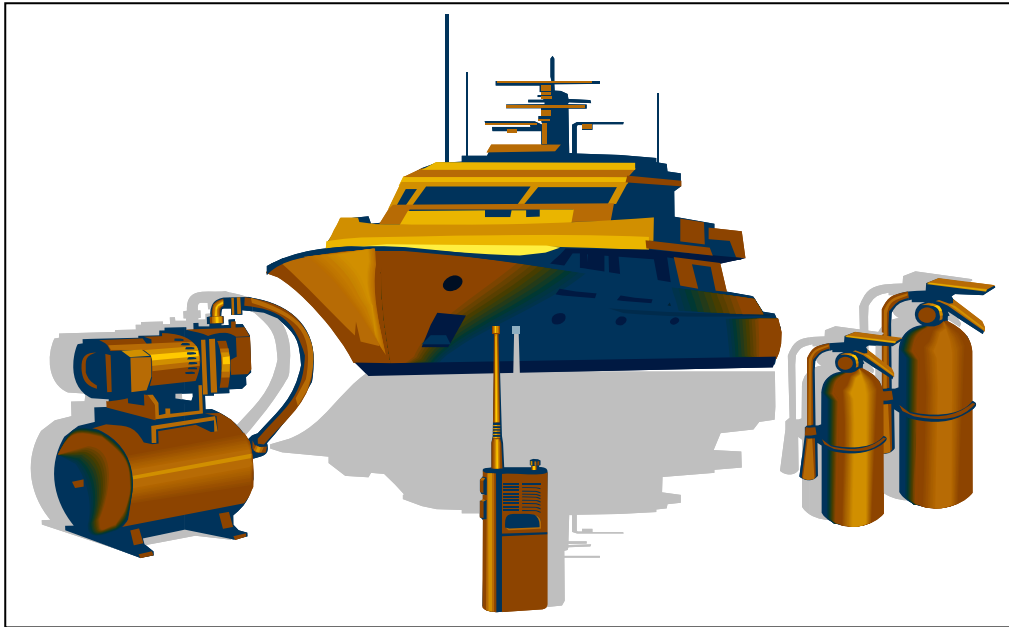


Prepare, maintain and test response equipment



This workbook is intended for Trainees seeking to attain competency as required by the NSW State Rescue Board Minimum Training Requirements for Marine Rescue Personnel (v 4 2005). It should be studied with reference to the accompanying text "The Bare Facts of Marine SAR" and the assessment documents provided by your chosen assessor.

LOG BOOKS

Trainees should maintain a Log where practical activities and experience should be recorded and witnessed. When you feel confident ask your Trainer to arrange an assessment at your squad or other suitable location. Your assessor will provide feedback on your assessment.

The Author acknowledges references to material as used by Port Macquarie Sea Rescue Group. All content is supplied on the understanding that users exercise their own skill and care with respect to its use. Before relying on the material in any important matter users should carefully evaluate the completeness and relevance of the information for their purposes.

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Prepare, maintain and test response equipment

CONTENTS	COMPETENCY PUAEQU001A
Clean, maintain and re-stow equipment	Element 3
	3.1 Equipment is cleaned, maintained, assembled and stowed according to organisation's procedures
	3.2 Equipment records are updated according to organisation's procedures
	3.3 Equipment is recovered, re-stowed and made ready for future use
Inspect response equipment	Element 1
	1.1 Equipment is inspected in accordance with organisation's procedures
	1.2 Missing parts are identified and reported according to organisation's procedures
	1.3 Faulty or damaged equipment is reported and recorded in accordance with organisation's procedures
Test response equipment	Element 2
	2.1 Equipment is tested according to approved procedures and is fit for purpose according to organisation's standards
	2.2 Test results are recorded according to regulatory and organisation's requirements
	2.3 Defective equipment and sub-standard performance is reported and recorded according to organisation's procedures

This workbook rearranges the order of the elements of competency, to that listed above, to follow more closely the progressive tasking in preparing, then maintaining, and subsequently inspecting & testing rescue response equipment.

Introduction

Response readiness requires not only the provision of adequate equipment for the operation, but that it will not fail when needed. Marine rescue equipment may actually be used infrequently and in the corrosive environment of its use and storage. To delay deterioration a rigorous application of maintenance schedules is demanded.

Types of rescue equipment

Rescue equipment includes the land based premises, the search vessels and vehicles and their fitted equipment, and the portable equipment selected by response teams in specific operations.

The premises and equipment.

- The building structure and landscaping.
- The jetties, sheds and fences.
- Office utilities, faxes, phones, photocopiers, computers.
- Furniture and furnishings.
- Lights and domestic electrical appliances.
- Radio operations room and its radiotelephones.

