CHAPTER 15

DAMAGE CONTROL PRACTICE

CONTENTS

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1501. Immediate Action in HQ1

If flooding from damage results in heel of more than a few degrees, the most urgent task confronting the MEO and the DCO (see Chapter 8) is to restore the ship to a stable and, if possible, upright condition. If the upright condition is impossible, the aim must be to obtain a heel, which is acceptable to the operation of weapons, including aircraft (it should be borne in mind that heel caused by floodwater is probably loll in a small ship and list in a big ship (see Chapter 29).

1502. Immediate Action at the FRPP

a. In conjunction with the urgent requirements of reporting and passing information, countermeasures must be started. Generally, personnel nearest to an incident, or discovering it, should start tackling the job themselves. Their priorities are:

(1) Raise the alarm.

(2) Initiate a continuous and aggressive attack on a fire.

(3) Ascertain and limit the extent of damage and flooding.

(4) Carry out first aid repairs.

b. Speed is vital in the early stages of combating damage. Although search and investigation of compartments and spaces must be done thoroughly, it must also be done quickly. Much damage will be readily apparent and the immediate plugging of a visible leak may well prevent a compartment from flooding when the leak would be no longer visible. Firefighting, leakstopping, clearing away debris etc are immediate actions.

1503. Hazards

Damage, particularly fire, is likely to be accompanied by smoke, perhaps dense, or by toxic or combustible gases. If the Officer or Senior Rating in charge considers that a dangerous atmosphere exists, those personnel dealing with the incident must wear breathing apparatus. Structural damage is likely to be the cause of further personal danger - sharp broken edges at head height, holes in decks, ladders missing, etc. Such dangers should be roped off and illuminated as soon as possible, but until this can be done, a sentry with a torch should be stationed to warn of the danger.

1504. Power Failure

Damage to electrical supplies will probably result in failure of lighting circuits. The restoration of lighting may be delayed because of more urgent work to be undertaken by the Electrical Repair Party, but it should be given reasonable priority for its marked effect on morale as well as progress of work. If power to essential equipment and machinery is lost and cannot be restored through alternative supplies, the DCO(L), in consultation with the MEO and DCO, must prioritise the supply of emergency power to equipment reflecting the Command Aim.

1505. Follow Up Action

a. Following the initial countermeasures, the urgent requirement is the establishment of fire/flooding boundaries, leakstopping, pumping, shoring weakened structure and the restoration of services.

b. The repair and control of damage in action is largely a matter of improvising to meet circumstances that cannot be foreseen exactly or in detail. The sole purpose of a warship is to be a fighting unit and her capability to fulfil this role must not be reduced unless such a reduction is essential to enable her to survive. Apart from this, all the resources of the ship must be made available to deal with damage. If it proves necessary to use items (eg mess tables and cushions) for purposes for which they were not intended, authority should be given without hesitation. Firefighting accepted, the most urgent need is to combat flooding, ie stop the leaks and pump out floodwater. Speed is of the utmost importance because:

(1) Extension of flooding must be stopped as soon as possible to preserve buoyancy and stability, and to prevent the loss of equipment and services essential to the ships seagoing and fighting efficiency.

(2) As compartments fill, the plugging of holes becomes progressively more difficult.

(3) The ship may heel and/or trim and bring above-water holes below the new waterline.

