MP 2.24.3.3/Pesawat Bantu

Lecture 1: Intro Auxiliary Machinery

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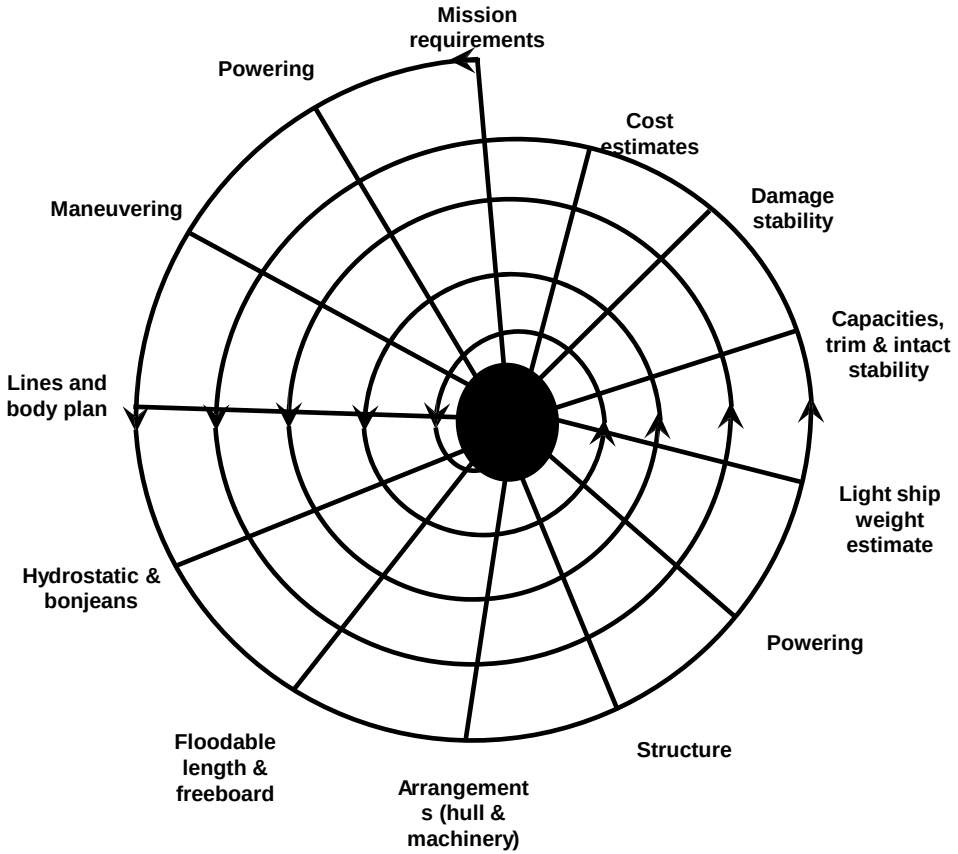
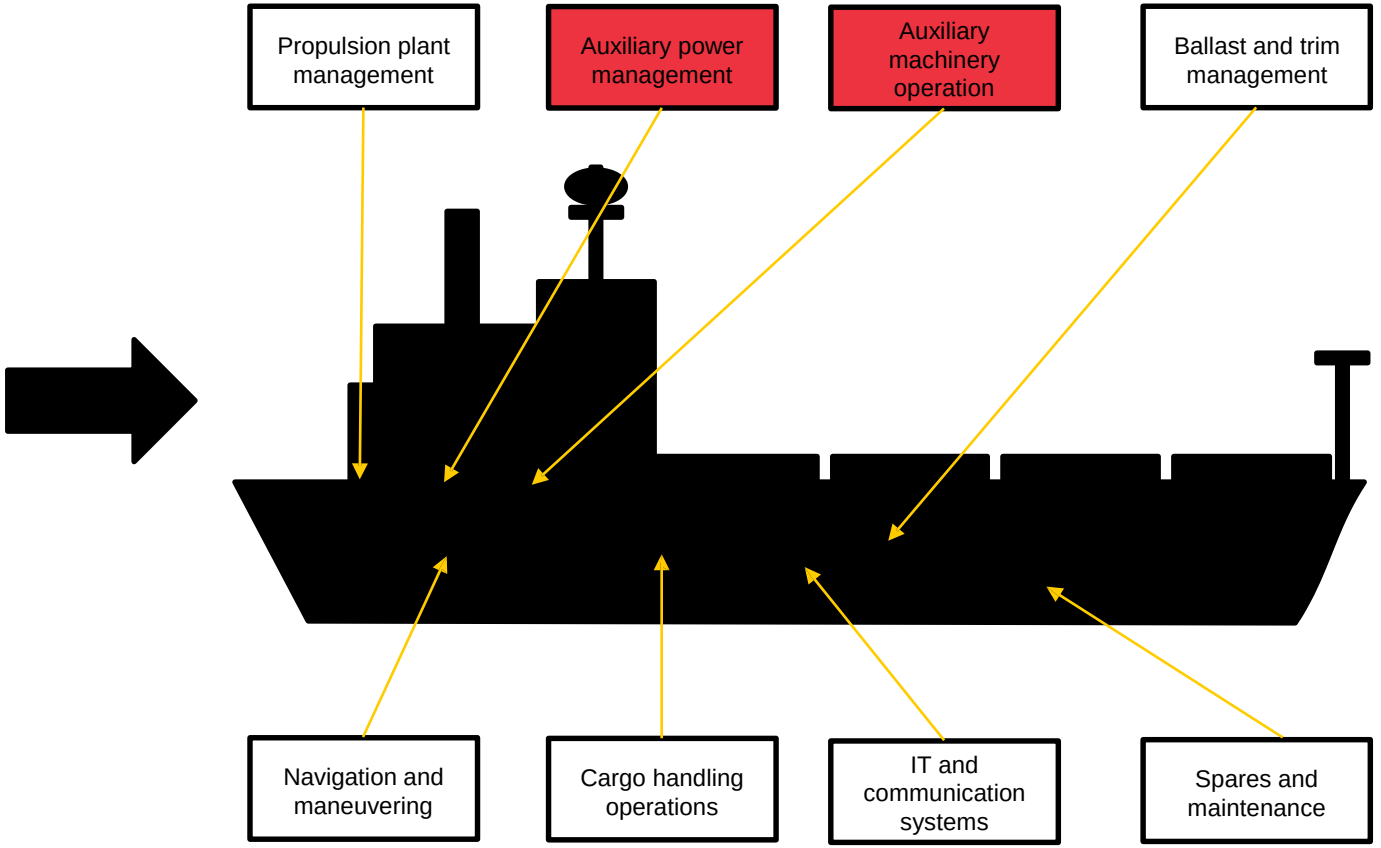
BADAN RISET DAN SUMBER DAYA MANUSIA KELAUTAN DAN PERIKANAN
POLITEKNIK KELAUTAN DANPERIKANAN SORONG

The perspective and evolution of ship systems in ship design

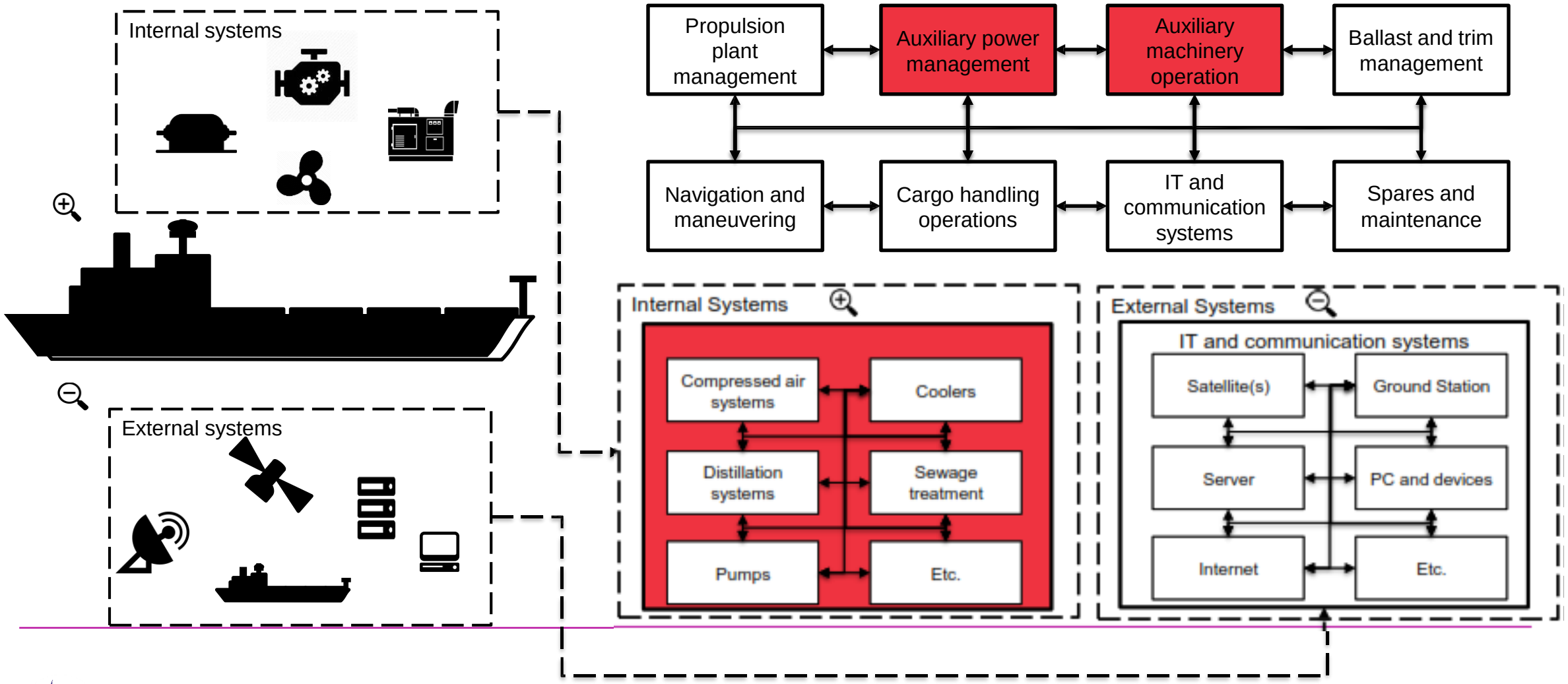


The traditional ship design spiral by Evans 1959



The design of the next generation of digital ships by Martin Stopford 2018

The ship as a system of systems

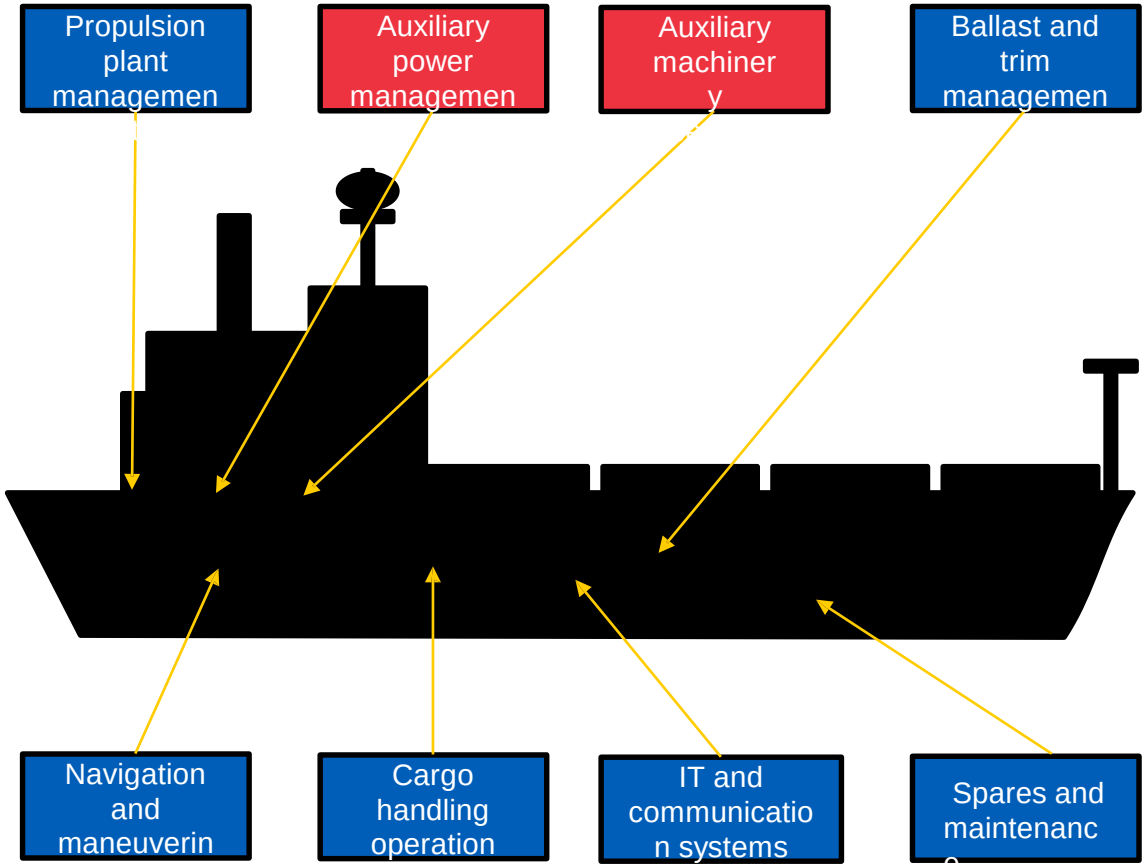


Pesawat Bantu

Kapal adalah kendaraan besar dan kompleks yang harus mandiri dalam berbagai kondisi lingkungan untuk waktu yang lama dengan derajat keandalan yang tinggi.

Mesin, selain mesin induk penggerak unit propulsi, biasanya disebut ‘pesawat bantu’, tanpa pesawat bantu mesin induk tidak akan mampu beroperasi lama

Pesawat bantu kapal adalah berbagai jenis mesin diatas kapal selain mesin induk yang berfungsi sebagai sarana penunjang pokok dalam pengoperasian kapal.



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Fundamental aspects of auxiliary machinery (1)

Marine machinery is designed to ensure the proper functioning of a ship's main engines, piping systems, and equipment.

Auxiliary marine machinery includes pumps, compressors, and blowers for circulating fuel and the fresh water and seawater for supplying air to the starting system of the main engine, for cooling refrigerated holds, and for air-conditioning various parts of the ship and for refrigeration machinery.

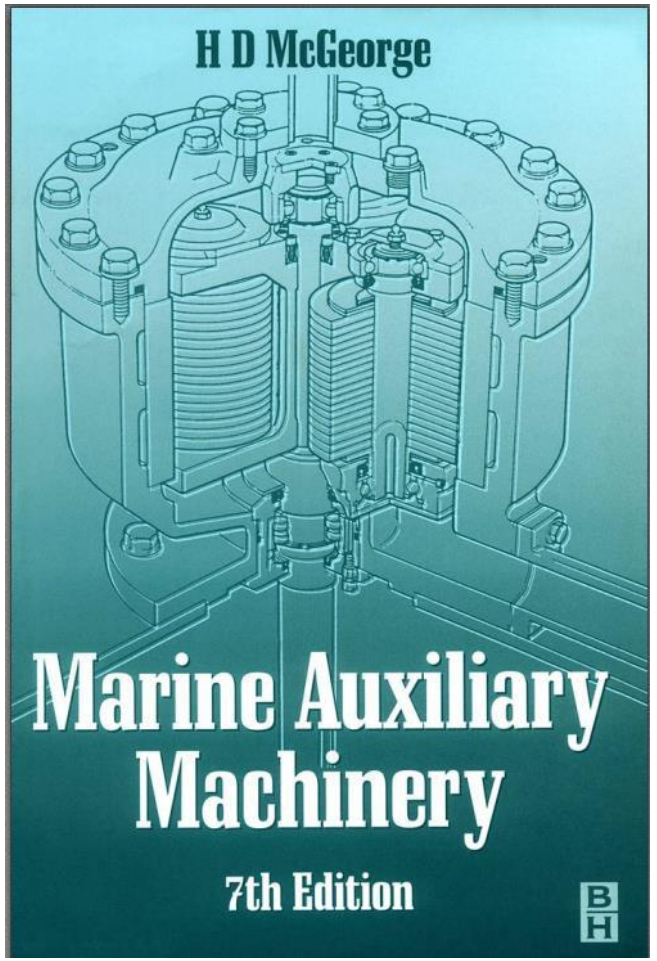
Auxiliary main items

- Air compressors
- Heat exchangers
- Distillation equipment
- Oil/water separators
- Sewage treatment plants
- Incinerators

Fundamental aspects of auxiliary machinery (2)

Auxiliary marine machinery

- Main propulsion services and heat exchangers
- Machinery service systems and equipment
- Valves and pipelines
- Tanker and gas carrier cargo pumps and systems
- The propeller shaft
- Steering gears
- Bow thrusters, stabilizers and stabilizing systems
- Refrigeration
- Heating, ventilation and air conditioning
- Deck machinery and cargo equipment
- Fire protection
- Safety and safety equipment
- Control and instrumentation

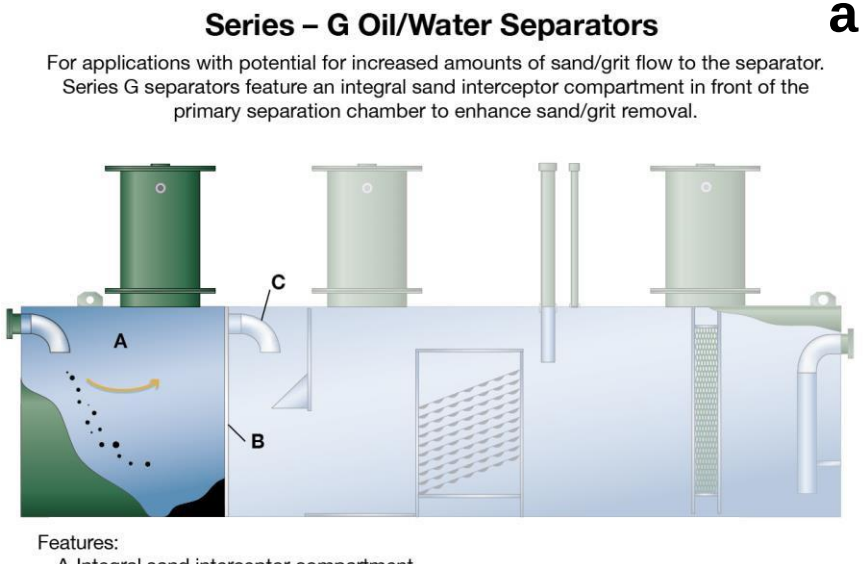


HD Mc George
7th Edition, 2002

Fundamental aspects of auxiliary machinery (3)

Auxiliary marine machinery includes e.g. separators for removing water and other contaminants from fuel and oil (a), steering machinery (b), capstans, windlasses, and winches for anchoring, mooring, and cargo loading (c), and cranes (d).

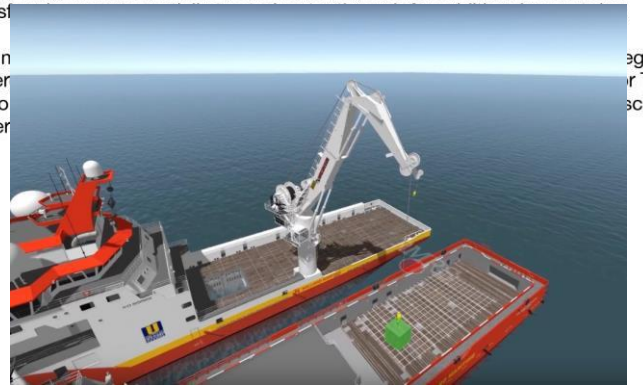
a



b

c

d



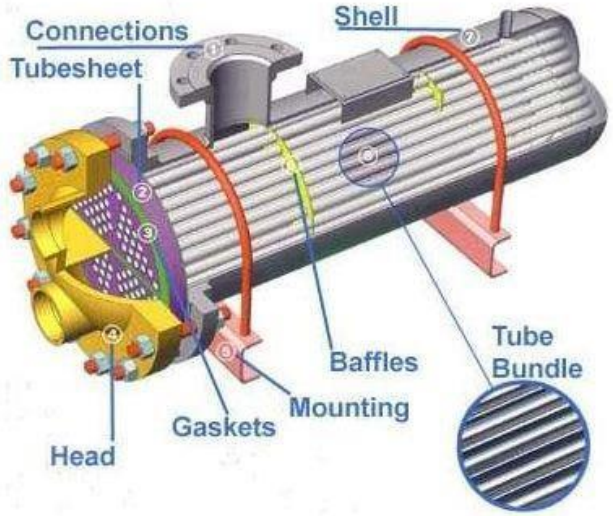
Main propulsion services and heat exchangers

The heat produced by running machinery, must be removed to ensure the satisfactory functioning of the equipment.

Cooling is achieved primarily through circulation of water, oil and air but the abundant supply of sea water is normally reserved for use as an indirect coolant because the dissolved salts have a great potential for depositing scale and assisting in the setting up of galvanic corrosion cells. Pollution of coastal areas by industrial and other wastes has added to the problems of using sea water as a coolant.

Heat exchangers

Heat exchangers are used to condense vapors and to heat and cool working fluids, such as water, oil, and air, filters for the seawater and fuel supplies, and separators for bilge water.

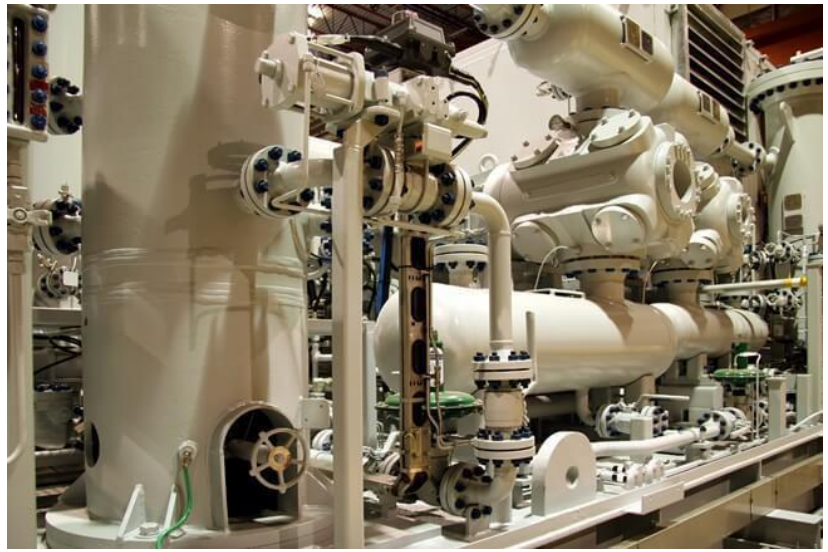


Auxiliary machinery – Refrigerator system (1)

- Propulsion plant management
- Auxiliary power management
- Auxiliary machinery operation
- Navigation and maneuvering
- IT and comm. systems
- Ballast and trim management
- Cargo handling operations
- Spares and maintenance

Refrigeration of cargo spaces and storerooms employs a system of components to remove heat from the space being cooled. This heat is transferred to another body at a lower temperature. The cooling of air for air conditioning entails a similar process.

The arrangements adopted can be considered in three parts: the central primary refrigerating plant, the brine circulating system, and the air circulating system for cooling the cargo.

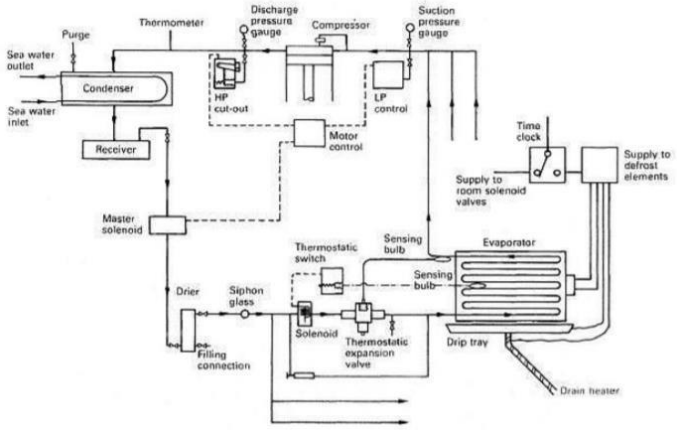


Ship refrigeration plant

Auxiliary machinery - Refrigerator system (2)

- Propulsion plant management
- Auxiliary power management
- Auxiliary machinery operation
- Navigation and maneuvering
- IT and comm. systems
- Ballast and trim management
- Cargo handling operations
- Spares and maintenance

The refrigerant flow through the chiller splits into four circuits, each with its own expansion valve. The four circuits are used to control the amount of evaporator surface, depending on the degree of condenser loading at the time, thus giving greater system flexibility. The large oil separator is a feature of screw compressor plants and the circuit for oil return is shown in the illustration.