The search vessels and vehicles and their fitted equipment.

- Vessels and vehicles motors.
- Vessels, vehicles and trailer structure and regulatory compliance.
- Safety equipment – survival, firefighting and first aid equipment.
- Navigational equipment – compass, radios, GPS, sounder, radar,
- Navigational lights - regulatory requirements indicating usage.
- Warning indicators – gauges & alarms used on both vessels and vehicles.
- Lifesaving equipment – stretchers, neck brace, breathing apparatus.
- Ropes and cordage- for mooring and tow.
- Pumps.

The portable equipment used by response teams in operations.

- Equipment used to provide personnel protection (PPEs).
- Communication equipment, an essential part of any type of response.
- Fire pumps and hoses.
- Hand and hydraulic power tools.
- Electrical generators and lighting equipment. (Because of a potentially wet environment, only special applications are relevant)

This workbook is less concerned with the maintenance regime of individual utilities (found in their manufacturer's manuals) but more with the processes involved in ensuring that rescue equipment is continuously maintained to appropriate standards.

3. Clean, Service and Re-stow Equipment

Equipment maintenance

3.1 *Equipment is cleaned, maintained, assembled and stowed according to organisation's procedures*

Equipment assembling

The last thing you want when you are in the thick of the heat and smoke of fighting a fire at sea is to find out that the fire pump nozzle and fire hose couplings won't fit together. Clearly, the visual check back at the rescue boatshed was insufficient to identify the misfit; pre-assembling was required.

In its widest sense, the rescue equipment described earlier, the premise, vessels and portables are all an assembly of the necessary gear. The performance of the whole is dependant on the functioning of the parts. It is the function of the organisations management committee to ensure that their equipment is adequate and user friendly. In procurement the committee will have to consider the:

- Operational need, organisational manpower & training.
- Workplace health & safety requirements (including safety induction).
- Federal, State, industry or organisational standards.
- Quality control procedures.

Of course, the mishap with the fire pump should never have been possible with quality control ensuring continuity in procurement, but the nature of volunteer rescue is that much is begged, borrowed, donated, and, accidents do happen. What is needed is a maintenance regime that identifies defects and effects timely repairs.

Maintenance team

The maintenance team would normally undertake the responsibility to keep all equipment ready to go (though it is most unwise for rescue crews not to personally recheck critical equipment.) A maintenance team could consist of a team supervisor who has experience and diagnostic skills, and sufficient team members to handle the workload. A trainee member of the team will work under supervision until skilled.

Maintenance schedules

The maintenance process is continuous, but there are levels of thoroughness.

- **At every use** - As the urgency of the response allows, at every call out a visual check will be made of the overall readiness for the operation.
- **After every use** - At return from the job, the vessel and equipment must be cleaning and prepared for the next call out. More thorough checks, repairs, re-stocking and re-stowing are also required. It might be at this thorough visual inspection that a failure or potential for failure is identified. This may require removal of the offending article from service and ensuring that the utility is repaired and returned to service quickly.

- **Scheduled maintenance-** A more complete examination and servicing at weekly, fortnightly, monthly, three monthly and six monthly jobs.
- **Accrediting inspections-** Lastly the Commercial Vessels (or Rescue vessels) annual survey requires preparations for examination as does and the NSW State Rescue Board annual accreditation audit.

At every use - Preparing equipment

A typical pre-departure checklist for the three vessels of a rescue squad is shown below:

DUCK (IRB) PRE-DEPARTURES CHECK- IN ADVANCE OF EVERY OUTING:	
Yes	Bungs are replaced, earmuffs off and fuel reserves are adequate for task.
Yes	Launch procedures ensure IRB crew and the public's safety.
Yes	Replace cowl, start motor, confirm telltale, stress test steering and propulsion.
Yes	Don wetsuits, lifejackets and mobile VHF (immersion protected)
Yes	Radio sign on and confirm crew list & operational task instructions.
RIB PRE-DEPARTURES CHECKLIST- IN ADVANCE OF EVERY OUTING:	
Yes	Check rails, in launch procedure ensure RIB crew and the public's safety.
Yes	Bungs are replaced, earmuffs off and fuel reserves are adequate for task.
Yes	Turn on battery, lower & start motors/navigational electronics, confirm telltale.
Yes	Raise aerials, set radios to channel, volume and squelch.
Yes	Stress test steering (hard over to hard over) and propulsion before bar exits.
Yes	Don lifejackets
Yes	Radio sign on and confirm crew list & operational task instructions.
RESCUE 1 PRE-DEPARTURES CHECKLIST- IN ADVANCE OF EVERY OUTING:	
Yes	Check rails, in launch procedure ensure CR1 crew and the public's safety.
Yes	Select appropriate battery bank.
Yes	Raise aerials, set radios to channel, volume and squelch.
Yes	Close engine hatches.
Yes	Start engines and note warm up times to marked presets (coolant /oil pressure)
Yes	Visual check for exhaust (raw water flow and smoke quality.)
Yes	Visual check for safe stowage and trim.
Yes	Stress test steering (hard over to hard over) and propulsion before bar exits.
Yes	Don lifejackets
Yes	Radio sign on and confirm crew list & operational task instructions.
Yes	Maintain vigilance of gauge levels and unusual vibration

