

Mac N Hom, always supporting your technical needs.

At Mac N Hom systems, we are focussed on diverse range of products and fully devoted to meet the ever increasing demands of customers in terms of sophistication and diversification. Established in 1995, Mac N Hom has brought to market innovative products, one after another to provide only the highest quality goods and services for your requirements and offers customised solutions and challenging applications quickly and cost effectively.

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Hydraulic Steering System for fishing vessels



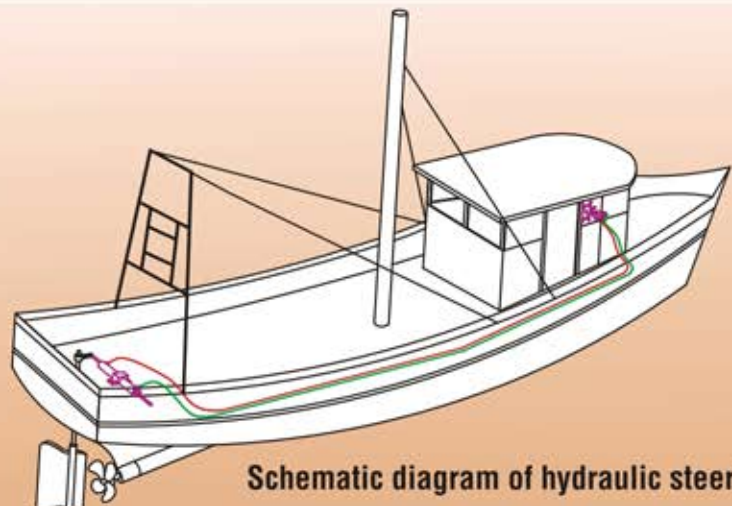
Model : **Jumbo**

A) Salient Features :

- 1) Hydraulic System with **Overload Protection**
- 2) Strain Free operation of Steering unit.
- 3) Long Maintenance free service life.
- 4) Upto 45 degree turning from centre to both sides.
- 5) Automatic holding of rudder plate position.
- 6) Frictionless, Rust Free Zinc coated Seamless Steel / Stainless Steel tube for oil transmission.
- 7) One time charging of hydraulic oil.
- 8) Self priming process of air removal during oil filling.

B) Drive Varients

- Manual Hydraulic Drive
- Hydraulic Powerpack compatible to Engine Drive
- Electric Motor Driven Hydraulic Powerpack



Schematic diagram of hydraulic steering

C) Introduction

Water borne vessels, big or small, need navigation control to cruise through water and to move through a controlled path. As vessels move forward by pushing the water backward, the guidance of the vessel by turning it right or left can be controlled by directing the pushed water towards respective direction.

Refer schematic on page 1. A plate of steel, connected to a rod, which is extended to a convenient height of the boat deck, is used to deflect water to both sides, according to the requirement of turning. This plate is called RUDDER PLATE and the shaft extending to the deck, connected to the rudder plate is called RUDDER-STOCK. The boat driver will use mechanical or Hydraulic systems to turn a rod connected to the rudder-stock to do the turning job.

This rod, used to turn the rudder plate is called TILLER-ARM. Though control of Tiller-Arm is easy for small boats running slow in backwaters /lakes, it requires high effort and skill to hold tiller-arm in right position in sea, as well as during fast movement in backwaters.

As the fast-moving / heavy modern vessels use an engine to run a propeller, to push water backwards, they use modern mechanisms to guide the vessel. In these vessels, angular movement of rudder-plate is precisely and efficiently controlled by Hydraulic actuators, driven by closed-loop manual/ diesel-run hydraulic systems.

Based on mounting position of the engine, vessels are classified into two. In-Board Vessel, with engine mounted inside the vessel, and Out-Board vessel with engine mounted outside the vessel, preferably backside of vessel.

Mac-N-Hom Systems, with twenty years of experience in designing and developing Hydraulic systems for various industrial applications, developed Three models of hydraulic rudder control systems for In-Board vessels and One model hydraulic rudder control system for Out-Board vessels.

D) Description of Hydraulic Rudder Control System Mac-N-Hom make Hydraulic Control System has four sub-sections :

- 1) Heavy Duty Balanced Hydraulic Linear Actuator
- 2) Hydraulic Drive System
- 3) Oil Transmission System
- 4) Self Priming Oil Feeding System

1) Heavy Duty Balanced Hydraulic Linear Actuator

A Balanced Hydraulic Linear Actuator is planned, to turn the Tiller-Arm to both sides of the vessel, smoothly and precisely. Oil supply ports are provided on both sides of this actuator, through which, oil can be supplied to the piston of the actuator.