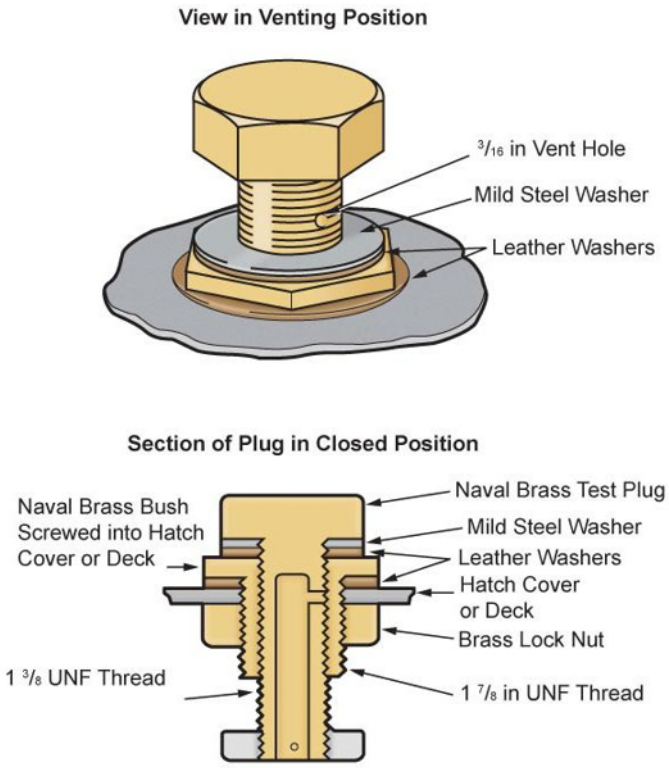
1506. Zones of Damage

An early appreciation of the zones of damage (see Para 1417) is essential before coordinated action can be taken. To this end, blanket search parties must be sent out immediately.

1507. Indicator Test Plugs

When a search is being made great care must be exercised not to spread flooding by the incautious opening of watertight doors and hatches. To enable tests for flooding to be made without opening compartments, indicator test plugs (ITP) are fitted to the crown of every watertight compartment (except those normally containing liquid in bulk) within the Red Risk Zone (see Chapter 5). ITPs are generally fitted to the hatch or manhole giving access to a compartment, but they may be fitted to any suitable and accessible part of the structure. The plug is a hollow bolt with a small hole at the side leading to the central bore. The bolt should be cautiously unscrewed until the hole at the side of the thread is exposed. If water spurts out the compartment is obviously full-flooded and the plug should be screwed home If nothing is seen the hatch may be cautiously lifted and the compartment examined. Test plugs to magazines and flammable storerooms have an elongated thread and are fitted with a nut and split pin to prevent complete withdrawal of the plug. Fig 15-1 illustrates a plug in the venting condition and also shows in section a plug fitted with a nut and split pin.

Fig 15-1. Indicator Test Plug



1508. Flooding Boundary

a. When a ship is damaged below water, the need for rapidly establishing the flooding boundary cannot be too highly stressed. Initially, the limits of the flooding boundary are the limits of the intact structure surrounding the area of the damage, ie inside the Secondary Zone and probably towards its outer edges. The immediate aims of the Repair Parties must be the reduction and eventual elimination of the slow flooding in the Secondary Zone. The ultimate objective is to reduce the flooding boundary until it coincides as nearly as possible with the Primary Zone. Unless the measures taken are prompt and effective, the Secondary Zone may become completely flooded. In deciding which bulkheads and decks are to form the flooding boundary it is necessary to:

(1) Ascertain which compartments are flooding or flooded as a direct result of damage.

(2) Inspect adjacent compartments to locate progressive flooding, its cause and to make certain what structure is sound.

(3) Decide in which compartment(s) the flooding can be stopped or controlled.

b. When the initial flooding boundary has been decided, energetic action must be taken to establish it and ensure its integrity by:

(1) Stopping leaks in the structure and isolating pipe systems until temporary repairs are carried out.

(2) Concurrently with leakstopping, rigging and working portable pumps and eductors (operating fixed pumping/draining/salvage systems if fitted).

(3) Shoring leaking doors and hatches.

(4) Shutting ventilation systems and drainage systems as necessary.

(5) Supporting strained/weakened/bulging bulkheads and decks with shores.

c. When the initial flooding boundary has been established, the next most urgent task is to reduce the area flooded as much as possible. Stopping leaks to bring the ingress of water to within the capacity of available pumps will allow the eventual reclamation of the compartment.

1509. Leakstopping and Shoring

Details of leakstopping, initial repair and shoring are contained in Chapter 16, Chapter 20 and BR 4008.

1510. Pipe Systems

Generally, the restoration of pipe systems is an after-action job to be tackled in slow time. Damage to the HP Sea Water Main, however, must be dealt with more urgently, even if only by temporary measures and these are described in Chapter 16.

1511. Cofferdams

a. Cofferdams are structures of wood and/or steel built to form temporary watertight barriers. They are generally constructed of tongued and grooved planking between 38 mm and 75 mm thick, secured to a framework of shoring timbers, but they can be made of steel plates suitably stiffened and welded. The usefulness of a cofferdam is mainly restricted to the waterline area and some uses are as follows:

(1) To restrict the spread of water from large holes in the ships side at or above the waterline, until repairs are made.