After every use - Cleaning and preparing equipment

After every operation the Rescue Vessel (RV) must be cleaned and serviced for the next job. This represents the first level of maintenance that keeps the RV always in a state of operational readiness. A Trainee needs to know the extent of the "clean and service" routine on the RV so checklists of the organisations procedures will help.

There are also times when the Skipper will ask your help with additional care and maintenance of the Rescue Vessel. This can happen when the Rescue Vessel has been out for an extended period of time in poor conditions or extended service

schedules are due. The jobs will vary with the vessel's design, construction material, the equipment carried and whether the vessel is permanently moored or trailer mounted.

Moored vessels cleaning internally:

- Helm throttles and gauges.
- Radar, sounder, GPS, auto pilot, chart plotter, barometer and clock.
- Marine radio/s.
- Chart table, navigator's seat, helmsman seat.
- Radio / radar operator's seat.
- Dinette (where fitted) and seating.
- Main cabin, forward cabin, hatches and doors.
- Walls, ceiling, floors, grab rails, windows and fire extinguishers.

Moored vessels cleaning externally:

- Fore deck - windscreens, anchor and line, hand rails and deck fittings.
- Side decks - outside of side windows, roof, radar dome and mast, antennas, navigation and signal lights, grab rails and stainless steel fittings.
- After deck - insides of the bulwarks, transom, deck, motor compartment covers, lockers, rope boxes, towing bollard, boarding ladders and platforms.
- Outboard motors - stern drive legs, wash and dry the outside only.
- The hull, wash down, clean and dry.
- Tidy up mooring lines, ensure security.

Trailer vessels cleaning externally:

Because it is taken clear of the water, you can thoroughly wash down and dry the hull. The trailer must be also thoroughly cleaned, with attention to brakes and road lights to monitor maintain their legal working condition.



Re-stowing and preparing for the next callout.

Refuelling:

If your vessel is permanently moored, there will be a fuel point on a wharf or pontoon. The Skipper will take the vessel to that point and the refuelling will be carried out to risk managed SOP's, limiting the risk of fire and spills. If trailer mounted, you may refuel at the dockside or a private fuel depot that belongs to the Squad. Fuel usage must be monitored and recorded. Diesels may require a fuel additive for maintaining performance.

Standard fire precautions would include caging off the fuel store, provision of ventilation, catch all trays below fuel drums, fire extinguisher and an anti spill and mop up kit. The storage and refuelling zone should be signed for no smoking, naked lights or static electricity sources. Batteries should be turned off and the public access to the site restricted while refuelling.



The refuelling plan is managed to limiting the risk of fire and spills.

Cleaning response equipment:

Guidelines vary with types of equipment. You would not clean a marine radio with the same high pressure jet blaster used to clean the salt encrusted on a water transfer pump.

- Step 1** Consult Squad Maintenance Procedures.
- Step 2** Take the unit to the cleaning area, and prepared to SOPs.
- Step 3** Service the unit to the manufacturer's guidelines.
- Step 4** Stand to dry.

More thorough checks and repairs may also be required if damage was suspected or sustained. If at this thorough visual inspection a failure or potential for failure is identified, the offending utility should be removed from service, repaired and returned to service quickly. SOP's will also describe the procedure to report lost or damaged equipment.



Cleaning a fire pump.

Using the example of a typical unit, consider a Fire Fighting Pump. A typical procedure could be:

- Step 1** Consult the Squad Maintenance Procedures.
- Step 2** Take the pump to the cleaning area, ensuring it is prepared to SOPs.
- Step 3** Clean the pump and hoses to the manufacturer's guidelines.
- Step 4** Stand to dry.

During the wash down, as time permits a visual inspection would be made of the pump to ensure that the fuel was topped up, the oil quantity and quality adequate. If the pump was damaged it should be tagged as out of service and reported to the maintenance team.