Automatic direct expansion refrigeration system

1

Each primary refrigerant circuit has its own evaporator within the brine chiller which results in totally independent gas systems. There will probably be three such systems on a cargo or container ship installation. Since they are totally independent each system can be set to control the outlet brine at different temperatures. Each brine temperature is identified by a color and will have its own circulating pump. The cold brine is supplied to the cargo space air cooler and the flow of this brine is controlled by the temperature of the air leaving the cooler

The cooler in the cargo space is arranged for air circulation over it and then through the cargo before returning. An arrangement of fans and ducting direct the air to the cooler and below the cargo . The cargo is stacked on gratings which allow the passage of cooled air up through the cargo..

For small refrigerated cargo spaces or provision rooms a direct expansion primary refrigerant system may be used. The twin circuit arrangement for each cooler (evaporator) provides flexibility and duplication in the event of one system failing. The back pressure valve maintains a minimum constant pressure or temperature in the evaporator when working a space in high temperature conditions to prevent under-cooling of the cargo. If one space is operating at a low-temperature condition at the same time the back pressure valve would be bypassed.

2

Vessels designed for specific refrigerated container trades have built-in ducting systems. These can be in two forms: a horizontal finger duct system in which up to
48 containers are fed from one cooler situated in the wings of the ship or, alternatively, a vertical duct system in which each stack of containers has its own duct and cooler. This type of system is employed for standard containers having two port holes in the wall opposite the loading doors.

3

Functionality:
Air is delivered into the bottom opening and, after passing through a plenum, rises through a floor grating over the cargo and returns via another section of the plenum to the top port. The connection between the duct arid containers is made by couplings which are pneumatically controlled.

Auxiliary machinery – Coolers (1)

- Propulsion plant management
- Auxiliary power management
- Auxiliary machinery operation
- Navigation and maneuvering
- IT and comm. systems
- Ballast and trim management
- Cargo handling operations
- Spares and maintenance

Coolers at sea fall into two groups, shell and tube type coolers and the plate type.

Shell and tube heat exchangers for engine cooling water and lubricating oil cooling have traditionally been circulated with sea water. The sea water is in contact with the inside of the tubes and water boxes.

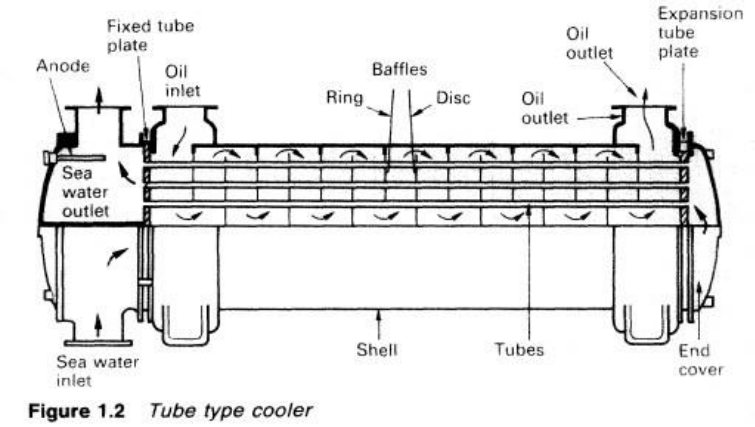


Figure 1.2 *Tube type cooler*

Tube type cooler

Auxiliary machinery – Coolers (2)

- Propulsion plant management
- Auxiliary power management
- Auxiliary machinery operation
- Navigation and maneuvering
- IT and comm. systems
- Ballast and trim management
- Cargo handling operations
- Spares and maintenance

The obvious feature of plate type heat exchangers, is that they are easily opened for cleaning.

The major advantage over tube type coolers, is that their higher efficiency is reflected in a smaller size for the same cooling capacity.

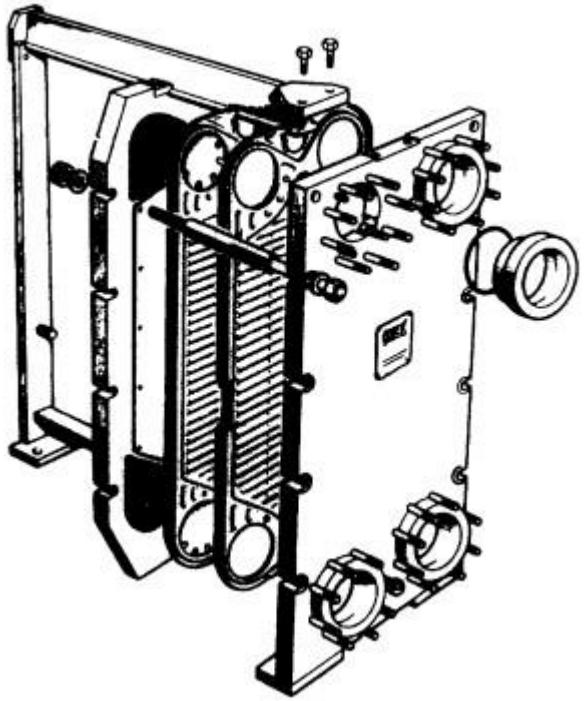


Plate type heat exchanger

Machinery service systems and equipment

Service systems are necessary for the main machinery and for generators in addition to the circulating systems.

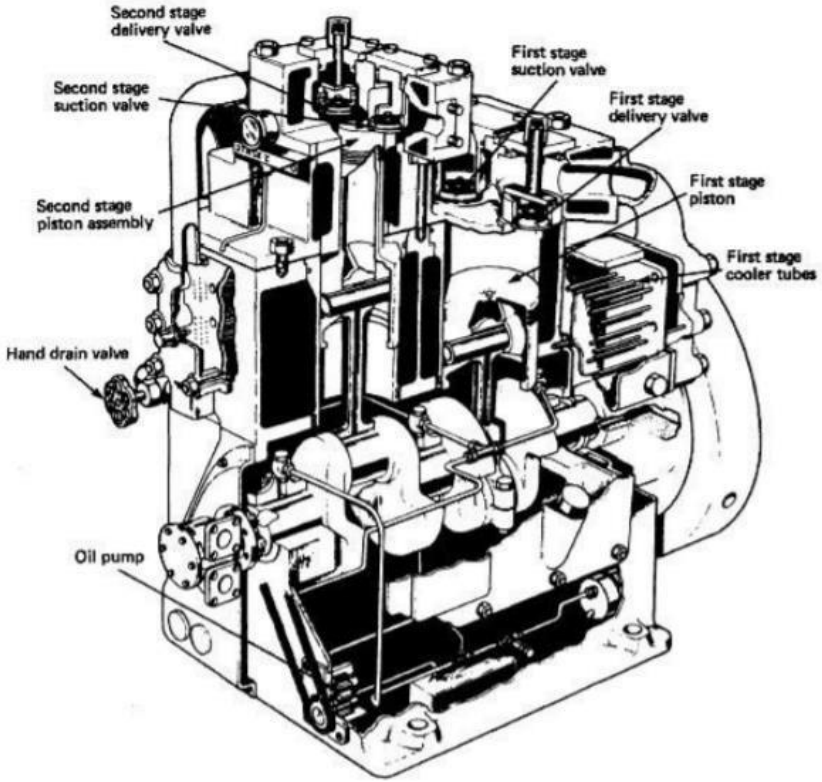
The supply of compressed air for starting and control systems requires the provision of compressors and air receivers. Modern residual fuels need a handling system with settling tanks, centrifuges, heating, filtration, and sometimes with homogenization and blending equipment. Lubricating oil also benefits from being centrifuged as well as being filtered.

Auxiliary machinery - Air compressors (1)

- Propulsion plant management
- Auxiliary power management
- Auxiliary machinery operation
- Navigation and maneuvering
- IT and comm. systems
- Ballast and trim management
- Cargo handling operations
- Spares and maintenance

Compressed air has many uses on board ship, ranging from diesel engine starting to the cleaning of machinery during maintenance.

The air pressures of 25 bar or more are usually provided in multi-stage machines. Here the air is compressed in the first stage, cooled and compressed to a higher pressure in the next stage, and so on. The two-stage crank machine is probably the most common.



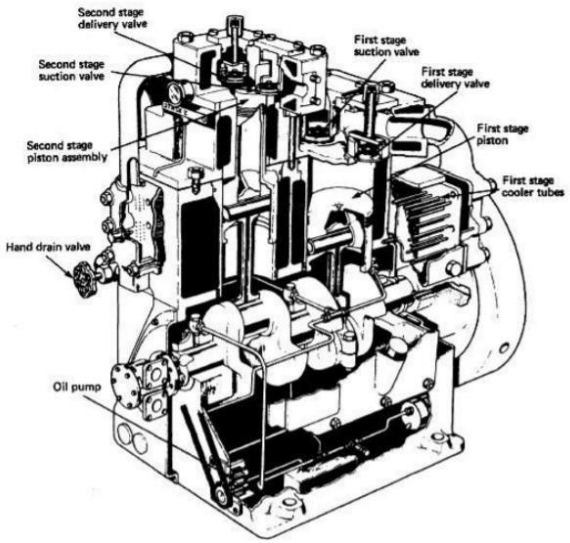
Two stage air compressor

Auxiliary machinery - Air compressors (2)

- Propulsion plant management
- Auxiliary power management
- Auxiliary machinery operation
- Navigation and maneuvering
- IT and comm. systems
- Ballast and trim management
- Cargo handling operations
- Spares and maintenance

Air is drawn in on the suction stroke through the first-stage suction valve via the silencer/filter. The suction valve closes on the piston upstroke and the air is compressed. The compressed air, having reached its first-stage pressure, passes through the delivery valve to the first-stage cooler. The second-stage suction and compression now take place in a similar manner, achieving a much higher pressure in the smaller, second-stage cylinder.

1



Two stage air compressor

After passing through the second-stage delivery valve, the air is again cooled and delivered to the storage system. The machine has a rigid crankcase which provides support for the three crankshaft bearings. The cylinder block is located above and replaceable liners are fitted in the cylinder block. The running gear consists of pistons, connecting rods and the one-piece, two-throw crankshaft.

2

The first-stage cylinder head is located on the cylinder block and the second-stage cylinder head is mounted on the first: each of the heads carries its suction and delivery valves. A chain-driven rotary-gear pump provides lubricating oil to the main bearings and through internally drilled passages in the crankshaft to both connecting rod bearings. **Cooling water is supplied either from an integral pump or the machinery space system**. The water passes into the cylinder block which contains both stage coolers and then into the first and second stage cylinder heads.

3

A water jacket safety valve prevents a build-up of pressure should a cooler tube burst and compressed air escape. **Relief valves are fitted to the first and second-stage air outlets and are designed to lift at 10% excess pressure.** A fusible plug is fitted after the second stage cooler to limit delivered air temperature and thus protect the compressed-air reservoirs and pipework. Cooler drain valves are fitted to compressors.

4

To stop the **compressor, the first and second-stage cooler drain valves should be opened and the machine run unloaded for two to three minutes. This unloaded running will clear the coolers of condensate**. The compressor can now be stopped and the drains should be left open. The cooling water should be isolated if the machine is to be stopped for a long period.

5

Automatic compressor operation is quite usual and involves certain additional equipment. An unloader must be fitted to ensure the machine starts unloaded, and once running at speed will load' and begin to produce compressed air. **Various methods of unloading can be used but marine designs favor either depressors which hold the suction valve plates on their seats or a bypass which discharges to suction. Automatic drains must also be fitted to ensure the removal of moisture from the stage coolers.** A non-return valve is usually fitted as close as possible to the discharge valve on a compressor to prevent return air flow: it is an essential fitting where unloaders are used.

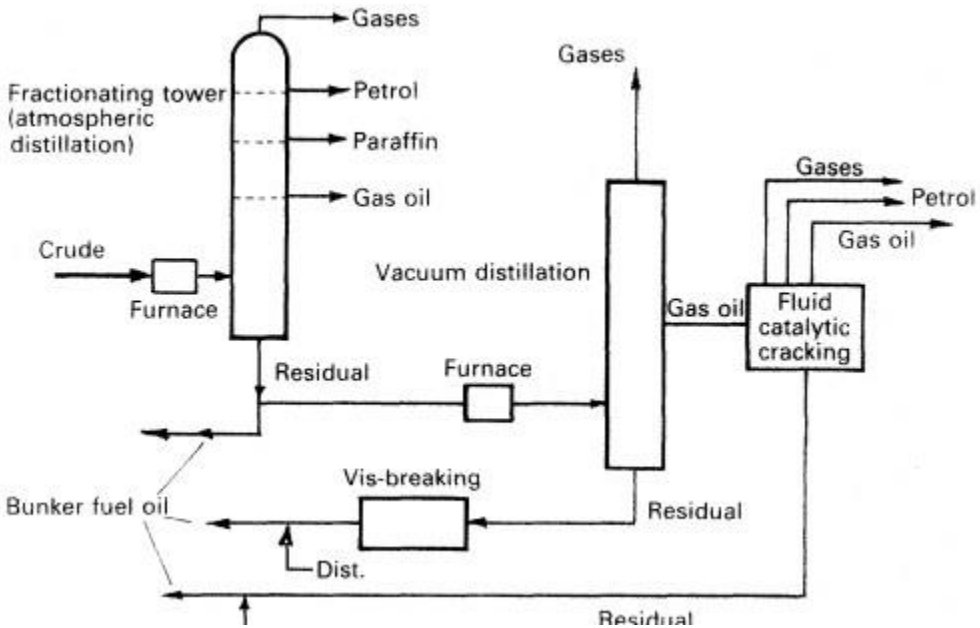
6

Auxiliary machinery - Fuel handling and treatment (1)

- Propulsion plant management
- Auxiliary power management
- Auxiliary machinery operation
- Navigation and maneuvering
- IT and comm. systems
- Ballast and trim management
- Cargo handling operations
- Spares and maintenance

Fuels and lubricating oils are obtained from crude primarily by heating the crude oil, so that vapors are boiled off and then condensed at different temperatures. The constituents or fractions are collected separately in a distillation process.

Crude oil contains gaseous fuels, gasoline (petrol), kerosene (paraffin), gas oils, distillate diesel fuels and lubricating oils which can be collected from the fractionating tower where they condense out at the different levels maintained at appropriate temperatures.



Oil refinery process

Ship service systems

Some of the equipment in the machinery space is dedicated to servicing the ship in general and providing amenities for personnel or passengers.

The bilge system is available to clear oil/water leakage and residues from machinery and other spaces as well as to provide an emergency pumping capability. The domestic water and sewage systems provide amenities for personnel.

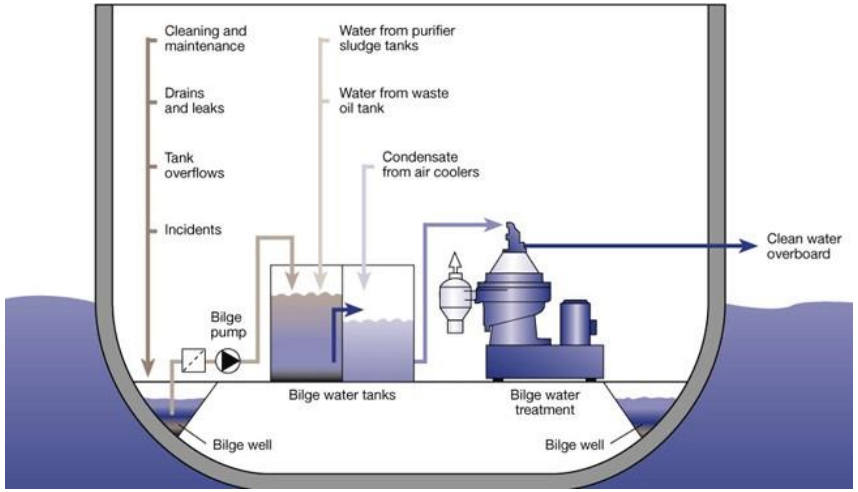
Auxiliary machinery - Bilge systems and oil/water separators (1)

- Propulsion plant management
- Auxiliary power management
- Auxiliary machinery operation
- Navigation and maneuvering
- IT and comm. systems
- Ballast and trim management
- Cargo handling operations
- Spares and maintenance

The essential purpose of a bilge system, is to clear water from the ship's 'dry' compartments, in emergency.

The major uses of the system, are for clearing water and oil which accumulates in machinery space bilges as the result of leakage or draining, and when washing down dry cargo holds.

The bilge main in the engine room, has connections from dry cargo holds, tunnel and machinery spaces.



Bilge and joint systems

Auxiliary machinery - Bilge systems and oil/water separators (2)

- Propulsion plant management
- Auxiliary power management
- Auxiliary machinery operation
- Navigation and maneuvering
- IT and comm. systems
- Ballast and trim management
- Cargo handling operations
- Spares and maintenance

Oil/water separators are necessary aboard vessels to prevent the discharge of oil overboard mainly when pumping out bilges. They also find service when deballasting or when cleaning oil tanks.

The requirement to fit such devices is the result of international legislation. Legislation was needed because free oil and oily emulsions discharged in a waterway can interfere with natural processes such as photosynthesis and re-aeration, and induce the destruction of the algae and plankton so essential to fish life. Inshore discharge of oil can cause damage to bird life and mass pollution of beaches.

Ships and ship's master found discharging water containing more than 100 mg/litre of oil or discharging more than 60 litres of oil per nautical mile can be heavily fined.

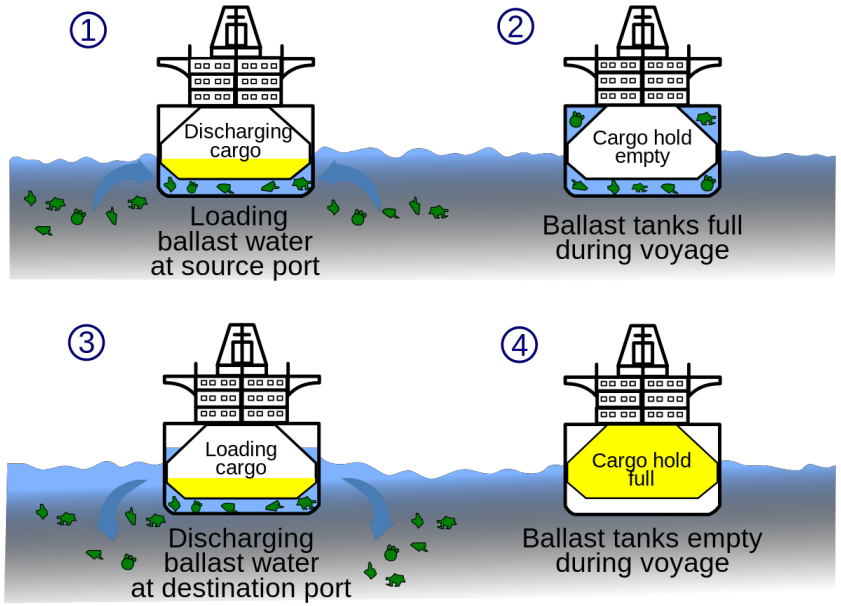
Auxiliary machinery – Ballast tanks and arrangements

- Propulsion plant management
- Auxiliary power management
- Auxiliary machinery operation
- Navigation and maneuvering
- IT and comm. systems
- Ballast and trim management
- Cargo handling operations
- Spares and maintenance

The ballasting of a vessel which is to proceed without cargo to the loading port is necessary for a safe voyage, sometimes in heavy weather conditions.

On arrival at the port the large amount of ballast must be discharged rapidly in readiness for loading.

Ballast carried in the empty cargo tanks of crude oil carriers has potential for pollution when discharged, particularly if cargo pumps are used for the purpose.



Ballast tanks

Auxiliary machinery – Domestic water systems

- Propulsion plant management
- Auxiliary power management
- Auxiliary machinery operation
- Navigation and maneuvering
- IT and comm. systems
- Ballast and trim management
- Cargo handling operations
- Spares and maintenance

Systems using gravity tanks to provide a head for domestic fresh and sanitary water, have long been superseded by schemes where supply pressure is maintained by a cushion of compressed air in the service tanks. Provision of:

- Fresh water
- Sanitary water

The crew uses on average about 70 litre/person/day and in a passenger ship, consumption can be as high as 225 litre/person/day. Water used in the machinery spaces as make up for cooling system losses may be fresh or distilled but distilled water is essential for steam plant where there is a water tube boiler.

Ballast tanks

Auxiliary machinery – Sewage systems

- Propulsion plant management
- Auxiliary power management
- Auxiliary machinery operation
- Navigation and maneuvering
- IT and comm. systems
- Ballast and trim management
- Cargo handling operations
- Spares and maintenance

The exact amount of sewage and waste water flow generated on board ship is difficult to quantify. European designers tend to work on the basis of 70 litres/person/day of toilet waste (including flushing water) and about 130-150 litres/person/day of washing water (including baths, laundries, etc.).

Some plants are designed so that the effluent is retained in the vessel for discharge well away from land, or to a receiving facility ashore; others are designed to produce an effluent which is acceptable to port authorities for discharge inshore.

Sewage treatment plant

5 min. break

Valves and pipelines

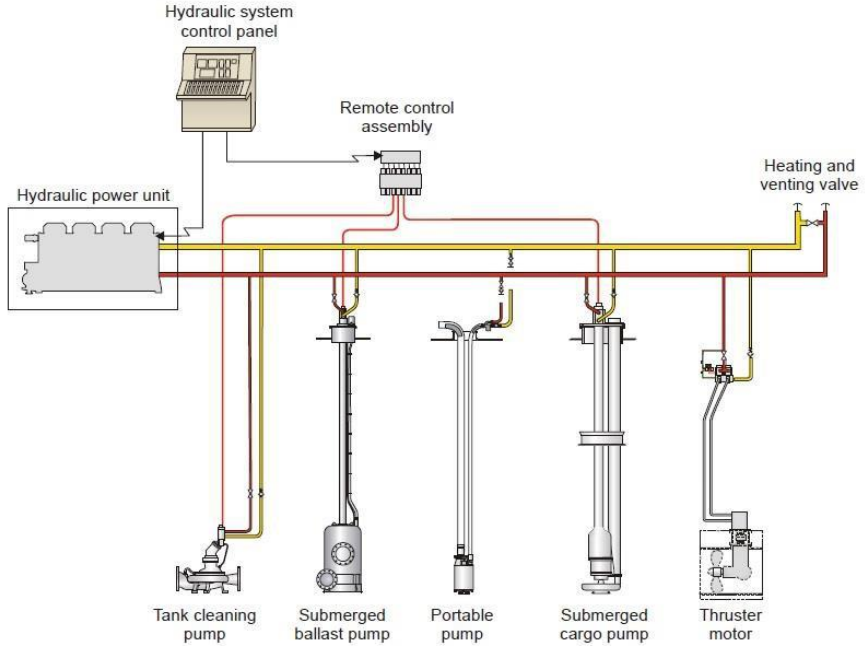
Pipe systems for commercial ships must comply with any applicable rules of the responsible government department and those of the designated classification society. Guidance is provided in government and classification society publications and it is required that plans for principal systems are submitted for approval.

The safety and reliability of critical individual fittings is ensured by a requirement that they are made to specification by an approved manufacturer. Materials are tested, welds are inspected, major fittings are tested and marked, systems are pressure tested by or in the presence of a representative of the appropriate authority. Some accidents have been the result of replacement valves and other components being of inferior quality.

Pumps and pumping

The centrifugal pump is now used for most applications and systems on ships.

In the machinery space it provides a much more reliable service than the steam reciprocating pumps that were still being installed in the 'fifties as auxiliary boiler feed and fuel pumps. These reciprocating pumps required regular maintenance and, if neglected, they needed constant attention to keep them functioning. The general use of the centrifugal pump helped to make the unmanned machinery space viable.



