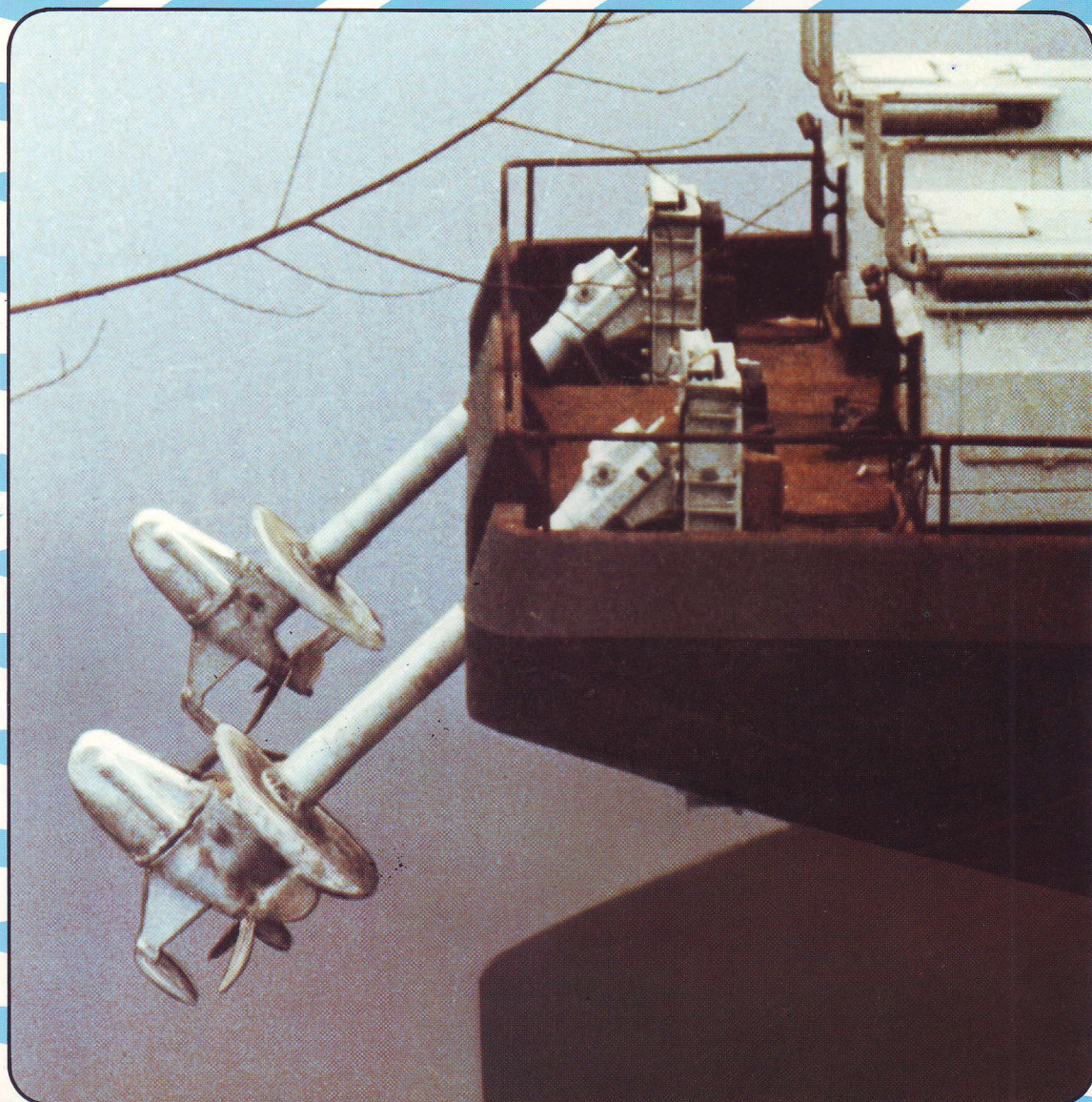


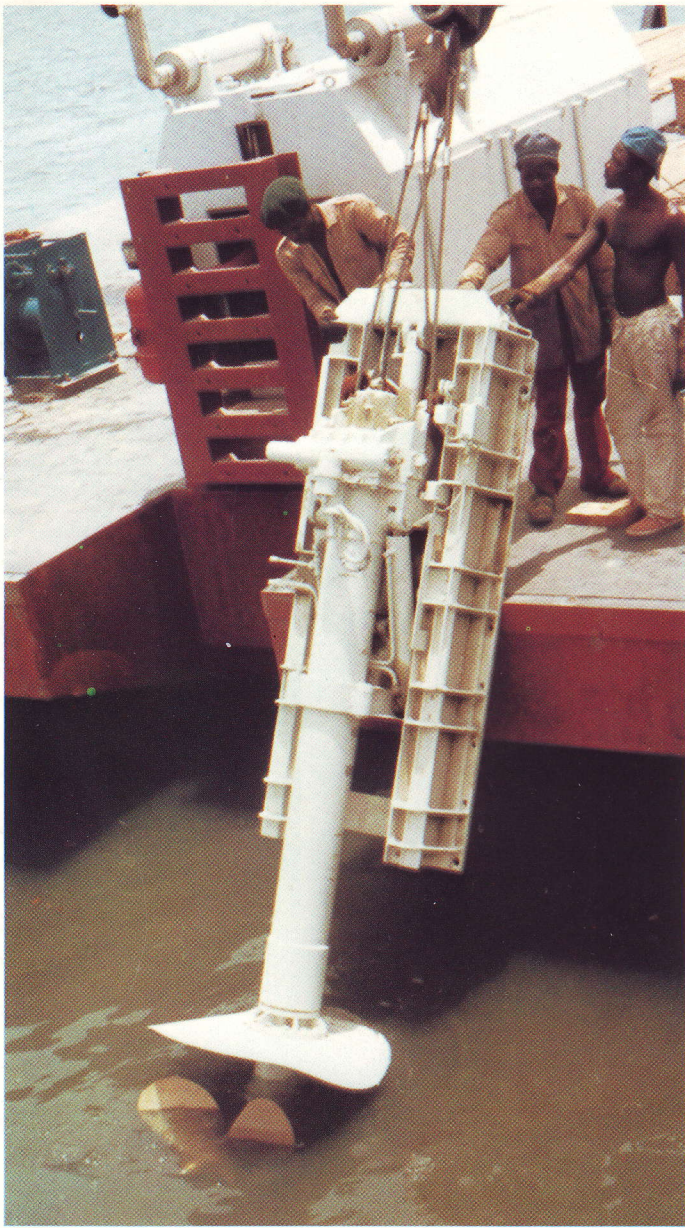