Precautions need to be taken washing electrical units

A record of the jobs undertaken should be kept; the post-departure (make & mend) checklist. This will be useful as an aid to memory in completing the task. A typical post-departure checklist for the three vessels of a rescue squad is shown overleaf:

RESCUE DUCK (IRB) -POST-DEPARTURES SAFETY CHECKLIST	
Yes	Hose down.
Yes	Remove transom bungs, drain interior, replace bungs.
Yes	Flush motor and remove cowl.
Yes	Refuel, inspect fuel lines, filter and prop.
Yes	Inspect, dry and re-stow equipment as necessary.
Yes	Radio sign off and complete logbook.
RESCUE RIB -POST-DEPARTURES SAFETY CHECKLIST	
Yes	Hose down.
Yes	Remove transom bungs, drain interior, drain water ballast, replace bungs.
Yes	Flush motor and remove earmuffs.
Yes	Record engine hours.
Yes	Turn off battery master switch.
Yes	Refuel, inspect fuel lines, water separator and prop.
Yes	Inspect, dry and re-stow equipment as necessary.
Yes	Re-inflate as required.
Yes	Radio sign off and complete logbook.
R1 ENGINEERING -POST-DEPARTURES SAFETY CHECKLIST	
Yes	Centre helm, raise trim tabs, lower aerials, shut down motors/nav. electronics.
Yes	Hose down.
Yes	Check engine oil, fuel levels and fuel water separators, coolant level.
Yes	Visual check engine room condition (hoses, belts, raw water screen viewer, bilges.)
Yes	Visual check all areas for safe stowage and clearance for moving parts.
Yes	Inspect, dry and re-stow equipment as necessary. Open engine hatches to ventilate.
Yes	Turn off battery master switch, engine room lights and fly bridge radio.
Yes	Radio sign off and complete logbook.
BOAT SHED	
Yes	All lights off, all doors /windows locked/radio sign off as appropriate, alarm on.

Scheduled maintenance-Servicing periods

The maintenance schedule will list the weekly, fortnightly, monthly, three monthly and six monthly jobs.

The schedule itself will have been drawn up by the maintenance team by taking into account the industry/organisations written bench marks for meeting standards:

- Maintaining the Manufacturer's Specification. (the user/manufacturers manual)
- Meeting Safety Standards. (safety management manual)
- Meeting regulatory requirements of compliance. (OH&S and NSCV code)

(The National Standards for Commercial Vessels incorporates the International Maritime Organisation's SOLAS recommendations)

In a large rescue organisation there are a lot of jobs to be done, and this may be beyond the capabilities of the volunteer maintenance team alone. In this case, rosters for some of the maintenance jobs will have to be assigned to crewmen. A typical roster of weekly jobs checklist for the three vessels of a rescue squad is shown overleaf:

WEEKLY ROSTERED JOBS - ONE HOUR DURATION FOR TEAM			
Date	Initial	Job	Description
Week 1		1	R1- Polish Starboard hull.
Week 2		2	R1- Polish Port hull.
Week 3		3	R1- Polish upper works and where required.
Week 4		4	R1- Check props, rudders, trim tabs for operation. Flybridge steering reservoir level.(requires special hydraulic oil) Trim tab hydraulic oil levels Invert fire extinguishers Anchor locker & winch (clean) Engine air ventilator flap operation Fresh water reserves & flares & First aid equipment All house, navigation lights, torches & searchlights Operate toilet valves & pumps Bilge hoses and valves
Week 5		5	R1- Check all equipment. Clean E.R. & cabin. Wash lifejackets Radio & battery connections and electrolyte. Engine & batteries connections and electrolyte. Fuel filters and water separators Raw water filters Condition of belts, hoses & clamps Engine coolant levels (when cold) Gear box oil (note it is pressurized) Grease trolley wheels
Week 6		6	R1- Polish stainless fittings.
Week 7		7	RIB- Check all equipment. Check first aid kit Grease engine Fuel filters and water separator Remove prop & grease shaft Wash boat & jackets Grease trailer & oil winch cable Inflate pontoons Check lights, bilge pump, battery & terminals
Week 8		8	DUCK- Check all equipment. (plus first aid kit and tools in toolkit) Wash boat & life jackets Clean fuel filter Remove prop & grease shaft & grease engine Trailer checks- bearings, tyres, lights, rollers
Week 9		9	SHED- Clean & tidy lower floor Oil cable & inspect winch & mountings. Treat corrosion. Check fire pump operation, fittings & hoses. Spray with Innox. Check generator operation. Treat corrosion as necessary.

It will be seen that the skill levels for these more complex jobs will require instruction for trainees to participate effectively. Having identified what is required and the level of maintenance needed for each piece of equipment, a Trainee can complete the tasks with reference to the operator's handbook, or maintenance manuals.