(2) As dwarf bulkheads to break up free surface area.

(3) To restrict the floodwater that might come up through a damaged deck.

(4) To allow access to a partially flooded compartment by blanking off the lower part of the door opening.

b. In most circumstances, a cofferdam needs to extend only about 500 mm above the damaged waterline but, in some cases, it might need to extend almost to the deckhead, leaving only enough space for access, suction hoses, etc. A cofferdam acting as a trunk between two hatches must obviously be made watertight throughout its length, and strength of construction must be carefully watched to prevent breakdown under pressure.

1512. Wreckage

When a ship sustains damage to the hull or internal structure it usually means a lot of distorted, torn and loose plating, beams, frames, etc, and before any form of watertight repair can be attempted, eg the fitting of a cofferdam, this torn and loose structure must be cut away or brought reasonably together. To cut the structure away quickly will require the use of a thermal lance cutting equipment as there will invariably be too much 'spring' in the metal to allow the use of cold chisels or hacksaws. If the edges of broken plating can be brought reasonably together it may be possible to weld or strap them. Weakened structure can be strengthened with doubling plates or stiffening angles secured by welding or the use of a Ramset explosive powered tool. Flapping plating in the hull is extremely dangerous and every effort must be made to cut it away or lash it securely. Damaged cables, lockers and fittings can be cut away for access, by the cutting and spreading equipment.

1513. Damage Repair Equipment

Some equipment in ships is carried specifically for damage control purposes, (eg shoring material and thermal lance) and must not be used for any other purpose. It must be borne in mind, however, that all the equipment and tools carried for normal daily maintenance can and should be used for the control and repair of action damage. Such equipment includes the ships welding and burning sets, lifting equipment and the tools contained in the various technical workshops.

1514. Ramset Explosive Powered Tool

WARNINGS

1. IF THE TOOL FAILS TO FIRE DO NOT REMOVE IT FROM THE WORK SURFACE FOR AT LEAST 30 SECS THEN CAREFULLY WITHDRAW IT AND KEEP THE MUZZLE POINTING IN A SAFE DIRECTION. UNLOCK AND OPEN THE TOOL AND REMOVE THE CHARGE.

2. MAKE NO ATTEMPT TO FIRE THE TOOL AT AN ANGLE (ALTHOUGH THE BUILT-IN SAFETY SHOULD PREVENT IT FIRING). ALWAYS HOLD THE TOOL PERPENDICULAR TO THE WORK SURFACE.

a. The Ramset tool is an explosive-powered fastening tool that is intended primarily for use in ships of comparatively light scantlings, and for the repair of damage structure above the waterline, (eg a breached citadel). It can be used in emergency, by order, for structural patching under shallow flooding provided that special precautions are taken. Use of the Ramset tool enables a patch plate and inserted rubber sheet to be 'nailed' to the parent plate. The Ramset tool has a 9.5 mm bore, is 375 mm in length and weighs 3.6 kg. It is simple to operate and can be used by comprehensively trained personnel. It is dangerous if abused or mishandled and all safety precautions must be strictly adhered to. Ramset training facilities are available at the MWS Phoenix Training Group (see Chapter 36).

Note. *Ramset training is given to CBRNDC 35 courses and the LET(ME)s through CBRNDC 29 Course.*

b. The fastening system consists of a steel drive pin (nail) that is 40 mm long with a 5.5 mm shank and a 9.5 mm diameter head, and a fastening charge. The fastening charge is colour coded to denote its power as follows:

Brown	Sub-charge for use on extra thin plating or aluminium.
Green	Light strength
Yellow	Medium strength
Red	Heavy strength

The weakest charge must always be used for the first firing, if necessary into a test plate, and increased to the strength necessary to drive the nail flush-headed into the patch plate. A red plastic tip is fitted to all nails to guide them in the barrel when fired. A nail must never be used without this red plastic tip in place. The outfit of charges supplied to a ship is particular to that ship and is decided solely by the thickness and type of plating in the ship.

c. A patch plate of up to 9 mm thickness can be secured to a parent plate up to 15 mm thick, provided that the total thickness of plating and rubber insert does not exceed 25 mm. For the strongest possible fastening, the nail should completely penetrate the parent plate and its head should be flush with the surface of the patch plate as the Ramset nail itself is the fastening medium. The elastic properties of the penetrated steel provide a vice-like grip of the shank of the nail and the holding power varies only with the thickness of steel penetrated.

d. The procedure for operation of the Ramset tool and the safety arrangements and precautions are as follows:

(1) **Safety of Personnel.** Despite built-in safety features, it is possible for plastic shrapnel to be produced during Ramset operation. The following personal safety equipment is therefore to be worn by the Ramset tool operator and all other personnel involved with, or in the vicinity of the work being undertaken:

(a) Overalls (correctly fastened).