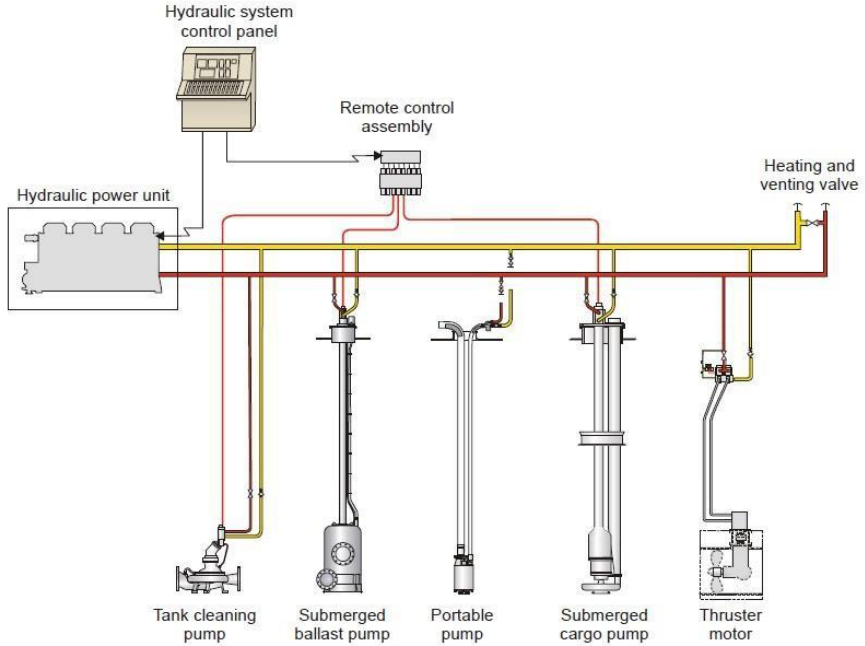
Ship pumps (suction and discharge sides)

Pumps and pumping (in Tankers and Gas carriers)

The nominal time for complete discharge of cargo from a tanker is 24 hours and this is the figure that is normally written into the cargo pumping warranty.

Control equipment is available for managing the loading and discharge of oil tankers and instrumentation is used to monitor the state of the cargo. There are three main systems of pipelines in use each requiring a different

method of handling: ring system; direct system; and free-flow system.



Ship pumps (suction and discharge sides)

The propeller shaft

The simplistic view of the main propulsion shaft installation is that the system is set up with initial straight alignment and remains in that state during the lifetime of the ship, unless affected by accident or wear.

The reality is that there are many factors which can affect and alter alignment during building and throughout the working lifetime of a vessel.

Factors e.g.

- **Deviation while building**
- Mounting of propellers
  Alignment deviation in service
- Change of engine position

Steering gears

Every ocean going cargo ship need to be provided with a main steering gear and an auxiliary steering gear unless the main steering gear comprises two or more identical power units.

Steering gear control for power operated main and auxiliary steering gears is from the bridge and steering gear compartment, the auxiliary steering gear control being independent of the main steering gear control (but not duplication of the wheel or steering lever). Steering gear on ocean-going ships is generally of the electro-hydraulic type.

The total system may be considered made up of three parts, control equipment, a power unit and a transmission to the rudder stock

Bow thrusters, stabilizers and stabilizing systems (1)

The transverse thruster, installed in the bow and/or the stern, has become an essential item of equipment on many vessels.

It enables the normal process of docking to be managed without tug assistance because the vessel is made more maneuverable at low speeds. Safety is increased when berthing in adverse weather conditions provided that the required thruster capacity has been correctly estimated. Transverse thrusters are installed to facilitate the positioning of some types of workboats.

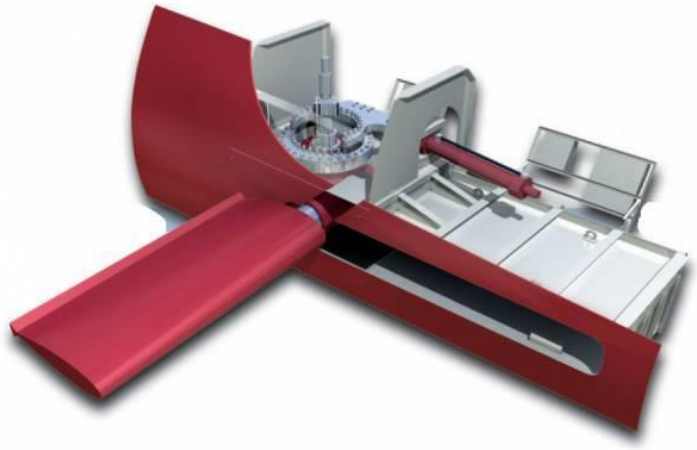
Bow thrusters

Bow thrusters, stabilizers and stabilizing systems (2)

A ship at sea has six degrees of freedom, i.e. roll, heave, pitch, yaw, sway and surge.

Of these, only roll can effectively be reduced in practice by fitting bilge keels, anti-rolling tanks or fin stabilizers.

Since a ship is a damped mass elastic system, it has a natural rolling period and large rolling motions may be induced by resonance with relatively small wave forces. Large resonant rolls can be avoided by generating forces equal and opposite to the impressed sea force.



Stabilizers and stabilizing systems

Heating, ventilation and air conditioning

Good ventilation is vital to the health and well-being of those on board ship and the general requirements for ventilation, formulated before the universal installation of air conditioning systems, still apply.

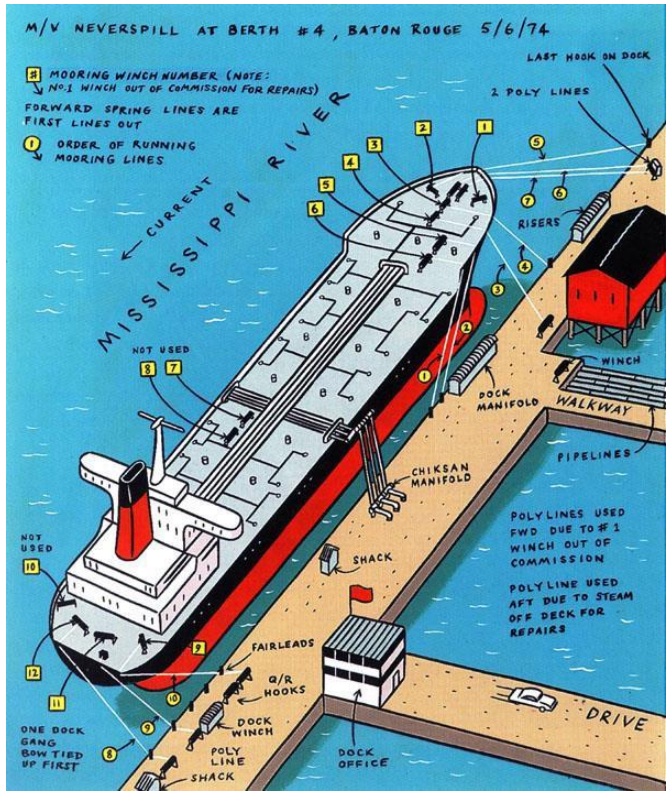
Heating, always necessary for the colder areas of the world. With extremes of low temperature, the heating increased the capacity of the air to absorb moisture and caused excessive evaporation with discomfort to crew and passengers due to drying of the nasal passages, throat and skin.

Air conditioning is based on the ventilation requirement for accommodation and incorporates heating with any necessary humidification and importantly, cooling with de-humidification as necessary. Comfortable conditions depend on the temperature and humidity but are also sensitive to air movement, air freshness and purity.

Deck machinery and cargo equipment (1)

The operation of mooring a vessel has traditionally required the attendance of a large number of deck crew fore and aft. Supervision of the moorings was also necessary to maintain correct tension through changes due to the tides and the loading or unloading of cargo.

The introduction of steel hatch covers not only speeded up the operation of opening and closing the covers but also reduced the number of personnel required for the task.



Ship mooring overview

Deck machinery and cargo equipment (2)

Mooring equipment:

Mooring winches provide the facility for tensioning the wire up to the stalling capacity of the winch.

Anchor windlasses control the running anchor and cable,

Chain stoppers,

Fairleads, guide a line, rope or cable around an object, out of the way or to stop it

Capstans, the driving machinery is situated below the deck and the cable lifters are mounted horizontally.

Mooring equipment

Deck machinery and cargo equipment (3)

For cargo handling

- Cargo winches
- Deck cranes
- Cargo access and maintenance

Emergency power supply for ships machinery

Emergency generator

In the event of a main generating system failure an emergency supply of electricity is required for essential services. This can be supplied by batteries, but most merchant ships have an emergency generator. The unit is diesel driven and located outside of the machinery space.

The emergency generator must be rated to provide power for the driving motors of the emergency bilge pump, fire pumps steering gear, watertight doors and possibly fire fighting equipment. Emergency lighting for occupied areas, navigation lights, communications systems and alarm systems must also be supplied.

Auxiliary Engines (Diesel Alternator)

The engines used to drive the generators/alternators are the vessels primary source of power. This must always be taken into account in establishing priorities with regard to the operation, maintenance, and ordering of spares.

It is essential that the manufacturer's instructions are closely followed with regard to maintenance and overhaul of critical components such as connecting rods, bottom end bolts, shell bearings, pistons. All maintenance, overhauls and repairs must be fully and accurately recorded. Any accidental over speed, overheating, blackout or major failure must be notified to the relevant Management office.

Fire protection

Fire protection on ships is provided by detection and fire-fighting equipment together with structural features which are intended to contain an outbreak of fire and the employment when required of non-combustible materials to prevent its spread.

An outbreak of fire requires a source of ignition, the presence of combustible material and ample oxygen.

Safety and safety equipment

The survival of seafarers is jeopardized by special factors, many of which are not obvious and not always present. Thus entry to enclosed spaces whether they are ballast or cargo tanks, pump rooms, cofferdams or even dry cargo holds may be made hazardous by the presence of dangerous liquids, toxic or flammable gas from a cargo or ballast water or by the absence of oxygen.

Equipment
• Gas analysis • Oxygen analyser • Combustible gas indicators • Explosimeter • Breathing apparatus • Emergency bilge pumps for passenger ships • Power operated water tight doors • Lifeboat davits • Whistles and sirens • Etc.

Unmanned machinery space operations

Personnel should never enter or remain in an unmanned machinery space alone, unless they have received permission from, or been instructed by the engineer officer in charge at the time.

They may only be sent to carry out a specific task which they may be expected to complete in a comparatively short time. Before entering the space, at regular intervals whilst in the space and on leaving the space, they must report by telephone, or other means provided, to the duty deck officer.

Plan, work process control and reporting are critical when entering to these spaces.

Resume Permesinan Bantu di Kapal

Peralatan Penggerak Kapal
Peralatan Kemudi
Peralatan Tambat dan Labuh
Peralatan Bongkar Muat
Peralatan Stabilitas Kapal
Peralatan Bow Thruster
Peralatan Desalination
Peralatan Navigasi dan Komunikasi
Peralatan Treatment Minyak
Peralatan Anti Kebakaran
Peralatan Keselamatan Pelayaran
Peralatan Pengendalian Emissi dan Polusi
Peralatan Khusus (Tambahan)

DISAMPING MANDATORY CLASS YANG KETAT DAN TELITI, SECARA REGULASI KEBANYAKAN PERMESINAN BANTU DIATAS MENJADI PERSYARATAN STATUTORY

PERALATAN PENGGERAK KAPAL (mandatory)
PERALATAN KEMUDI (mandatory)
PERALATAN TAMBAT DAN LABUH (mandatory)
PERALATAN BONGKAR MUAT (mandatory)
PERALATAN STABILITAS KAPAL (non-Class matter)
PERALATAN BOW THRUSTER (non-Class matter)
PERALATAN DESALINATION (non-Class matter)
PERALATAN NAVIGASI DAN KOMUNIKASI (SOLAS)
PERALATAN TREATMENT MINYAK (MARPOL)
PERALATAN ANTI KEBAKARAN (SOLAS)
PERALATAN KESELAMATAN PELAYARAN (SOLAS)
PERALATAN PENGENDALIAN EMISSI DAN POLUSI (MARPOL)

Thank you

ALAT BANTU PENANGKAPAN IKAN

(FISHING AUXILIARY)

Klasifikasi Kapal Perikanan

Menurut International Standard Statistical Classification of Fishery Vessels - FAO 2019:

Kapal perikanan terbagi atas 2 (dua) jenis kapal perikanan, yakni :
1. Jenis kapal penangkap ikan (fishing vessels)
2. Jenis kapal bukan penangkap ikan (non fishing vessels).

Fishing vessels[2]

Fishing Vessel Category	Fishing Vessel Sub-Category	ISSCFV Code	Standard Abbreviation
Trawlers		**1**	**TO**
	Otter trawlers[3]	1.1	OT
	Pair trawlers	1.2	PT
	Beam trawlers	1.3	BT
	Side trawlers	1.4	TS
	Stern trawlers	1.5	TT
	Trawlers nei	1.9	TOX
Purse seiners		**2**	**SP**
	Purse Seiners - American type	2.1	SPA
	Purse Seiners - European type	2.2	SPE
	Drum seiners	2.3	SPD
	Purse seiners nei	2.9	SPX
Seiners (other)		**3**	**SO**
	Seiners nei	3.9	SOX
Dredgers		**4**	**DO**
	Dredgers nei	4.9	DOX
Lift netters		**5**	**NO**
	Stick-held dip netters	5.1	NS
	Lift netters nei	5.9	NOX
Gillnetters		**6**	**GO**
	Drifters	6.1	GD
	Set netters	6.2	GS
	Gillnetters nei	6.9	GOX
Trap setters		**7**	**WO**
	Pot vessels	7.1	WP
	Trap setters nei	7.9	WOX
Longliners		**8**	**LL**
	Bottom longliners	8.1	LB
	Midwater longliners	8.2	LM
	Longliners nei	8.9	LLX
Line vessels (other)		**9**	**LO**
	Jigger vessels	9.1	LJ
	Pole and Line vessels	9.2	LP
	Trollers	9.3	LT
	Hand liner vessels	9.4	LH
	Line vessels nei	9.9	LOX
Multipurpose vessels		**10**	**MO**
	Purse seine/pelagic trawlers	10.1	MTS
	Multipurpose trawlers (in combination with longline, trap, gillnet, dredge)	10.2	MTW
	Multipurpose non trawlers (longline, gillnet, trap)	10.3	MLG
	Multipurpose vessels nei	10.9	MOX
Recreational fishing vessels		**18**	**RO**
	Recreational fishing vessels nei	18.9	ROX
Other fishing vessels		**19**	**FX**
	Other fishing vessels nei	19.9	FXX

Vessels supporting fishing related activities[4]	**Motherships**	**20**	**HO**
	Motherships nei	20.9	HOX
	Fish carriers and reefers	**21**	**FO**
	Refrigerated transport vessels	21.1	FR
	Fish carriers and reefers nei	21.9	FOX
	Support vessels	**23**	**SA**
	Bunkering tanker vessels	23.1	SB
	Towing vessels	23.2	ST
	Support and auxiliary ships nei	23.9	SAX
	Fishery research and survey vessels	**25**	RT
	Fishery research and survey vessels nei	25.9	RTX
	Patrol vessels	**26**	PX
	Patrol vessels nei	26.9	PXX
	Fishery training vessels	**27**	CO
	Fishery training vessels	27.9	**COX**
	Vessels supporting fishing related activities	**29**	**VO**
	Multipurpose vessels supporting fishing related activities	29.1	VOM
	Vessels supporting fishing related activities, nei	29.9	VOX

ALAT BANTU PENANGKAPAN

- MEMPERMUDAH PROSES KERJA
- MEMPERCEPAT PROSES KERJA

YANG HARUS DI PERTIMBANGKAN

- STABILITAS KAPAL
- BIAYA YANG DIKELUARKAN
- PENGGERAK MULA YANG DI BUTUHKAN

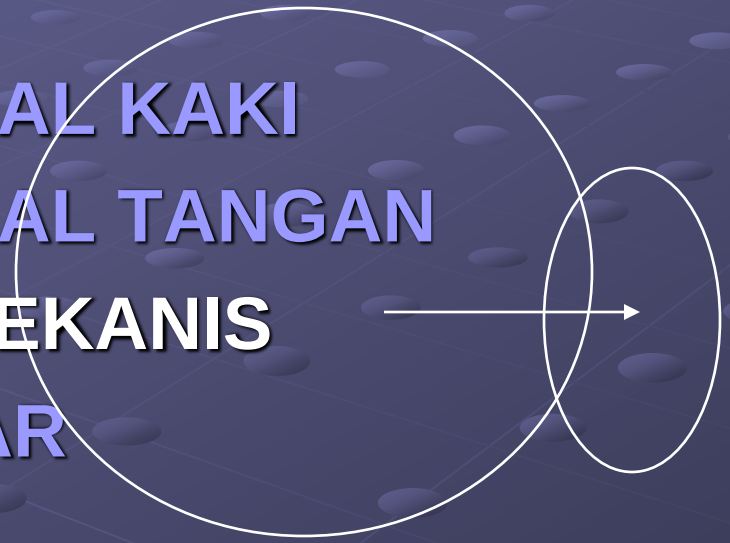
PENGGERAK ALAT BANTU

MANUAL

- DENGAN PEDAL KAKI
- DENGAN PEDAL TANGAN

PENGGERAK MEKANIS

- MOTOR BAKAR
- HIDRAULIK
- ELEKTRIK
- ELEKTRIK HIDRAULIK



WAKTU PENGGUNAAN ALAT BANTU

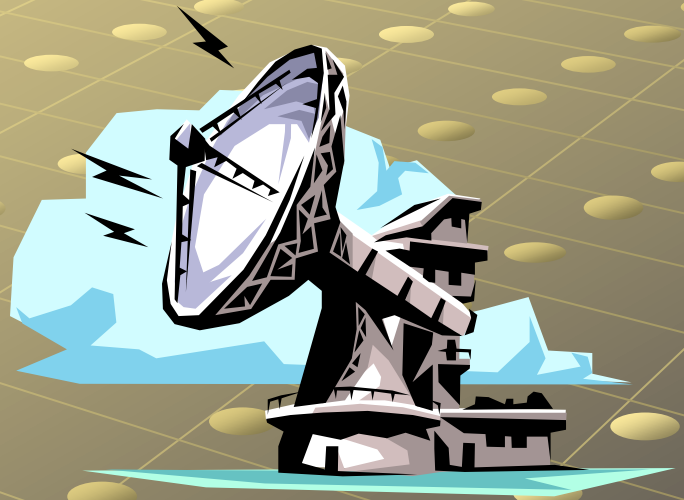
- DIGUNAKAN PADA SAAT SETTING
  - LINE CASTER UNTUK KAPAL LONG LINE
  - NET CASTER UNTUK KAPAL GILLNETTER

- DIGUNAKAN PADA SAAT HAULLING CAPSTAN UNTUK MENARIK TALI –TALI CANTRANG, PURSE SEINE DAN TRAWL
- POWER BLOCK UNTUK PENARIKAN JARING PURSE SEINE
- LINE HAULLER UNTUK TALI LONG LINE

Klasifikasi Sarana Penangkapan :

1. Alat Penangkap Ikan
2. Kapal Perikanan
3. Alat Bantu Penangkapan

Alat Bantu Penangkapan



1. Alat Bantu Pengumpul Ikan
2. Alat Bantu Deteksi
3. Alat Bantu Navigasi
4. Perlengkapan Penangkapan (Mesin dan Peralatan Penangkapan)

1. Alat Bantu Pengumpul Ikan (FAD)

- **Rumpon / Payaos**
- **Lampu**

2. Alat Bantu Deteksi/Pelacak

a. Penginderaan Jarak Jauh (Remote Sensing)

b. Hidro Akustik (Gema/Echo) & gel.Radio

- **Fish Finder / Echo Sounder**
- **Sonar**
- **RDF (Radio Direction Finder)**

3. Instrumentasi Nautika/Navigasi Kapal Perikanan

a. Instrumen nautika elektronik kapal perikanan

b. Instrumen nautika mekanik kapal perikanan

4. Perlengkapan Penangkapan

a. Mesin Penangkapan (Fishing Deck Machinery)

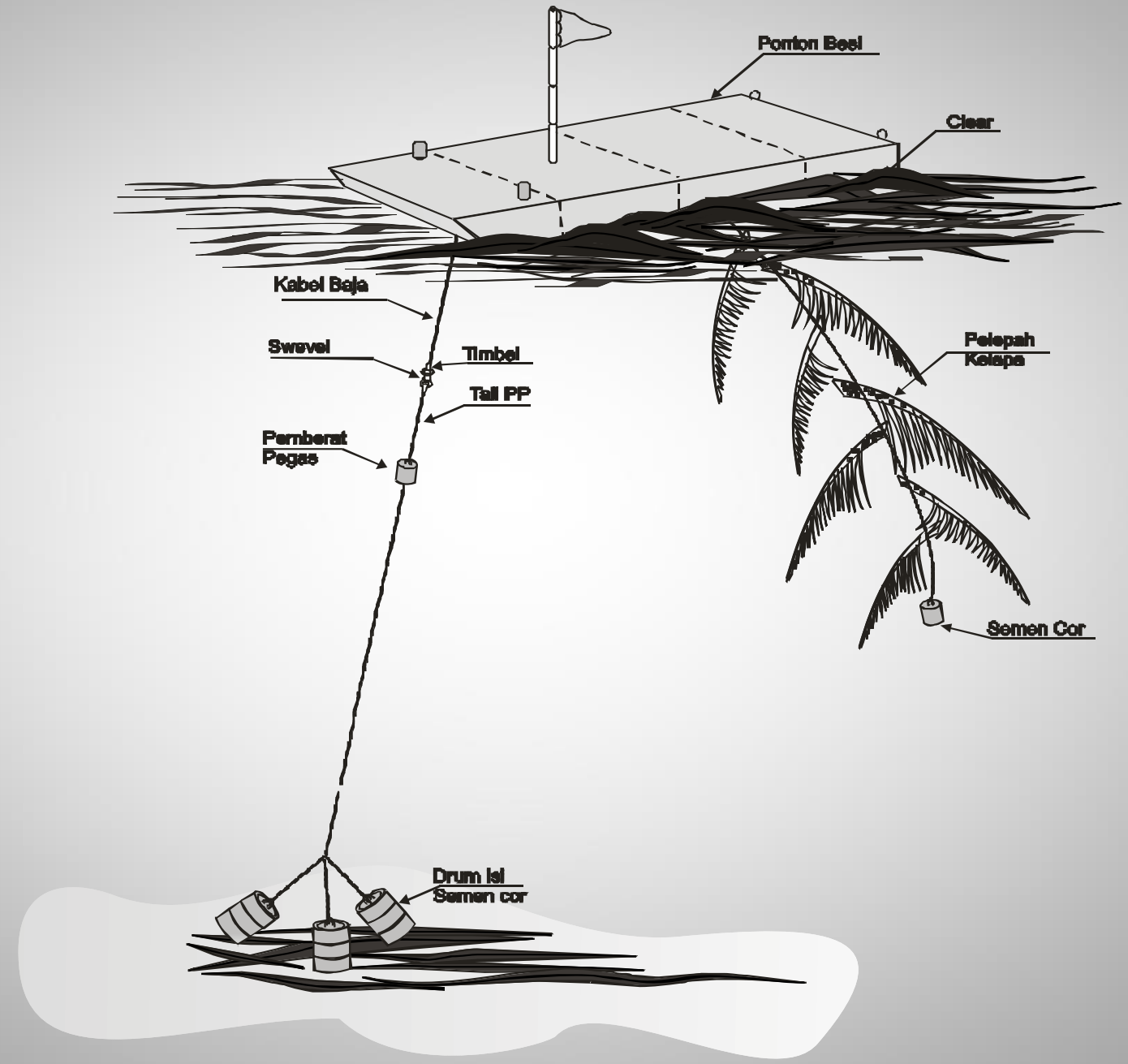
b. Peralatan Penangkapan (Fishing Deck Out Fitting)

Alat Bantu Pengumpul Ikan :