The trainee should:

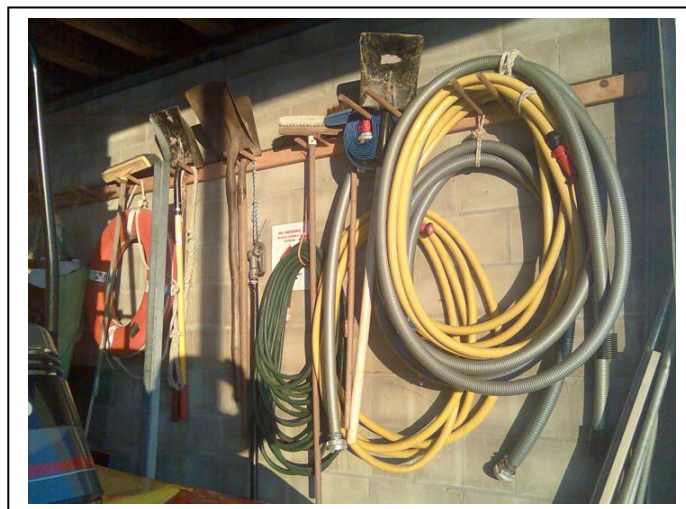
- Seek instructions and acknowledge receiving the instruction.
- Gather the relevant sources of information, and take them to the workplace.
- Undertake the task. If in doubt, ask.
- Report completion of the allocated task.
- Have your supervisor check the completed job.

Servicing response equipment

A typical servicing as per the manufacturers guidelines and squad procedures could be:

- Check 1** Check fuel supply, fill tank with the correct fuel.
- Check 2** Check lubricants, top up as necessary.
- Check 3** Check seals & "O" rings, connect coupling for fit and tightness.
- Check 4** Take pump to test area and with suction and delivery lines connected
Start pump and note the spray pressure.

Did the test of the pump meet the standards noted in the Manufacturer's guidelines? With a positive result, the pump and hoses can be dismantled, dried off and stored ready for its next usage. If the results were inadequate, report to your supervisor and seek instructions. If left awaiting a decision, tag the unit as pending repair, and place it with similar units.



Ensuring seals are in place and hoses dry

Always use relevant safe working practices during equipment maintenance that observe OH&S and environment protection regulations. Wash down effluent should not be allowed to drain into storm water or sewers. Your local authority can provide information on the proper disposal of the effluent of your wash down area.

Longer service periods may require contractors to be called in to assist the maintenance team.

Operational Procedures

Only experience can help the trained eye to pick up indicators of the beginning of a failing part, or advanced wear, which needs immediate attention. Your Trainer will explain in detail when a failing part or piece of equipment is encountered. Stick with your Trainer during repairs, as this will provide “hands on” experience. Some Squads send out specific repair work to a specialist service agent. If a Squad has the expertise within its members, it may carry out “in house” repairs. As this is all emergency response equipment, the agent or the competent repair member should move to repair, test and return the equipment to the Response Team ASAP.

Equipment service records

3.2 Equipment records are updated according to operational procedures.

Your Trainer will introduce you to the processes used in your Squad, usually one or more of those as set out below:

- ***Verbal, or scribbled notes*** - unreliable.
- ***Chalk or white boards*** - very visible to a called out crew if located correctly.
- ***Loose leaf record sheets*** - entered into a folder on completion.
- ***Card systems*** - cards recording servicing kept on each piece of equipment.
- ***Maintenance logs***- effective tracking & diagnostic books that don't go missing.
- ***Computer data bases***- facilitates cross referencing, compiling reports and updating but unavailable to response crew on call out.

What ever method or combination of methods the Squad uses, it must be ***clear, concise and accurate.***

Maintenance schedules are one of the essential Safety Management Procedures that aim to identify hazards and reduce risks. The workshop and its tools, cleaners, paints and solvents also create hazards and potential risks. Poisons and flammable substances should be appropriately stored and handled according to their Material Safety Data Sheets. Provision should be made for the secure storage of toxic material and an appropriate first aid station should be maintained.

Recovered Equipment

3.3 Equipment is recovered, restored and made ready for future use.

The RV has returned from an operation and has a muddy anchor and line. This equipment needs to be recovered from the vessel, restored by cleaning and checking

and returned to the RV ready for a future use. Set out below is one way of addressing the task:

- Remove the soiled anchor, chain and line from the anchor well.
- Transport it to a position where it can be cleaned by pressure jet.
- Clean the anchor and chain and set to dry.
- Clean and rinse the anchor line and place in a position where it can be dried.
- Restore the equipment to a working unit in the anchor locker, ready and fit for future use.
- Report completion of the task to the Skipper and enter the activity in the appropriate log book.

