USCGC STRATTON (WMSL 752)

DAMAGE CONTROL HANDBOOK

TEN COMMANDMENTS

OF

DAMAGE CONTROL

I. **THOU SHALT KEEP OUR SHIP WATER TIGHT.**

II. **THOU SHALT NOT VIOLATE OUR MATERIAL CONDITION.**

III. **THOU SHALT BELIEVE IN OUR SHIP AND IN HER ABILITY TO WITHSTAND SEVERE DAMAGE.**

IV. **THOU SHALT KNOW THY WAY ABOUT OUR SHIP EVEN THOUGH THOU ARE IN TOTAL DARKNESS.**

V. **THOU SHALT KNOW THE USE OF THY DAMAGE CONTROL EQUIPMENT AND KEEP IT PROPERLY MAINTAINED.**

VI. **THOU SHALT REPORT ANY DAMAGE TO THE CLOSEST DAMAGE CONTROL STATION.**

VII. **THOU SHALT KEEP THY PERSONAL ITEMS SECURED AT ALL TIMES.**

VIII. **THOU SHALT PRACTICE PERSONAL DAMAGE CONTROL. THOU SHALT PROTECT THY SELF SO THAT THOU CAN PROTECT OUR SHIP.**

IX. **THOU SHALT TAKE EVERY POSSIBLE STEP TO SAVE OUR SHIP AS LONG AS A BIT OF HOPE REMAINS.**

X. **THOU SHALT NOT GIVE UP OUR SHIP!**

WATCH QUARTER STATION BILL

ASSIGNMENTS

NAME: _____

MOORING STATIONS: _____

SPECIAL SEA DETAIL: _____

GENERAL EMERGENCY: _____

ABANDON SHIP STATION/PROVIDE: _____

MAN OVERBOARD/PROVIDE: _____

AMIO, SECURITY BREECH: _____

ANCHOR DETAIL: _____

LOW VISIBILITY: _____

RESCUE & ASSISTANCE: _____

TOWING BILL: _____

GENERAL QUARTERS: _____

LAW ENFORCEMENT DETAIL: _____

SHIP'S PERSONNEL

COMMANDING OFFICER (CO) _____

EXECUTIVE OFFICER (XO) _____

ENGINEER OFFICER (EO) _____

OPERATIONS OFFICER (OPS) _____

WEAPONS OFFICER (WEPS) _____

DAMAGE CONTROL ASSISTANT (DCA) _____

COMMAND ENLISTED ADVISOR (CEA) _____

YOUR:

DEPARTMENT HEAD _____

DIVISION OFFICER _____

DIVISION CHIEF _____

PERSONAL INFORMATION

BERTHING AREA: _____

NEAREST PHONE: _____

NEAREST FIRE EXTINGUISHER: _____

EMERGENCY ESCAPE ROUTE: _____

IMPORTANT PHONE NUMBERS

QUARTERDECK	Ext: _____
BRIDGE	Ext: _____
DAMAGE CONTROL CENTRAL	Ext: _____
ENGINEERING CONTROL CENTER	Ext: _____
REPAIR 2	Ext: _____
REPAIR 3	Ext: _____

NOTES

The most effective and valuable member of a repair party is one who can step into any role.