- Rumpon

Rumpon Laut Dalam
Jenis Rakit Bambu

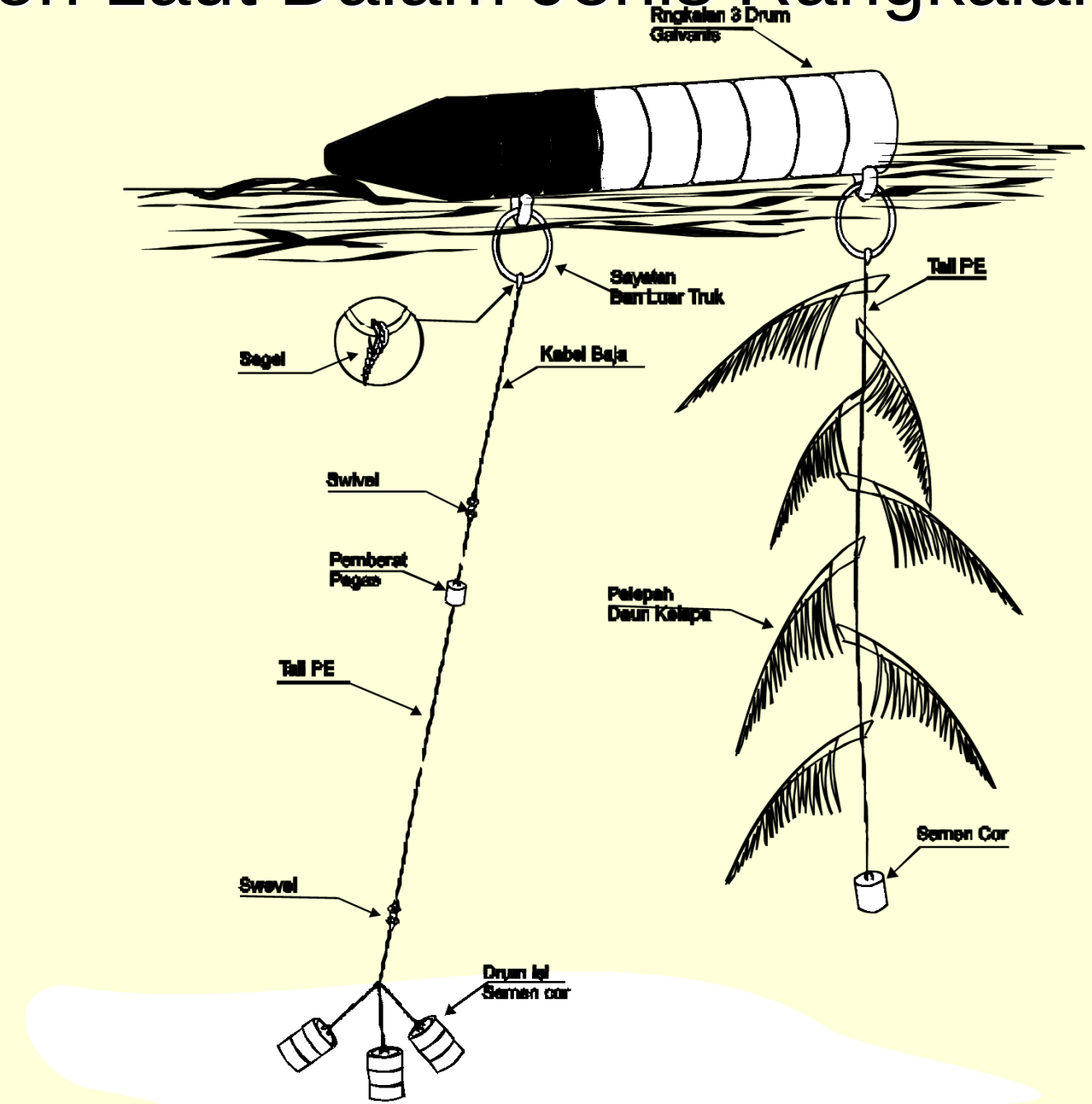
Rumpon Laut Dalam Jenis Ponton Plat Besi



Ponton Besi Rumpon


Rngkaian 3 Drum Galvanis
Sayatan Ban Luar Truk
Tali PE
Segel
Kabel Baja
Swivel
Pemberat Pagar
Pelepah Daun Kelapa
Tali PE
Semen Cor
Swivel
Drum Isi Semen cor
20.00 FED 20
8 m
41 bambu
41 bambu
8 m
41 batu 500 gr

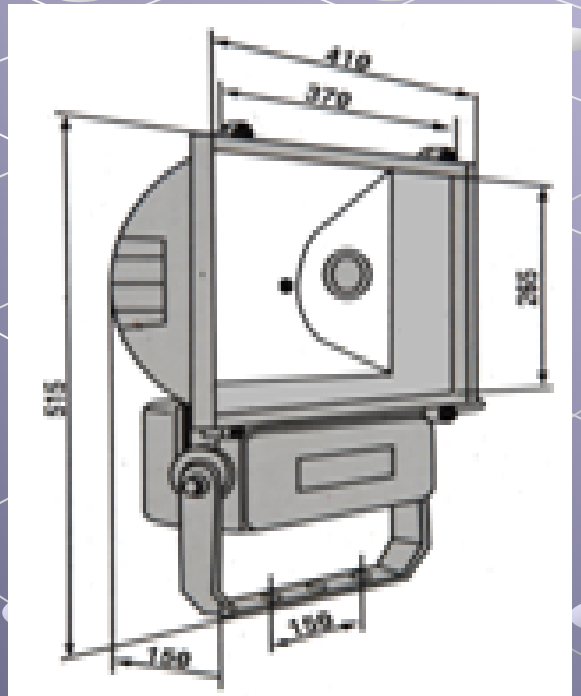
Rumpon Laut Dalam Jenis Rangkaian Drum

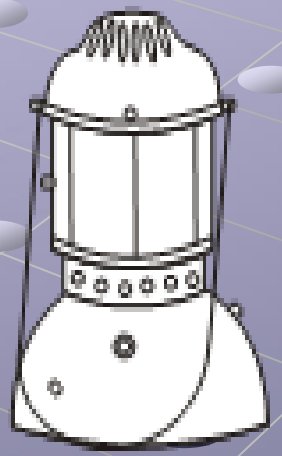


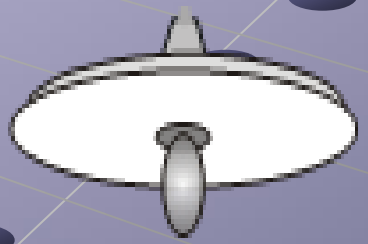
Beragam Jenis Ponton

Lampu Pengumpul Ikan

- Lampu Minyak (Tekan)
- Lampu Listrik :
  a) Permukaan
  b) Bawah Air
     (Under Water Lamp)







Lampu Pengumpul Ikan Di Atas Kapal Purse seine

Lampu Tekan Minyak dan Lampu Mercury Pada Kapal Purse Seine Kecil

Kapal Lampu

(Penjual Jasa Cahaya Lampu untuk Armada PurseSeine)

Lampu Pengumpul Pada
Kapal Pancing Cumi Jepang

Lampu Permukaan

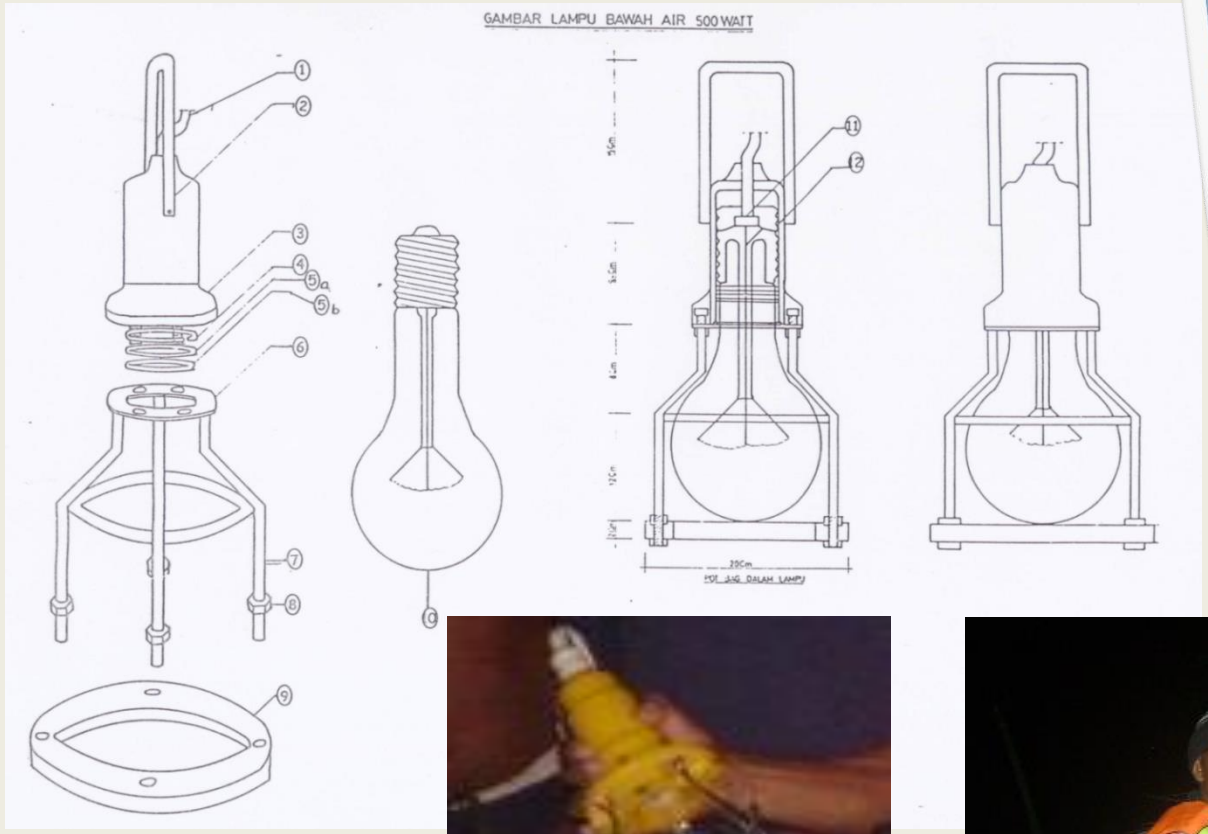
Lampu Pengumpul Pada Kapal Jala Cumi

Kapal Jaring Cumi Siap Operasi

Lampu Pengumpul Ikan Pada Kapal Stickheld DeepNet

Lampu Celup Dalam Air

(Hasil Rekayasa BBPPI Semarang)



Lampu (Hasil Rekayasa BBPPI Semarang)

Bawah AirSuper Hemat

Lampu Bawah Air Super Hemat
Hasil Praktek Latihan Nelayan

Uji Lapangan di Bagan

Efek lampu “BASH” Peperek (“petek”) berkurang banyak (Rp500,-)

Bilis (*“teri besar”*) bertambah banyak Rp3000,-

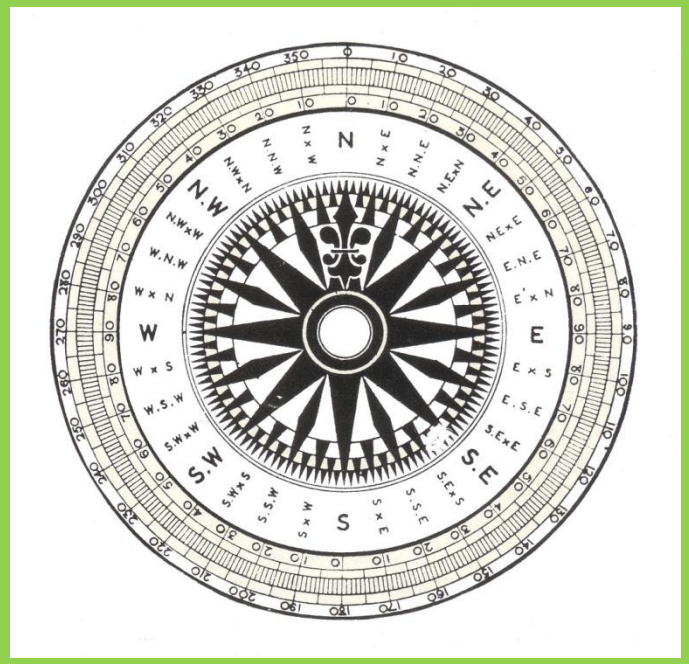
Kesimpulan utk Bagan Tancap KalTim:

- Lampu “BASH” 2 x 60Watt bisa menggantikan lampu Neon TL 23Watt x10 buah
- Penggunaan lampu “BASH” bisa mengurangi/menghilangkan fungsi Generator Listrik 3-4 KVA yg biasa terpasang di bagan
- Penggunaan “*marine epoxy*” direkomendasikan

Instrumentasi Nautika (Navigasi) Kapal Perikanan

- Kompas Magnit
- Peta Laut
- Teropong (*binocullar*)
- Alat ukur sudut kemiringan kapal
- Alat baring (*Sextant*)
- GPS (*Global Positioning System*)
- Radar (*Radio Detection and Ranging)*
- Radio Komunikasi : VHF, MF, dan HF
- Faksimili Cuaca (*Weather Faxcimile*)
- RDF (*Radio Direction Finder*)
- SART (*Search And Resque Radar Transponder*)
- EPIRB (*Emergency Position Indicating Radio Beacon)*
- GMDSS, Dan Lain-lain

Kompas Magnit

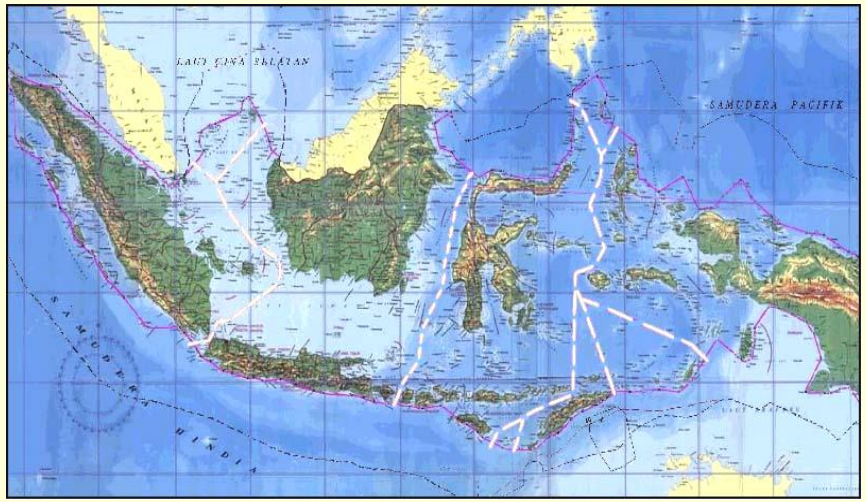


a. Mawar Pedoman pada Kompas Magnit

b. Kompas magnit modern

Alat jangka peta

alat ukur sudut kemiringan kapal

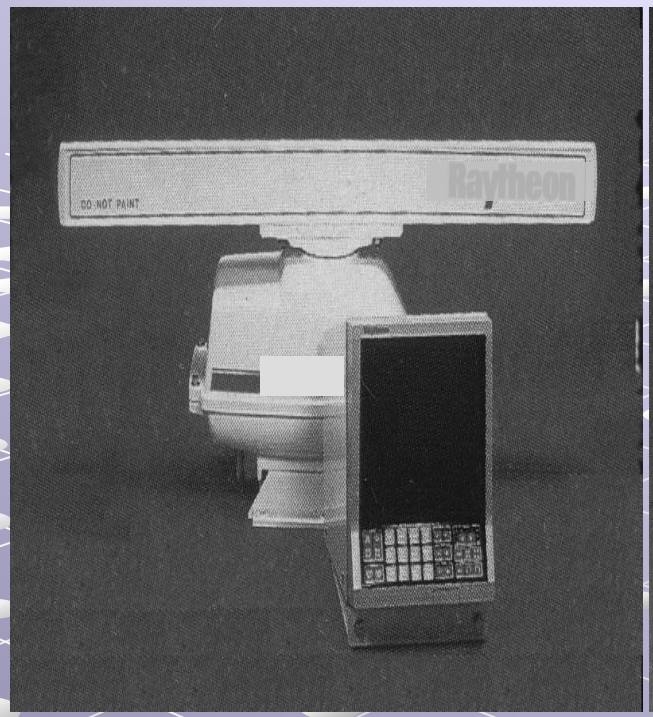


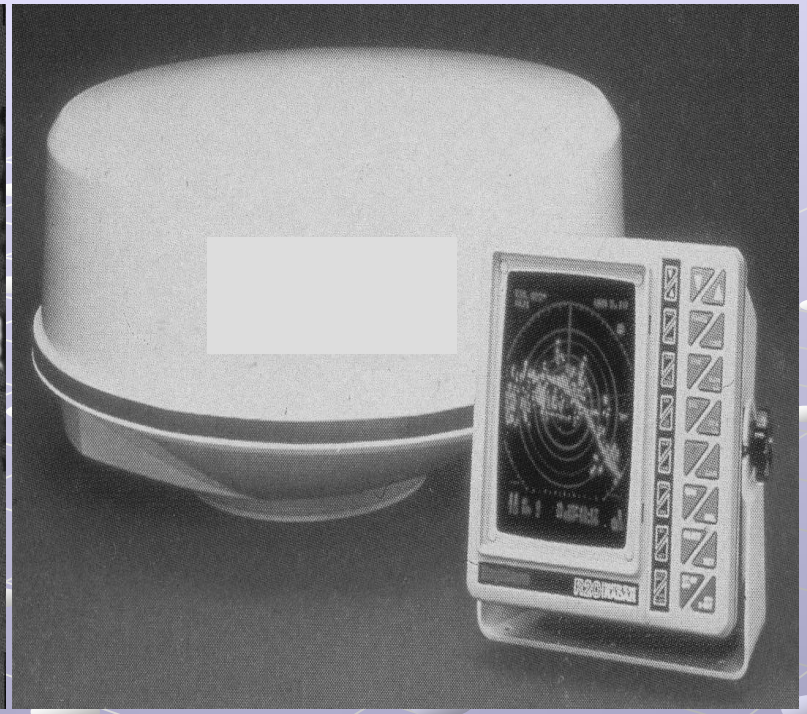
Peta laut

Alat baring (*Sextant*)

GPS (Global Positioning System)

RADAR

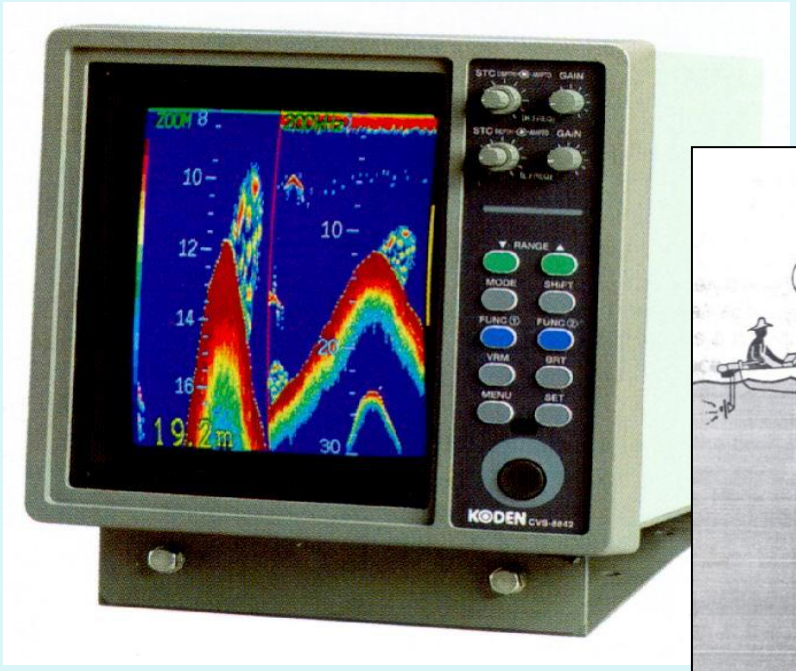




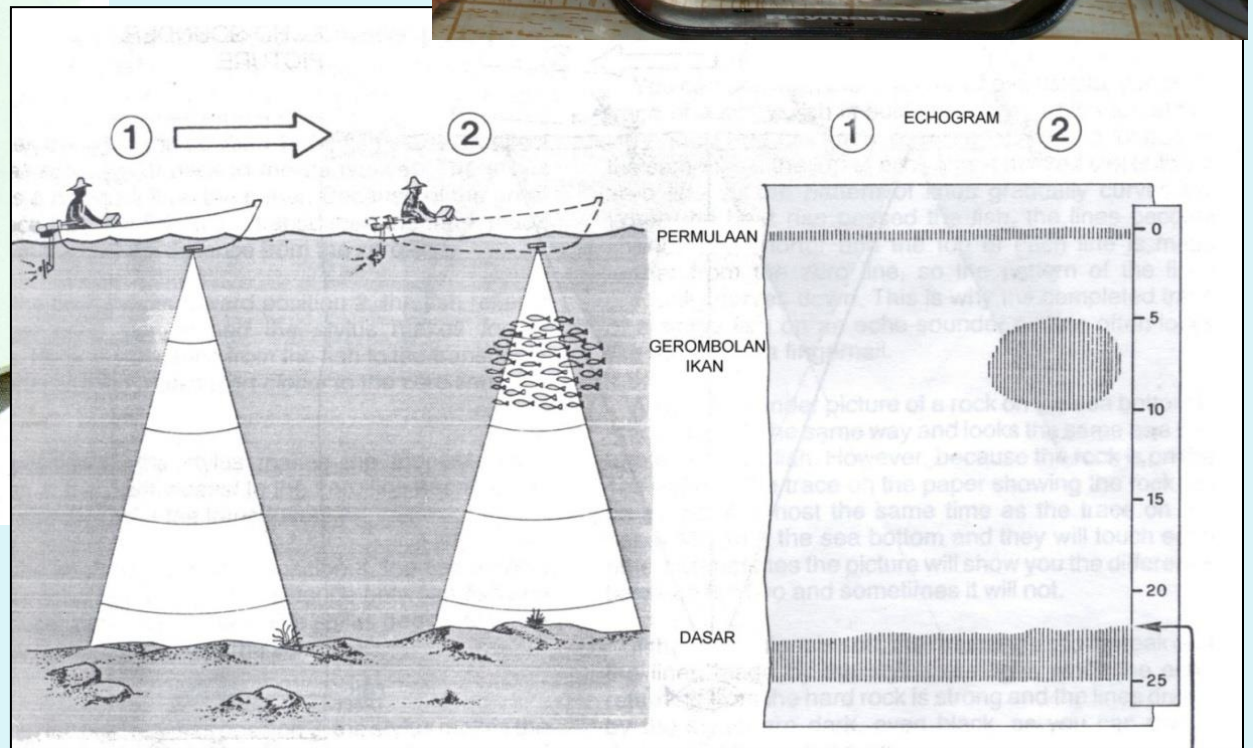
Radio komunikasi

Alat Bantu Pelacak (Deteksi)