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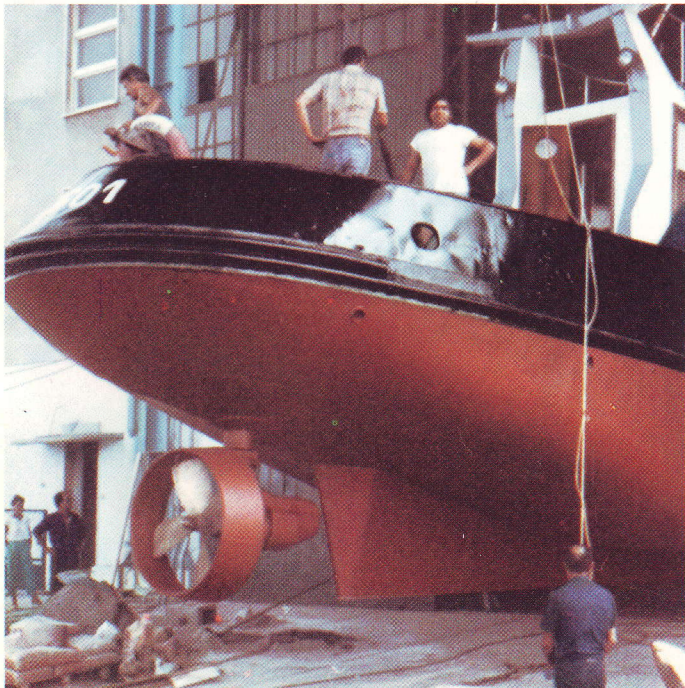
OIL HYDRAULIC PROPULSION UNITS