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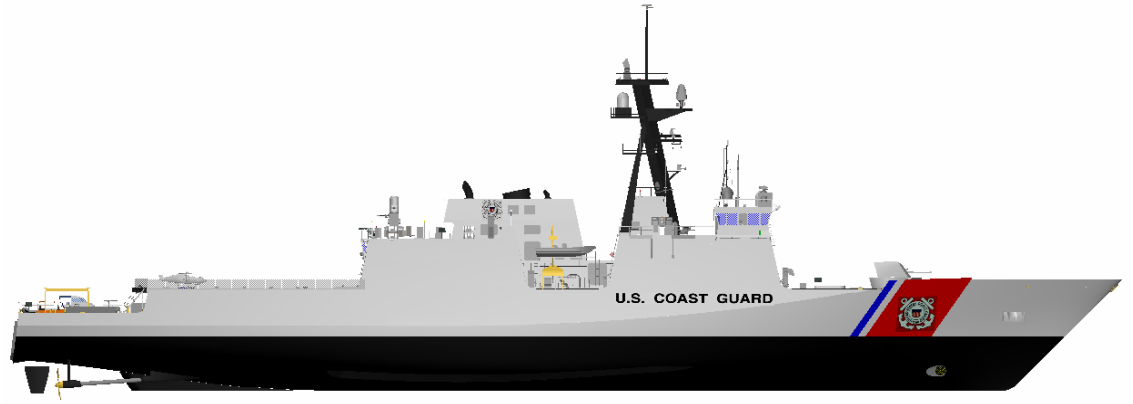
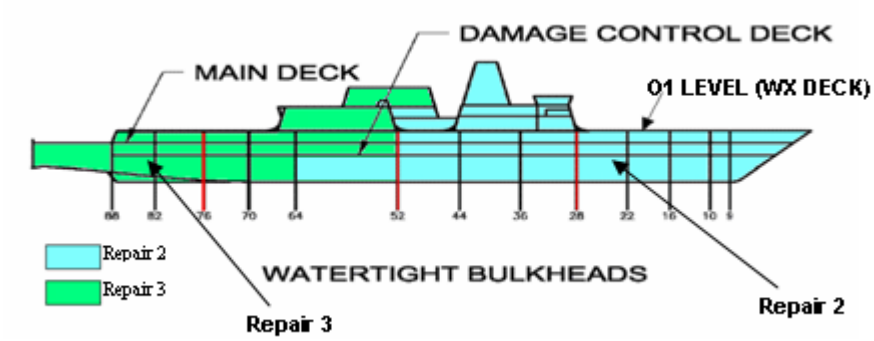


Ship Characteristics

Main WMSL design features	These are the main WMSL design features.	
	Feature	**Specification**
	Complement	Crewing: 111 (15 Officers, 15 CPO, 81 Enlisted) Berthing: 146 (20 Officers, 14 CPO, 114 Enlisted) Helicopters: 2 Small Boats: 3
	Displacement	Full Load: 4306 LT Lightship: 3206 LT
	Length	Overall: 418’ 7” Waterline: 390’ 0”
	Max Beam	54’
	Draft	Full Load: 15’4” Navigational 21’ 0”
	Max Speed	28 knots
	Range	12,000 Nautical Miles
	Armament	(1) 57 MM, MK110/MOD0 Bofors Gun (1) 20MM MK15/MOD21 Phalanx Close-In Weapons System (CIWS) (2) 7.62MM M260B Machine Guns (4) .50 CAL M2HB Machine Guns (2) MK137/MOD4 SRBOC Launchers (2) MK137/MOD10 Nulka Launchers
	Main propulsion	• Combined Diesel and Gas Turbine System (CODAG) • MPDE X2 – MTU 20V 1163 TB93 DIESEL 9724 BHP @ 1350 RPM • MGT X1 – GE LM2500 GAS TURBINE 29500 SHP @ 3600 RPM • 2X Renk Reduction Gears • 1X Renk Cross Connect Gear
	Electrical power	• SSDG X3 Caterpillar 3512B Series II, 12 Cylinders, 1360 KW @ 1800 RPM, 3 Phase, 60 HZ, 450 VAC, 2181 Amp
	Longitudinal Frame Spacing	4’ Spacing
	Miscellaneous	• Height of mast 140 ft • Height of eye at the bridge 65’-2 ¾” ft • Height of eye at the flying bridge 75’-7 5/16” ft

