Submarine School Notebook of Edwin Wilbur Bobson

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PREMIER
COMPOSITION

Name Edwin Wilbur Bryson S 2/c

School Submarine School

Grade Diving Section #30 Book #21-42

CLASS PROGRAM

Date

Family Name	Given Name	Class	Room

	MON.	RM.	TUE.	RM.	WED.	RM.	THURS.	RM.	FRI.	RM.
1										
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NAME ADDRESS

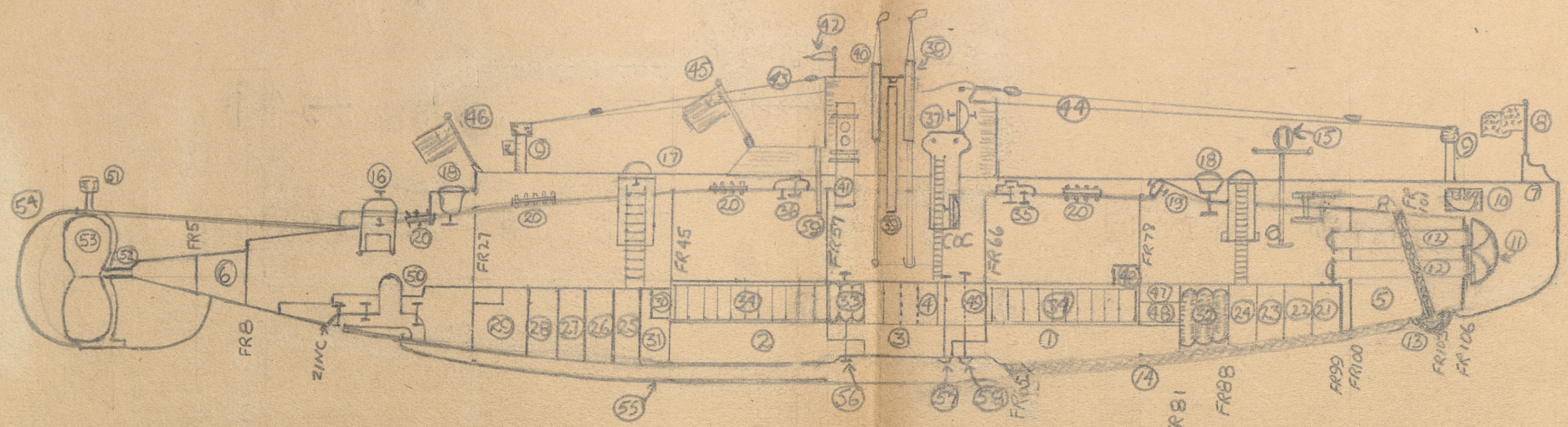
Submarine School

~ Jan. 1943 ~

New London, Conn.

O-BOAT ~ LONGITUDINAL VIEW

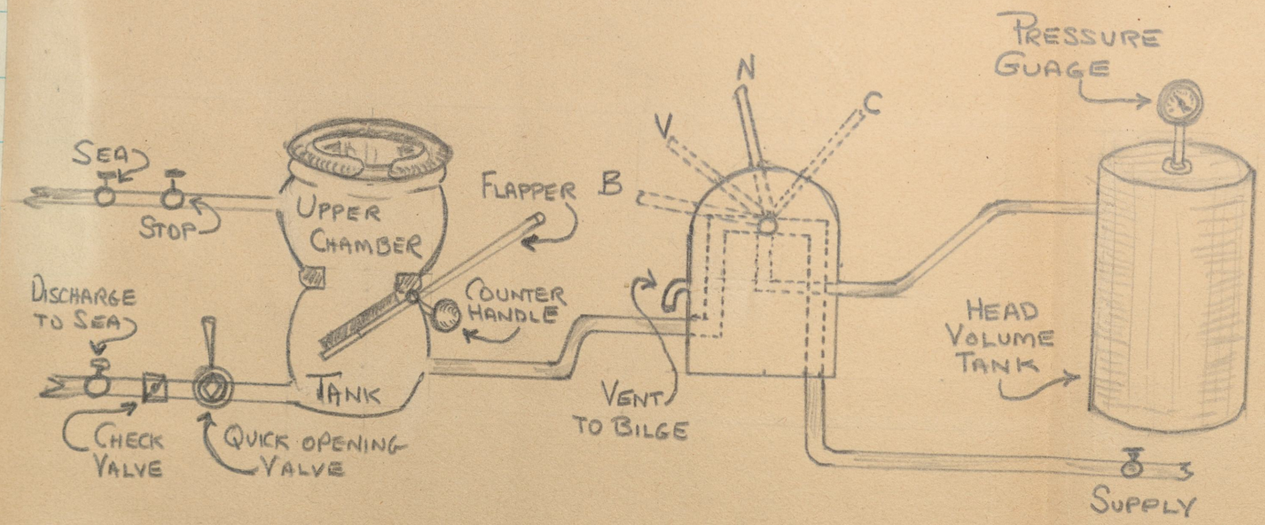
1



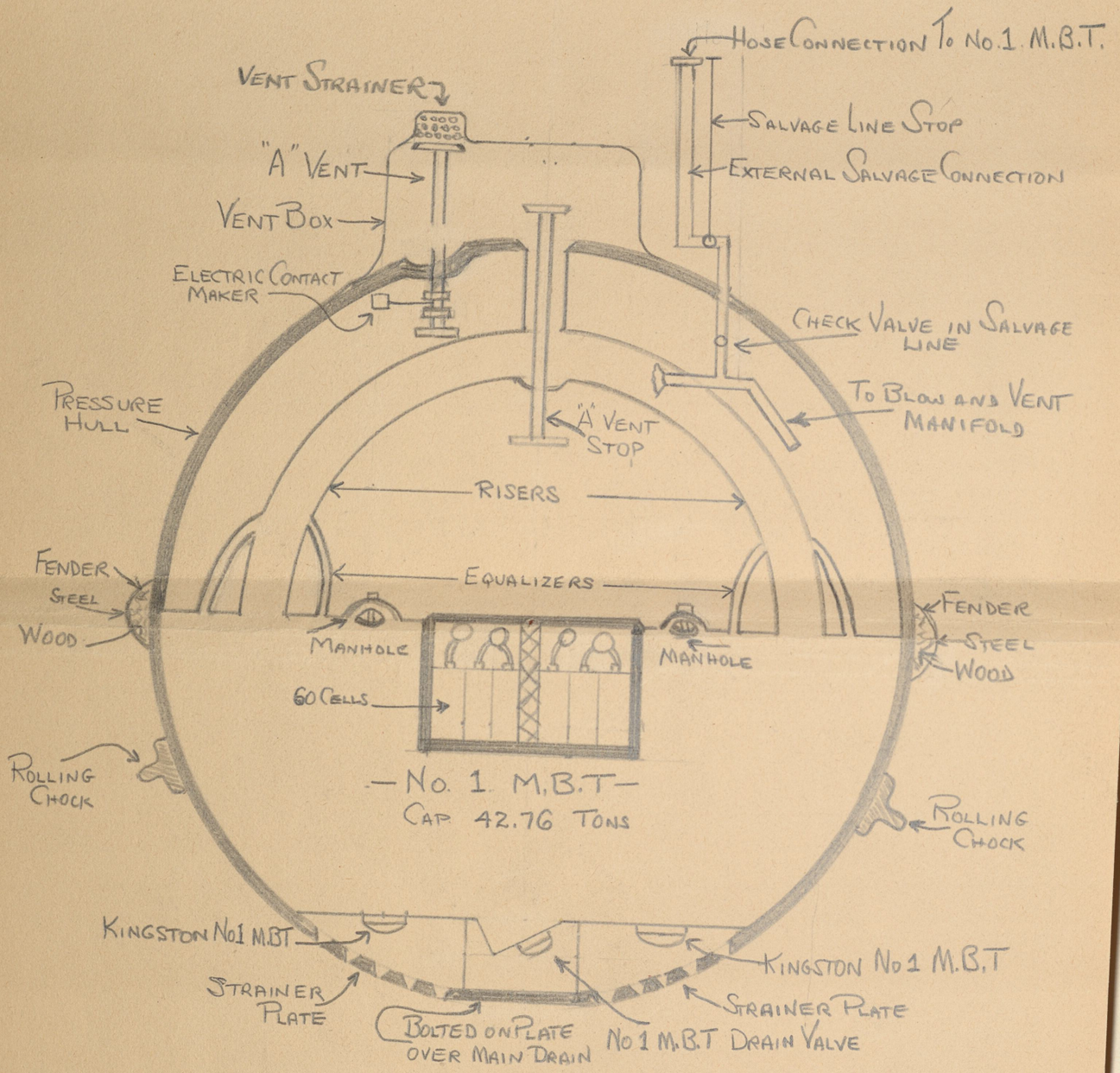
1 #1 MAIN BALLAST TANK. 2 #2 MAIN BALLAST TANK. 3- AUXILIARY TANK 4 REGULATOR TANKS. 5- FORWARD TRIM TANK 6. AFTER TRIM TANK 7- BULL NOSE. 8- JACK 9- STUD MASTS 10- DECK ANCHOR 11- BOW CAP 12- TORPEDO TUBES 13- SUBMERGED ANCHOR 14- FALSE KEEL 15- J.K. SOUND DEVICE 16- RESCUE AND ESCAPE HATCHES (TORPEDO ROOM AND MOTOR ROOM) 17.- ESCAPE HATCH 18- MARKER BUOYS 19- TORPEDO AND LOADING HATCH 20- SOFT PATCHES 21- #1 FUEL TANK. 22- #2 FUEL TANK. -23- #3 FUEL TANK. 24- #4 FUEL TANK 25- #5 FUEL TANK. 26 #6 FUEL TANK. 27 #7 FUEL TANK 28- #8 FUEL TANK. 29- #9 FUEL TANK 30- SUMP TANK. 31- LUB OIL TANK 32- AIR BOTTLE WELL (21 BOTTLES) 33- AIR BOTTLE WELLS (9 BOTTLES) 34- BATTERIES (60 CELLS EACH) 35- "A" VENT. 36 "B" VENT 37- CONNING TOWER 38- #1 PERISCOPE 39- MAIN INDUCTION 40- #2 PERISCOPE 41- RADIO TRUNK. 42- COMMISSION PENANT 43- RADIO ANT. 44- CLEARING LINE 45- COLORS AT SEA 46- COLORS AT ANCHOR 47- AMMUNITION MAGAZINE 48- BATTERY WATER (4 PORTABLE TANKS IN TORPEDO ROOM AND 2 IN FORWARD BATTERY ROOM) 49- FRESH WATER TANK 50- LOW PRESSURE PUMP. 51- LOW STERN LIGHT 52- SKEGGS 53- PROPELLERS 54- VERTICAL RUDDER 55- MAIN DRAIN 56- #2 MAIN BALLAST TANK DRAIN VALVE 57- AUXILIARY DRAIN VALVE 58- #1 MAIN BALLAST TANK DRAIN VALVE 59- SIGNAL GUN -