ITALIAN NEW PROPULSION TYPE

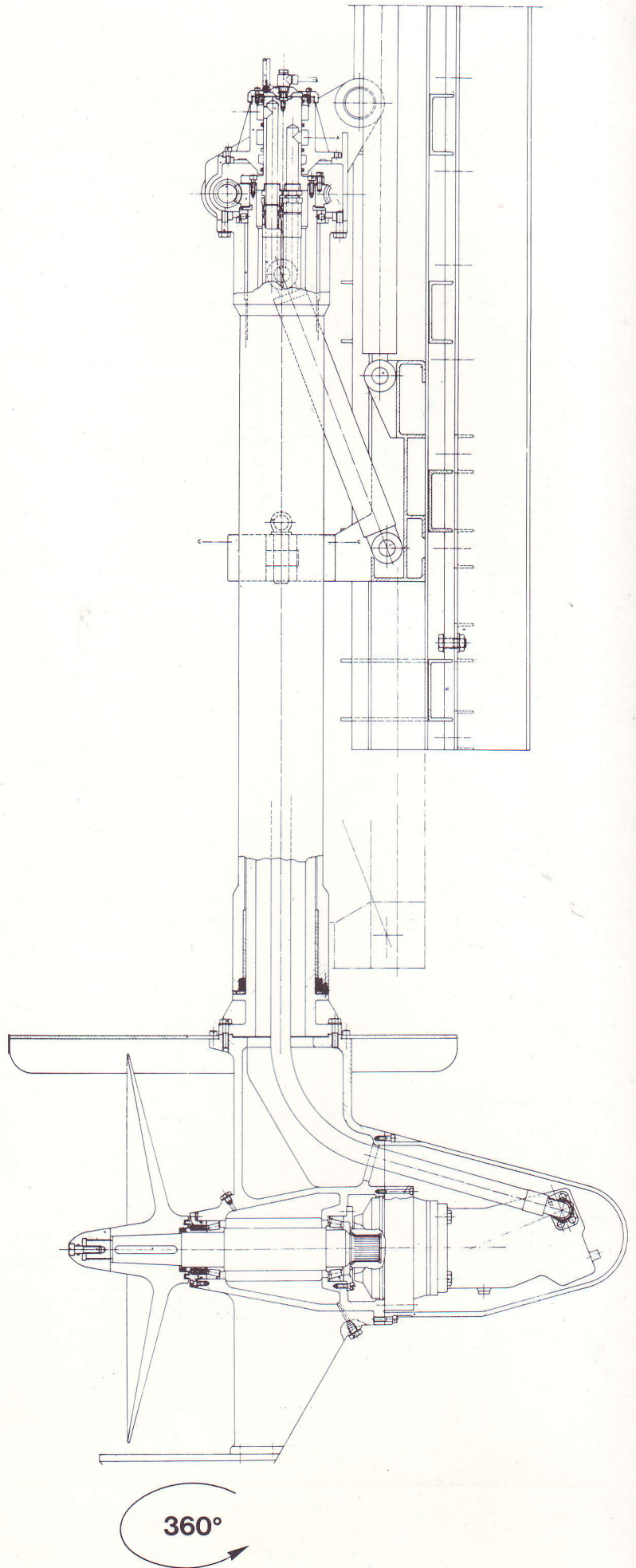




Mounting 250 HP DVM/R propulsion unit.



250 HP EH/A propulsion unit equipped with a Kort type nozzle.



ADVANTAGES AND ELEMENTS OF SAFETY RELATED TO THE USE OF OIL HYDRAULIC TRANSMISSION IN PROPULSION UNITS

I - As they have no mechanical transmission, oil hydraulic propulsion units may be installed on board with no limits to the distance between the vertical propeller slide and the Diesel power engine. The slide may be located aft, while the Diesel engine may be housed forward, above or below deck, in the most convenient position. The oil hydraulic connections between the slide and the Diesel engine may be of either the stiff type (with steel tubing) or the flexible type (with rubber tubing).

II - In the event of violent blows to the vertical propeller shaft, severe enough to deform it, the oil hydraulic transmission suffers no damages as the oil hydraulic connecting tubings between the pump and the engine are of the flexible type.

III - No water infiltration inside the system can occur in oil hydraulic transmission units, as the transmission system itself operates at pressures constantly higher than atmospheric pressure.

IV - In oil hydraulic transmissions with variable delivery pumps, such as those used in propulsion units, control of the propeller turns is achieved by means of the pump piston displacement variator rather than by changing the speed of the Diesel engine. The Diesel engine is therefore used in the best possible conditions, as far as concerns both the number of turns and the torque, with a considerable improvement in the life expectancy of the engine itself and in oil consumption.

V - In the event of accidental jamming of the propeller during navigation, which may be due to a number of causes, such as reefs, sandbanks and so on, in oil hydraulic transmission systems there is a device in the propulsion units which immediately cuts off the flow of oil from the pump and automatically returns the oil hydraulic transmission to a natural position, preventing otherwise certain damage.

VI - The oil hydraulic steering equipment of these propulsion units is equipped with two-fold protection against blows, by means of special oil hydraulic valves and easily replaceable break pins. Steering can be controlled in three different ways: main control from the bridge, secondary control on the propulsion unit (both electrohydraulically operated), and emergency control, manually operated from the bulb column (mechanically actuated).

VII - In these propulsion units reverse movement may be obtained in two different ways: either by rotation of the propeller bearing bulb by 180° maintaining the same performances as when moving forwards, or by operating the variable delivery pump control lever.

VIII - In addition to propulsion, the Diesel engine of the propulsion unit may also be used for driving electricity generators, hydraulic pumps, compressors and so on. The characteristics of the oil hydraulic transmission make any manoeuvring possible (ahead - astern - neutral) without changing the speed of the Diesel engine, allowing smooth movement and power for auxiliary facilities.