Ship Characteristics

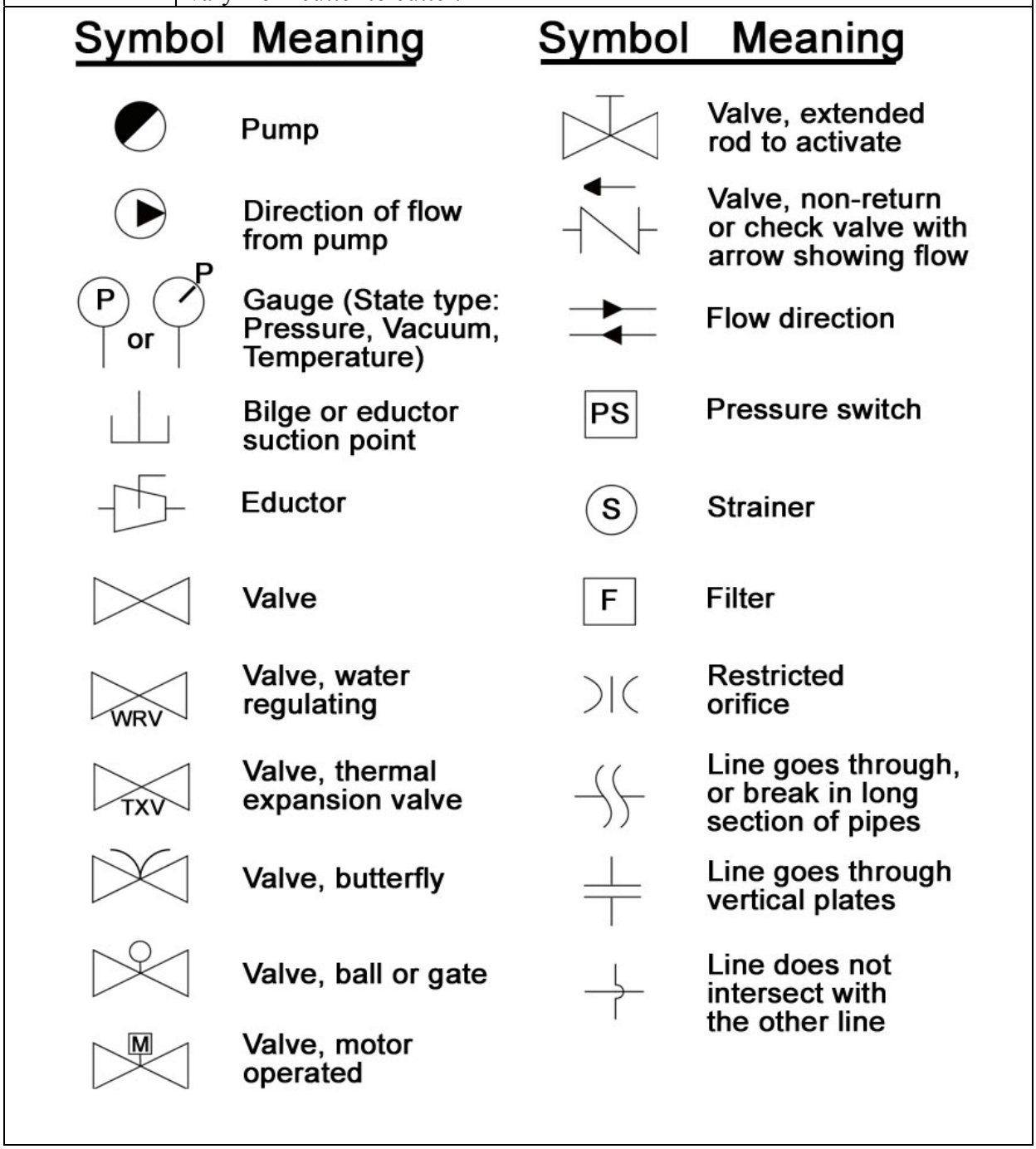
Description	CGC STRATTON has four decks and four levels. Decks divide a ship into layers the way floors divide a building into stories. The main deck, or 1st deck, is the uppermost of the decks that run continuously from bow to stern, this deck is also known as the DC deck. The second, third, and fourth decks are numbered in sequence from topside down. Any deck above the main deck is called a level. The first level above the main deck is the 01 level, the second, the 02 level, etc.
Damage Control Zones	**Transverse bulkheads:** *13 Watertight Bulkheads* Frames 9, 10, 16, 22, 28, 36, 44, 52, 64, 70, 76, 82, 88 **Damage Control deck:** Second Deck. **Fire Zone Bulkheads**: Frames 28, 52, 76 (4 Zones) 
Important Spaces	AMR – Auxiliary Machinery Room FMMR – Forward Main Machinery Room AMMR – Aft Main Machinery Room CIC – Combat Information Center ECR – Engine Control Room DCC – Damage Control Central

Piping System Colors

System	Color	System	Color
Firemain and Plugs	Red	HP Air	Dark Gray
AFFF	Striped Red/Green	LP Air	Tan
AFFF Concentrate	Striped Red/Light Blue	Salt Water	Dark Green
Potable Water	Dark Blue	Sewage	Gold
Chill Water	Striped Light Blue/Green	Steam	White
Fuel Oil/Gasoline	Yellow	Feed Water	Light Blue
Lube Oil	Striped Yellow/Black	JP-5	Purple
Refrigerants	Dark Purple	Hydraulic Fluid	Orange

Basic System Drawing Symbols

Purpose of the symbols	The following legend identifies some of the more common symbols that may be used in developing the required system drawings. Actual symbol use may vary from cutter to cutter.