(b) Ear defenders.

(c) Polycarbonate lens goggles.

(d) DMS boots.

(e) Full anti-flash.

(2) Where possible personnel other than the tool operator, should be kept 5 m from the immediate vicinity and remain out of the ‘line of fire’ from possible spalling/foreign objects which may result from the operation of the equipment.

(3) **When Handling the Tool Make Sure That:**

(a) The tool is not loaded until required for firing.

(b) The tool is not carried in the loaded condition.

(c) The shield is fitted.

(d) The tool is not pointed at the operator or other people, whether loaded or unloaded, and is kept pointed down.

(e) Casual onlookers are not allowed to gather, as they would be a hazard to the operator and to themselves.

(4) **To Load the Tool:**

(a) Grasp the handle with either hand. Do not place the finger on the trigger at any time except when intending to fire. Grasp the lower assembly with the other hand and rotate the handle 1/8th of a turn counter-clockwise. Draw the handle directly to the rear and swing it around until it rests against the lower assembly.

(b) If reloading after firing, eject the spent charge case with the positioning rod provided.

Fig 15-2. Ramset Tool and Operator

(c) With the breech clear, examine the barrel, chamber and breech face to ensure that no obstruction or abnormal condition exists.

(d) Insert the red-tipped drive pin (nail) point-first into the barrel.

(e) Insert breech plate and ensure fully home.

(f) Insert the charge (weakest strength for the first firing) into the chamber of the barrel. Press it firmly home with finger pressure only. Do not depend on the closing breech to seat the charge. Never attempt to lock the tool unless the rim of the charge is completely pressed into the chamber.

(g) With the charge fully seated, swing the handle and upper assembly into line with the lower and slide it forward as far as possible. Rotate the handle 1/8th of a turn clockwise to lock.

(h) The tool is now ready to fire.

(5) **Before Firing:**

(a) Make sure that no flammable vapours or materials are present or are likely to be present.

(b) Whenever possible, make sure that the other side of the parent plate is clear of obstruction and personnel.

(c) Wear the goggles that are supplied in the Ramset kit.

(6) **Firing:**

(a) Grasp the handle of the Ramset tool with one hand and the lower assembly with the other. Keep the finger clear of the trigger.

(b) Locate the barrel muzzle, by the location marks on the shield, with the desired fastening point.

(c) Depress the tool tight and square against the work until the yellow firing tip indicator shows flush with the top surface of the handle.

(d) Press the trigger.

(7) **Safety Arrangements.** The following safety arrangements are built into the Ramset tool:

(a) A visual yellow check button that shows flush with the handle when it is cocked.

(b) It cannot be fired at an angle to the work it must be square.

(c) It fails safe when the shield is removed.

(d) It will not fire if the barrel is inadvertently unscrewed.

(e) The breech automatically locks when it is cocked.

(f) It cannot be fired against a soft surface, eg clothing.

(g) It can only be fired in the correct sequence, ie cocking first, then pulling the trigger.

(h) It cannot be cocked if the breech is not properly locked.

(i) The cocking action and safety pawl lie perpendicular to each other so that it will not fire if dropped.

(j) It automatically unlocks with the release of cocking pressure.

(k) Firing gases are diverted on to the face of the blowback shield, completely eliminating bounce.

(l) The handle grip is neoprene and does not become slippery when wet.

e. One of the main uses of the Ramset tool is the repair of a breached citadel, which necessitates gastightness in the finished work. The patch plate should have an overlap of at least 100 mm more than the greatest dimension of the hole and before fitting it the parent plate should be faired as much as possible. The rubber insert must be the softest rubber available. The nails should be spaced approximately 75 mm apart and are started at the middle of the edges and worked towards the corners. The patch plate can be dressed with a hammer if necessary as work proceeds. To ensure gastightness, the completed repair should be sealed around the edges with masking tape or a sealing compound such as putty, cable gland compound, etc.

f. The Ramset tool supplied for use in the Service has some important differences to the standard tool, which allow its use under shallow flooding. These differences are as follows:

(1) A special safety shield is fitted (manufacturers part No 24203 instead of the standard part No 24168).