IX - Acting only on the control lever of the oil hydraulic circuit variable delivery pump, three different forward speeds and one speed in reverse can be obtained. Neutral gear is between the forward position and the reverse position.

X - Maintenance and any repair work to be done on the unit are easily carried out as the constructional solutions and rational arrangement of the single components make inspection easy and assembly simple.

XI - All the materials used to build the oil hydraulic propulsion units come within the requirements of the various Classification Societies. To make the required characteristics last longer researching into and procurement of specifically and specially studied materials has always been of the utmost importance. The pumps and oil hydraulic motors used are built by highly qualified firms, considered to be the most technically advanced worldwide among the industries of each specific field.

OIL HYDRAULIC PROPULSION UNITS

Description of the system

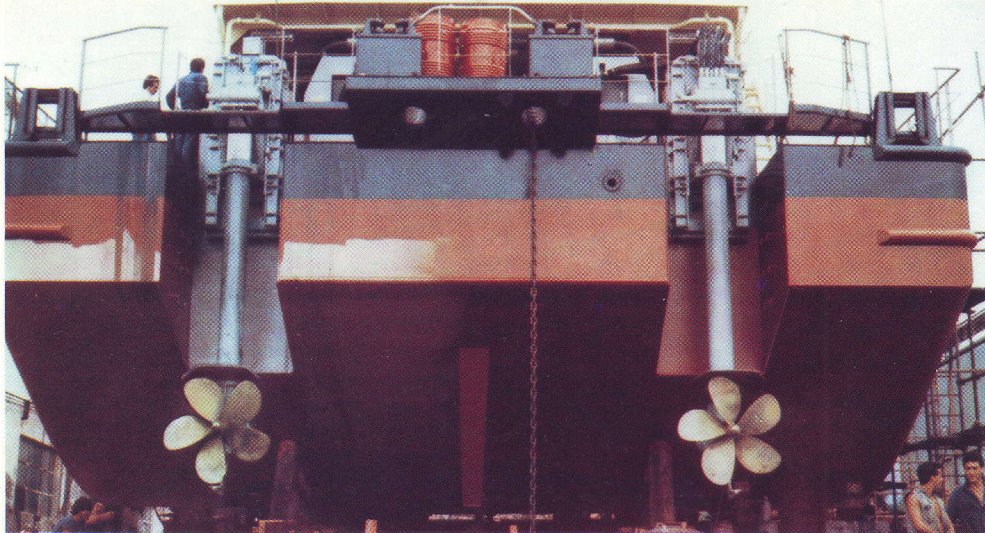
OIL HYDRAULIC PROPULSION UNITS are composed of two very different parts, as described herebelow:

- A - power unit.
- B - propulsion unit.

A - Power unit

This consists of the following items:

- Diesel engine of any kind, with a suitable base, radiator, bonnet, fuel and oil tanks, batteries and control panel.



350 HP DVM/R range propulsion units on a sea-going barge.

- Variable delivery oil hydraulic pump, for propulsion, connected to the main power outlet of the Diesel engine.
- Fixed delivery oil hydraulic pumps (3 off), for servo-controls, connected to the secondary power outlets of the Diesel engine.
- Heat exchanger, stand alone, for cooling the oil of the main propulsion closed circuit.

Main characteristics

- The rudder-propeller may be made to rotate by one whole turn (360°) by means of an oil hydraulic orbital motor through the worm gear-helical gear drive shrunk onto the rotating column. A specially designed safety coupling protects the system from any serious breakages.
- The propeller may be lowered or raised, even during navigation, by suitable pre-established distance. Standard travel is 850 mm.
- The unit bearing column, with its bulb and propeller, may be tilted longitudinally by an angle (45°) such that it may be removed from the water for a check, if required, without having to employ other costly means of inspection.
- The pumps which activate the servocontrols may be manually operated for each type of service, so that it is possible to make up for the failure of one of them, even including the pump of the heat exchanger for the closed circuit oil.
- Emergency manual controls are located in the vicinity of the Propulsion Unit.
- Connections between the pump and the oil hydraulic motor are implemented using flexible delivery, return and drainage tubes, able to bear pressures of 300 bars in continuous operation.
- The parts forming the shafting line located inside the bulb are oil-bath lubricated with the oil head originating from a tank positioned at a greater height.
- The propeller bulb is made of cast steel.
- The crankcase of the hydraulic motor and its gearbox is built with hydrodynamic functions in a light alloy and is sealed. It is also used to hold the transmission parts cooling oil.
- A suitable electric power system is provided for connection to the 24 V batteries, to operate the solenoid valves controlling the various services and their respective signalling lamps, as well as the electrical impulse controls for the Diesel engine accelerator, engine stop, gear control, alarm devices, propeller maximum and minimum height signals, bar marker, pressure gauges, revolution counters etc.
- All the signals have been brought together in a single dashboard located in the control cabin.
- All units may be supplied with propellers fitted with Kort type nozzles.