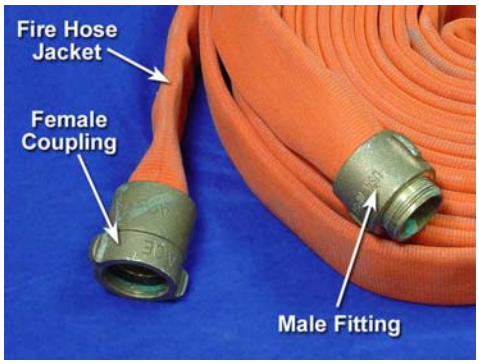


Installed Damage Control Systems

Overview	The main damage control features of STRATTON include: • Damage Control Central (DCC), Repair II and III • Installed DC systems • Portable DC equipment • DC closures, sensors, and alarms.
Installed Systems	The installed DC systems in STRATTON are designed to provide quick access to appropriate agents for fire and flooding incidents that may occur throughout the cutter. The installed DC systems include the • Firemain system • Drainage systems (eductors) • Aqueous Film-Forming Foam (AFFF) system • Carbon dioxide (CO2) system • Galley hood (APC) system. • FM200 (HFP) • Water Mist
Description	DC Central (DCC) and DC repair lockers are located on the 2nd deck. These spaces provide a coordination center and stowage area for damage control gear used to counter damage caused by fire, flooding, collision, toxic leaks, and other emergencies. The cutter's DC and repair equipment is distributed between the two repair lockers to maximize access and minimize gear loss in the event of a major casualty.
Location	The locations of DC compartments on the main deck are: • DC Central (2-52-1-E) • DC Repair II (2-22-2-Q) • DC Repair III (2-82-0-Q)
DC Central (DCC)	DCC is co-located with the Engineering Control Room (2-52-1-E). DCC accommodates the personnel and equipment necessary to carry out the DC coordination role. The cutter's DC plans, systems diagrams, and documentation are kept in DCC. It also has clinometers to monitor the cutter's pitch, roll, and trim.
AFFF	• 2 Stations – 225 Gal Tanks (2-28-1-E) & (2-61-0-E) • 6 Hose Reels – AMR, FMMR, AMMR, Port/Stbd Hangar, Aft Boat Deck • 8 Sprinklers – Port/Stbd Hangars, JP-5 Pump Room, Incinerator Room, AMR/FMMR/AMMR/SSDG #3 Bilges • 2 Monitors – Port/Stbd Top of Hangar • 21AFFF Canisters • 9 Portable Inline Eductors • Spare AFFF Canisters located in various locations throughout the ship
Magazine Sprinkler Systems	57mm Magazine Small Arms Magazine CIWS Magazine
Water Mist System	• 2 Stations – (2-28-3-Q) & (2-64-2-Q) - 112 gallon Primary Tanks Supplied by Secondary tanks 2,220 gallons Fwd & 2,160 gallons Aft. (Tanks are one level above stations) • 4 Sprinklers Groups – AMR, FMMR, AMMR, #3 SSDG Room