- Fish Finder / Echo Sounder
- RDF (Radio Direction Finder)
- Sonar

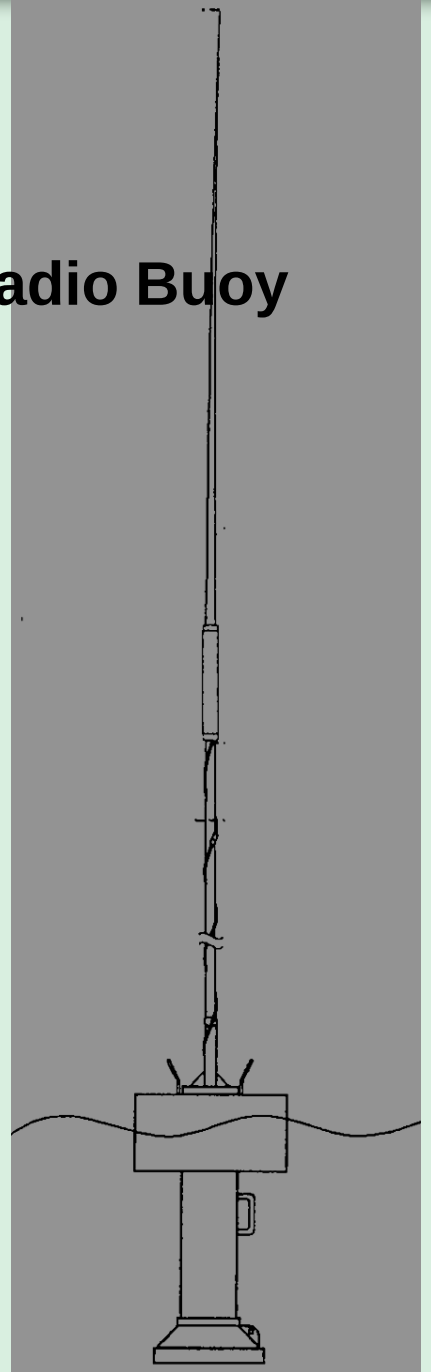


Fish Finder/
Echo Sounder

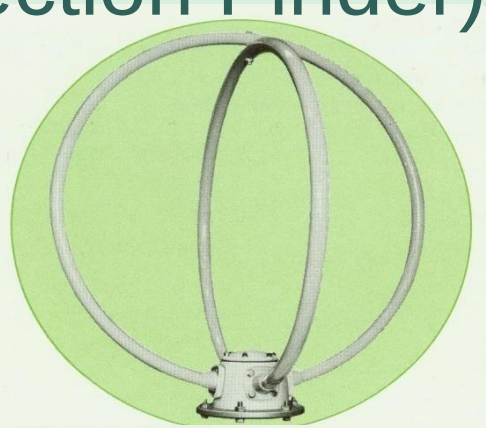


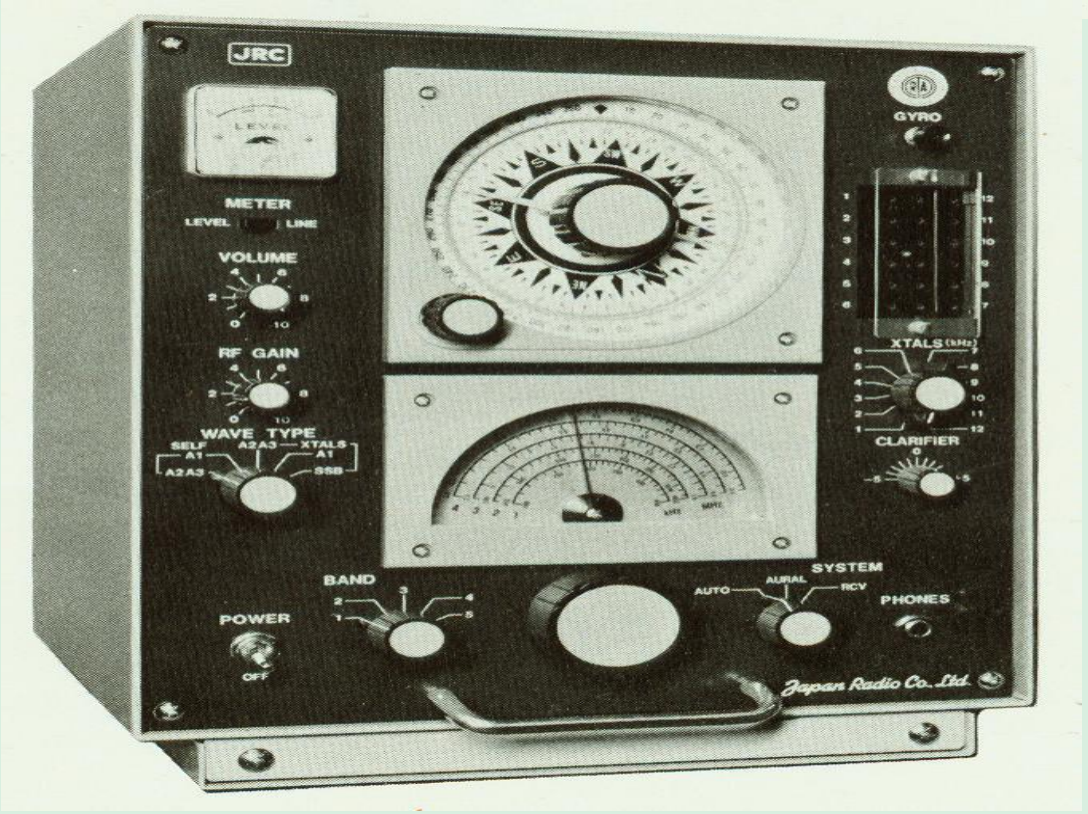
RDF (Radio Direction Finder)

Radio Buoy



Loop antena





b. Display unit, automatic type

Sonar

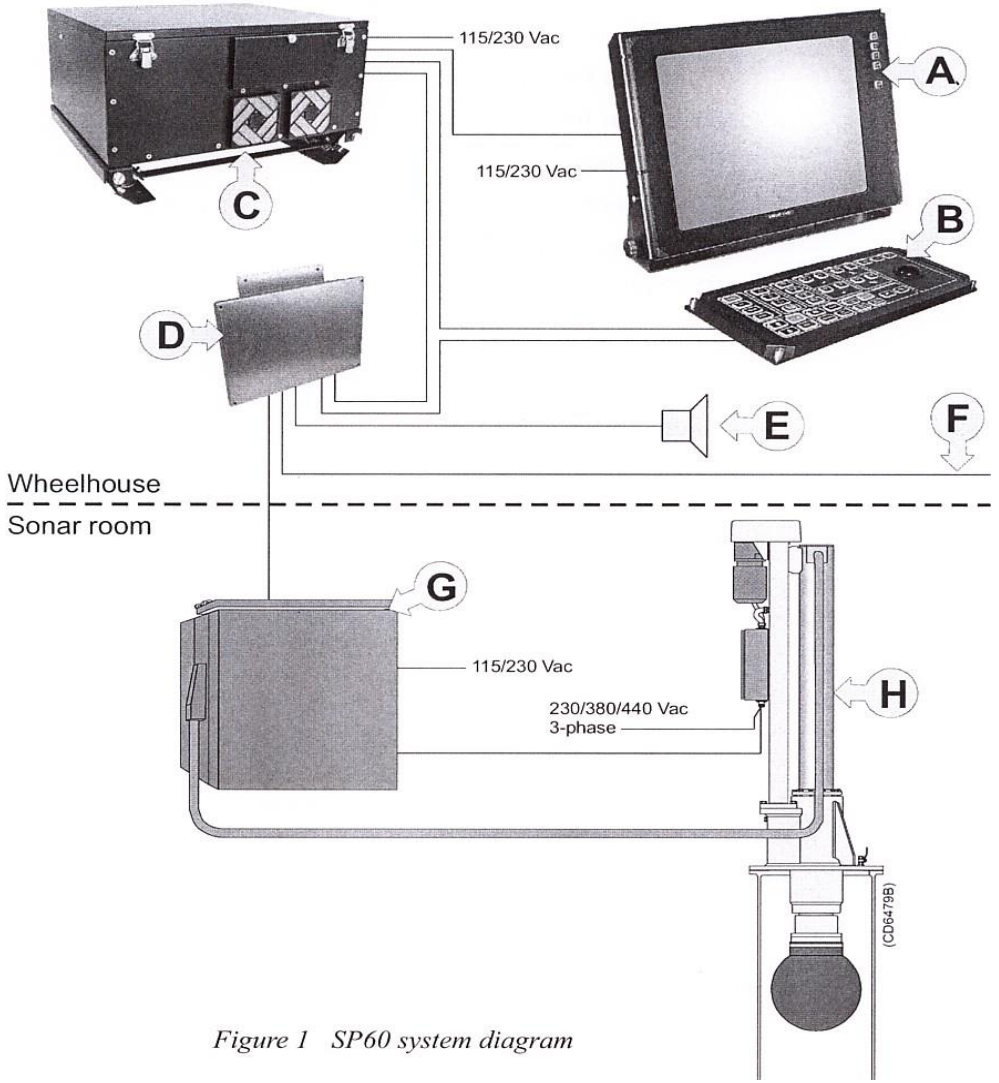


Figure 1 SP60 system diagram

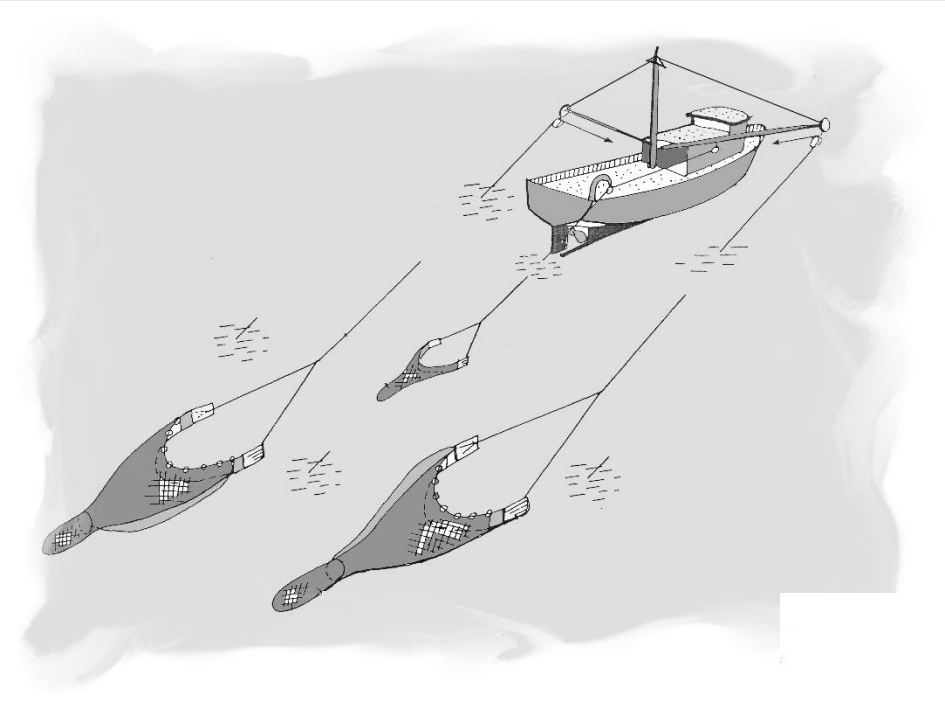
Bagian² Sonar

Perlengkapan Penangkapan

MESIN PENANGKAPAN
(Fishing Deck Machinery)

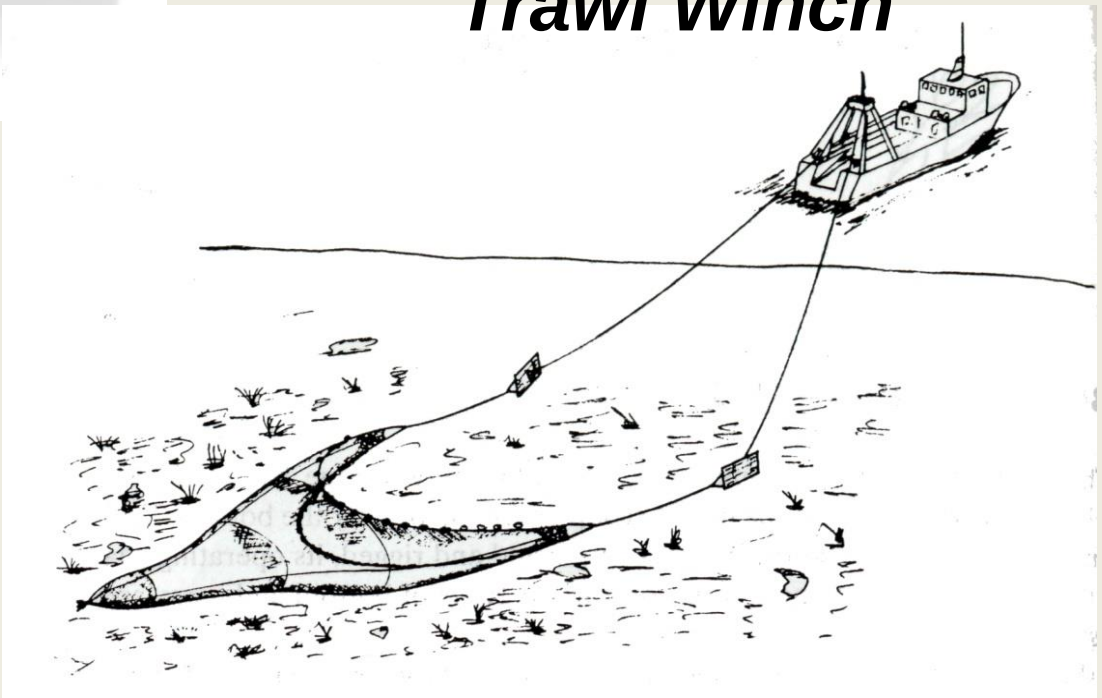
- ***Winch*** **:** (Trawl, PurseSeine, GillNet)
- ***Power Block*** **:** (PurseSeine, GillNet)
- ***Net Hauler*** **:** (PurseSeine, GillNet)
- ***Line Hauler*** **:** (Long Line, Bubu)
- ***Line Arranger, Thrower & Bait Launcher*****:** (LongLine)
- ***Squid Jigging*** **:** (Pancing Cumi)
- ***Line Reel*** **:** (Long Line, Hand Line)
- ***Capstan*** **:** (PurseSeine, Gill Net, Cantrang)

Double Rig Trawl

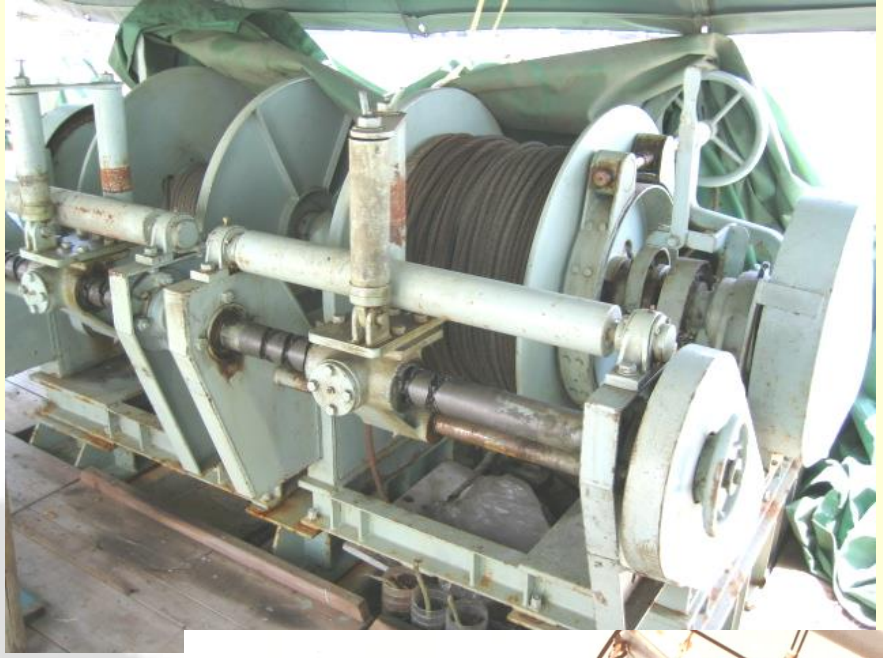


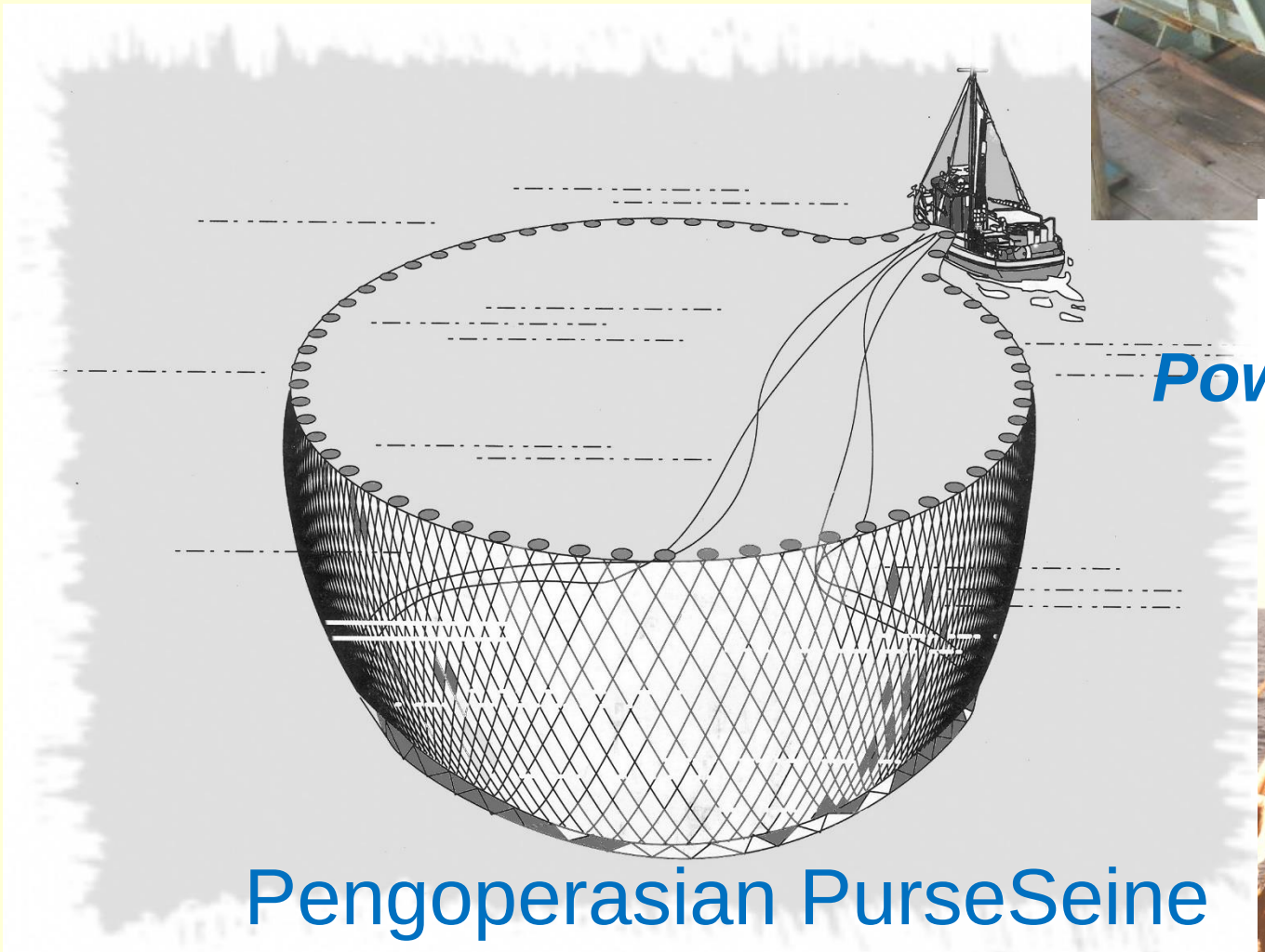
Trawl Winch

Stern Trawl



Purse Winch





Pengoperasian PurseSeine

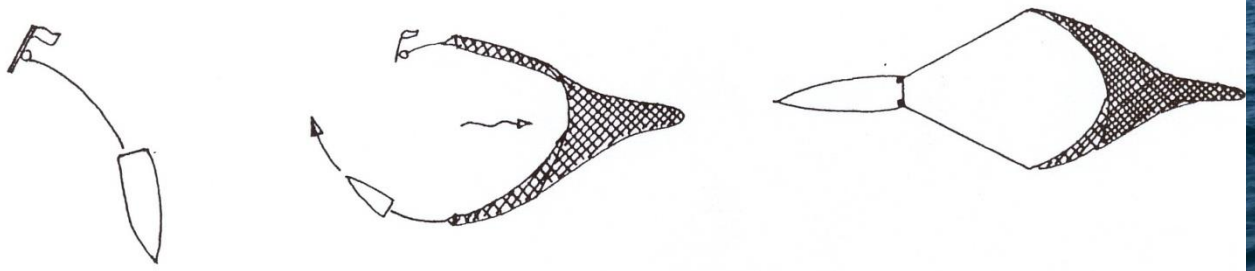
Power Block

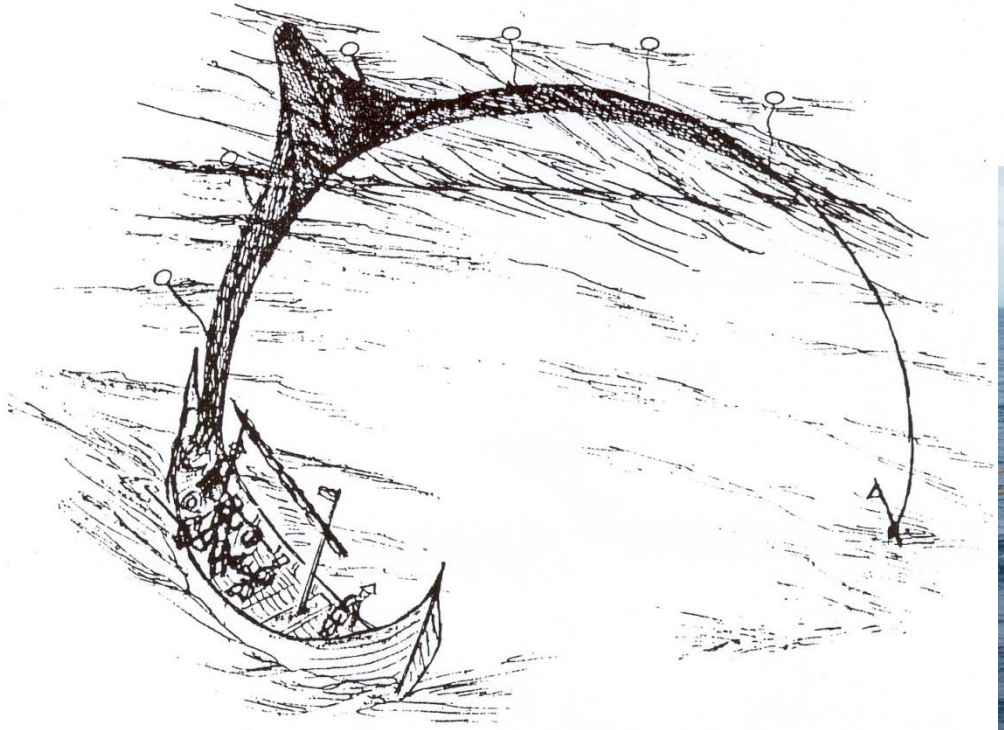
Pengoperasian *Power Block*

Kapstan (pembantu)