Summary

Preparing, maintaining and servicing can generally be classified as checks of:

- **Primary consumables** - Such as fuel, gas, electrical charge.
- **Ancillary consumables** - Lubricant, coolant, electrolyte levels.
- **Service items** - Filters, belts, globes, sharpening, replacement blades.
- **Diagnostic indicators**- Gauges, noise, exhaust.
- **Performance** - Power, flow rate, pressure checks, brightness.

During this process, it may become evident that some equipment is:

- Inoperative or operates ineffectively.
- Too many defects, too many anomalies.
- Dirty.
- Not fit for the purpose.

Report such problems to your Supervisor to ensure timely repairs/replacement and let **everyone** know if equipment is removed or unserviceable.



Written Activity- Clean, Service and Re-stow Equipment

Question 1 (5 Marks)

List five areas of a rescue vessel that require cleaning after return from a rescue mission.

Question 2 (5 Marks)

List five servicing items required on a rescue vessel after return from a rescue mission.

Question 3 (5 Marks)

List five portable items of equipment that could be used in a Rescue Response.

Question 4 (2 Marks)

What PPE's should be available for the maintenance team?

Question 5 (5 Marks)

Describe the procedure your Squad would use to clean, repair and return to service some portable emergency lighting equipment damaged during a recent operation.

Question 6 (5 Marks)

Describe four methods of maintaining records of the servicing of response equipment?

- 1 _____
- 2 _____
- 3 _____
- 4 _____

Which do you think is best, and say why?



Activity- Clean, Service and Re-stow Equipment

Your Skipper will provide as many opportunities as possible to practice the previous skills during simulated rescue operations or “on the job training”. Practice activities for this element of competency include:

- Studying Squad SOP’s for maintenance.
- Cleaning, maintaining and preparing equipment for response.
- Reporting and repair of unserviceable items.



Discuss with your team, the routine checks for the motor shown above. Remember to complete your log book.

1. Inspect Response Equipment

Equipment inspection

1.1 Equipment is inspected in accordance with operational procedures

While the term inspection can be used in a general sense, it is useful to distinguish between visual inspection, examination, survey and audit. The defined use of those terms would be:

- **Visual inspection** - A thorough visual check of the visible parts of equipment.
- **Examination** - A thorough visual and performance testing of accessible parts.
- **Survey** - Dismantling, measuring, performance testing and reassembling.
- **Audit** – Cataloging the organisation’s resources and their functionality.

The obvious purpose of inspections is the identification of faults to promote timely repair, so maintaining equipment in response readiness. The process is continuous, but there are levels of thoroughness and completeness. As the urgency of the response allows, at every call out a **visual check** will be made of the overall readiness for the operational requirements. At return from the job, more thorough checks, repairs, re-stocking and re-stowing prepare the vessel for the next call out. It might be at this visual inspection that a failure or potential for failure is identified. This would require an examination to resolve the problem and mend the utility.

A more complete general **examination** of utilities will await the maintenance schedule and its list of weekly, monthly, three monthly and six monthly jobs.



On the slips for the out of water survey.

Lastly the Commercial Vessels (or Rescue vessels) annual **survey** requires a twelve year cycle of inspections and dismantling testing and reassembling, and the NSW State Rescue Board annual accreditation **audit** closely inspects all aspects of the organisations equipment, resources, capabilities and preparedness.

The checklist below indicates a typical survey schedule of a commercial vessel.

<i>The schedule for vessels < 35 metres in length from Sect. 14 of the USL Code</i>	
Annual Surveys	
Date	Safety Equipment.
Date	Running trial of each main engine and associated gearbox. (Engine Hrs)
Date	Operational test of bilge pumps, bilge alarms and bilge valves
Date	Operation test of all valves in the fire main system.
Date	Operational test of all sea injection and overboard discharge valves and cocks.
Date	Operational test of main and emergency means of steering.
Date	Running trial of all machinery essential to the safe operation of the vessel.
Date	Inspection of all pipe arrangements.
Date	General examination of machinery installation and electrical installation.
Date	All safety and relief valves associated with the safe operation of the vessel to be set at the required working pressure.
Date	Pressure vessels, and associated mountings used for the generation of steam under pressure or the heating of water to a temperature exceeding 99° C
Date	Inspection of the liquefied petroleum gas installation.
Date	Inspection of escapes from engine room and accommodation spaces
Date	Inspection of personnel protection arrangements in machinery spaces.
Date	Inspection of cargo handling, fishing and trawling gear.
Date	Inspection of casings, superstructures, skylights, hatchways, companionways, bulwarks and guard rails, ventilators and air pipes, together with closing devices.
Date	Inspection of ground tackle (anchors and chains).
Two Yearly Surveys	
Date	Hull externally and internally except in way of tanks forming part of the structure.
Date	Sea injection and overboard discharge valves and cocks.
Date	Inspection of propellers, rudders and under water fittings.
Date	Pressure vessel and associate mountings of an air pressure/salt water system having a working pressure of more than 275 kPa.