As pressurised oil is supplied from the Helm Pump to the Linear Actuator, the piston-rod will move forward or backward, depending on, to which supply port, oil is provided. The Pistonrod-end / Ram-end of this actuator has a flexible connector, which can be coupled to the Tiller-Arm.



As the driver rotates the steering wheel to one side, oil filled in the circuit flows from one side of the circuit to the other side of the circuit, enabling the Piston-Rod of Actuator to move from one side to the other. When the driver rotates in opposite direction, the same process will repeat resulting Piston-Rod movement in the opposite direction.

2) Hydraulic Drive system

a) Manual b) Electro/Engine

In **Manual Drive System**, which is opted by 95% of the medium and small vessels, a steering wheel drive with a Helm Pump is provided, to supply pressurised oil to the system. By rotating a steering wheel, a driver can effortlessly pump oil required, to the Linear Actuator to turn the Tiller-Arm.

In **Electro/Engine Drive System**, an Electric Motor driven / Engine Driven Powerpack, is providing the pressurised oil to the system. Hydraulic pump is coupled to a shaft, driven by Engine/ Electric Motor.



3) Oil Transmission system



Thermo Plastic Hoses, as well as Zinc-coated Seamless Steel Tubes are recommended for transmission of oil from the Helm Pump to the Hydraulic Actuator.



In small boats, Thermo Plastic hoses will be sufficient. But in longer vessels, Zinc-coated Seamless Steel tubes are recommended between Thermo Plastic hoses at the Helm Pump-end and Actuator-end.



4) Oil Feeding and Priming System



To feed oil in the circuit, a Filler Breather is provided on top of a Reservoir Unit mounted on the Helm Pump. After filling oil in the Reservoir, drive-shaft of the Helm Pump is rotated in one direction by a Steering Wheel. Oil will flow to that side of the circuit and air trapped in the other side will escape through a special attachment in the Reservoir. On rotating the Steering Wheel to the other side, any air trapped in the first side will escape through the attachment. Two repeated efforts will make the full driving system ready for driving.

An Oil Level Indicator is mounted on the Reservoir Unit for monitoring quantity of oil in the circuit.

E) Supporting Accessories for Rudder Control

Electronic Rudder Position Indicator

This unit will indicate the angular position of rudder plate and guide the driver through out the travel. The rudder - stock will be mounted with a rotary encoder and the angular position of rudder plate is indicated in the display unit. References of zero position, and maximum angular positions on both sides are indicated.



Endurance- Test-Rig

Quality control system of our Company demands endurance test with cyclic operations of Hydraulic Actuator at various hydraulic pressure levels. We are employing electro hydraulic system based **Endurance-Test-Rig** to ensure quality of balanced hydraulic actuator, that every cylinder supplied is in accordance with highest quality level for long service life. We ensure each and every element supplied to the customer exceeds the demanded service requirements of the system. The system assembled in our **Assembly-Test-Rig**, undergoes rigorous testing before it reaches the customer.



Technical Specifications

Hydraulic Actuator Ram Size	: 56mm
Hydraulic Actuator Thrust @ 50Kg/cm ²	: 4,420 Kgf
Hydraulic Actuator Torque with Tiller Arm of 200mm	: 884 Kgm (8700 Nm)
Hydraulic Actuator Stroke	: 300mm
Tiller arm (200mm) Turn	: 45 Deg + 45 Deg
Steering Wheel Diameter	: 914mm (36")
Drive	: Manual / Electro Hydraulic (Optional)
Oil Transmission	: Zinc Coated Seamless Steel / Stainless Steel Tubes. High Pressure Thermoplastic Hoses.
Hydraulic Oil	: Servo 32 (IOC) /Bharath Hydro 32 (BPCL)/ Enclco-32

Certifications



Models Offered

- BHIMA** : For House Boats, Barges, Heavy Cargo Boats and Large Passenger Boats with In-Board Engine
- CETO** : For Medium size Passenger Boats with In-Board Engine.
- TUNA** : For Ambulance Boats, Honeymoon Boats with In-Board Engine.
- RAPID** : For Medium and Small size boats with Out-Board Engine