E.W. BOBSON 5 1/c DEC 30-1942

HEAD



E W. Bobson S 2/c
Dec 30-1942


Hose Connection To No. 1 M.B.T.
Vent Strainer
Salvage Line Stop
"A" Vent
External Salvage Connection
Vent Box
Electric Contact Maker
Check Valve in Salvage Line
To Blow and Vent Manifold
Pressure Hull
"A" Vent Stop
Risers
Equalizers
Fender
Steel
Wood
Manhole
Manhole
Fender
Steel
Wood
60 Cells
Rolling Chock
No. 1 M.B.T
Cap 42.76 Tons
Rolling Chock
Kingston No 1 M.B.T
Kingston No 1 M.B.T
Strainer Plate
Strainer Plate
Bolted on Plate over Main Drain
No 1 M.B.T Drain Valve

1. Describe the keel of an "O" boat.

The keel of an "O" boat is made of two "L" frames 17½ high placed 4½" from either side of the center line with the flange to the ~~out~~ inboard. It extends from frame 18 to frame 103 ~~103~~. The two members are bolted to plating but from frame 61 forward to frame 65 the plating is removable for easy access to the valves on the main ballast and auxiliary tanks when in drydock. The space formed between the vertical sides of the keels from frames 18 to 65 constitutes the main drainage system and is used as the main connection for the main ballast tanks and auxiliary tank to the low and high pressure pumps. From frame 65 to frame 103 the hollow space between the two "L" members is filled with leaded wood - the purpose being to absorb the shock when the ship grounds.

2. What are the frames and the bulkheads?

The frames are the structural ribs of the boat placed 18 inches apart onto which the pressure hull is riveted. There are 106 of these frames and are numbered from stern to stem, 1 through 106. Frame 106 is the foremost frame.

The bulkheads are the watertight partitions forming the compartments of the boat. They are tested for 10 lbs air pressure for ~~strength~~ tightness and vary for strength. The forward and after bulkheads in the control room are tested for 88.8 lbs per sq. inch. All others namely located at after of torpedo room, after of after battery room, after of engine room are tested for 25 lbs.

3. What pressures are bulkheads built to withstand?

The bulkheads are built to withstand 10 lbs internal pressure.

4. What is the pressure hull, what is the thickness of the hull, from what frame to what frame does the watertight pressure hull extend?

The watertight pressure hull is that part of the boat that is built to withstand the pressure of depth without admitting water. It is constructed to withstand pressure of 88.8 lbs. The ~~plating~~ in the midship section of the hull is 17 lb plate while the remainder of the hull is 14 lbs per sq ft. The pressure hull extends from frame 5 forward to frame 106

5. How many compartments (rooms) in an "O" boat? List the important gear in each room.

There are six compartments in an "O" boat - namely from fore to aft:- forward torpedo room, forward battery room - control of operations room, after battery room, engine room and motor room. In this compartment are located the muzzle breeches of the four torpedo tubes and loading racks for four spare torpedos, spare torpedo parts, J.K listening device, marker buoy release, rescue and escape hatch, torpedo and loading hatch, anchor gear, bow cap operating gear and torpedo testing equipment. The forward opening of the main induction also enters this compartment. Under the deck is an ammunition magazine, four portable battery water tanks, number 1, 2, 3 + 4 fuel tanks, an air bottle well of 21 bottles and the torpedo room forward bilge.

The gear in the forward battery room consists of the following: Below deck there are the #1 main ballast tank which is built into the shape of the hull in a "V" shape. In the V section are 60 battery cells - 2 volts each. This is covered with wooden strips covered with a rubber mat and then with a shellaced canvas cover to protect the rubber. Brass strips are dogged in place to make this deck water tight. Above the deck are bunks for the men, officers quarters, stowage lockers for charts and instruments of navigation, confidential documents and effects of the officers and crew. There is also in that room - ventilation facilities for the batteries which includes blowers and flapper valves to make the system water tight - Also there is a soft patch

In the control room below deck there are the auxiliary tank which

has the same shape as the #1 main ballast tank and in the V is an air bottle bank of 9 bottles, the fresh water tank. Above deck is the main control equipment of the boat - the hand and electric control of steering apparatus, the main motor control, the radio sending and receiving equipment, the bow and stern plane controls with both hand and electrical facilities. (the motors for same are located under the platform) depth guages and sensetive guage, barometer for measuring atmospheric pressure, air manifold including the bank, distributing, and blow vent manifolds with pressure guages for sea, high pressure, 200 lb air, 100 lb air and one for each ballast tank. Also interior communication board, bmgiston levers, water guages for regulator and auxiliary tanks and drain valve operating wheels.

Then there is the trim pump with control panel and water manifold, the conning tower with upper or outer hatch, and lower or inner hatch, #1 periscope, main induction valve operating wheel and flapper, #2 periscope, radio trunk with hinged flapper with strongback to make lower end of trunk watertight and the torpedo impulse tank repeater guages.

After battery room below deck has the #2 main ballast tank which is also U shaped and in the V are 60 more battery cells of 2 volts each. Above deck are the gyro compass, the ships galley, Electrician's work bench, main electrical switch board; mess table, signal gun in overhead, battery ventilation outboard exhaust line, riser pipe stop and vent valve to #2 M.B.T. ("B" vent) motor generator for sending and receiving via radio and a soft patch in pressure hull for removing

battery cells and such equipment that is too large to remove from boat through hatches.

Engine room has two diesel engines (main engines), engine clutch and operating gear, contact panels for main motors, escape and access hatch and soft patch. Under the deck (flat) are #5, 6, 7, 8, 9 fuel tanks, sump tank.

Motor room has the two main motors in it, the line shafting going to the propellors, two ships service air compressors, main induction inlet, tail shaft clutches, thrust blocks, rudder and stern plane quadrants, steering motor and clutch, lathe with independent motor, high and low pressure pumps, motor room water manifold, motor room escape and rescue hatch & large soft patch.

6. What is a main ballast tank? A variable tank? A trimming tank?

A main ballast tank is a tank which makes the boat buoyant. When they are flooded they provide the added weight to allow the ship to submerge.

A variable tank is a tank which does not necessarily have to be filled to enable submersion. Its purpose is for weight compensation

A trimming tank is a tank of the same purpose design as the variable tank. The purpose in this case being to balance the boat fore & aft.

7 What & where is the submerged anchor hawse pipe?

The submerged anchor hawse pipe is an opening (pipe) which passes up through the forward trim tank slanting slightly toward the aft at the top through which the cable for the submerged anchor passes to go to

the anchor gear that raises and allows the mushroom type anchor to be lowered.

8 Which of the hatches are fitted for escape? Which for rescue? What is escape equipment? What is rescue equipment?

The hatches fitted for escape are one in the motor room, one in the engine room, ~~one in the control room~~, one in the torpedo room ~~and the torpedo and loading hatch~~.

The hatches fitted for rescue are one in the torpedo room and one in the motor room.

Escape equipment is the Momsen lung.

Rescue equipment is a diving bell specially constructed to clamp onto rescue hatches ~~or any other equipment~~ that will be effective.

9. Describe the deck anchor as to type and weight. How is the chain marked, length and type of chain, how is the anchor raised and lowered, how is the chain stowed and where?

The deck anchor is a short shank patent anchor weighing 900 lbs. It is carried on a billboard on the starboard side of the bow. The anchor chain is made up of 4-15 fathom shots of 3/4" studded link chain, marked every fifteen fathoms and leads from the anchor over a sheave and through a covered channel under the deck and back over the wildcat and down into the chain locker where chain must be carefully tiered to prevent kinking and piling up. The deck anchor wildcat is fitted with a brakeband and pawl which may be controlled from the deck only.

10. Describe the submerged anchor as to type, weight, length of cable. how hoisted and lowered, how and where is cable stowed, how tell how much cable is out?

The submerged anchor is of the mushroom type and weighs 2.000 lbs. It is stowed up against the hull under the forward trim tank and from here a hawsepipe leads up through the trim tank, slanting slightly aft at the top. Shackled to the submerged anchor is a five foot shot of 7/8" chain with a swivel and to this is attached 50 fathoms of 3/4" plow steel wire cable. The cable leads up through the hawse, over sheave and back through superstructure to submerged anchor drum where it is stowed around the drum. This drum is fitted with a brakeband and pawl which may be operated from the torpedo room only. A dial, located in the torpedo room is geared to the drum and as the drum rotates the dial shows how much cable is out to the anchor.

The power to raise this anchor is derived from the anchor gear located in the torpedo room. The same gear operates the deck anchor but power is diverted to either anchor desired to be raised through separate clutches that may be controlled from the torpedo room.

11 Explain why the "Main Induction" the hatches and doors from the conning tower to the engine and motor room. should never be closed, while running main engines.

These doors and hatches should not be closed because the engines when

running are taking in air to allow them to run and if there were no air being allowed into the boat they would have no source of air supply thus creating a vacuum which would be very injurious to the crews health and eventually cause the engines to stop. It can cause death of crew

12. What is the superstructure, the conning tower shears, the periscope shears?

The superstructure is the non watertight construction on top of the pressure hull extending forward of frame 106 aft to about frame 16. It provides an above surface decking, bridge and protection for gear that does not need to be within the pressure hull - (such gear as vent lines, anchor chains, etc)

The conning tower shears is that metal construction around the bridge.