B - Propulsion unit

This consists of:

- Slide support, welded to the aft structure of the hull.
- Fixed slide bolted to the above support in a conveniently chosen position.
- Mobile slide bearing the propulsion unit.
- Fixed column.
- Rotating column.
- Propeller bulb, inside which the following are housed:
 - Oil hydraulic propulsion motor.
 - Epicyclic reduction gear.
 - Propeller shaft.
- Propeller.
- Steering control oil hydraulic motor.
- Bar marker.
- Various tubing.

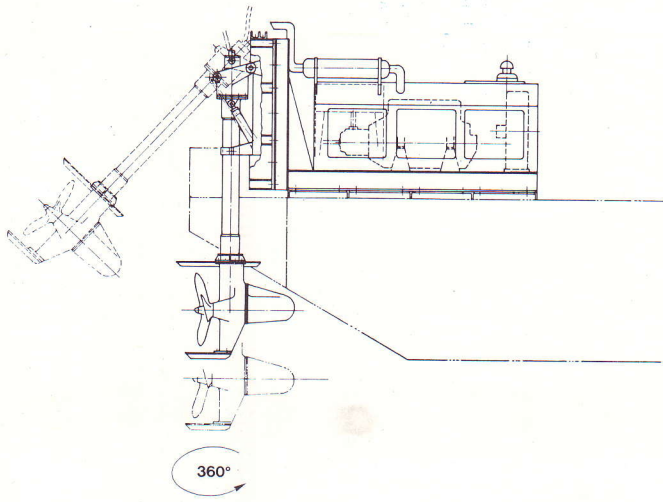
The UNITS, exclusively oil hydraulically operated, are currently built in a range varying from 100 to 1000 HP. The units are extremely easy to mount, whether on new hulls or on already existing hulls, as the position of the Power Unit does not condition in any way that of the Propulsion Unit. The Power Unit may be located in any part of the hull, either on deck or under deck, forward or midships, in any position lengthwise or transversally.

The controls are all servo-assisted and centralized on a single console which may be installed either near the UNIT or in any other position on board the craft (control cabin).

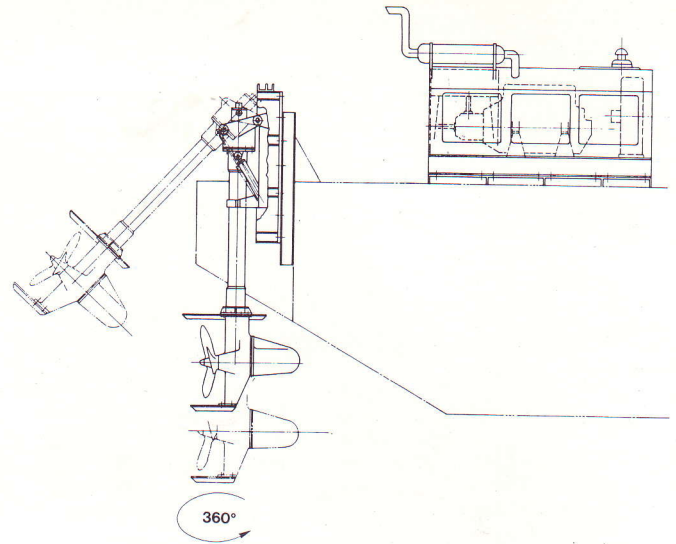
The unit can be supplied in an electric version, to be linked up to an auxiliary power generator on the boat.

DVM/R range propulsion units on a mobile dredger.

