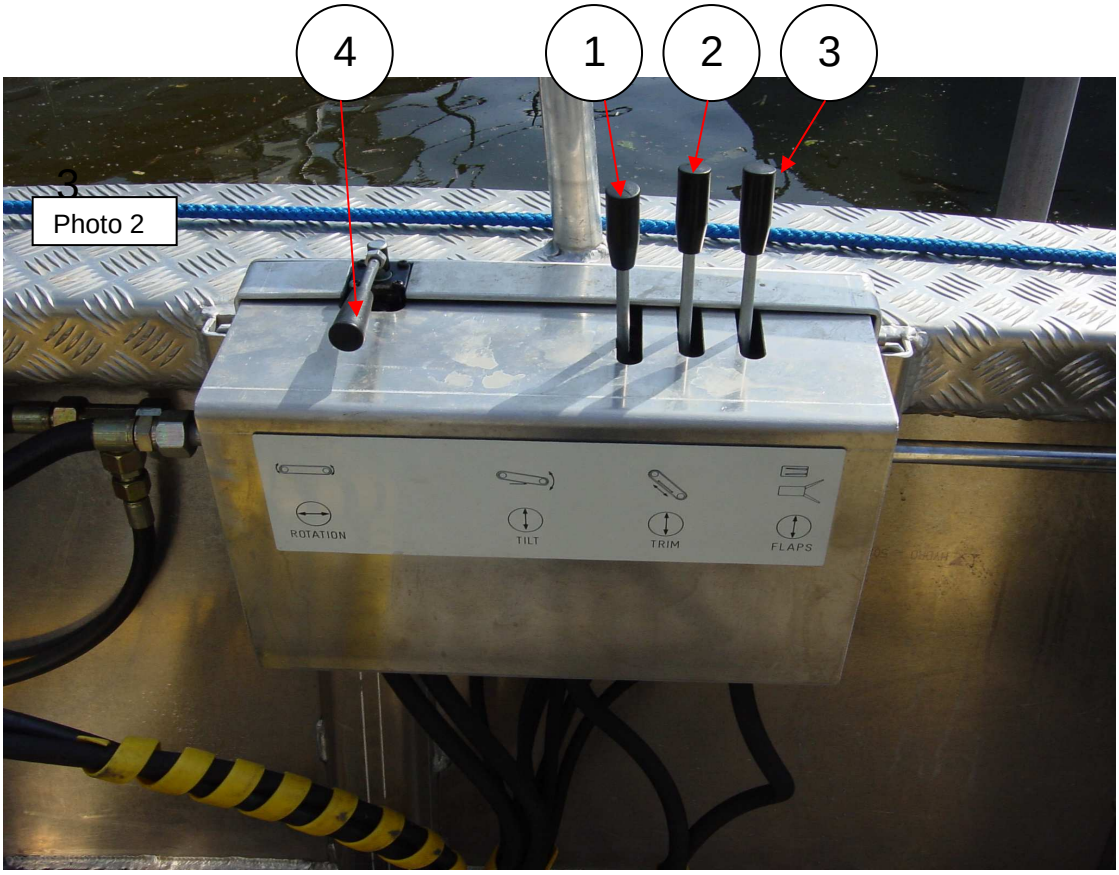


Photo 2

The detachable control panel has 4 operational levers for operating the Bow Collector:

1. Lever for adjusting tilt angle, and for switching into free floating position and back, while in working position.
2. Lever for adjusting from the highest position to the lowest and back.
3. Lever for opening guiding sweeps from transport position to working position and back.
4. Lever for adjusting speed and rotation direction.

ATTENTION:

When collecting oil, always rotate the brushes in the right working direction which is upwards towards the hopper. The opposite rotation direction can only be used for **a short-term period** to remove clogging debris from the brush belt.

6.5 Adjusting to working position

After arrival to the place of oil spill recovery, the equipment has to be adjusted to the right working position by following these instructions:

1. Remove the transport straps.
2. Place the detachable control panel on the rails on the starboard side of the vessel (photo 2).