The periscope shears is that metal construction built around the periscopes above the deck for protection of the ~~protectors~~ periscopes.

13. Why see that all deck lockers and gear stowed in the superstructure is properly secured?

So that none of the gear will be washed away when submerged or so that it will not shift and cause damage either to the boat or to the gear involved.

14. What rooms have soft patches, what are they? What are the marker buoys?

The motor room, the engine room, the after battery room, and the

forward battery room have soft patches. Soft patches are removable sections of plate (larger in size than hatches) which when removed reveal openings in the hull for the purpose of removing machinery, batteries and other gear from the hull that is too large to be removed through the hatches.

15. What is the towing pendant release, the cable cutter, the signal gun, the J. K. device?

The towing pendant release is a mechanism to which the end of the towing pendant that is to remain fast to the boat is shackled. This mechanism is operated from inside the torpedo room by a vertical shaft and wrench with proper gears to turn release lug to release position. This makes it possible for the boat when in tow to release itself at will.

The cable cutter is a cutting device located at the top of the hawse pipe of the mushroom (submerged) anchor. It is used to cut the cable of the submerged anchor when it becomes fouled on the bottom and is impossible to raise it or when time does not permit the boat to stay at its position long enough to raise said anchor.

The signal gun is a device located in the after battery room to shoot by air to the surface identifying signal flares when boat is in distress.

The J. K. sound device is an electrical device used under water to detect the presence of shipping. It is controlled and operated from the torpedo room and is mounted on the top side above this same room.

It is also used for taking bearings as it is a very sensitive installation.

16 What is the main difference between the gyro compass and the magnetic compass?

The main difference is that the gyro compass works by electricity involving a gyroscope. Its mechanism revolves at the rate of about 6.000 R.P.M and because of its unique construction it gives a true north reading whereas the magnetic compass operates by the magnetic forces of the earth with the result that it will not give a true north reading. The gyro compass will always, when properly functioning, give a more accurate direction.

17. In what compartments are emergency rations and water stored?

Emergency rations are stored in each room throughout the ship as is emergency water. The regularly used water supply which is contained in four portable tanks is located in the control room under the deck.

18 Is smoking permitted on a dive? Why is silence necessary on a dive?

Smoking while on a dive is not permitted except at such times when the commanding officer shall order - "the smoking lamp is lighted." any emergency thereafter shall put "the smoking lamp out."

Silence is absolutely necessary so that any orders passed shall be heard.

19. Describe how to shift to hand

power on the bow and stern planes.

In the control room are two wheels for operating these planes - (one for forward and one for stern). If power fails or if it is desired to operate by hand a lever is thrown to disengage the motors from the mechanism so that it will not be necessary to turn over the motors when turning the wheels which operate the planes. When power is again in use the reverse operation takes place to disengage the operating wheels.

20 What precautions must be taken before a man can enter a tank? What precautions are made when a man is in a tank?

The tank should be aired out for at least forty-eight hours before entrance is made and entrant should have a line fastened to him with the other end being held by someone who is not in the tank so that if anything should go wrong the man who is in the tank may be readily rescued.

21. What precautions must be taken while fighting a fire in a confined space?

Care should be taken to get fire completely out and also it should be controlled as quickly as possible so as to prevent spreading to oils and also the bilges. Use CO2

22. What precautions taken in fighting electrical fires.

Water should not be used - use Carbon Tet.
Power should be shut off
in all affected section and lines.

23 What precautions are taken when there are explosives at the scene of fire?

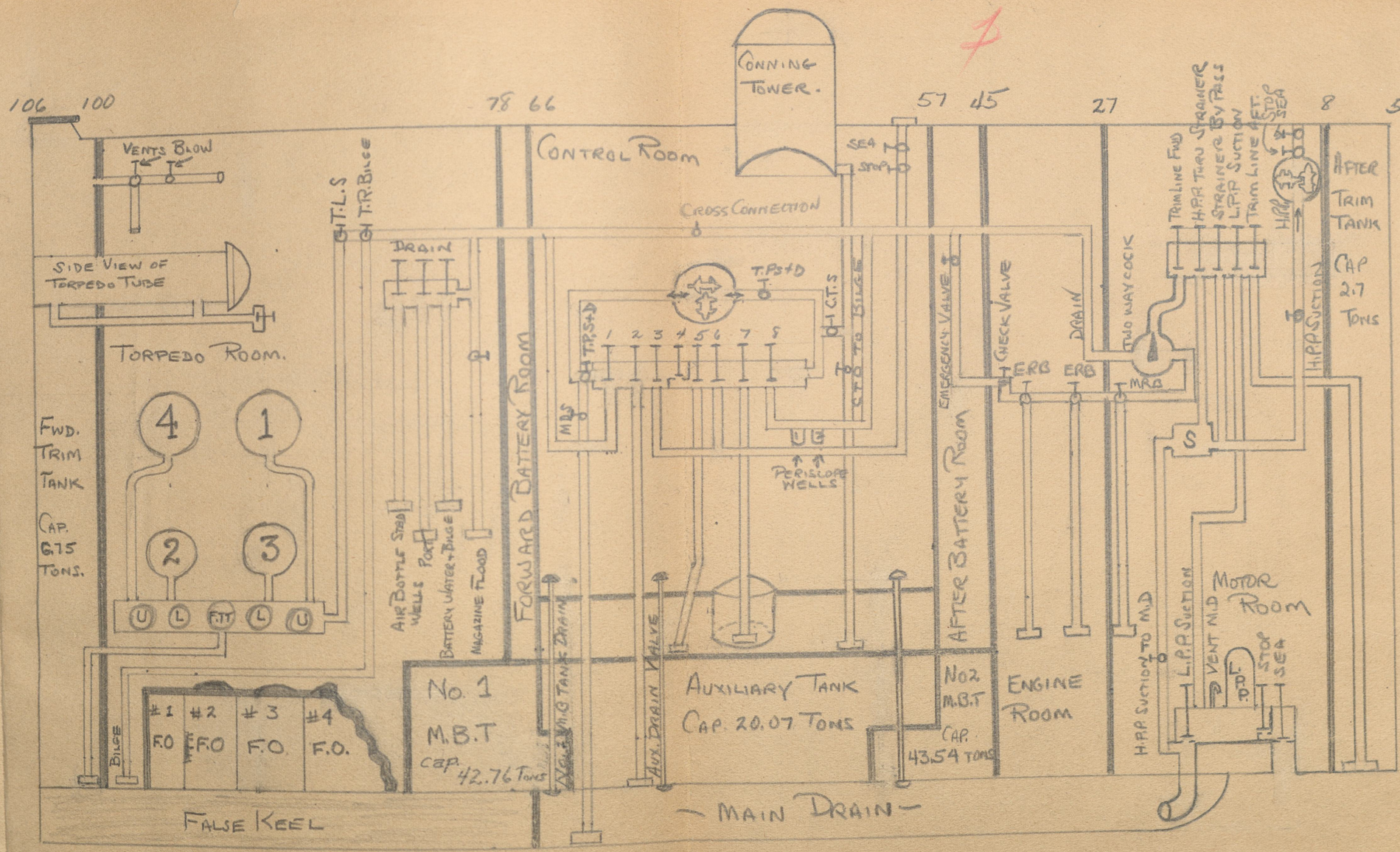
The explosives should be removed as quickly as possible. If impossible to remove all and those remaining can be covered by a constant flow of water, that should be done.