Penarikan Purse Line (Tali Kerut) Dng Kapstan Pada Kapal PurseSeine

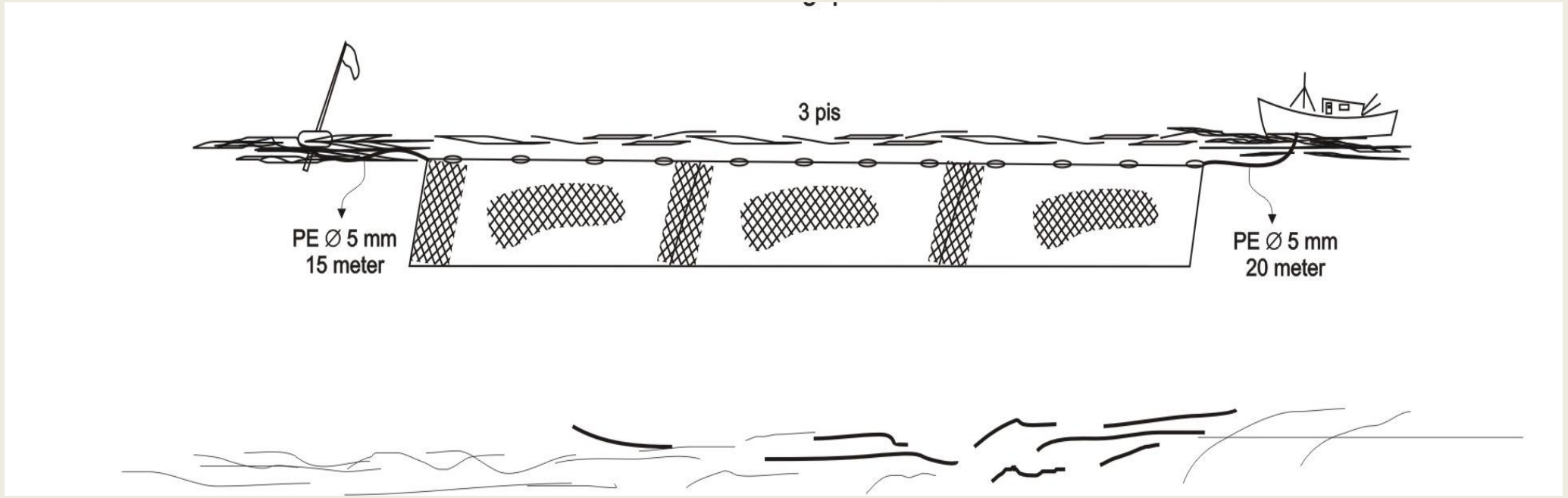
Kapstan



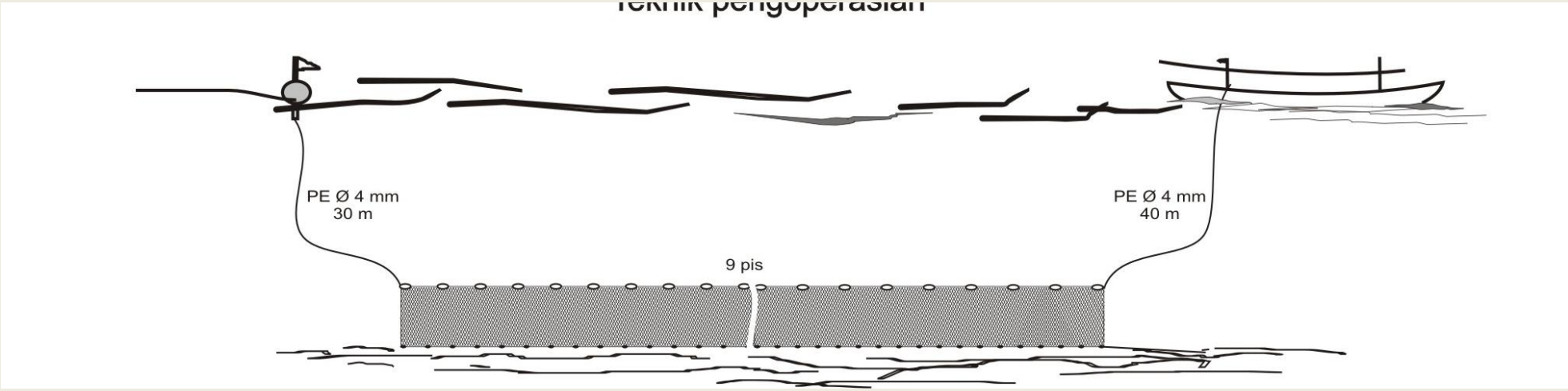


Pengoperasian Cantrang

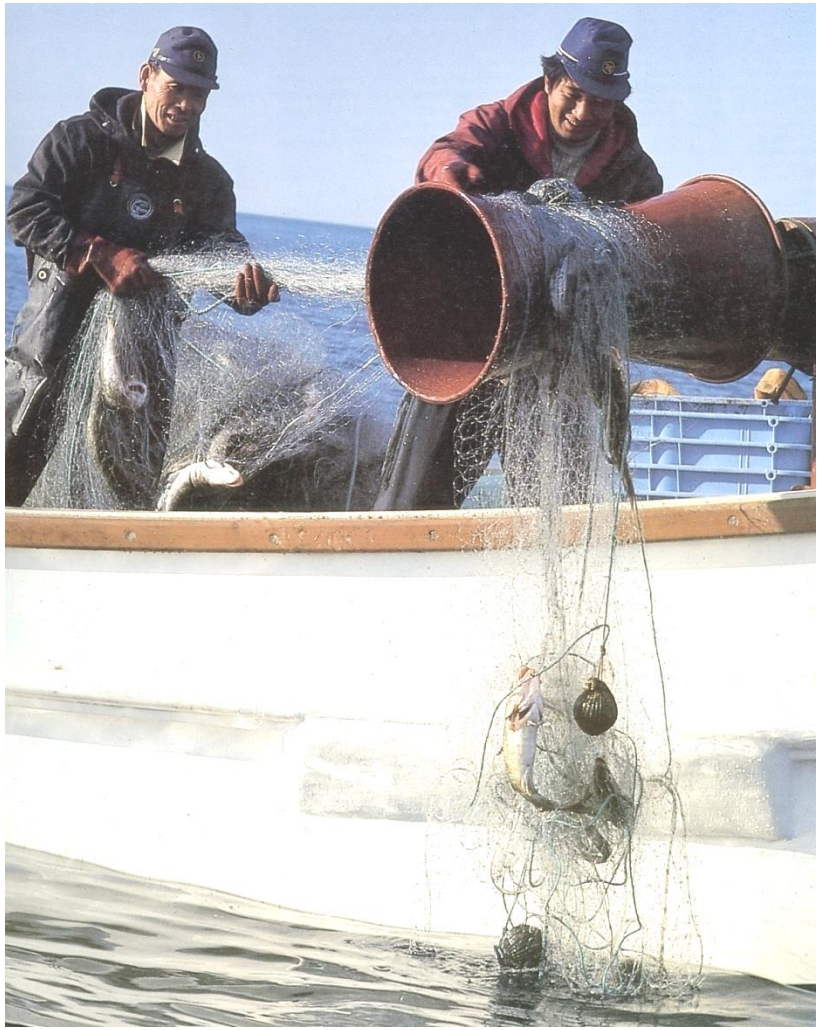
Pengoperasian : Gill Net Permukaan



Gill Net Dasar dan Trammel net



Net Hauler :



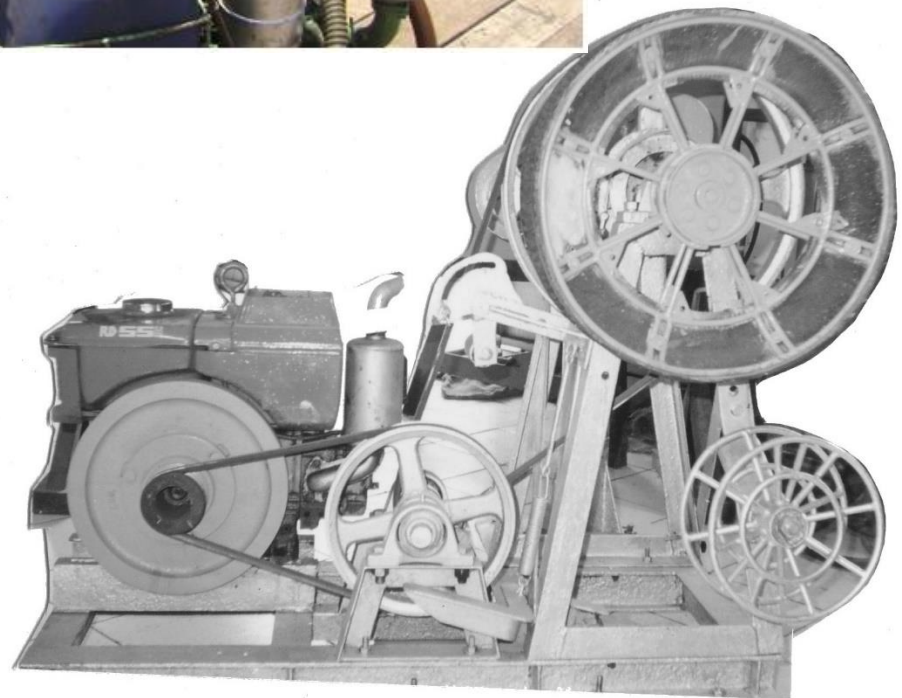
Hydraulic Net Hauler

Net Drum

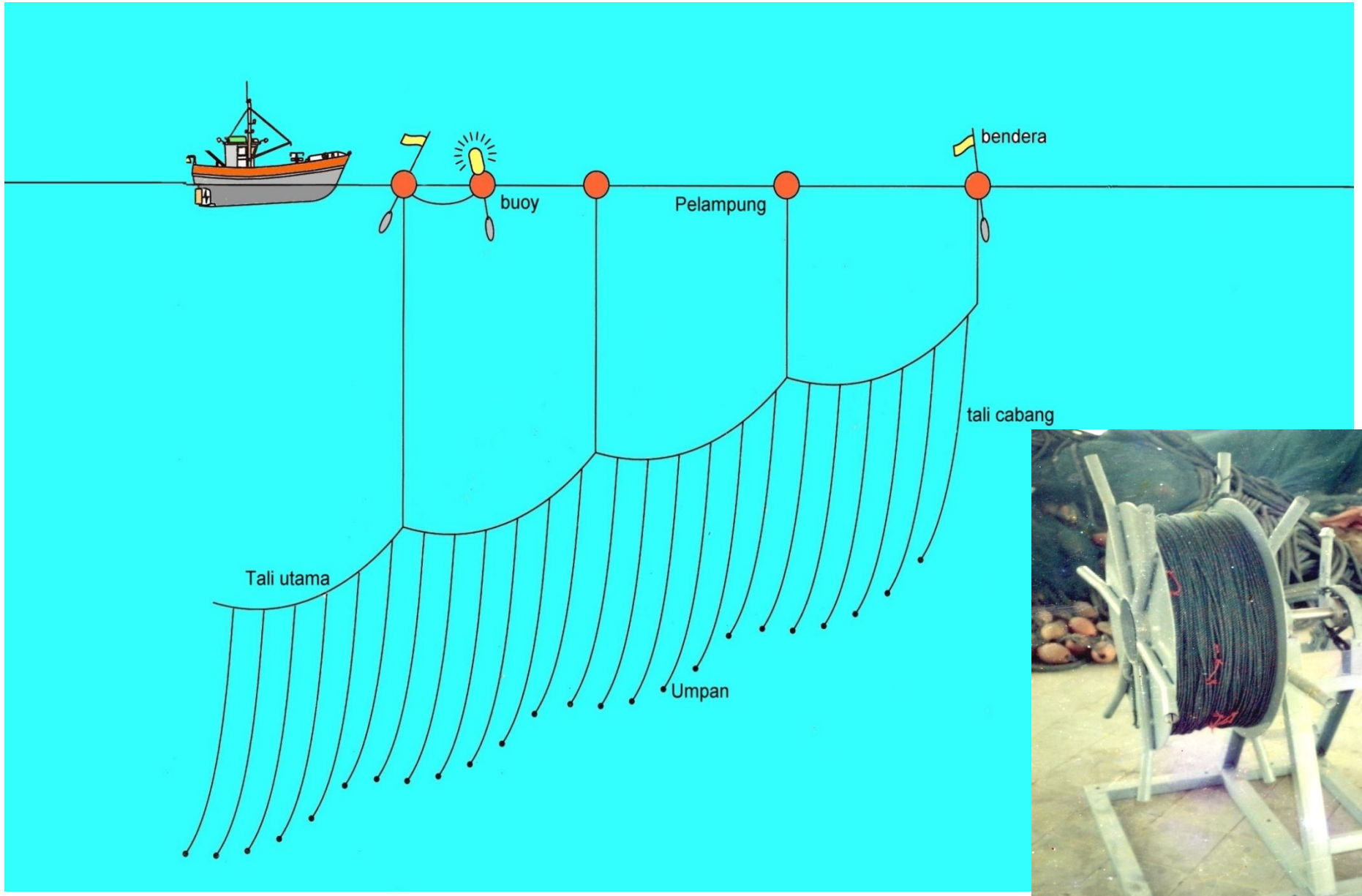
Diesel Net Hauler

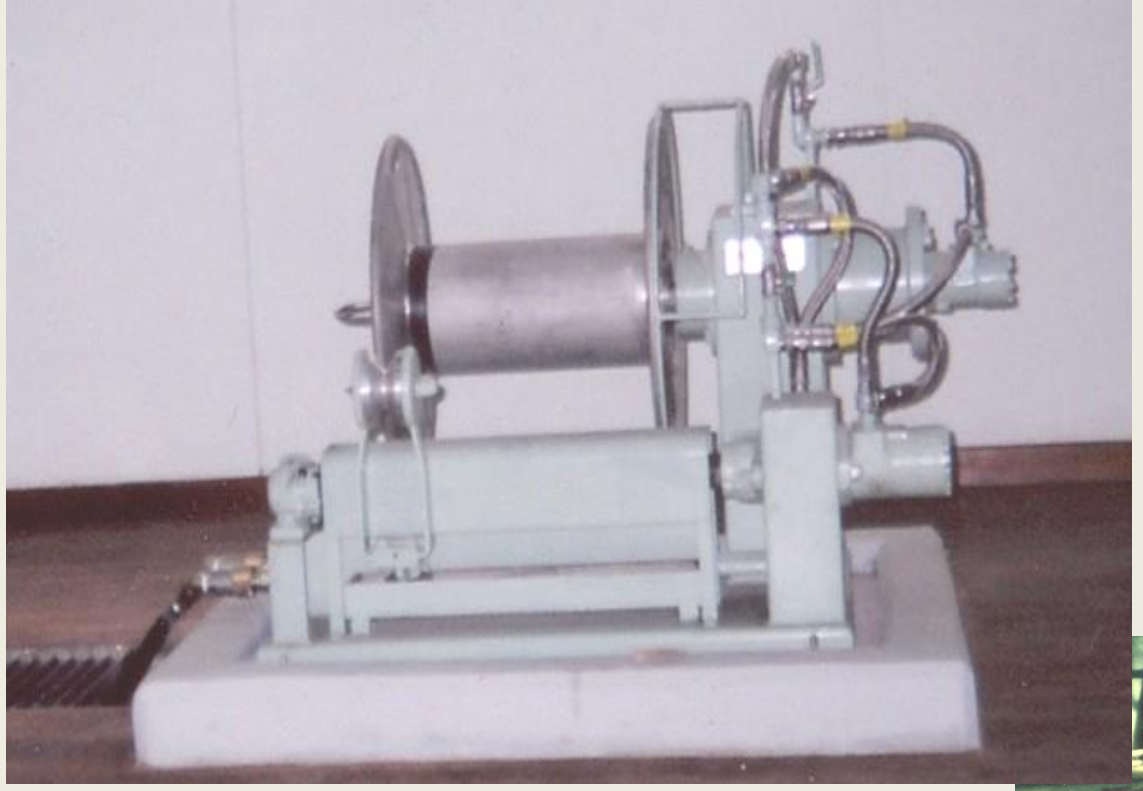
(Rekayasa Lokal)

(Rekayasa BBPPI 1990



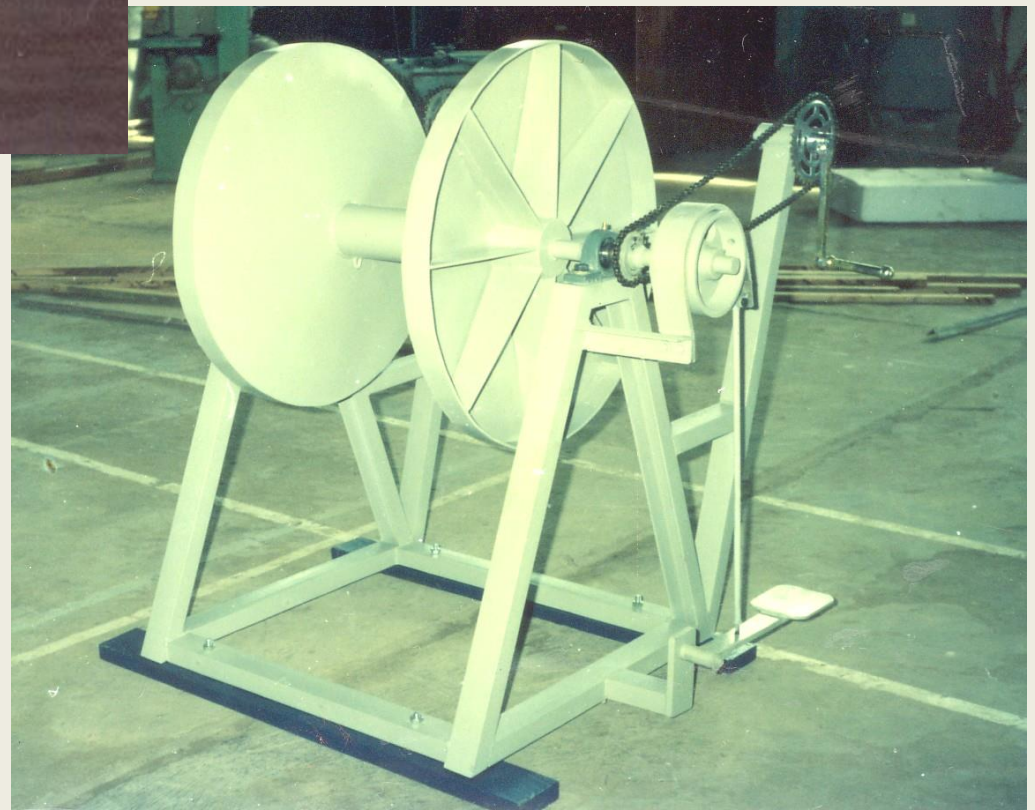
Pengoperasian Long Line

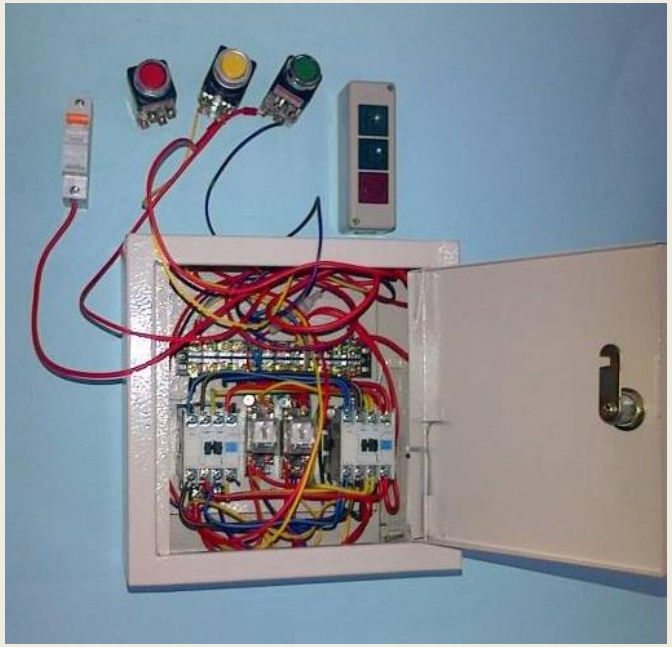




Kelos Rawai Tuna
Manual

Hydraulic Line Drum
Utk Tuna LongLine



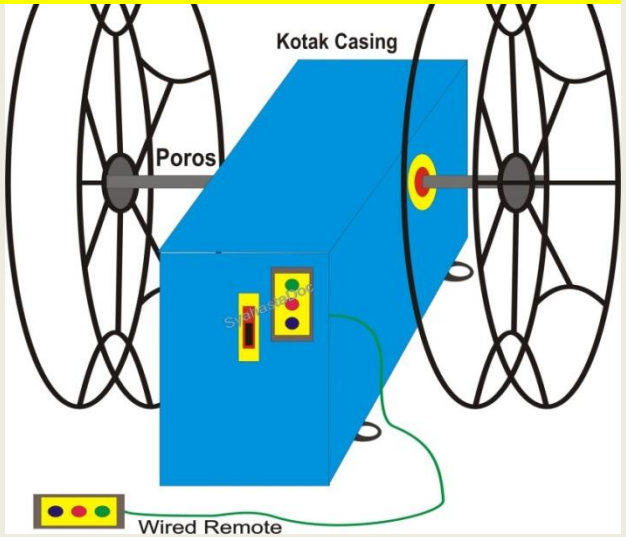


PENGUJIAN MESIN PANCING
SKALA LAB IN-DOOR

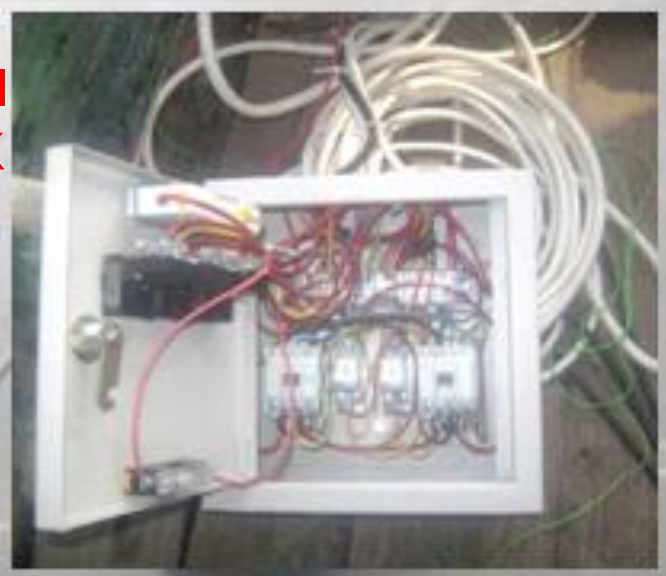
ALAT BANTU MESIN PENARIK TALI PANCING TUNA BERTENAGA LISTRIK

TUJUAN RANCANG BANGUN :

1. Untuk kapal pancing ulur tuna skala kecil
2. Untuk meringankan dlm penarikan ikan pelagis besar hasil tangkapan terutama yg berat >30 kg
3. Mempercepat penarikan hasil tangkapan, shg mutu ikan diharapkan akan lebih baik



ALAT BANTU MESIN PENARIK TALI MULTI GUNA BERTENAGA LISTRIK

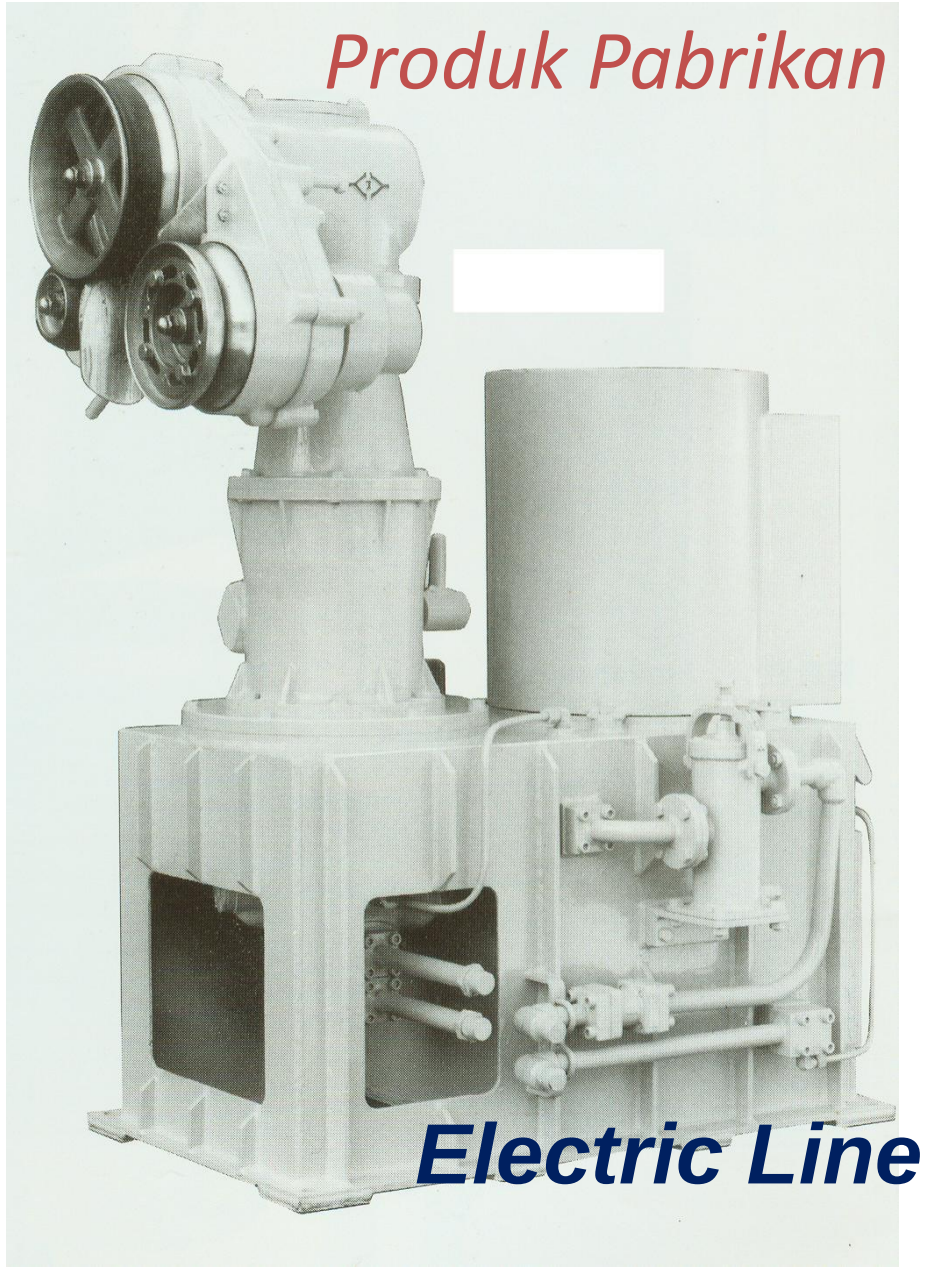



PENGOPERASIAN


Nagata


Nagata

Line Hauler :