3. Turn lever 1 of the fixed control panel (photo 1) to switch the hydraulics to the detachable control panel.
4. Tilt the Bow Collector approximately 15-20^{O} by using lever 1 of the detachable control panel (photo 2) and remove the supporting crossbar (see chapter 3.1).
5. Switch off the hydraulics by turning lever 1 of the detachable control panel.
6. Open the ramp 15-20° by turning lever 2 of the fixed control panel.
7. Turn lever 1 of the fixed control panel (photo 1) to switch the hydraulics to the detachable control panel.
8. Use lever 1 of the detachable control panel to adjust maximum tilt angle of the Bow Collector.
9. Use lever 2 of the detachable control panel to let the Bow Collector down to its furthest position.
10. Use lever 3 of the detachable control panel to adjust guiding sweeps to working position (sweeps completely opened).
11. Fix lever 1 of the detachable control panel to its right end position (lock position to the starboard side of the vessel). This will ensure the free floating position of the Bow Collector.
12. Put a storage tank for recovered oil right under the oil collecting hopper.
13. Open the hooks of the fixing chains and lower the oil collecting hopper:
    - To the lowest position, if the oil flow will be led to the storage tank straight from the hopper
    - By using the chains to the fixed intermediate position, in which the oil flow to the storage tank through the waste-pipe in the lower part of the hopper and through the flexible hose that is connected to the hopper.

ATTENTION:

The Bow Collector is now in working position and ready to recover oil. Oil and debris can be recovered from the surface of the water when the speed of the vessel is **below 3 knots** and the wave height is **less than 1.5 m**.

14. Turn lever 4 of the detachable control panel counterclockwise to adjust correct rotation speed of brushes to ensure minimum water content in the collected oil, and start the oil recovery.

6.6 Transport after oil recovery

After finishing oil recovery the Bow Collector has to be put in transport position by following these instructions:

1. Stop the brush rotation by turning lever 4 of the detachable control panel to middle position.
2. Switch off the floating position by turning lever 1 of the detachable control panel from its right end position to the middle position.
3. Close the guiding sweeps (completely closed) by using lever 3 of the detachable control panel.
4. Lift the Bow Collector to its highest position by turning lever 2 of the detachable control panel.
5. Tilt the Bow Collector 15-20^{O} by using lever 1 of the detachable control panel.
6. Switch the hydraulics to the fixed control panel by turning lever 1 of the fixed control panel.
7. Use lever 2 of the fixed control panel to close the ramp completely.
8. Put the supporting crossbar into transport position.
9. Turn lever 1 of the fixed control panel to switch the control of the equipment to the detachable control panel.
10. Use lever 1 of the detachable control panel to bring the Bow Collector back on the supporting crossbar.
11. Put the oil collecting hopper in vertical position and fix it with chains.
12. Put the detachable control panel in transport position on the rails on the right side of the Bow Collector.
13. Fasten the Bow Collector to the construction of the vessel with the transportation belts.
14. Turn off the hydraulic power from the power pack.
15. Disconnect the hydraulic hoses from the hydraulic supply.

7. CLEANING SERVICE AND MAINTENANCE

Oil recovery equipment service and maintenance should be taken care of as any other emergency equipment. It is too late to become acquainted with the equipment, when an oil spill accident already has happened.

7.1 Cleaning after operations

- When cleaning the equipment it is advisable to use protective clothing and gloves. Handling oil without proper protective clothing is dangerous for your health.
- The brush system and the guiding booms have to be cleaned with high pressure hot water within 24 hours from finishing recovery operation.

- The temperature of the hot water should not exceed 60 ºC. Liquids above 60ºC will damage the brushes which must be replaced.
- The brushes should be cleaned by rotating the brushes hydraulically and at the same time spraying the brushes with high pressure hot water.
- During the rotation of the dirty brush oil cleaning liquid or diesel oil can be used to clean the brush from heavy oil. Oil cleaning liquid should be sprayed on the brush to remove light oil.

- Finally the brush is sprayed with hot water.
- If the skimmer is still dirty it has to be dismantled and cleaned with hot water or diesel oil.
- When the skimmer is clean, spray a thin film of oil on all the components and assemble it. The thin oil film is important for the shafts, hydraulic couplings and the valves. This will keep the skimmer's components in good shape during storage until the next operation.
- Finally install the PVC-cover on the skimmer to protect the brushes from UV-radiation.

7.2 Service

The hydraulic pump must be lubricated twice a year. Check the condition of the v-belt for the hydraulic pump.

Change hydraulic filters and hydraulic oil once a year or after 200h operation.