24. What necessary connection must all tanks have?

~~All tanks must~~ have vents ~~and drains.~~ Fluid & Drain Blow & Vent,

Second Week

7

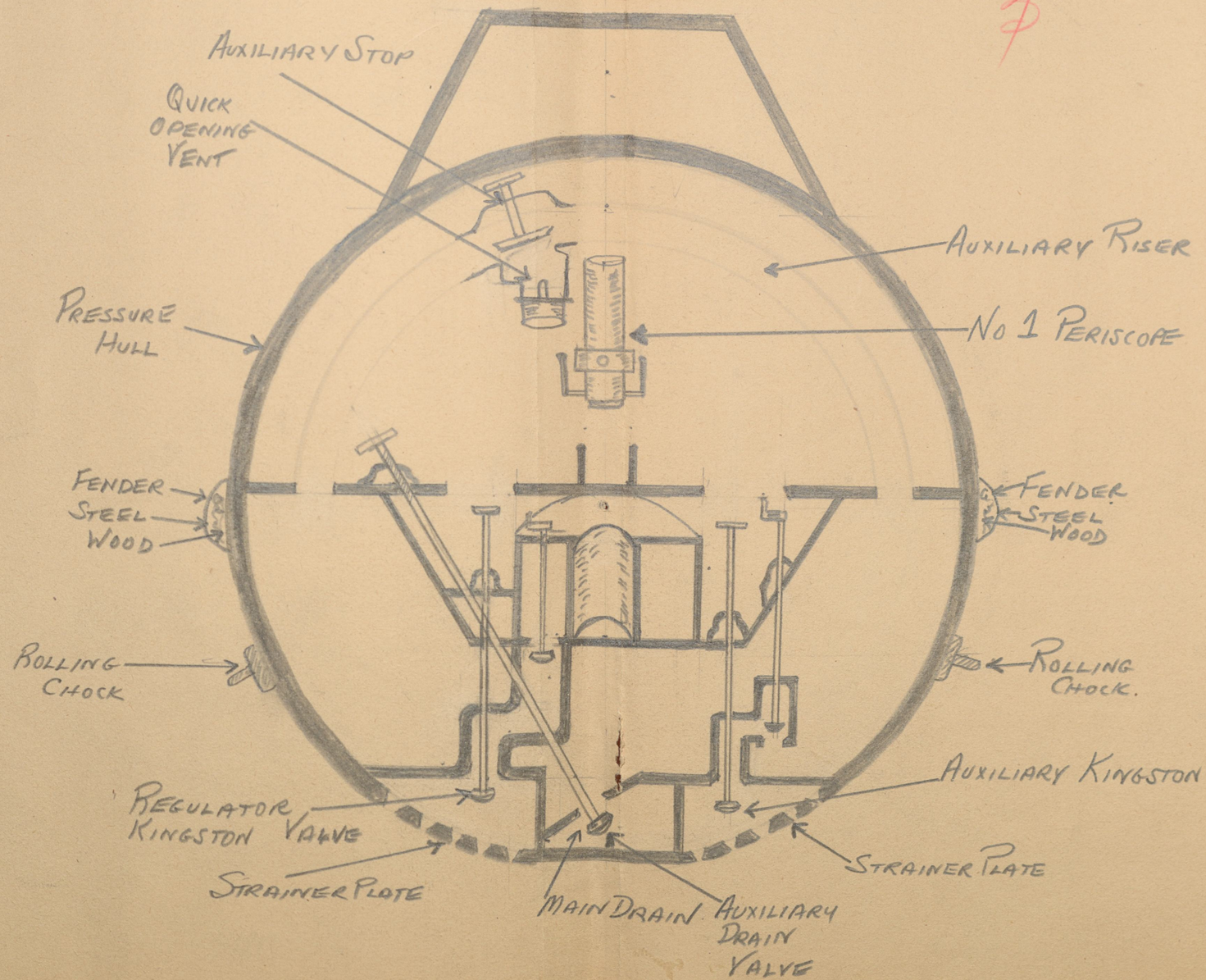


1. Forward Trim Line
2. Auxiliary Tank
3. Sea Valve
4. Bypass

5 Control Room Bilges
6 Sea Valve
7 Regulator Tank
8 After Trim Line —

"Note"
— All Bilge Valves are Check Type —

7


SUPERSTRUCTURE
AUXILIARY STOP
QUICK OPENING VENT
PRESSURE HULL
AUXILIARY RISER
NO 1 PERISCOPE
FENDER
STEEL
WOOD
ROLLING CHOCK
FENDER
STEEL
WOOD
ROLLING CHOCK.
REGULATOR KINGSTON VALVE
AUXILIARY KINGSTON
STRAINER PLATE
STRAINER PLATE
MAIN DRAIN
AUXILIARY DRAIN VALVE

Second Week.

1. Why are regulator and auxiliary tanks fitted with a kingston and a stop valve?

Because the regulator and auxiliary tanks are variable tanks and are not always filled when boat is submerging as they are used to trim the ship therefore a kingston valve and stop is necessary to insure against valve leakage which would result in the changing of the boats trim.

2. How do regulator and auxiliary kingston valves differ from those of the main ballast kingston valves?

The regulator and auxiliary kingston valves are screw type valves while the main ballast kingston valves are lever operated type.

3. What feature of construction of the main ballast tanks allows the kingston valves to be grouped together so as to be operated from the control room?

The feature of construction of construction of the main ballast tanks that allows the operation of the kingston valves to be made from a grouped position in the control room is the construction of flood tunnels that lead from the after part of main ballast tank #1 and from the forward part of the main ballast tank #1. The kingstons are located in this tunnel which runs under the control room.

4. You are stationed at "A" vent. You are on a dive; the vent and stop valve are both open; what do you do when the surface alarm sounds?

When the surface alarm sounds I would close "A" vent so that the pressure used to blow the main ballast tank would not escape ~~into~~ outside the ship. I would not touch the stop unless the "A" vent valve failed. or in other words, only in emergency or in securing boat.

5. Describe the high pressure, low pressure and trim pumps; state their purpose and capacities.

The high pressure pump is a Kinney type gear pump and is non reversible, only discharging to the sea through a sea and stop valve. It can pump from the main drain or trim line and it's capacity is 200 gals. per minute at a 300 ft. head. It runs by its own independent motor and is located in the motor room.

The low pressure pump is a centrifugal pump and its capacity is 1500 gals per minute at a 20' depth. It is used generally to quickly pump the main ballast tanks through the main drain to the sea on the surface only. It also is located in the motor room.

The trim pump which is located in the control room, is a Kinney type reversible gear pump with a capacity of 20 gals. per minute at a 300' head. It is used or can be used for pumping to or from and forward to aft from forward trim line - auxiliary tank, bilge - regulator tank, after trim line, periscope wells, torpedo drains, air bottle wells, battery water and bilge, magazines, main drain,

6. What is the trim line, what is it made of, how and what pressure is it tested, and what is its purpose?

The trim line of an "O" boat runs along the starboard side from frame 5 to frame 106 and is made of 3" copper pipe except for its flanges which are made of brass and are bolted together. It is tested hydrostatically (hydraulically) for 88.8 lbs per sq. inch except the sea connection which is tested for 150 lbs. It is also known as a secondary drainage system and is used mainly for transferring water from tank to tank but is also used for pumping from tank to sea.

7. Discribe how to use the trim pump and manifold; how to start and stop the pump; what are three main things to remember when using the trim pump and manifold?

To use the trim pump and manifold it is necessary to open

the suction valve and a valve and vent at whatever tank is selected to be pumped - (in case of bilges there is no vent). Then a valve on the same side of the manifold corresponding to the tank or bilges to be pumped is opened and on the other side of the manifold a valve is opened that will direct the water to its place of discharge. If it is to be discharged to another tank it will be necessary to open the drain and flood discharge valve of that tank as well as its vent. If pumping to sea the sea and stop valve must be opened. After that operation the pump may be turned on. (First it is necessary to turn the controller handle either clockwise or counter-clockwise to determine in which direction the water will be pumped -) then hold up on the contact maker lever and turn controller wheel slowly clockwise or counter clockwise as desired. To stop pump, turn controller wheel to "off" position. When rotated "clockwise" the pump takes a suction from the ~~after~~ forward side of the manifold and discharges to the after side. When rotated counter clockwise the pump takes a suction from the after side of manifold and discharges to the forward side.

The three main things to remember are 1- To have suction valves open

2 To have discharge valves open.

3 - To have vents on tanks being pumped and discharged into open.

8. State exactly how to pump torpedo tubes and bilges to sea with high pressure pump. You must handle all valves and pumps yourself.

Open the flood and drain valves

on the torpedo tubes and quick opening vents, open the trim line suction valve, bilge suction valve, open the cross connection valve, turn the two way cock athwartship, open #1 valve on manifold in motor room, and open #3 valve, open H.P. suction valve and sea and stop valves.

9. State exactly the procedure followed on board ship: 3 blasts of diving klaxon in relation to handling of main vents, blow valves, drain valves, kingston valves, inboard vents, and pumps.

On three blasts of klaxon the main vents should be closed, blow valves opened on order, drain valves should be opened, and kingstons should be ~~open~~ Closed until tanks are blown dry.

Inboard vents on tanks being pumped shall be opened and pumps as long as suction exists shall be operated but as soon as suction is lost a report should be made to diving officer in order to obtain permission to secure the pumps.

10. State exactly the procedure to flood magazine and control flooding from the control room.

Open magazine flood and suction valve, open #1 valve on manifold and #3 valve and control room sea and stop valve.

11. State exactly how to put high pressure pumps on main drain.

Open high pressure suction valve, high pressure suction valve to main drain and sea and stop valves.

~~also open main drain vent.~~

12 State exactly how to put low pressure pump on main drain.

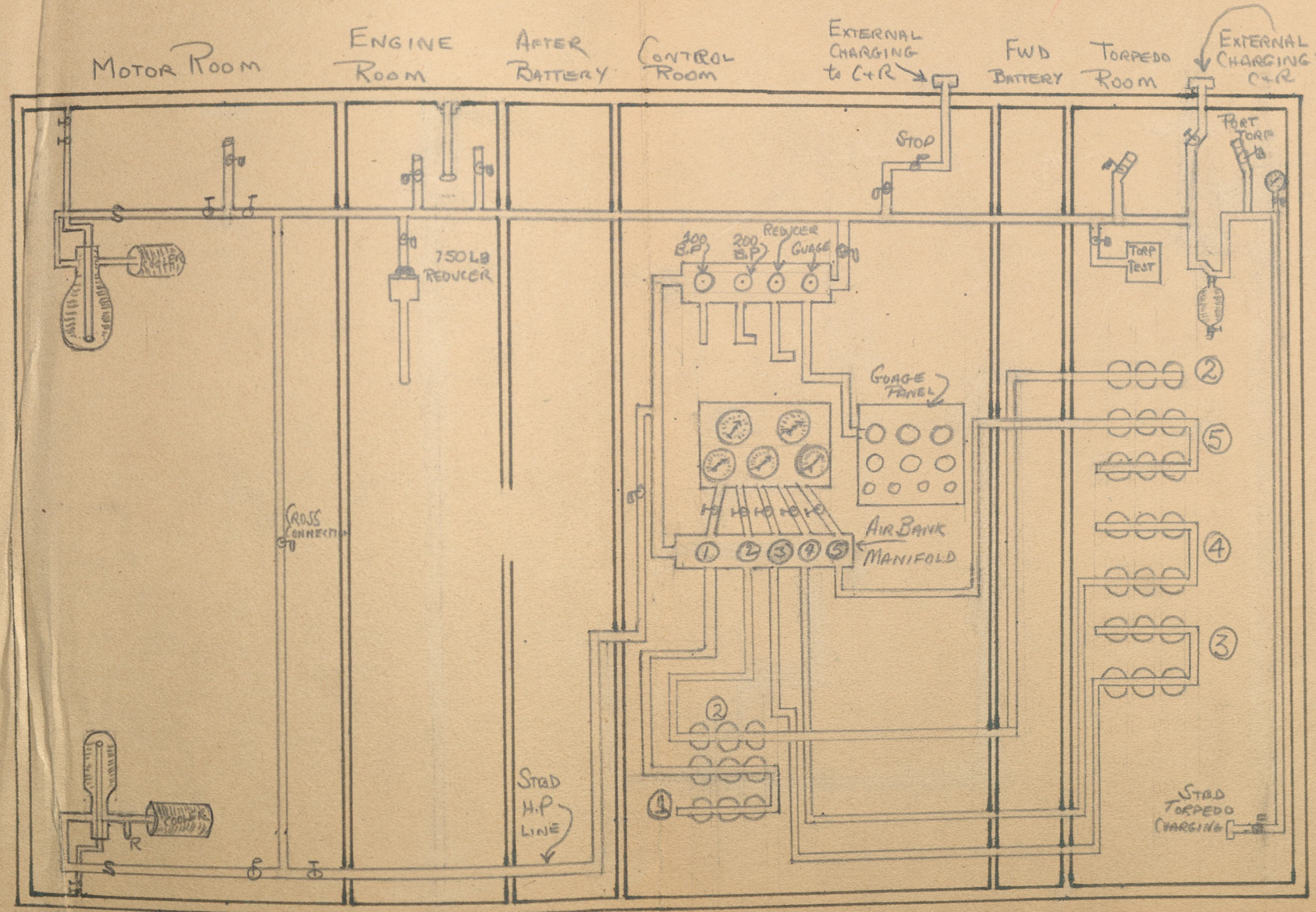
Open low pressure pump suction valve, sea and stop valves.