Electric Line Hauler AC & DC

Line Hauler Produk Rekayasa Lokal

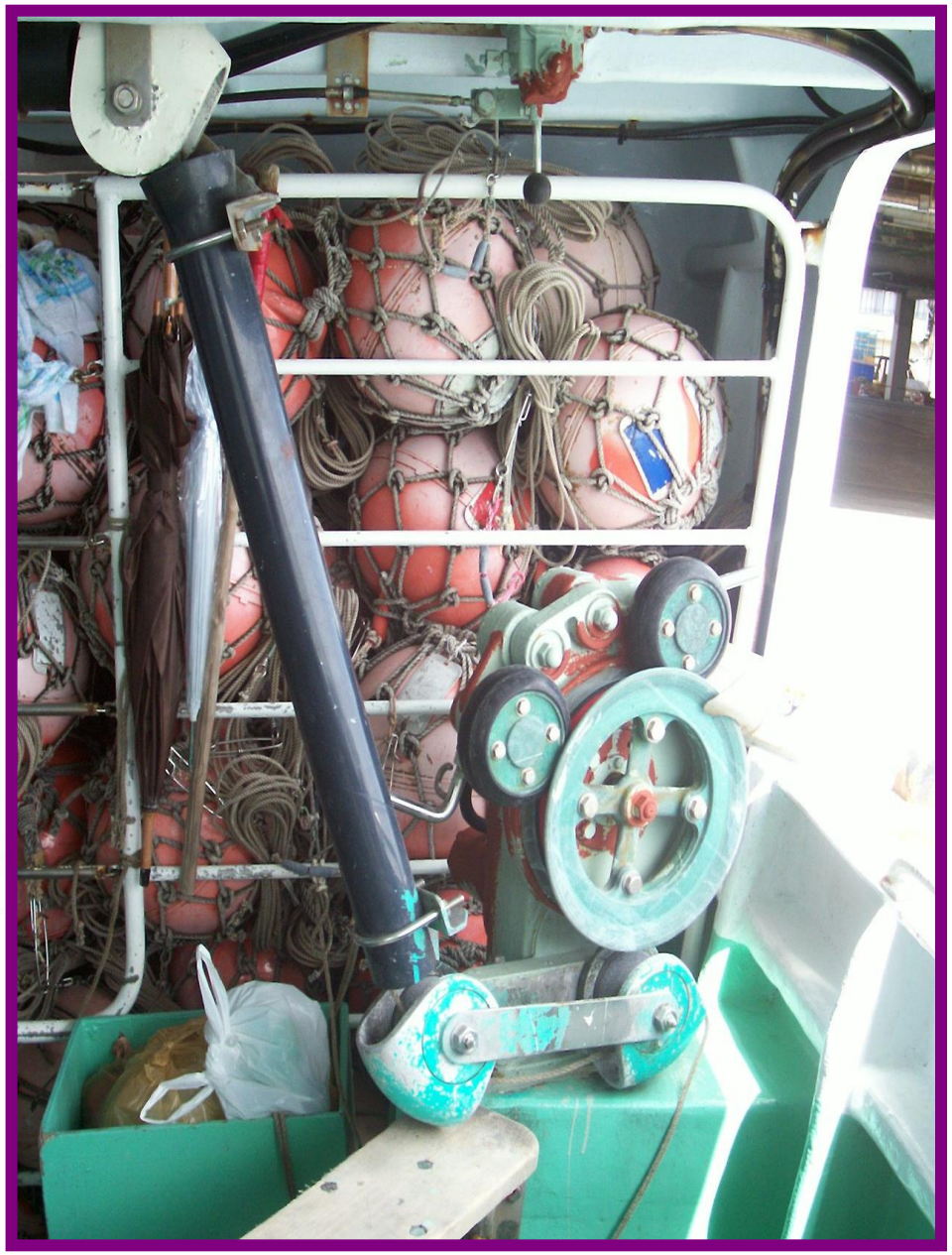
Pancing Rawai Dasar dng
Line Hauler Hidrolik

Line Hauler Hidrolik
Utk Tuna Long Line

Mesin Pelempar Tali *(Line Thrower)* pd kapal LongLine

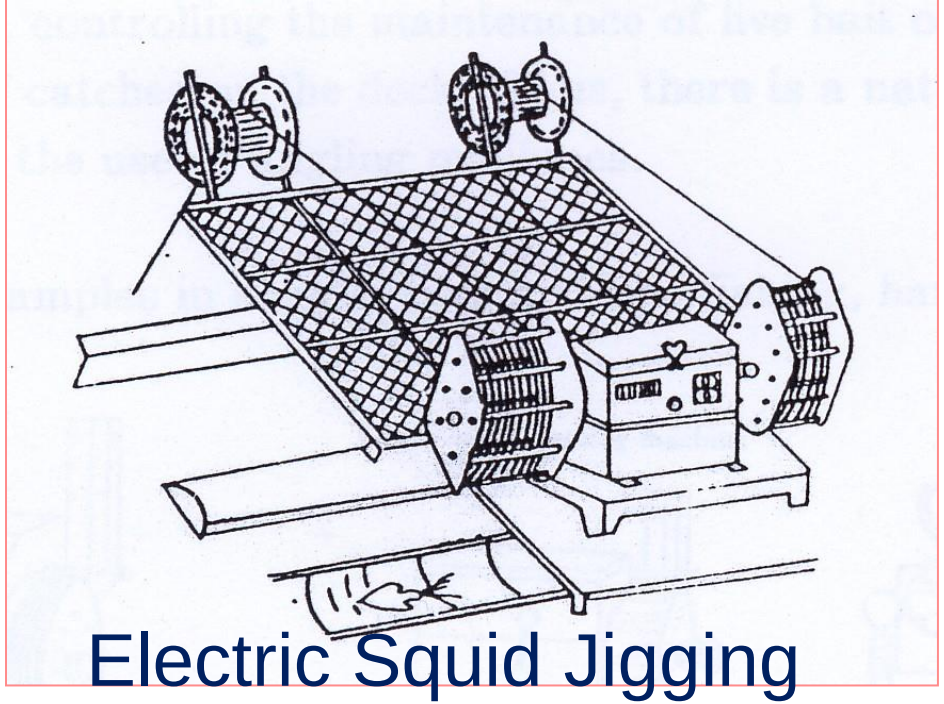
(Sistem Hidrolis)

Mesin Pemasang dan Pelempar Ikan Umpan

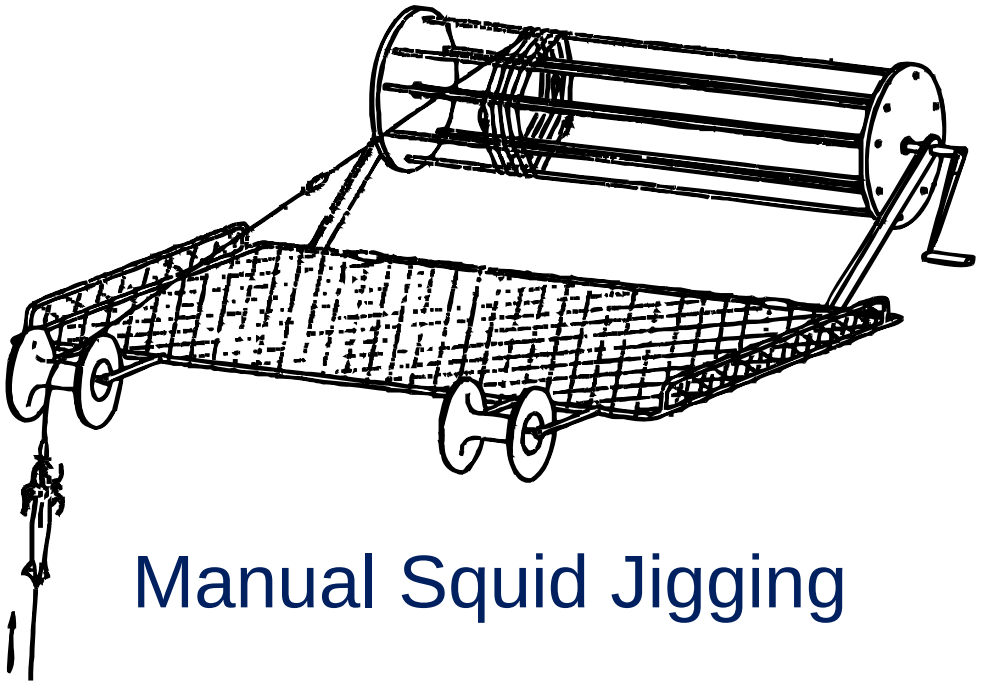


Hydraulic Net & Line Hauler
(Constructed by BBPPI)

Manual *Line Reel* (Constructed by BBPPI)

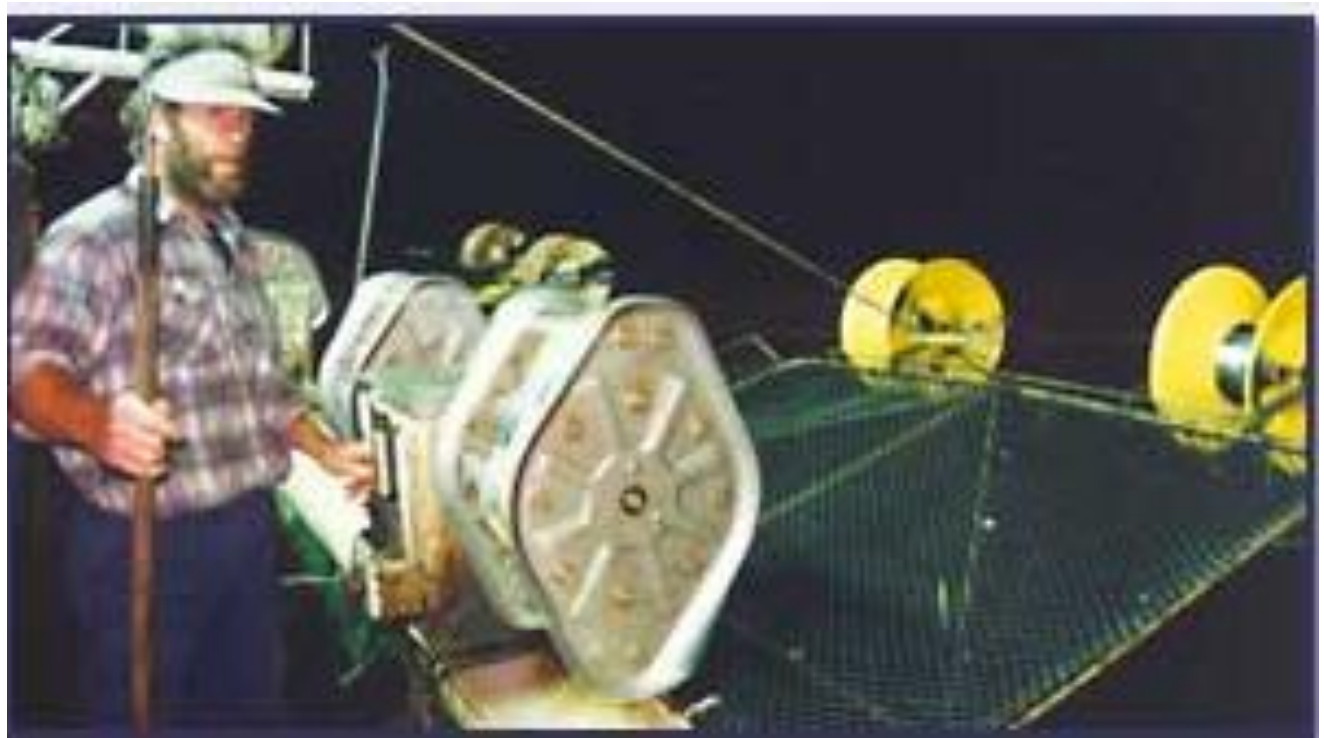


Electric Squid Jigging

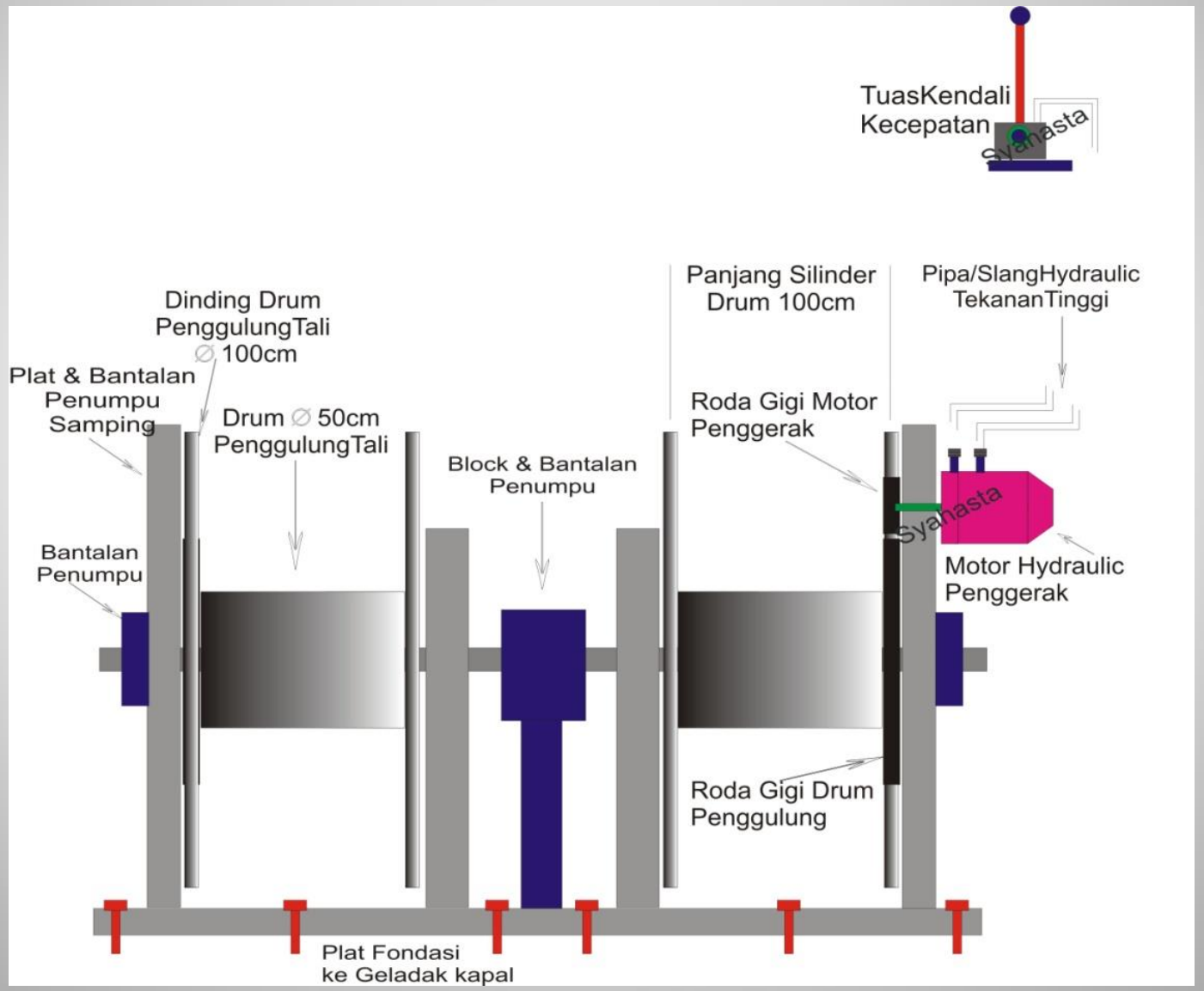


Manual Squid Jigging

Pengoperasian Automatic Electric Squid Jigging



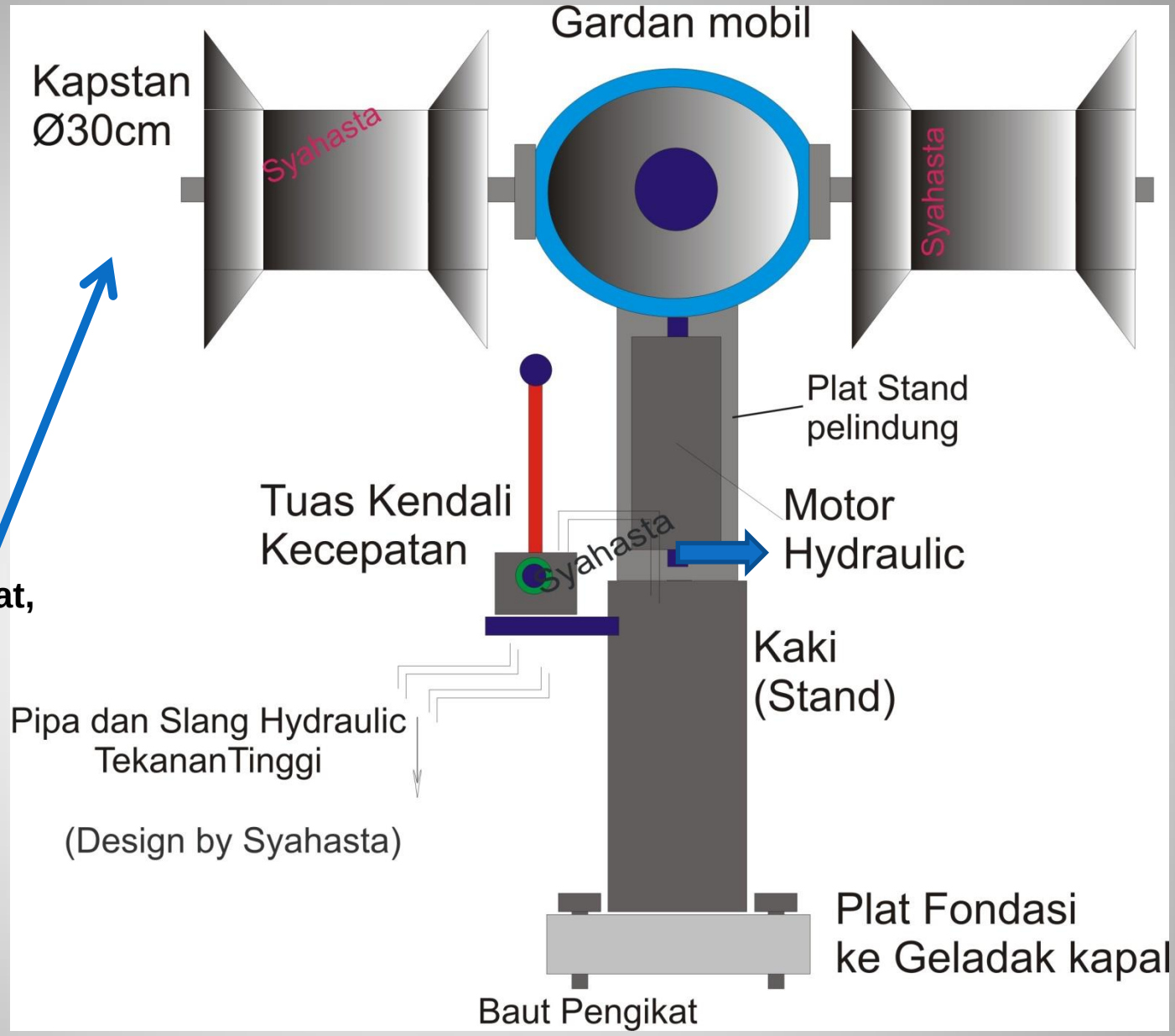
Perekayasaan Desain
Kelos PenggulungTali Kerut Purse Seine Bertenaga Hidrolik
(Desain Rekayasa BBPPI)



Kelos Penggulung Tali Kerut Purse Seine Tenaga Tangan (Rekayasa Pekalongan

Diameter

Kapstan bertenaga hidrolik hasil rekayasa teknologi pada kapal purse seine besar (75 – 115 GT)



Bahan Kapstan
Bisa dari Besi Plat,
Stainless Steel
ataupun Kayu

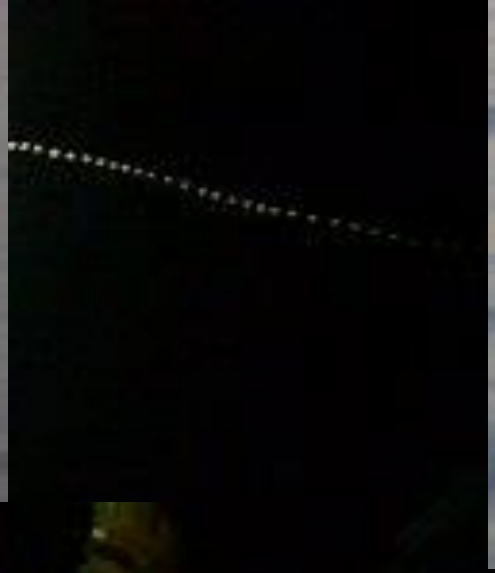
Desain Kapstan "Gardan" Penarik Tali Kerut Purse Seine Tenaga Hidrolik

(Perekayasaan Modifikasi)

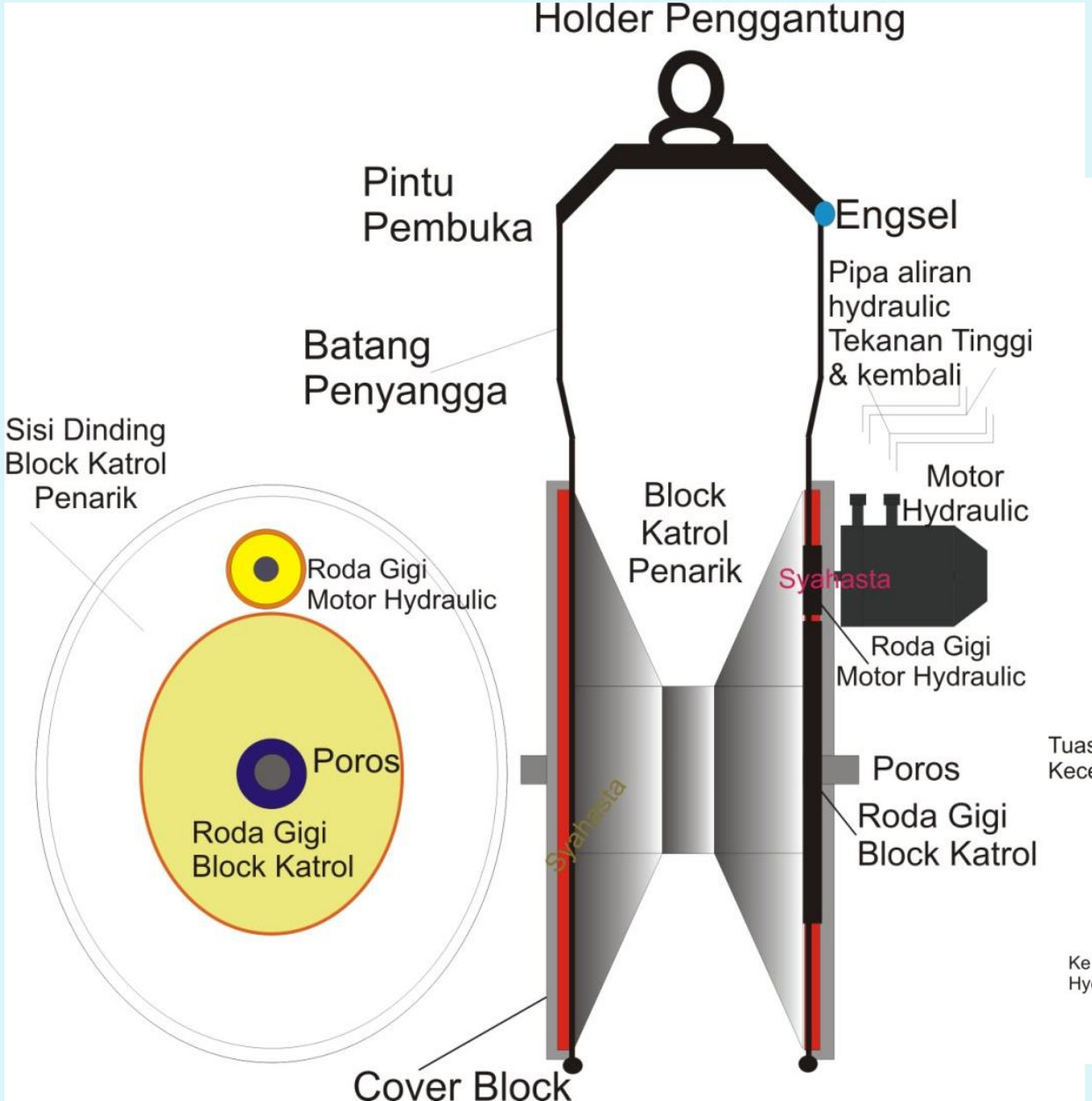
Pembuatan Dudukan, Perakitan Kapstan Gardan