Filter type:	FRA31B06BNCD011W-UFI
Hydraulic tank volume:	30 liter
Hydraulic oil type:	ISO VG 32

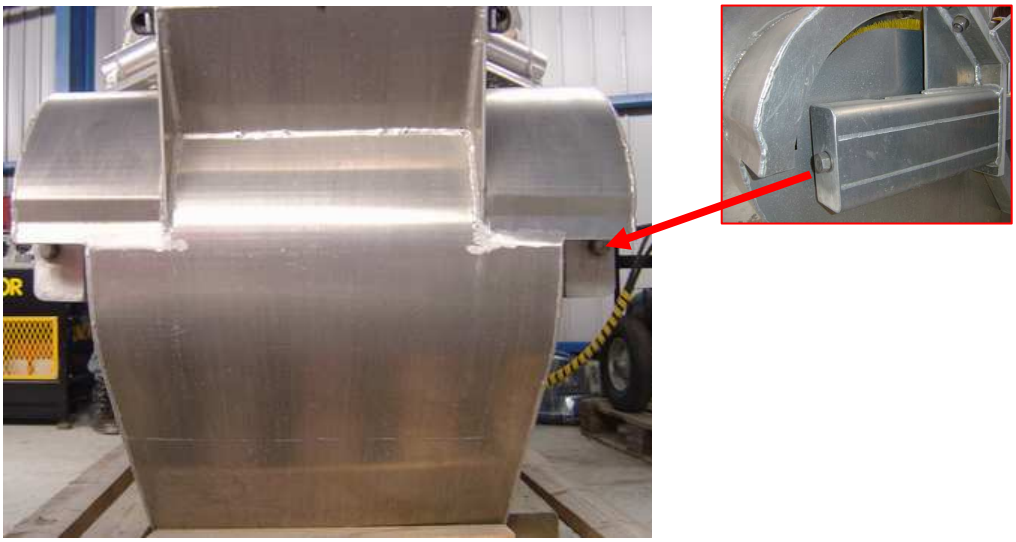
7.3 Storage

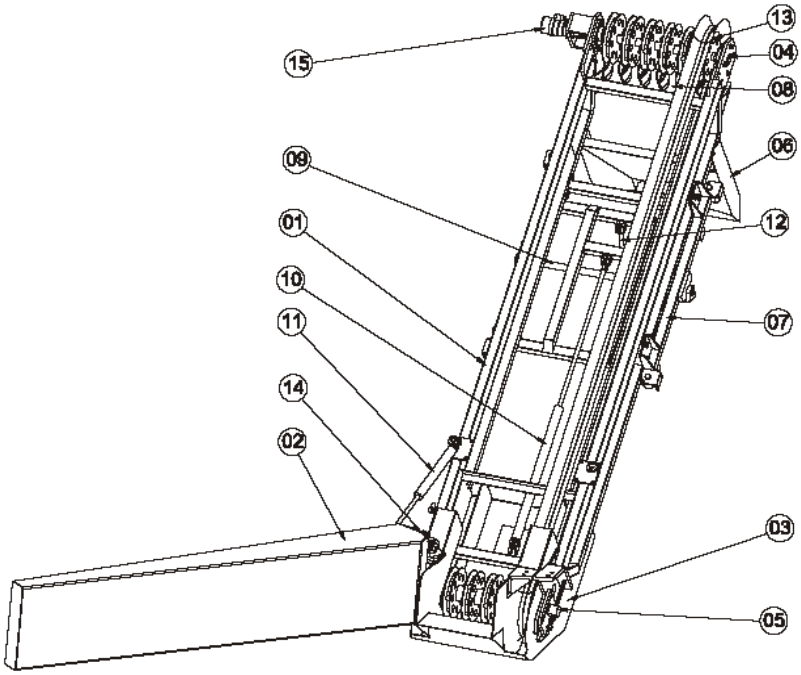
Although the brushes have been treated for protection against ultraviolet radiation, it is recommended that the oil recovery equipment should not be exposed to the sun for extended periods of time

When not in operation, the Brush Conveyor should not remain in sea water for extended periods of time, because of potential corrosion damage and fouling by marine growth.

The pump should be stored under cover and in dry environment.

After cleaning and before storage, loosen the brush belts to avoid stretching the belts. Loosen the belts by opening the adjustment bolts. Remember to tighten the belts again before start up.





01	Frame	Aluminum
02	Sweeping booms	Aluminum
03	Float	Aluminum
04	Drive shaft	SKF FYKE 508
05	Belt tightener	AISI (M16)
06	Intermediate tank	4” TW male
07	Turning frame	Aluminum
08	Brush cleaner	Lamor-ECU
09A 09B	Tilt frame shaft Shaft	TØ30x80 SMS 779 30/40x20-50x5
10	Trim cylinder	MTS-40-20-743
11	Guiding cylinder	MTS-40-20-320
12A	Tilt cylinder (V-type)	MTS-40-20-250
13	V-brush belt	LC-32-80-6975
14	Guiding shaft	AISI
15A 15B	Hydraulic motor Flexible coupling	Danfoss OMP-200 Trasco 28/38-B/B-AL