(2) A special threat protector cap is fitted (manufacturers part No 24202 instead of standard part No 24198).

(3) A special washer is located behind the firing pin (manufacturers part No 24205).

g. It is important to clean a tool that has been used underwater, immediately after use, to prevent corrosion. The cleaning routine is as follows:

(1) Make sure the tool is not loaded.

(2) Thoroughly rinse the tool in fresh water.

(3) Immerse the complete tool in a 2% solution of water soluble oil. To ensure the solution penetrates all parts of the tool, open and close the breech then, pressing against a firm surface, work the tool up and down.

(4) As soon as possible completely strip the tool, wash the parts in light oil, wipe the excess away to leave a thin film, and reassemble.

h. The explosive charges, which are packed 250 in a Box M64, are to be stowed in the small arms ammunition magazine. The MEO is to be responsible for the custody of the remainder of the equipment. It is recommended that the equipment should be stowed in a secure stowage within the Engineers' Ready Use Store.

1515. Thermal Lance Cutting Equipment

WARNINGS

1. THE TEMPERATURE AT THE ROD TIP IS 5000°C. THIS MAKES IT A VERY DANGEROUS PIECE OF EQUIPMENT. EXERCISE GREAT CAUTION AND ALLOW NOBODY WITHIN 3 METRES OF THE OPERATION.

2. THE MIXTURE OF OXYGEN AND ELECTRICITY IS POTENTIALLY LETHAL, UNTRAINED PERSONNEL MUST NOT USE THE THERMAL LANCE.

a. This damage control emergency cutting equipment is portable and allows the operator to cut ferrous, non-ferrous metals and most other material rapidly, with accuracy and control. It uses ultrathermic cutting rods that are precision mini thermic lances (ie iron wires encased in a tube through which oxygen is fed). The rods are ignited by a battery ignition system arcing between the rod and the hand-held striker. One rod will cut approximately 380 mm of 20 mm steel (dependant on the operator) and can be used in water up to 1 m deep. This will permit its use in personnel rescue and battle damage situations. Full details are contained in BR(F) 6589(402) - Damage Control Thermal Lance Cutting Equipment

b. The thermal lance equipment consists of six major components:

(1) Aluminium storage case.

(2) Body harness.

(3) Oxygen bottle and regulator.

(4) Batteries and cable assemblies.

(5) Cutting torch and striker plate.

(6) Ultrathermic rods.

c. Safety precautions are as follows:

(1) The correct dress when using the thermal lance is:

(a) Overalls worn over No 4s and cotton underwear.

(b) DMS boots.

(c) Anti flash hood.

(d) Welders goggles.

(e) Welders gloves.

(2) Be aware of the composition of the target material.

(3) Be aware of what is behind the target material.

(4) Clear the area of flammable materials.

(5) Keep bystanders a minimum of 3 m away.

(6) Never point the torch at anybody.

(7) Do not allow the positive and negative sides of the battery to contact.

(8) Untrained personnel are **NOT** to use the Thermal Lance. Training is carried out on the CBRNDC 35 Course, LET(ME) QC or by special arrangement with the MWS Phoenix Training Group (see Chapter 36).

d. Before using the thermal lance, the following preparations are to be made:

(1) Inspect all components for damage or wear. Check the batteries and oxygen bottle are fully charged (batteries are to be charged as a pair in series and should be kept fully charged at all times).

(2) Connect the cutting torch to the oxygen bottle and set the regulator to 90 - 120 psi (depending on application).

(3) Connect the batteries to the harness, cutting torch and striker (cutter torch in the right hand).

(4) Check the working area, remember painted and plated surfaces can give off lethal fumes to adequate ventilation must be provided.