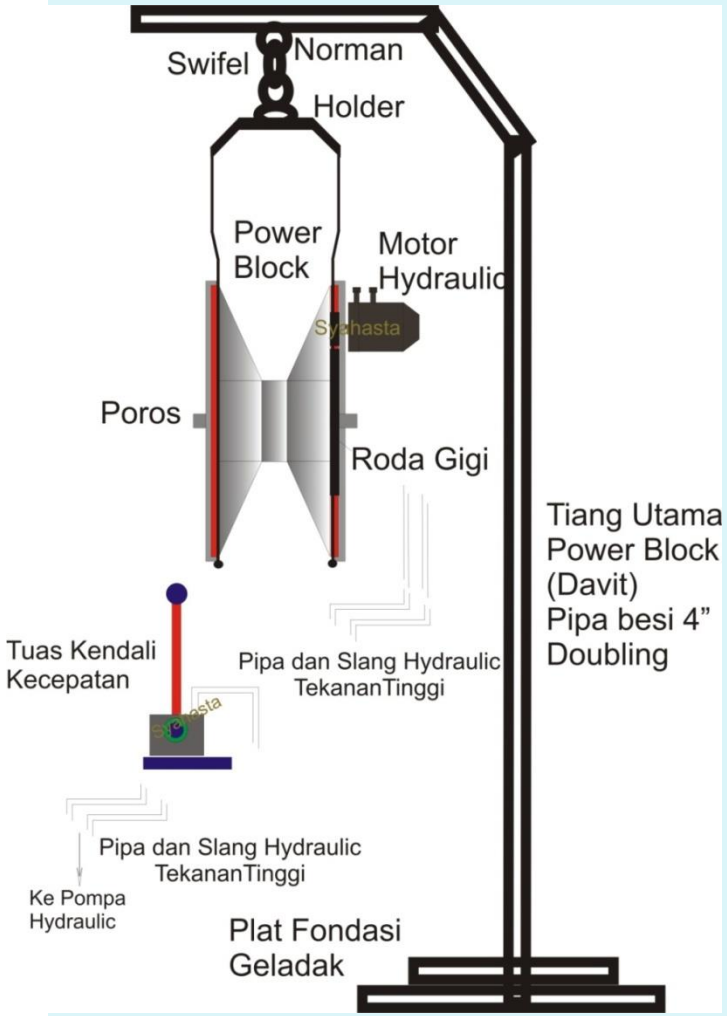
Pembuatan Dudukan , Perakitan Kapstan & Gardan

Pemasangan di Atas Kapal Purse Seine



Desain Awal Power Block Hidrolik Penarik Jaring Purse Seine (Rekayasa Modifikasi)

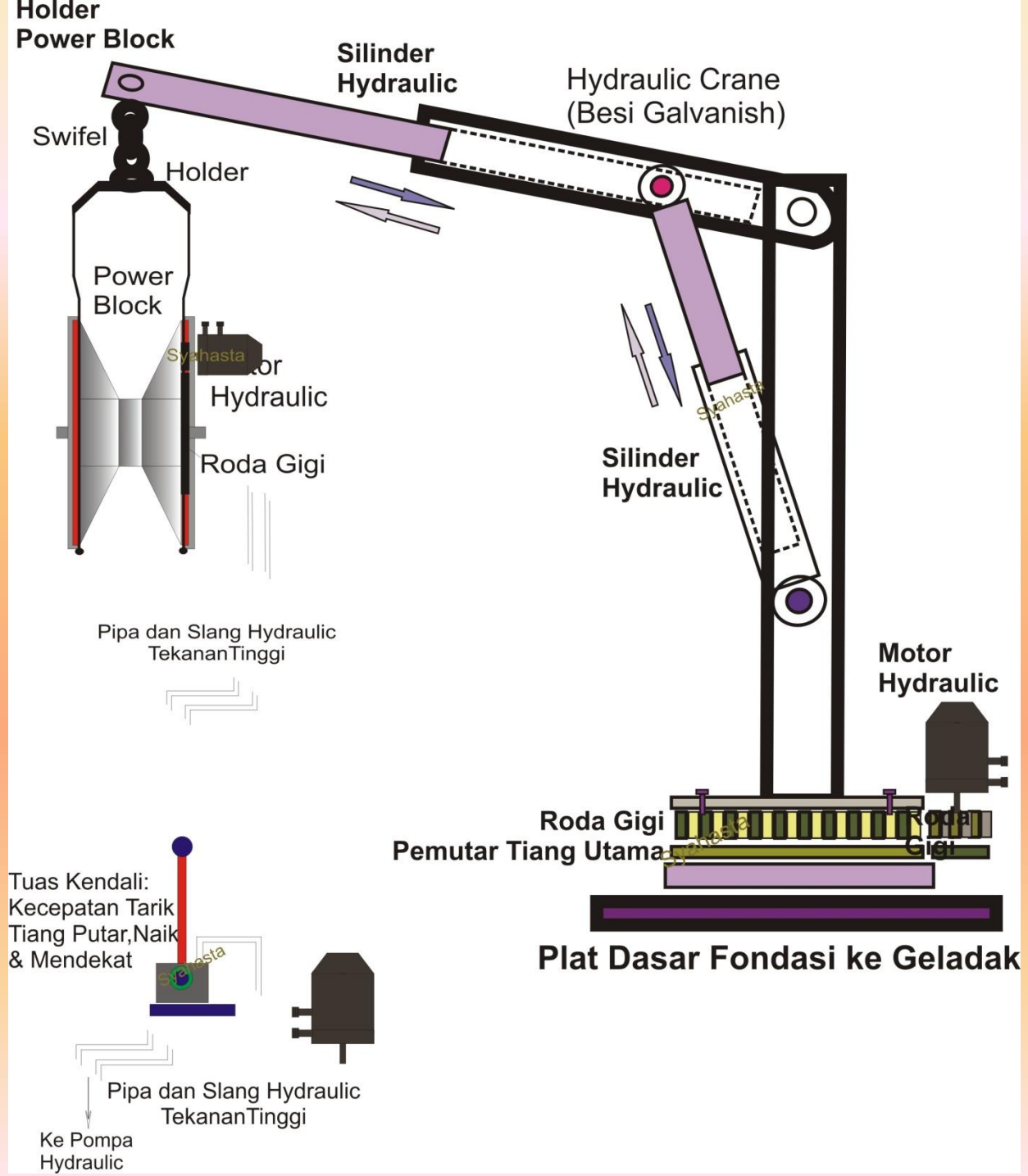




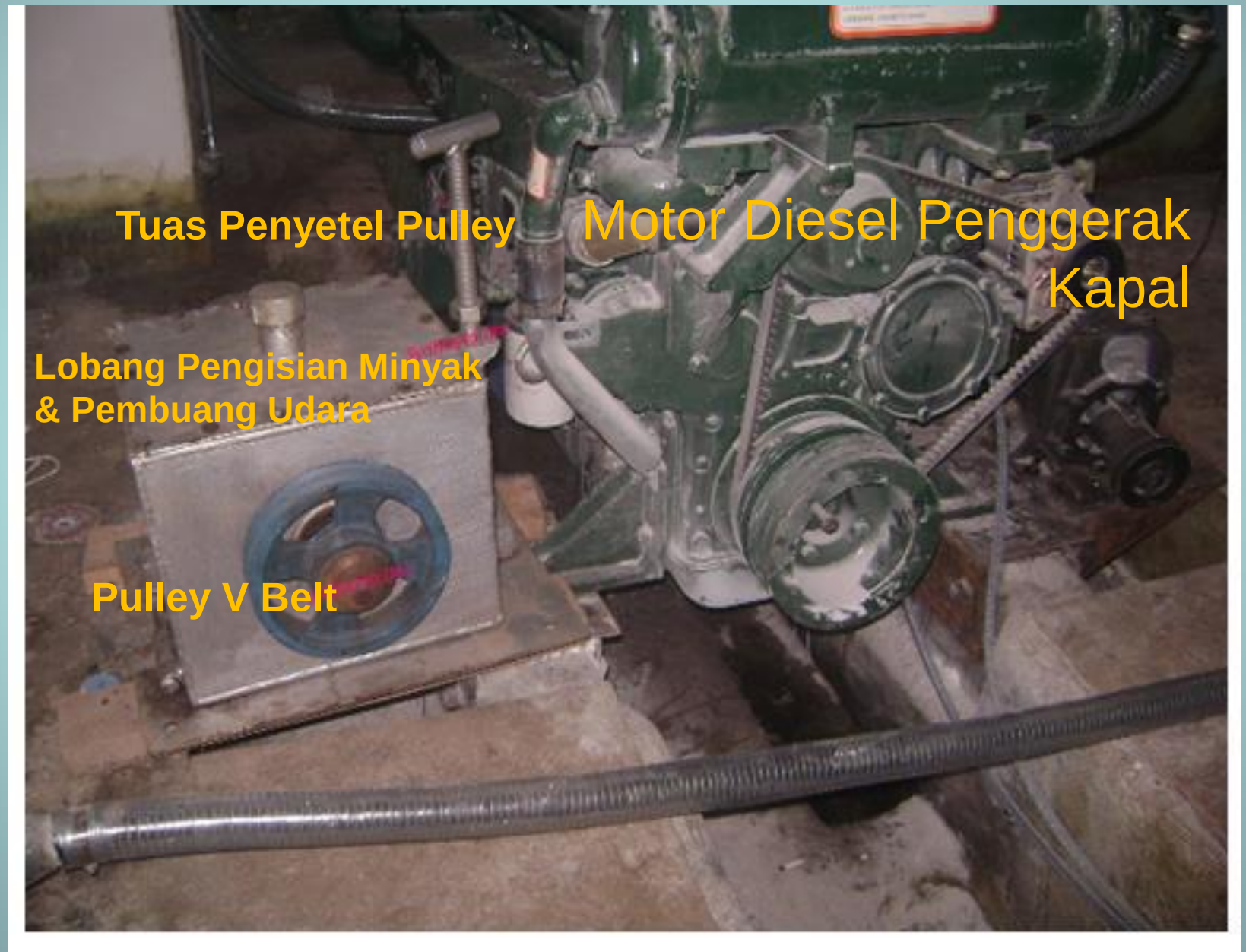
Desain Awal :

Perekayasaan Rancang Bangun "Power Block Crane" utk Menarik jaring Purse Seine

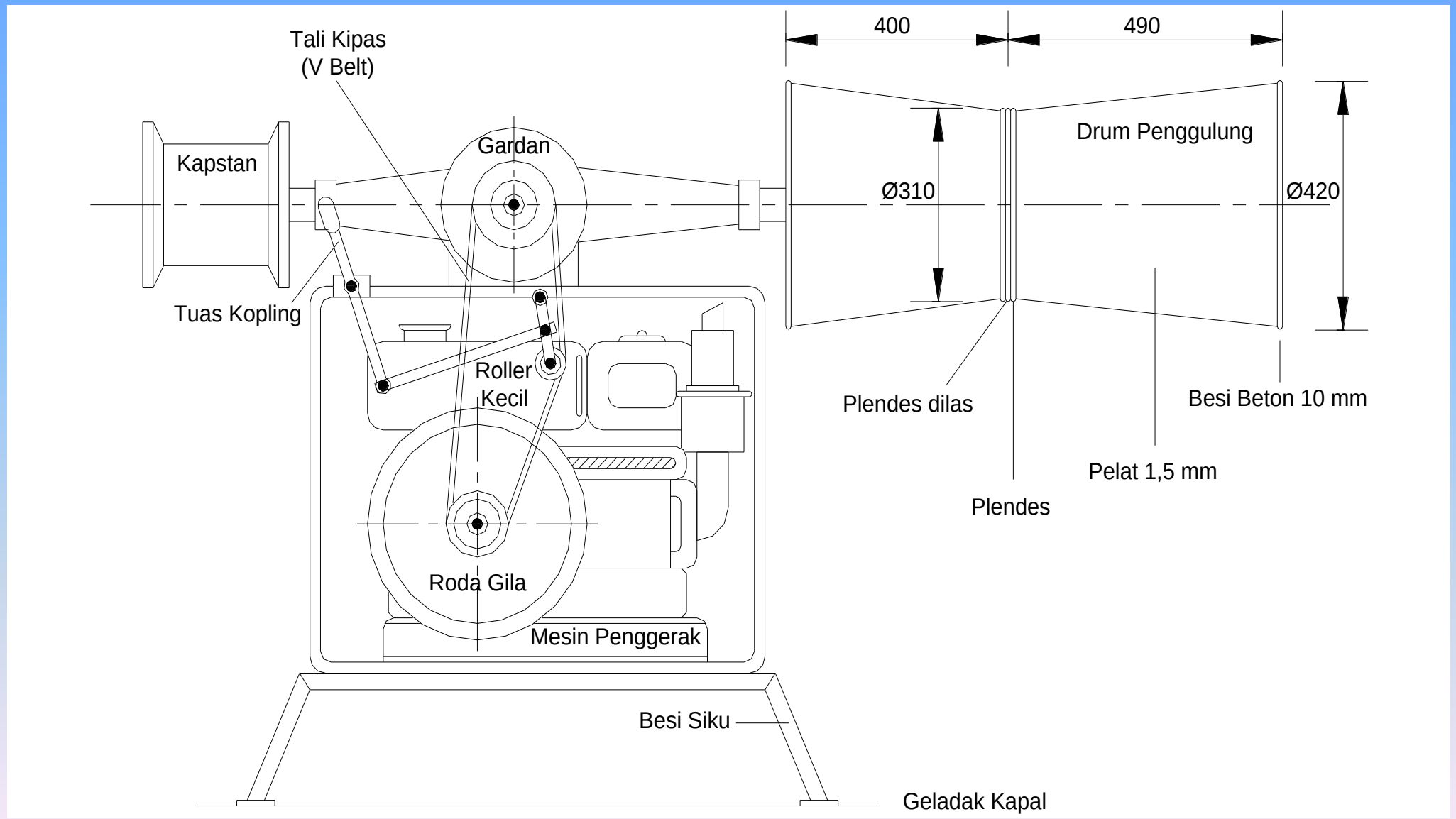
(Perekayasaan Modifikasi)



Pemasangan Kotak Rumah Pompa System Hidrolik Thd Motor Penggerak Kapal



Net Hauler (Rekayasa Desain BBPPI)



7 Fishing vessel (Eurocutter) "Z575"

1. Rudder
2. Jet nozzle
3. Propeller
4. Engine room
5. Engine room bulkhead
6. Main engine
7. Fuel tanks, two wing tanks and a center tank
8. Starboard bracket pole, used when fishing is done with nets and otter boards. The derrick will not be used in that case
9. Mast aft
10. Revolving drum for nets
11. Funnel
12. Messroom, dayroom
13. Bridge with navigational equipment and control panels for main engine, drum for nets and fish winch
14. Cabin for four
15. Railing
16. Capping
17. Scupper hole
18. Wooden workdeck
19. Hatch on fish tank
20. Drop chute
21. Fish tank, with an insulation layer of about 20 cm all around
22. Bilge keel
23. Shear strake
24. Double bottom
25. Bow thruster installation
26. Name of the ship and fishery (registration) number
27. Fish winch
28. Conveyor belt and fish cleaning table
29. Guide pulleys for fish line
30. Forecastle deck
31. Fish wire blocks
32. Fish wire
33. Fish derrick
34. Mast
35. Radar antenna on mast

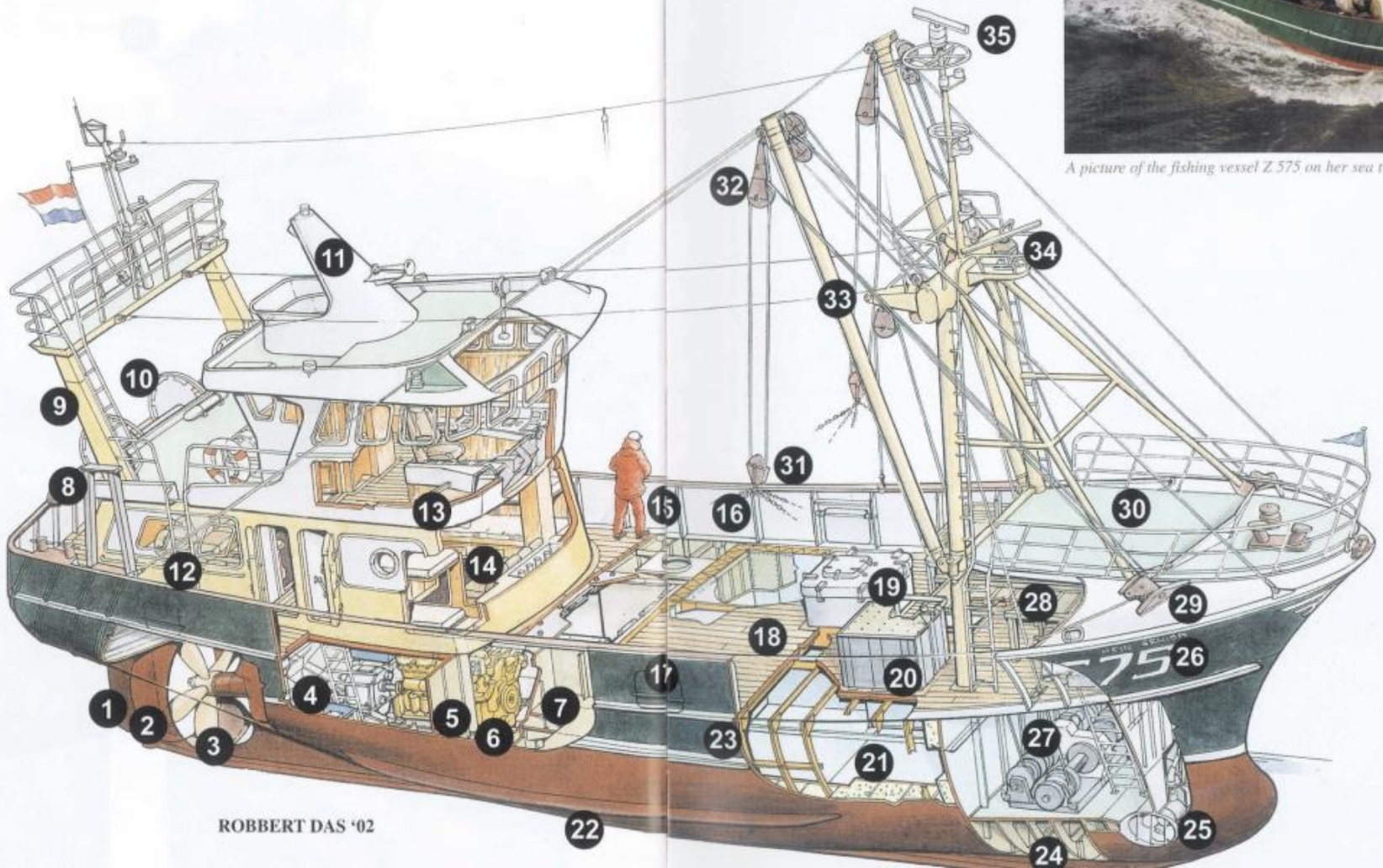
Principal Dimension:

Dimensions:

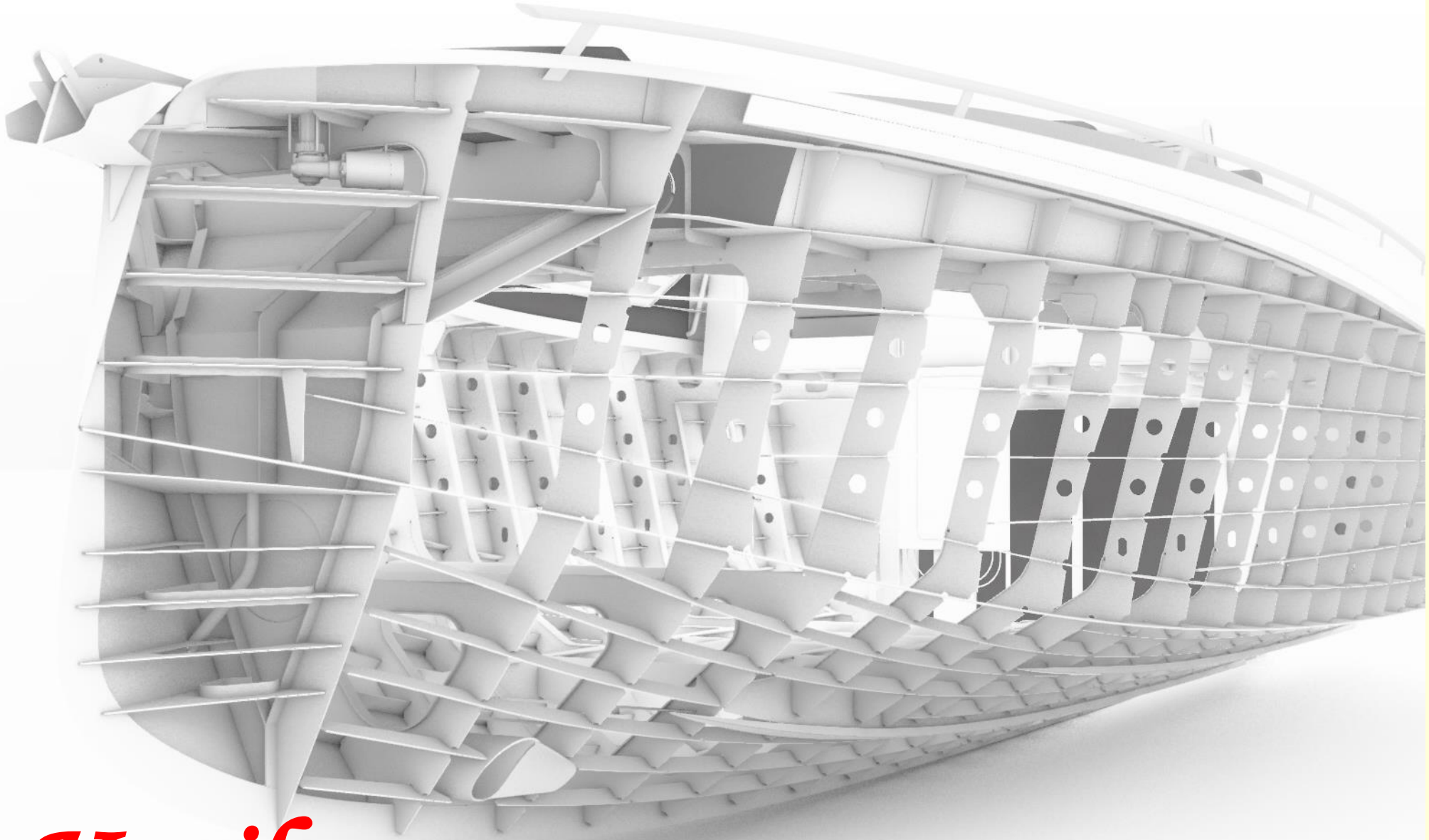
Length:	23.99 m
Breadth:	6.20 m
Depth:	2.70 m
Gross Tonnage:	**102 GT**
Delivered:	**2000**
Main Engine:	**300 hp**

A comparable type of the fishing vessel in service

A picture of the fishing vessel Z 575 on her sea trials.



ROBBERT DAS '02



Terima Kasih

SEMOGA BERMANFAAT

Zoom Meeting

View

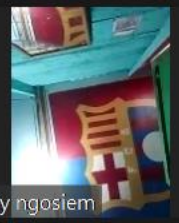

Anthonius Rumbino (MP).2


Nurul Huda


Ferdinand Ambrau/MP II


Ask to Unmute
David A Kafiar (MP).2


Dimas Rahmanto MP2


Hendry ngosiem


Putra Wairoy


Jupri Mahulette /MP/Ambon


Muhammad Asdad ziyaul haque


Muhamad Rizky Wildana MP-2


gustab kubela / mp 2


Gusty Hukubun


Amirullah MP 1 (Wasior)


rojil gufron ramdani


Muhammad fahmi


Nikson c laelaem(MP)II


Zulkarnaen.Yanis(NIT 20.2.03.075)


Matias Fatubun


Muhammad Syarif Ibrahim-MP²(K...

IMANUEL
IMANUEL


Nurul Huda

Unmute
Start Video
Security
Participants 21
Chat
Share Screen
Record
Reactions
Apps
End