Three Yearly	
Date	Compass adjustment
Four Yearly Surveys	
Date	Each screw and tube shaft.
Date	Anchors and cables to range.
Date	Chain locker internally.
Date	Tanks forming part of the hull, other than oil tanks, internally.
Date	Void spaces internally.
Date	Compressed air pressure vessels having a working pressure of more than 275 kPa and associated mountings.
Date	Pressure vessel and associated mountings of an air pressure/fresh water system having a working pressure of more than 275 kPa.
Date	Cargo handling, Fishing and trawling gear.
Date	Insulation test of all electrical installations above 32V A.C. or D.C.
Date	All safety and relief valves associated with the safe operation of the vessel to be set at the required working pressure.
Eight Yearly Surveys	
Date	Each rudder stock and rudder stock bearing
Date	Each rudder stock and rudder stock bearing
Date	Steering gear.
Date	Hull in way of removable ballast.
Date	Selected sections of internal structure in way of refrigerated space.
Twelve Yearly Surveys	
Date	Fuel oil tanks internally

Identification of missing parts

1.2 Missing parts are identified and reported according to organisational procedures

A typical procedure would require consulting the following:

- Squad SOP's, which will indicate the job and available supporting documents.
- Lost /damaged equipment report form, that sets out the details required to initiate the supply of a replacement part.
- Operators/users Handbook or Maintenance Manual, that usually provides a parts list and exploded views of the equipment, each part is numbered. These enable positive identification if missing parts, and correct part number for replacement. Check also that the method of securing the part is still serviceable (split pins, nyloc nuts, keyways, etc.); be specific about thread size & type; were washers used, what type and how many? The Supervisor will advise you if the part is available immediately or has to be ordered "in".

Experienced Supervisors can often initially direct you to examine for a common fault, to where in the stores a replacement can be readily found and to complete the replacement and servicing. Such instruction is termed an "operational directive"

So there are two ways to identify what is missing and how to replace it

- An Operational directive
- Use the Operators Handbook and the supporting documentation.

Faulty or damaged equipment is reported

1.3 Faulty or damaged equipment is reported and recorded in accordance with organisational procedures.

As a fault is found or a damaged item or a piece of equipment does not meet the Standards, the fault or damaged item is to be reported and recorded by one or more of the methods previously discussed in section 3.2 (Equipment service records):

- **Verbal-** needs to be clear & accurate and response crews must be briefed.
- **Chalk/white boards notes-** need to be where it will be seen by response crews.
- **Loose record sheets-** can be placed where it will be seen by response crews.
- **Maintenance logs -** can be placed where it will be seen by response crews.
- **Card systems-** is not visible to called out response crews.
- **Computer data bases-** is not visible to called out response crews.

It is vital that response crews are aware of equipment that has been removed from service or is temporarily working inadequately. Contribute to efficiency and safety in your workplace by ensuring that all crew know if a piece of equipment is out of service or faulty by **tagging** it. Don't leave it for another person to either use it, or repeat the procedure of inspection and testing.



Written Activity- Inspect Response Equipment

Question 7 (4 Marks)

What do the following words mean?

Visual inspection _____

Examination _____

Survey _____

Audit _____

Question 8 (2 Marks)

Name and describe the content of two documents that are useful in identifying missing parts.



Activity- Inspect Response Equipment

Your Skipper will provide as many opportunities as possible to practice the previous skills during simulated rescue operations or “on the job training”. Practice activities for this element of competency include:

- List the annual survey or accreditation items for your Rescue Vessel.
- Inspect one of these items.
- Check the serviceability of the items below .



Discuss with your team, the inspection of the items above. Remember to complete your log book.

2. Test Response Equipment

Equipment testing

2.1 Equipment is tested according to approved procedures and is fit for purpose, according to organisational standards.

When all the cleaning, maintaining and servicing has been completed, you must ensure that the item of equipment works satisfactorily, to the standards, by testing.

Testing

Two basic strategies for testing are:

- **Proof testing** - As its name suggests, proof testing is putting the equipment under load pressure and seeing if it is up to the strains of service. In fact, usually considerably more than would conceivably be encountered in normal use. An example would be a bosun's chair and lift that Marine Orders 32 (Cargo Gear) specifies should support four times the intended usage weight. The advantage of this type of testing is its low tech confirmation of the fitness of the equipment for the user's purposes. The disadvantage is that the equipment may well be destroyed, damaged or distorted in the testing process.
- **Specification (performance testing)** - Usually requiring a degree of technical skill and testing apparatus to ascertain if the equipment meets the specification standards. Unlike proof testing, performance testing is not destructive.