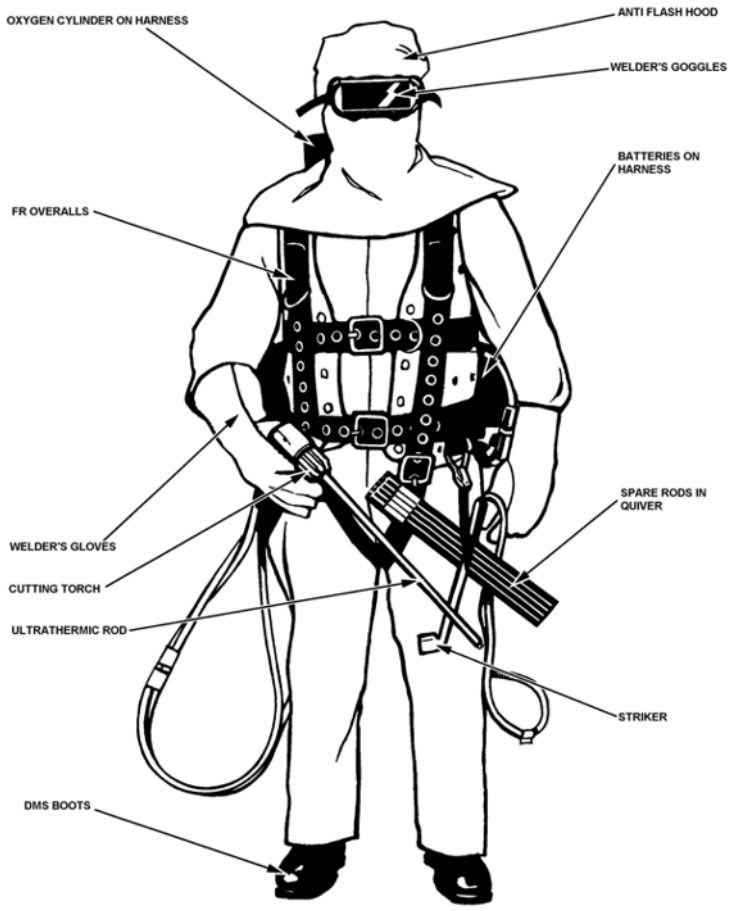
(5) Wear the correct safety clothing, including anti-flash, welder's goggles/ facemask and gauntlets.

e. When commencing cutting work:

(1) Open the oxygen bottle valve.

(2) With gauntlets on, undo the collet nut on the cutting torch and insert an ultrathermic rod (it will bottom out of the seating washer); tighten the collet nut.

Fig 15-3. Thermal Lance and Operator



(3) Point the rod away from the operator and bring it into contact with the cup of the striker plate; when the rod top starts sparkling introduce a light flow of oxygen into the cup by gently squeezing the oxygen control lever (a circular or scraping motion may help to effect ignition). When the rod has ignited keep the oxygen flowing and move the top to the work area. Put the striker aside where it will not hinder the work.

(4) The rod should be angled slightly to the direction of the cut and dragged along the cut line. The speed of movement should be slow enough to ensure the material is cut all the way through and the oxygen jet blows the molten material clear. Another technique is to use the torch like a saw. For comprehensive information on cutting methods refer to the makers handbook.

1516. Cutting and Spreading Equipment

a. The hydraulic cutting and spreading equipment (see Fig 15-4) is provided for clearance of wreckage after action damage. It is powered by an air-driven hydraulic pump, air being supplied from EDBA bottles, or from the ships LP or HP air systems. If compressed air is not available, a hand-operated hydraulic pump may also power the tool. The tool is capable of cutting steel bar of up to 25 mm diameter and steel plate typically used for the construction of ship bulkheads, doors, etc.

When used for spreading, the working arms exert a force of between 35 kN (3.6 tons) and 86 kN (8.7 tons), depending on the opening of the arms. The kit comprises an aluminium box containing the following components:

(1) Combined cutting and spreading tool and associated hydraulic hoses.

(2) Hydraulic hand pump.

(3) Air driven hydraulic pump (maximum air inlet pressure 8 bar).

(4) 2-stage air pressure reducer.

(5) Hydraulic pressure relief dust cap. This is required for releasing excess pressure in hoses if they have been stowed in a hot location, causing hydraulic locking of the self-sealing couplings.