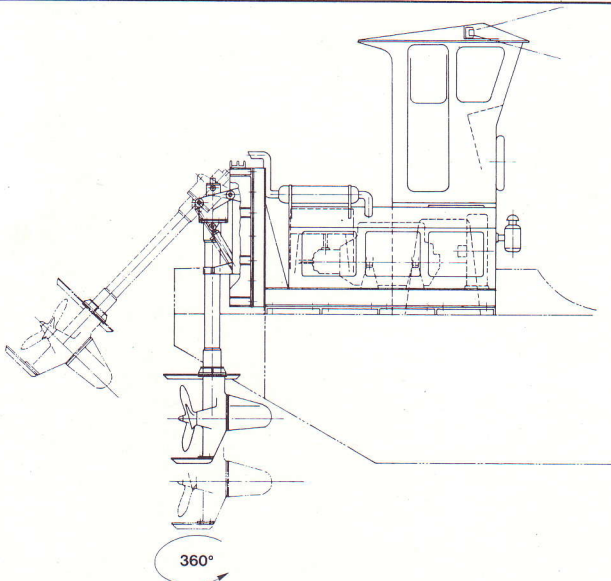




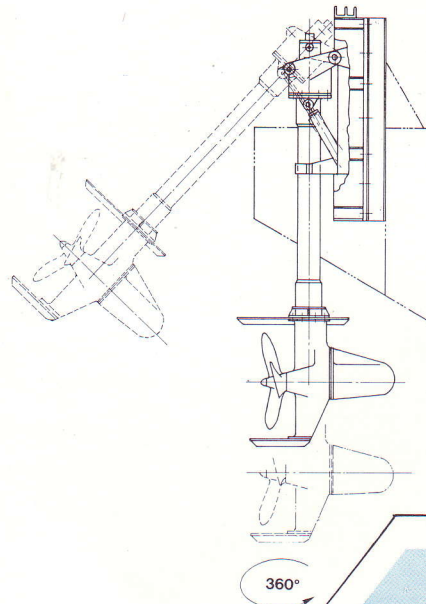
DVM/R RANGE - **Version A.** The power unit in this version forms a single body with the propulsion unit.



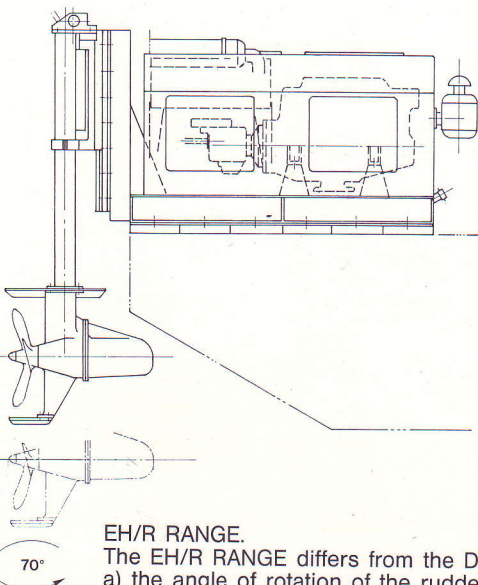
DVM/R RANGE - **Version B.** The power unit in this version is detached from the propulsion unit and may be positioned on board with no restrictions of distance or position.



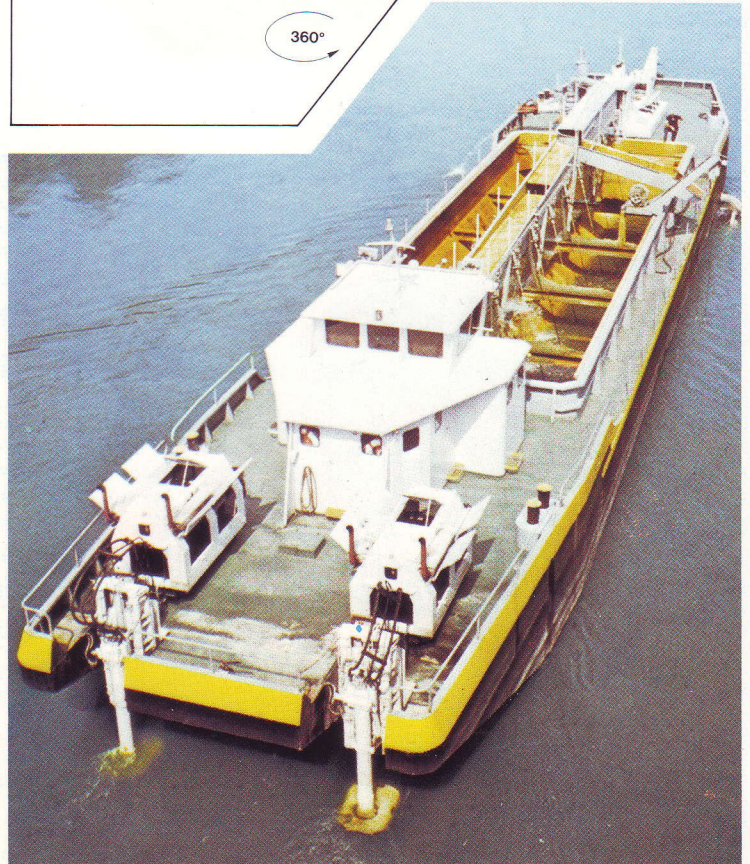
DVM/R RANGE - **Version C.** The power unit in this version forms a single body with the propulsion unit, and includes an elevated control cabin.



DVM/R RANGE. **Version D.** In this version the propulsion unit is supplied with separate pumps, to be flanged to an already existing motor.