The specifications standards can be found by researching the:

- The Australian Standards.
- National Standards. (National Standards for Commercial Vessels/Marine Orders)
- State or Industry Standards (NSW State Rescue Board, NSW Maritime Authority, Workcover & BIA).
- Manufacturer's Guidelines

Having identified the standard to which the equipment should match in performance, you check your manufacturer's guidelines to identify the approved procedure of the testing.

Disassembly and reassembly

Specification testing will often require taking the equipment apart. This may be removing a prop shaft to set up on a centre lathe for testing wear tolerances, or disassembling a stainless steel steering ram and die testing for signs of fatigue fractures, etc. Conforming to a procedure of disassembly will save a lot of grief when it comes to reassembly.

Safety is a key issue and the importance of **isolating** power and fuel supply and appropriate use of personnel protective equipment cannot be over stated. Good lighting and a scrupulously clean dismantling area (perhaps a dust cloth below) will limit the loss of parts that resist coming loose only to fly off and disappear in the dirt. Contamination by oils and dirt is also reduced by attention to cleanliness.

Using the **correct tool** for the purpose it was designed for will avoid burring and damaging nuts, and probably avoid slicing the skin off your knuckles if the spanner slips. Marine components are often corroded and can be extremely resistant to separate. It is not unusual to resort to ever longer spanners, bigger hammers, soaking overnight in diesel or even heating with a blow torch. In the increasingly wilder efforts and mounting frustration resulting from such situations, it is well to pause and reconsider appropriate PPEs (visor, boots, gloves, dust mask). In removing a reluctant propeller, it is wise to remove the retaining split pin and propeller nut, then loosely refit the nut so that when the prop suddenly pops off the shaft, it does not fall on your toe.

Even though your manufacturer's manual with its engineers exploded diagram of components is a guide for reassembly, bearing wear often results in couplings and flanges that need to be reassembled as was. Before disassembly it is a good precaution to chalk/scratch aligning marks on both meeting surfaces. Likewise, a method of removing nuts, washers, springs, etc. and laying them out in the order of disassembly will greatly assist reassembly when no diagrams are available.

Equipment can contain extremely complex assemblies. It is a brave or foolish person who will attempt to dismantle a diesel rotary fuel pump and its many sprung components. The questions must always be asked, "**Can put it back together?**" or "**Have I got the skill and spares?**" or "**Is this a job for an expert?**"

Test result records

2.2 Test results are recorded according to regulatory and organisational requirements.

The recording methods could vary from one Squad to another. As well as tracking maintenance carried out, we also are obligated to maintain a record of the equipment being tested before being put back into service.

- **Reports** – not easily accessible.
- **Record sheets or maintenance logs** - effective and a tracking & diagnostic tool.
- **Card systems** - effective but time consuming.
- **Computer data bases**- effective but invisible to a called out crew.
- **Maintenance schedules** - kept in the service bay, they give instant access for all the maintenance team and facilitate subsequent preparation of reports.

Often, a combination of methods is used to best serve the needs of the Squad.

Defective equipment reports

2.3 Defective equipment and sub-standard test results are reported and recorded according to organisational procedures.

The result of tracking is of great benefit to your Squad purchasing officer and the members generally. If items manufactured by a certain Company are consistently failing, it is important to look for an alternate product. A Squad and its members can purchase wisely when such documented knowledge is readily available.

The reporting and recording procedure have been previously described in 1.2 (Identification of missing parts), 1.3 (Faulty or damaged equipment is reported) and 3.2 (Equipment service records).



Written Activity- Test Response Equipment

Question 9 (4 Marks)

What do the following words mean?

Testing _____

Tagging _____

Tracking _____

Isolating _____

Question 10 (4 Marks)

List four sources of specification standards useful for testing your Squads equipment.

Question 11 (2 Marks)

How does a proof test differ from a test to specification?

Question 12 (2 Marks)

How would you maintain a record of tested items?

Question 13 (4 Marks)

Describe the preparations and precautions for disassembling and reassembling a complex mechanical component.

Question 14 (1 Marks)

What precautions against pollution could be taken in the job of pressure washing the hull of a Rescue Vessel?



Activity- Test Response Equipment

Your Skipper will provide as many opportunities as possible to practice the previous skills during simulated rescue operations or “on the job training”. Practice activities for this element of competency include:

- Researching the manufacturer’s specifications for a response equipment utility.
- Removing, dismantling, testing to specification and reassembling a component.
- Documenting and preparing a report for an unserviceable item.



Discuss with your team, the tests for the bilge systems shown above. Remember to complete your log book.