(6) Adaptors and hoses for connecting the hydraulic pump to bottled air or ships air supply.

b. The equipment is only to be used by trained operators. The operator and all personnel involved with, or in the vicinity of the work being undertaken must be wearing overalls, safety helmet with visor or goggles, and heavy duty gloves. If heavy duty leather aprons are available they are to be used for protection purposes. Training is included in all Aircraft Handler Qualifying Courses, CBRNDC 35 Course and given to LET(ME)'s through the CBRNDC 29 Course. Additional training may be arranged with the MWS Phoenix Training Group booking office (see Chapter 36). Detailed operation and maintenance instructions are provided in a handbook in each kit. Operation of the tool is by a 'dead mans handle' that is turned one way for cutting and the other way for spreading. When this handle is released the tool stops operating. When used for cutting, it is essential that the tool be held at 90° to the material being sheared, to prevent the blades being forced apart and damaged. For spreading, the tips of the tool are inserted between the areas to be spread. If the gap is too small, spread the arms and insert one tip, close the arms and bend the fixed material away to provide a wider gap.

1517. Displacement of Floodwater

The loss of buoyancy due to a free flooded compartment can be considerable. If the ships outer bottom is holed and repair parties cannot reach the damaged area, consideration should be given to displacing the floodwater by:

a. Inflatable fenders or aircraft salvage bags, if the compartment is still accessible.

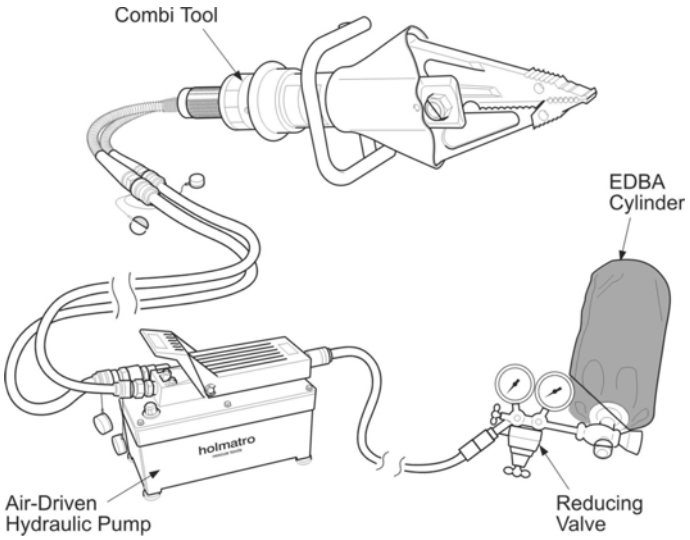
b. LP air via an improvised connection (eg indicator test plug) on the compartment boundary, or by divers, where available, via the holes in the hull.

1518. Counterflooding to Reduce List

a. Counterflooding to correct adverse list can be undertaken only in ships that have a fair degree of longitudinal subdivision. This will not be found in small ships but ballast tanks incorporated into the structure can be used for a similar effect. The results obtained from filling or emptying such tanks are listed in the CBRNDC Class Book.

b. Counterflooding is generally used only to give an immediate correction to dangerous list or list that nullifies the ships armament. For damage floodwater to cause list it must be off-centre, which is only really possible in ships with longitudinal subdivision. Special arrangements for counterflooding are fitted in aircraft carriers. The ballast system in Assault Ships can be used for counterflooding if necessary.

Fig 15-4. Cutting and Spreading Equipment



c. Should the total correction available by counterflooding be insufficient to bring the ship back to an acceptable level, it may become necessary to flood selected watertight compartments at the expense of the equipment they contain. This can usually be done only by hose from the HP Sea Water (HPSW) main and usually entails closing down a section of the HPSW main or accepting a loss of pressure in the section concerned. Any form of deliberate flooding results in a loss of reserve buoyancy and though it produces quick and effective corrections to heel and trim it must be regarded as an interim measure only. As soon as it becomes possible to undertake the lengthier process of transferring liquid (fuel and fresh water) the deliberately flooded compartments must be pumped out and the transference and pumping out must be done together to avoid undue changes in the stability condition of the ship. Due regard must be given to the relative leverages of the compartments involved. Counterflooding and the transfer of liquid weight must be restricted to that necessary to restore the operational efficiency of the ship.