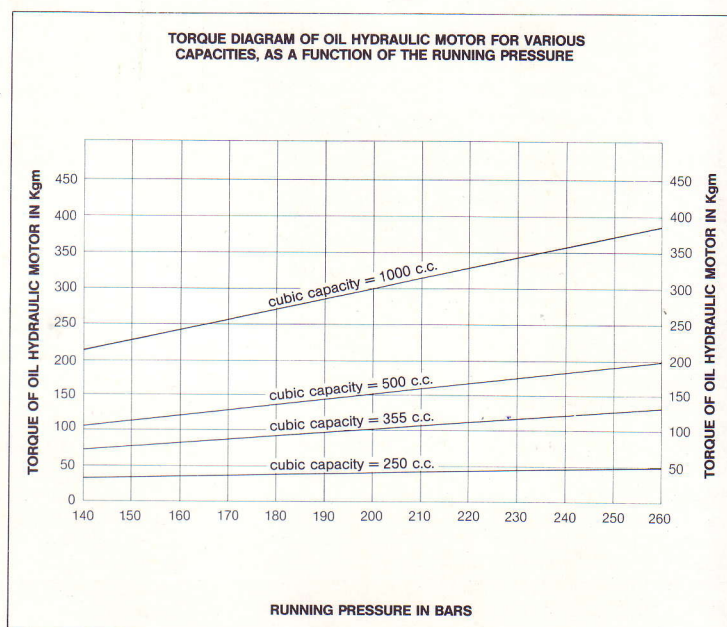
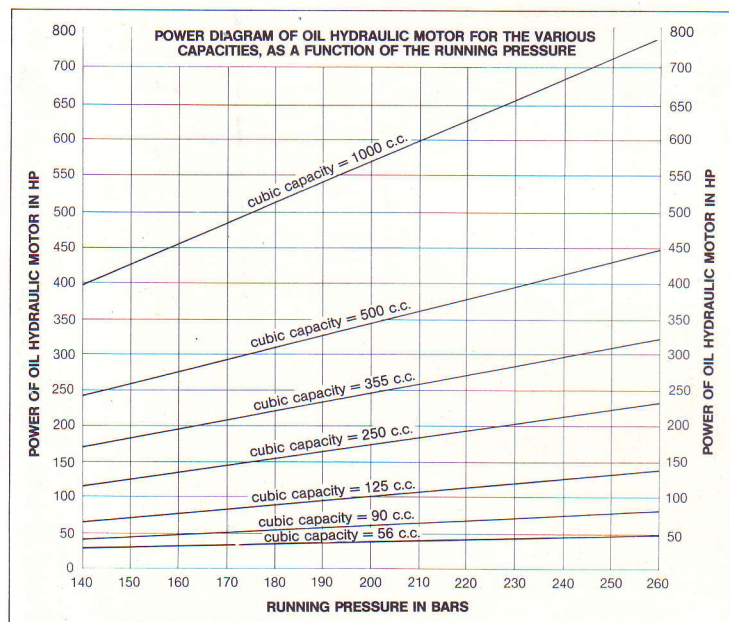
EH/R RANGE.
The EH/R RANGE differs from the DVM/R RANGE in:
a) the angle of rotation of the rudder-propeller: 70°
b) the movement of the unit holding column on a longitudinal plane: travel 800 mm.
c) the column can't be tilted longitudinally



PROPULSION UNIT HYDROSTATIC TRANSMISSION

			EH RANGE		DVM/R RANGE				
OIL HYDRAULIC PUMP	CAPACITY	c.c.	56	90	125	250	355	500	1000
	DELIVERY PER MIN.	lt/1'	110	180	300	428	607	855	1425
OIL HYDRAULIC MOTOR	CAPACITY	c.c.	50	100	150	250	355	500	1000
	R.P.M.	n	2000	2000	1900	1625	1625	1625	1354
DIESEL ENGINE	POWER	HP	60	110	160	250	360	500	from 840 to 1000 and more
	R.P.M.	n	2200	2200	2100	1800	1800	1800	1500
MOTOR/PROPELLER REDUCTION RATIO			2	3.16	3.16	3.16	4.05/3.16	4.05	4.05
MAXIMUM PROPELLER DIAMETER			600	900	900	1050	1050/1300	1300	1500
LENGTH OF STEM AT CENTRE OF PROPELLER	MAX.	mm.	2500	4000	4000	4000	5000	5000	5000
	MIN.	mm.	1000	1500	1500	1500	2000	2000	2000
STEM UPWARD/DOWNWARD TRAVEL			800	800	800	850	850	850	850
RUDDER ANGLE			70°	70°	360°	360°	360°	360°	360°
UPSETTING ANGLE			0°	0°	40°	40°	40°	40°	40°
APPROXIMATE WEIGHT OF WHOLE UNIT			3	4	6	7.5	8	8.5	9.5

Orders for propulsion units of more than 1000 HP can be accepted.