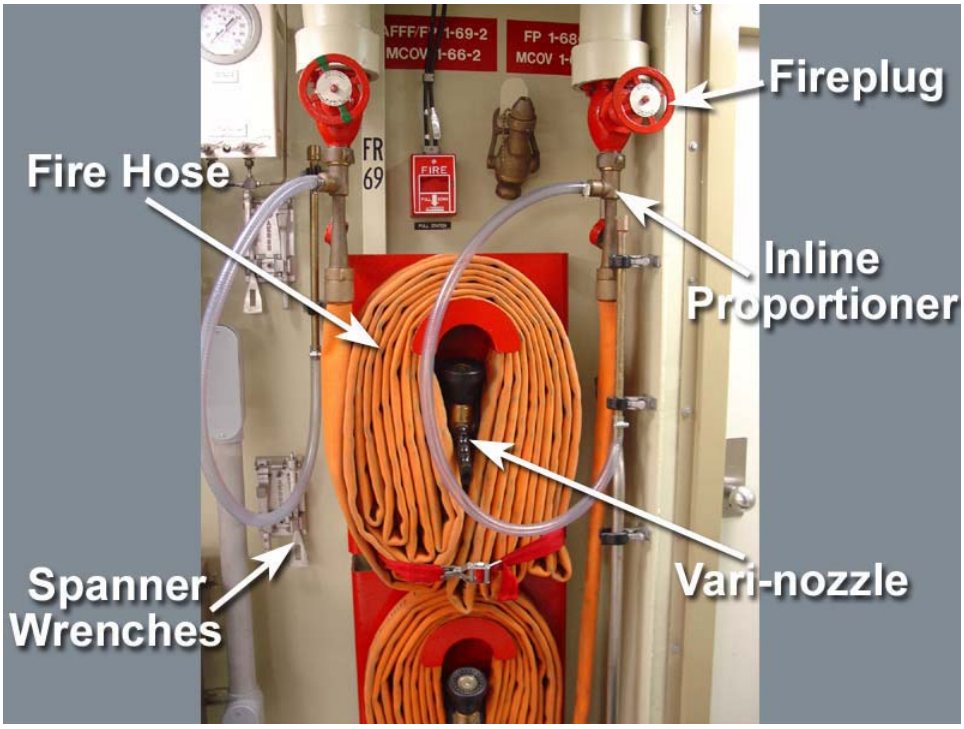
Installed Damage Control Systems

Firemain

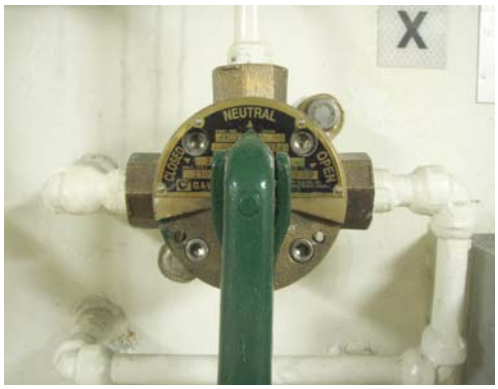
Firemain Overview	The firemain system uses piping and pumps to draw seawater from the sea chest and distribute it throughout the cutter for firefighting and a variety of other purposes. The firemain is a single main, dry riser system that can be divided into two sections using the zebra isolation valve.
Fire pump Features	Each fire pump is electric motor-driven and is rated for 1000 gallons-per-minute (GPM) at 125 PSI. Pump #1 – Bow Thruster Room (3-10-0-Q) Pump #2 – AMR (5-36-01-E) Pump #3 – FMMR (5-44-01-E) Pump #4 – AMMR (5-52-01-E) Pump #5 – Aft Pump Room (4-72-01-E)
Firefighting Hose Stations	• 97 Stations • 100 ft of 1 ½" Hose (1 ¾" Connections) • Vari-Nozzle • 2 Spanner Wrenches There are 97 hose stations on the various decks and levels of the cutter. Each hose station holds 100 feet of 1 ½ inch hose. While only one 50 foot section of hose is hooked-up on interior stations, all exterior stations have 100 feet of 1 ¾ inch hose hooked-up. The necessary vari-nozzle (forward is off, pull back to energize with 30-90 degree fog pattern), and spanner wrenches are also provided.
View of Firemain Valve and Fire Station	 

Installed Damage Control Systems

View of Firemain Shore Supply and P-100 Hook-up Connection	There are five manifolds that provide a shore supply for the firemain: Port/Stbd Foc'sle, Port/Stbd Notch, Aft Boat Deck
Firemain Services	In addition to the firefighting hose stations, the firemain can also supply water for the following systems via cross-connects. • Dewatering Eductors • AFFF system • Wash Down Counter Measure (WDCM) • Tank Fill Connections (ballast manifold) • Emergency Auxiliary Seawater Supply. • Magazines Sprinklers
Cutout Valves Maintain Integrity	Cutout valves (COV) allow for isolation of the firemain for damage control or maintenance purposes. These valves are installed on the main as well as on the risers, junctions, and pump suction and discharge points.
Fire Fighting Hose Stowage	If not "camel backed" on a station, store the hose with the male threads protected. This is done by folding the hose in half with the male end 4 feet shorter than the female end and rolling the folded end towards the female end.