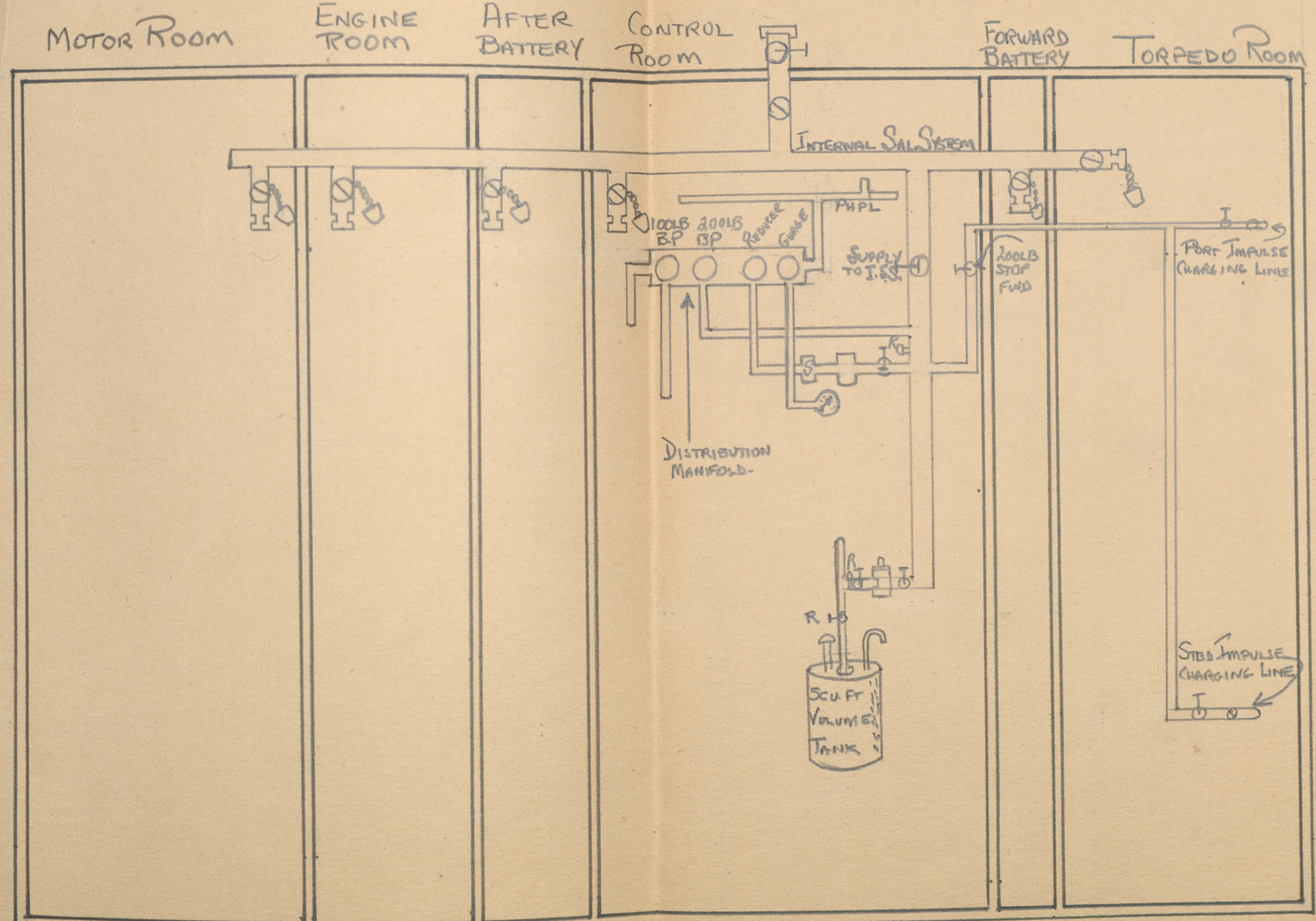
13 State exactly how to pump engine room bilges to sea.

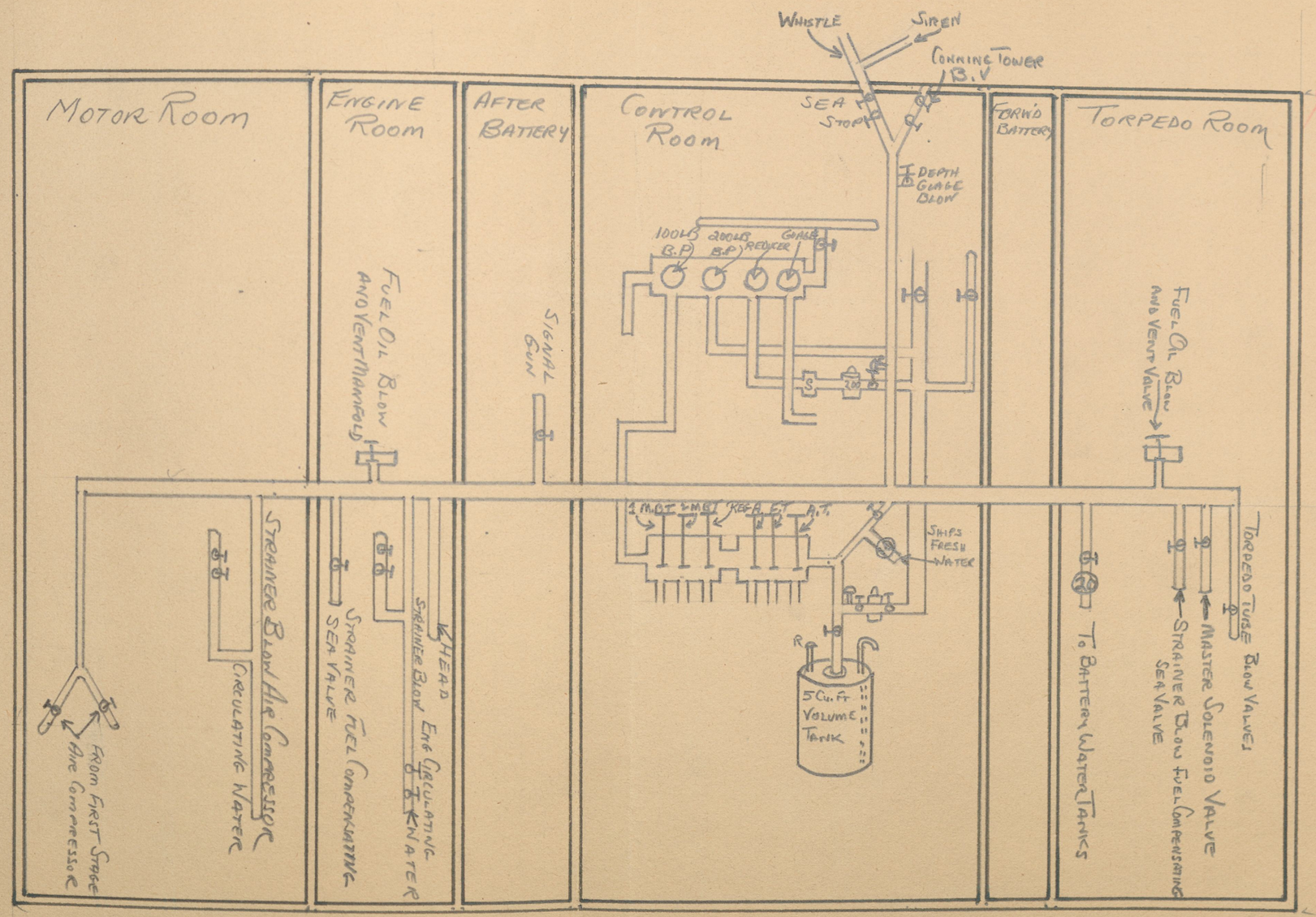
Open engine room bilge valves, two way cock ~~athwartships~~ fore and aft open #1 and #2 valves on motor room manifold, open high pressure suction valve and sea and stop valves - and start high pressure pump.

14. What is the klaxon signal used for? What is the sirex signal used for?

B The klaxon is used for diving signals (and rising). The sirex signal is used for collision warning.