1519. Responsibility for Counterflooding

Captains Standing Orders should allow for sufficient counterflooding to be carried out immediately covering the most urgent requirements. The MEO is wholly responsible up to these limits. Should he consider more counterflooding to be necessary, permission must be requested from the Command who would make the decision in the light of the tactical situation, remaining freeboard, weather conditions, etc. It is important that immediately a compartment has been flooded up to its crown, the valves are shut to prevent extension of flooding, straining of the deckhead or free communication of floodwater. The MEO must keep the stability condition of the ship under constant review. The DCO should give any necessary orders for transference of fuel and the working of fuel tanks to ensure an uninterrupted supply to the main engines. He must also issue any orders necessary for the isolation of the HPSW main and the operation of all pumps associated with damage control.

1520. Tactical Considerations

If the ship stops listing before the angle of deck-edge immersion is reached and is not rolling heavily, the danger of capsize is not immediate and counterflooding should be stopped. The decision to counterflood further should then be governed by the tactical situation, ie whether the use of armament or the operation of aircraft is required, or by the necessity of urgent repair work. If none of these requirements exists, the heel should be corrected by the transfer of liquid weights. Great care must be taken to differentiate between list and loll. Generally, if a ship with longitudinal subdivision is heeling, the condition is list. A ship with little or no longitudinal subdivision (transversely constructed) can rarely attain a condition of list if the heel is caused by floodwater, and loll must be assumed (see Chapter 29).

1521. Salvage of Ships with Hazardous Cargoes

When rendering damage control assistance to merchant ships, the dangers from hazardous cargoes must be considered. To expedite the identification of such hazards detailed guidance is provided in BRd 2170(2) Chapter 5.

1522. Telescopic Damage Control Ladder

a. **Description.** The ladder is supplied with unique safety stabiliser bars, fitted with large rubber feet in order to protect floor surfaces and give effective grip in all positions. It weighs 11.5 kg and takes a maximum load of 150 kg and opens and closes 'rung by rung', and can be used at various heights up to 3.85 m (see Fig 15-5). It is only to be opened to the height that is required, therefore giving increased manoeuvrability, particularly in confined spaces. It is extremely compact in storage and transportation (880 mm high x 480 mm); however if stored or transported with the stabiliser fitted the width is increased to 690 mm. For ease of transportation and protection of the ladder it is supplied with a heavy duty carry bag incorporating a shoulder strap and carry handle. The ladders are also supplied with full instructions.

b. **Concept of Use.** Currently each platform carries an emergency rigid ladder. This ladder is used in an emergency to gain access to compartments, for instance following fires in main machinery spaces; allowing a route into the space to fight a fire when the original access point is damaged. However, problems are encountered when using the rigid ladder as it is cumbersome, bulky and slow to deploy. The Telescopic Damage Control Ladder has been introduced to enhance the onboard damage control capability particularly following battle damage and will aid and facilitate in the evacuation of and the access to compartments during emergencies. The Telescopic Damage Control ladder that has the ability to collapse to a small size, is lightweight and easily manoeuvrable in a confined space.

c. Although this ladder offers some advantages over the rigid ladder it is not a replacement for it. The telescopic ladder is intended to complement the rigid ladder offering additional flexibility. There remains a requirement for rigid ladders, which serve multiple purposes both onboard and when disembarked, for example disaster relief and can take a greater load than the telescopic variant. The telescopic ladder is not to be used for any purpose other than DC&FF training or real incidents.

Fig 15-5. Telescopic Damage Control Ladder

d. The stores NSN and the entitlement list is available in BRd 2170(3) Chapter 3. Due to the valuable and attractive nature of these items they have been classified as Permanent stores and must be accounted for on a PLR. This ladder is not intended for use by HM Submarines and is **NOT** be demanded by them.

e. **Stowage.** Ladders are to be stored at each FRPP/ZCP or Section Base. Where entitlement does not meet numbers of FRPPs/ZCP or Section Base then they are to be allocated on a priority basis. Local securing arrangements are to be provided with appropriate consideration given to noise hygiene and securing for action requirements.

f. **Training.** There is no requirement for specialist training with this piece of equipment due to the inherently simple design of the ladder. However, Ship's Staff and in particular CBRNDCQs are to ensure that the written instructions are clearly understood. Consideration should be given to use of this item during CBRNDC circuit training and/or FRPP training as required by ships individual training programmes. All courses at MWS Phoenix Training Group will receive a basic brief on the use of this ladder during Damage Control training.