POWER OF OIL HYDRAULIC MOTOR IN HP IN RELATION TO RUNNING PRESSURE

PUMP CAPACITY	POWER IN HP									
56 c.c.	29	31	33	35	37	39	41	43	47	
90 c.c.	46	50	54	58	62	66	70	74	80	
125 c.c.	70	77	84	91	98	105	112	119	126	
250 c.c.	130	138	146	154	162	170	178	188	216	
355 c.c.	184	195	206	219	230	243	255	267	303	
500 c.c.	254	272	290	308	325	342	359	376	427	
1000 c.c.	427	456	484	513	541	570	598	627	714	
RUNNING PRESSURE IN BARS	150	160	170	180	190	200	210	220	250	

COSTRUZIONI NAVALI spa

Sede Legale e Amministrativa:

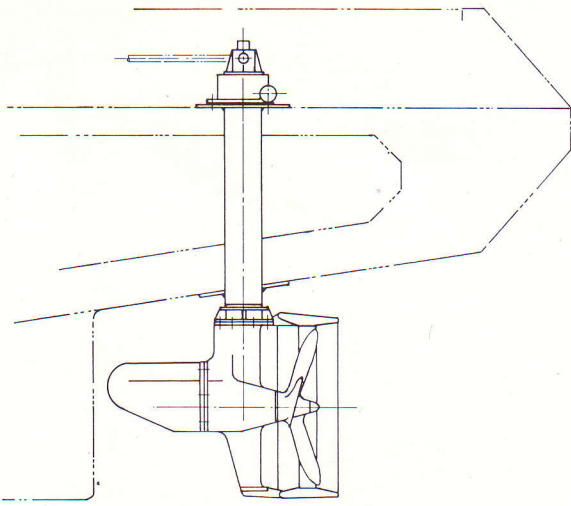
27020 TRAVACÒ SICCOMARIO (Pavia) - Via Piarda Vecchia, 9
 Tel. 0382.482.031/0382.482.258 - Fax 0382.482.090
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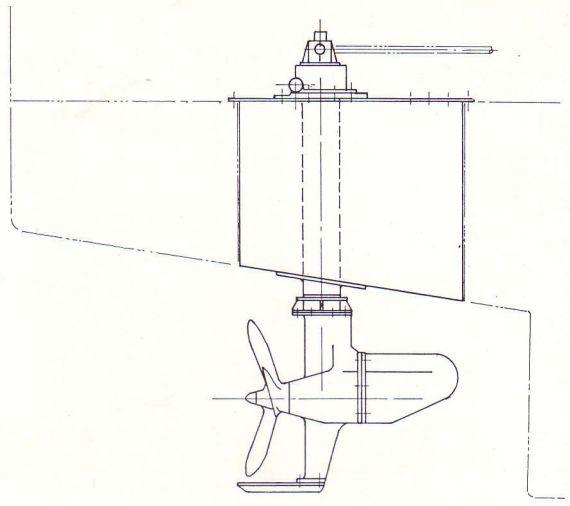




EH/A RANGE.

EH/A RANGE are fastened in the required position on the hull by welding two flanges, within the fixed guiding holder of the rotating column passes.

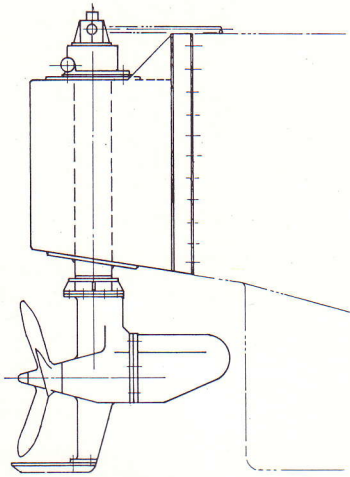
- a) Version A: angle of rotation of rudder-propeller: 70°
- b) Version B: angle of rotation of rudder-propeller: 360°



EH/B RANGE.

EH/B RANGE are fastened to the hull by means of a sealed housing, and arrangements can be made for them to be easily removable working wholly from the deck.

- a) Version A: angle of rotation of rudder-propeller: 70°
- b) Version B: angle of rotation of rudder-propeller: 360°



EH/C RANGE.

EH/C RANGE are fastened stiffly to the aft at a convenient height which depends on the designed draft.

- a) Version A: angle of rotation of rudder-propeller: 70°
- b) Version B: angle of rotation of rudder-propeller: 360°

BOW-THRUSTER UNITS.

These are built in sizes ranging from 50 to 500 HP. They operate in the same way as the PROPULSION UNITS. The propellers mounted have diameters varying from 300 to 1500 mm.

The propeller bulb is fixed inside a sealed extraction chamber. They are supplied complete with transverse tunnels.