MOTOR ROOM
ENGINE ROOM
AFTER BATTERY
CONTROL ROOM
EXTERNAL CHARGING to C+R
FWD BATTERY
TORPEDO ROOM
EXTERNAL CHARGING TO C+R
STOP
PORT TORP
750 LB REDUCER
100 B.P
200 B.P
REDUCER GUAGE
TORP TEST
GUAGE PANEL
CROSS CONNECTION
AIR BANK MANIFOLD
STBD H.P LINE
STBD TORPEDO CHARGING


MOTOR ROOM
ENGINE ROOM
AFTER BATTERY
CONTROL ROOM
FORWARD BATTERY
TORPEDO ROOM
INTERNAL SAL SYSTEM
100LB BP
200LB BP
REDUCER
GAUGE
PHPL
SUPPLY TO I.S.S.
200LB STOP FWD
PORT IMPULSE CHARGING LINE
DISTRIBUTION MANIFOLD
R.H.
5 CU. FT VOLUME TANK
STBD IMPULSE CHARGING LINE


Whistle
Siren
Conning Tower
13.V
Sea Valve Stops
Depth Gauge Blow
Motor Room
Engine Room
After Battery
Control Room
Forw'd Battery
Torpedo Room
100 LB B.P
200 LB B.P
Reducer
Gauge
Fuel Oil Blow and Vent Manifold
Signal Gun
Fuel Oil Blow and Vent Valve
1 M.O.I 1 M.S.I Ref. Ex. A.T.
Ships Fresh Water
Torpedo Tube Blow Valves
Master Solenoid Valve
Strainer Blow Fuel Compensating Sea Valve
To Battery Water Tanks
5 Cu. Ft Volume Tank
Strainer Blow Air Compressor
Circulating Water
From First Stage Air Compressor
Strainer Fuel Compensating Sea Valve
Strainer Blow Eng Circulating Water
Head

Third Week

1. How many air bottles are provided and into how many banks are they divided? Where are the flasks located?

Thirty air bottles are provided. Twenty one are located in the air bottle well in the torpedo room and nine in the control room bilge. The flasks are grouped to form five groups of six each with a total capacity of 180.81 cu. ft. Nine bottles are in the control room bilge and 21 in the torpedo room.

2. What is the purpose of the 100# bypass? The 200# bypass?

The purpose of the 100# bypass is to permit higher pressure air to be bled directly into the 100# line in case of failure of reducers.

The purpose of the 200# by pass is also so that high pressure air may be bled directly into the 200# line in case of reducer failure.

3. What is the purpose of the volume tank?

The purpose of the volume tank is to increase the volume of line and thus keep a supply of air for operation.

4. How are air bottles and volume tank cleared of any water?

Water is cleared from these bottles and volume tank by means of a relief valve and drain on each one.

5. Make a list of the 100# line air connections in each room.

Torpedo room

(1) Master tube blow valve
(2) Strainer blows for sea chests of fuel oil manifold.
(3) Fuel tank blow manifold.
(4) Master solenoids valve.
(5) Battery water tanks.

Forward battery room has no connections.

Control room.

(1) Conning tower blow.
(2) Fresh water blow
(3) Whistle valve.
(4) Blow and vent manifold (from this manifold blowing and venting of all main and variable tanks is done.
(5) Depth guages.

After battery room.

(1) Signal gun

Engine room.

(1) Crew's head.

(2) Fuel oil tank manifold
(3) Strainer blow for sea chest of fuel manifold.
(4) Strainer blow for sea chest of circulating water suction from sea.

Motor Room.

(1) From first stage of each air compressor.
(2) Strainer blow for sea valve, circulating water to air compressor.

6. What is the purpose of the emergency air outlet in some compartments? In what compartments are they located and from what line do they lead?

The purpose of the emergency air outlet in some compartments is is to keep water at a low level if compartment is ruptured or to keep water at a desired level while using compartment for escape. There are emergency valves in the following compartments:-

(a) 1 in motor room
(b) (2)in engine room
(c) 1 in control room
(d) 1 in torpedo room.

These emergency valves are painted red and are located on the high pressure line.

7. To what pressures are the various air lines tested?

The high pressure line is tested to 3750 lbs. hydraulically.
The 200 lb. line is tested to 300 lbs.
The 100 lb line is tested to 200 lbs.

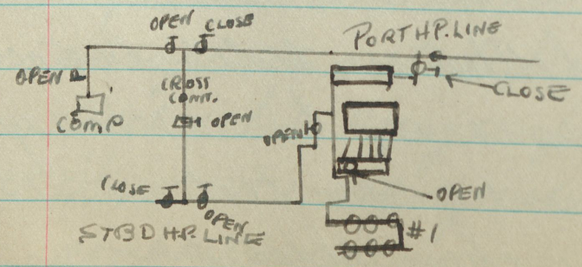
8 To what pressures are the air bottles tested? The volume tank?

The air bottles are tested to 5,000 lbs. when new and 10% less each 7 yrs. thereafter until the test is 3750 lbs. Bottles are then replaced.
The volume tank is tested to 200 lbs.

9. Where are the outside charging connections located? Into what line do they connect?

There is one charging line on the port side of the conning tower and one in the torpedo room. These connections connect to the high pressure line.

10. You are directed to charge no. 1 bank with the port air compressor via the starboard charging line. Describe exactly how to do this naming all valves. A line sketch may be made if desired.



11. You are stationed at the air manifold. State exactly what you do at the order "Rig for dive". All the banks do not have 2500 lbs pressure.

P

Put 3 banks with air pressure over 2,000 lbs each on the manifold; (the lowest pressure one first).

Build up pressure on the 100# line to 100# and maintain. Use 100# by pass if reducer does not operate satisfactorily.

Put 200# on 200# line to forward for torpedo impulse tanks and after to gag line.

12. You believe the guage of #4 bank is not calibrated properly. What can you do to check it?

I would open #4 guage stop and #4 air bank manifold guage, close

~~starboard charging valve, close port charging valve,~~ and open the master guage valve and check reading on master guage which is more finely calibrated to determine the accuracy of the # 4 bank guage.

13. What are the purposes of the blow lines to the strainers and the sea valves.

The purpose of the blow lines to the strainers and the sea valves is to blow out any foreign matter that may collect on the strainer and cause it to be clogged so that water cannot come through unresisted.

14. Describe how the air compressors are driven by the main shaft.

The compressors are driven by a friction type clutch, clutching the compressor to the main shaft, which drives a quill shaft with gears on after end of the air compressor shaft. The motive force can be furnished to the shaft by the main engines or motors provided the engines or motors ~~shaft~~ are not operated at more than 300 R.P.M. See supplement on next page.

15. You are stationed on the air manifold on a dive. The 100# line reducer is out of order. State what you would do when ordered to blow #1 main ballast tank.

I would close the stop valve on the 100# reducer and crack the 100# by pass valve and open the # main ballast tank manifold valve.

16. State exactly how you would blow from forward trim to #3 torpedo tube.

Open the forward trim valve on the air manifold (100# line), open the forward trim flood and drain valve, open the #3 torpedo tube drain valve and vent.

(14)

Supplement. The air compressors are driven by a friction clutch which is keyed to and turns over with the main shaft. This clutch has four fingers carrying a shoe with each finger. Around this main shaft is a quill shaft, the forward end has a large collar that rides over the friction clutch. The after end of the quill shaft has a gear that meshes with the gear on the air compressor's crankshaft. When the clutch lever is thrown in, it forces the fingers out and up carrying the shoes up against the collar on the quill shaft, thereby causing the quill shaft to turn over with the main shaft.

17. Explain why a partially filled tank shall never be blown to sea while submerged.

A partially filled tank shall never be blown to sea while submerged ~~is~~ because the pressure used may be too great for the strength of the tank and also because if a tank had been blown while submerged and it became necessary to reflood the same tank, the air pressure would have to be vented back into the pressure hull - thus increasing the internal pressure in the compartments.

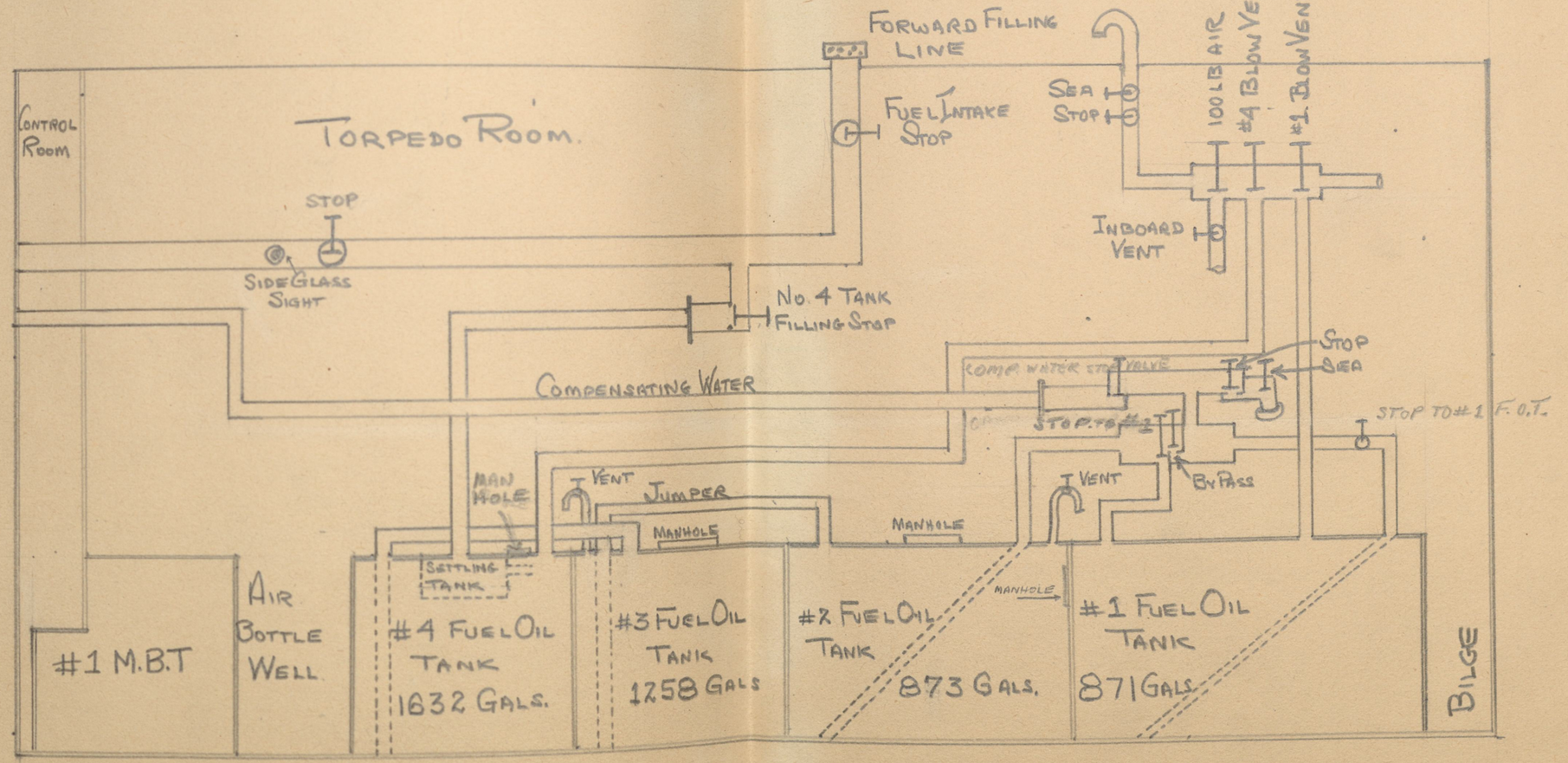
18. While submerged, discuss what deficiencies occur in the air and what is done to remedy them.

The CO_2 content of the air increases and the oxygen content decreases. When the CO_2 content becomes about 3%, CO_2 absorbant (a crystalline chemical mixture) is spread on a taut split mattress cover to remove this harmful content from the air. When the oxygen content of air is reduced to 17% then it is necessary to bleed into the vessel from oxygen bottles 0.9 cu ft oxygen at atmospheric pressure per man per hour. When bleeding oxygen into the hull it is necessary to use CO_2 absorbant before bleeding process starts.

19. Describe what you would do to get rid of the CO_2 generated during a long dive.

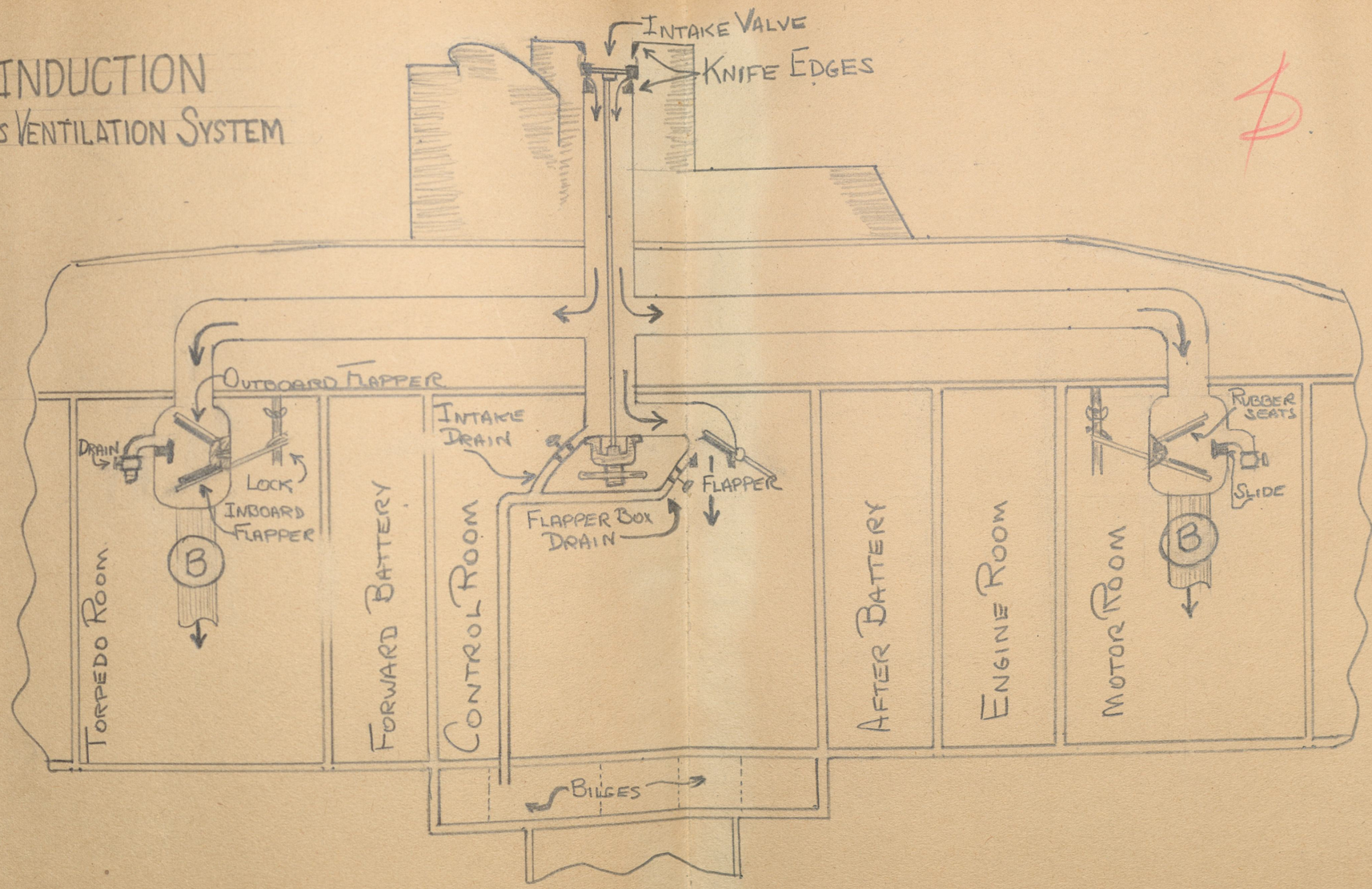
See answer to question 18.

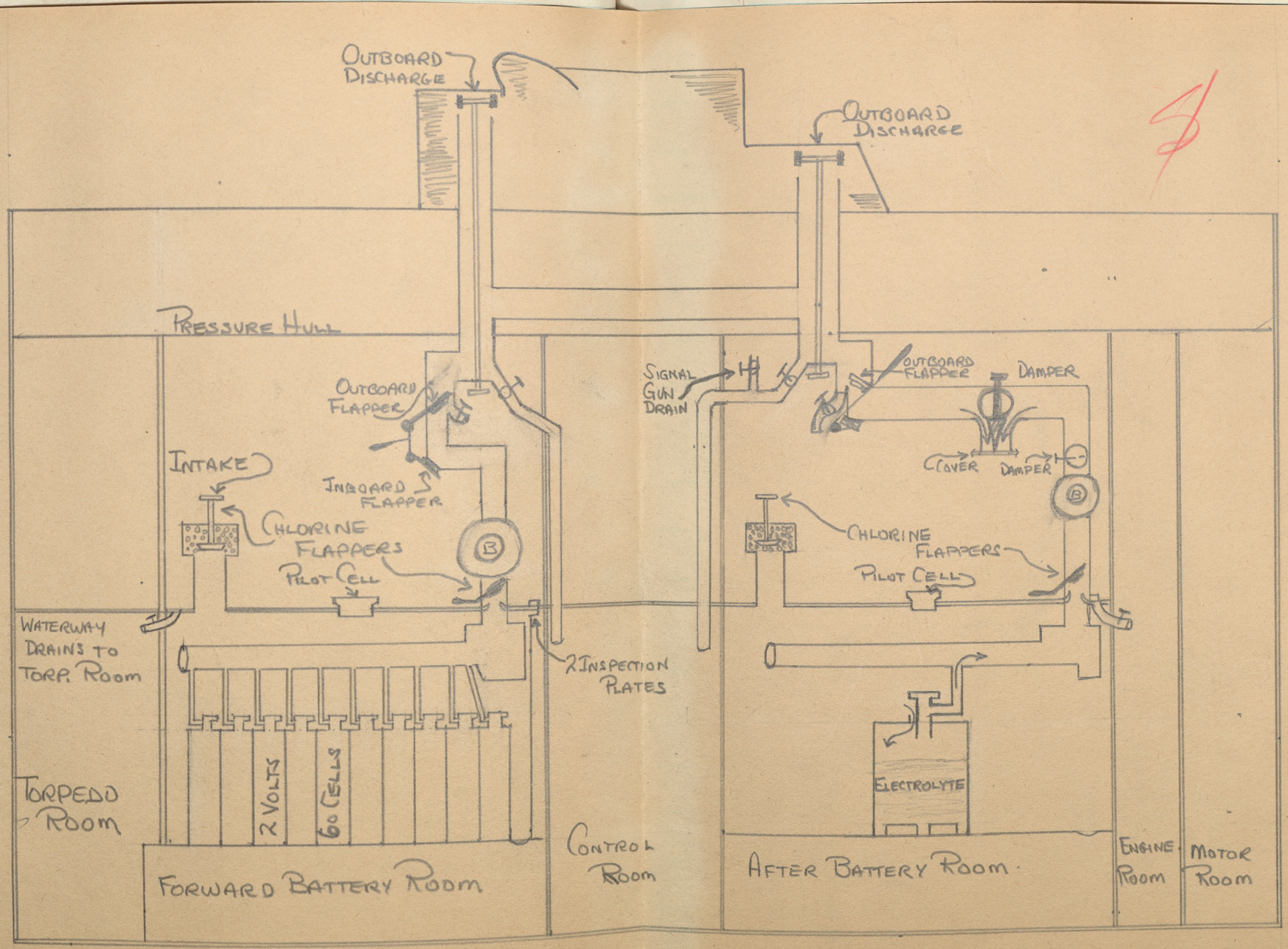
7

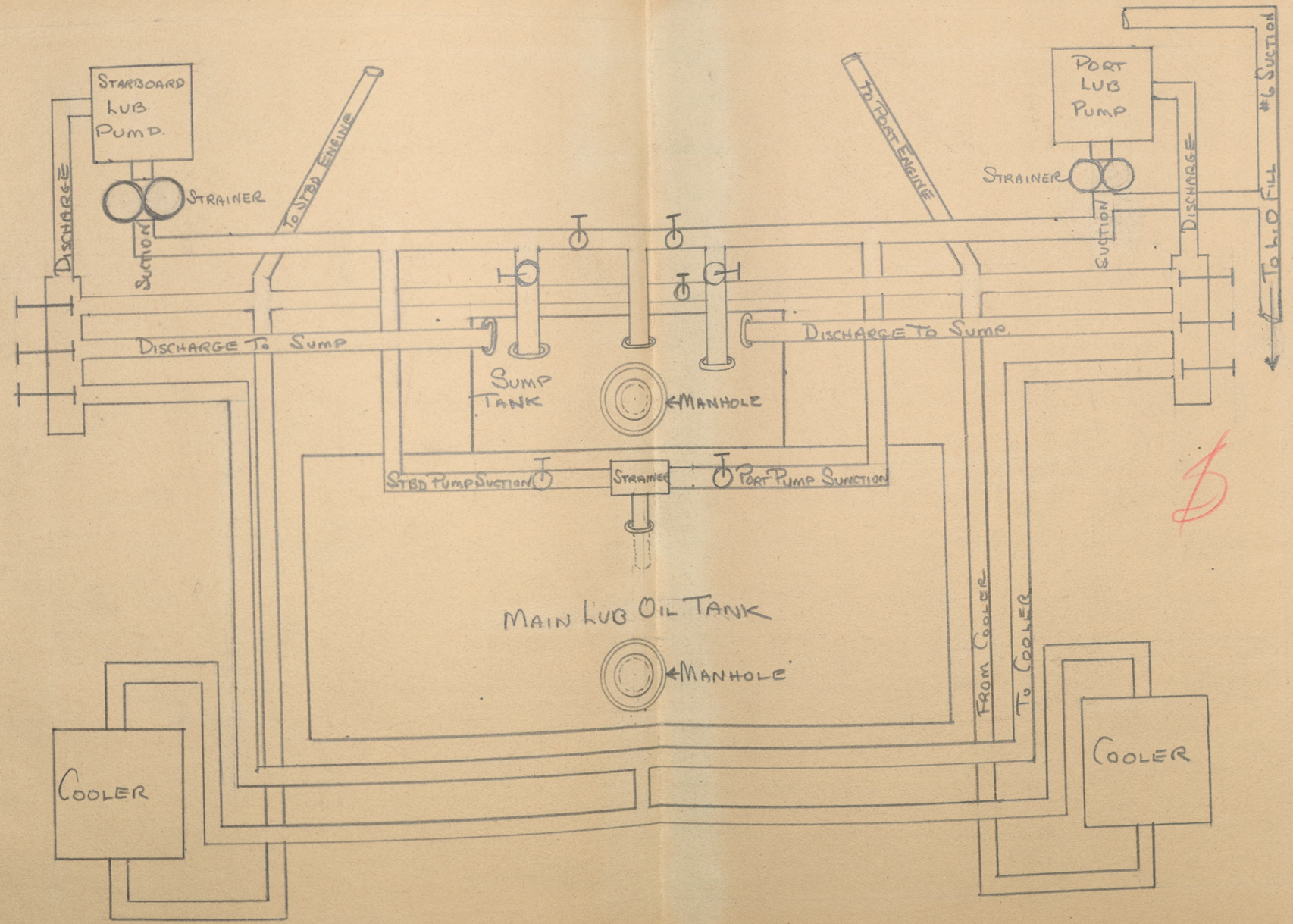

Control Room
Torpedo Room.
Forward Filling Line
Fuel Intake Stop
Sea Stop
100 LB Air
#4 Blow Vent
#1 Blow Vent
Inboard Vent
Stop
Side Glass Sight
No. 4 Tank Filling Stop
Stop Sea
Comp. Water Stop Valve
Compensating Water
Stop to #2
Stop to #1 F.O.T.
By Pass
Man Hole
Vent
Jumper
Manhole
Manhole
Vent
Manhole
Settling Tank
#1 M.B.T
Air Bottle Well
#4 Fuel Oil Tank 1632 Gals.
#3 Fuel Oil Tank 1258 Gals
#2 Fuel Oil Tank 873 Gals.
#1 Fuel Oil Tank 871 Gals.
Bilge

MAIN INDUCTION

SHIPS VENTILATION SYSTEM




OUTBOARD DISCHARGE
OUTBOARD DISCHARGE
PRESSURE HULL
OUTBOARD FLAPPER
SIGNAL GUN DRAIN
OUTBOARD FLAPPER
DAMPER
INTAKE
INBOARD FLAPPER
COVER
DAMPER
CHLORINE FLAPPERS
PILOT CELL
CHLORINE FLAPPERS
PILOT CELL
WATERWAY DRAINS TO TORP. ROOM
2 INSPECTION PLATES
2 VOLTS
60 CELLS
ELECTROLYTE
TORPEDO ROOM
FORWARD BATTERY ROOM
CONTROL ROOM
AFTER BATTERY ROOM
ENGINE ROOM
MOTOR ROOM


STARBOARD LUB PUMP
STRAINER
DISCHARGE
SUCTION
TO STBD ENGINE
DISCHARGE TO SUMP
SUMP TANK
MANHOLE
STBD PUMP SUCTION
STRAINER
PORT PUMP SUCTION
MAIN LUB OIL TANK
MANHOLE
COOLER
FROM COOLER
TO COOLER
COOLER
TO PORT ENGINE
PORT LUB PUMP
STRAINER
SUCTION
DISCHARGE
TO L.O FILL
#6 SUCTION
DISCHARGE TO SUMP

Fourth week

1. What are the two ventilation systems?

The two ventilation systems are the main induction system (ship's ventilation) and the battery ventilation system.

2. What is the purpose of circulating air through the main induction while submerged.

To cause a circulation of the ships air but the main reason is to cool the air. It is cooled because the main induction lines are located in the superstructure and are therefore surrounded by cool sea water thus cooling the air that circulates through.

3. You are ordered to circulate air through the main induction from

torpedo room to motor room; describe exactly what you would do.

(1) Open flappers in torpedo room.
(2) Leave control room flapper closed.
(3) In motor room open flappers and start main induction blower.

4. What is the purpose of the battery ventilation system?

To ventilate the batteries and rid them of the hydrogen gas that is generated by them and which is explosive as well as harmful to the crew if present over 3% in the air of the ship.

5. Describe the battery well lining, insulation, and strengthening of the bottom of the well.

A layer of cement four to six inches thick is placed in the bottom of the well. This is used to form a platform for the batteries and also helps to reinforce the tank. Located at the after end, a depression of about three inches depth is formed in the cement to form a well for the collection of acid or water that might get into the well, forming a pumping connection to the outer portion of the well. Laid over the cement and the sides is a layer of building papers. Over this paper, at the sides to about halfway up is an insulation of micanite. Over this is a solid box formed of sheet lead burned at the corners which make this well, water and acid tight.

A cribbing is formed at each end and sides to make a close fit of the battery. This is all given several coats of acid resisting paint. Taking

6. Describe just what you would do if ordered to "Ventilate Outboard," "Ventilate Inboard," Ventilate in after battery room".

Ventilate inboard. Open intake (always open except in case of emergency of chlorine) open flappers. open damper, open inboard flappers, ~~open outboard flappers~~, close outboard discharges and open drains to inboard flappers. See that at least one blower is running.

Ventilate outboard. Open intake - open flappers (chlorine on vent line) open dampers, open outboard flappers, close inboard flappers, open tell tale drains and open outboard discharge valves. See that a blower or blowers are running.

Ventilate in after battery room - Open chlorine flappers, open dampers, close inboard flappers, open outboard flappers, close outboard discharges and close ventilating (Y) damper and remove cover. Check both forward and after blowers to be running.

7. How stop battery blowers and seal up battery tank in case of chlorine?

Close chlorine flappers and turn rheostat for battery blower off.

8. By what means may the fuel oil be forced to the gravity tank?

By opening the sea valve to the circulating water pump in engine room, (start pump) - open compensating valve to #9 fuel tank - pressure goes through to #5 fuel tank through jumpers on tops of tanks, open stop on #5 fuel tank, open stop on fuel transfer line, by pass

fuel over fuel pumps into gravity tank.

9. What is the purpose of two gravity tanks in the fuel system?

The purpose of the two gravity tanks is that the fuel oil measuring pumps on the engine must be fed by gravity flow and also so fuel can be tested for water or sludge and drained off to bilge before it is cut in to engines. One tank is cut in to the engines at a time so as one is being used another can be filled and tested and be ready to cut in when other tank is about dry. If the fuel oil meter should be out of order fuel can be measured by means of a calibrated scale in gallons secured alongside of sight glass at end of each tank.

10. Describe exactly how you would fuel the forward fuel group.

Open fuel intake stop on forward fuel filling line and open the #4 tank filling stop and open #1 tank valve on jumper by pass manifold and open by pass - sea and stop. valves. When fuel oil appears at sea valve opening, secure valve and fueling.

11. What is the purpose of the sump tank?

The sumps is the reservoir for the lubricating oil that is in use while the main engines are running.

12. In the event it is desired to carry more lub oil than sump and main lub tank can hold, how may it be done?

It may be done by filling the #6 fuel tank with lub oil because #6 tank is independent of the after fuel group inasmuch that it is not connected to the compensating system. No water ever enters this tank. It is necessary to blow and vent some tank upon taking contents out or filling.

13 What bad effect would salt water have if mixed with lub oil?

It will cause the bearing surfaces of the engines to ~~rust~~ and break down the lubricating effect of oil causing break down of engine. When churned up together with the lub oil it will cause the lub oil to mulsify.

14. Describe briefly the main engines, their horsepower, what is the purpose of the engine clutch.

The main engines are non-reversible type, Nelseco diesels and are 440 h.p. rated 400 R.P.M.

The engine clutch is used to disengage the engines from the main shaft so that when the main motors are running it wont be necessary for them to turn the engines over. This clutch is a positive jaw type.

15 Describe briefly the main motors, their horsepower, what is the purpose of the tail clutch? Before starting up any machinery what must be done?

The main motors are compound wound electric motors and are rated for 190 h.p. at 267 R.P.M. These

motors are reversible and also are used as generators when ship is being propelled by the engines.

The purpose of the tail clutch is to disengage the propellors so that the engines or motors may be run for different purposes without moving the boat.

Before starting any machinery any machinery should be properly lubricated up and no rags or waste should be near any operating parts nor any other material that could injure the machinery. Lubricator should also be checked if machinery is not self lubricating type. The latters reservoirs should be checked and also its lubricating lines.

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