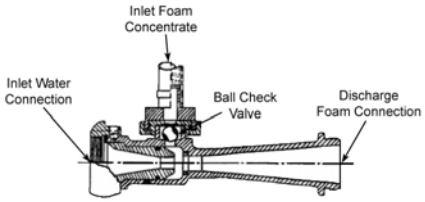
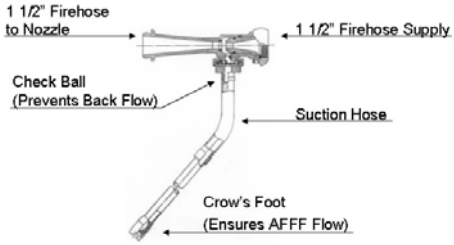
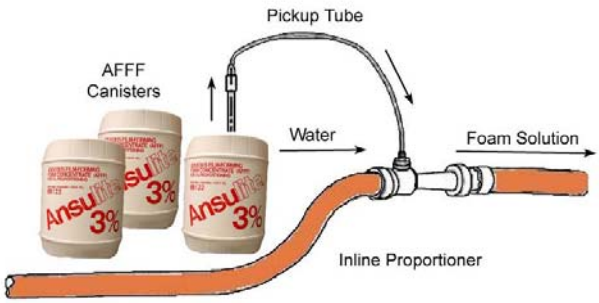
Installed Damage Control Systems

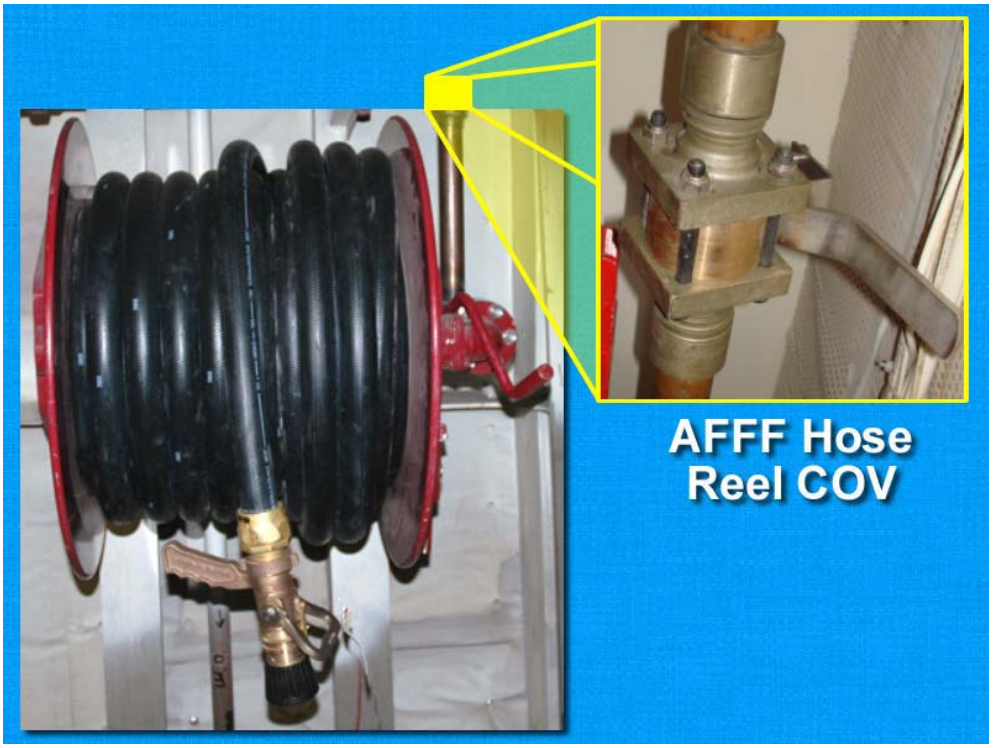
Firemain Supply to the Magazine	This system is a manually operated system from the fire main. It is activated through a hydraulic valve by one of two "three-way" manual control valves. These valves are located in compartment (4-52-01-M) and outside of Rep II. There are two magazine sprinkler groups: One group floods the 57mm and Small Arms magazine simultaneously, the other group floods the CIWS magazine.
View of the Remote Station for the Magazine	
The Commanding Officers permission (the OOD's permission in port) is required before flooding the Magazines.	

Main Drainage System

Main Drainage System	The drainage system utilizes two installed dewatering pumps and a series of installed eductors to dewater spaces in the event of flooding.

AFFF System

AFFF System Features	The Aqueous Film-Forming Foam (AFFF) System is used to combat class BRAVO fires. The system is made up of • fixed proportioning stations • bilge sprinkling nozzles • AFFF hose stations.	
Views of AFFF control station and proportioning station	The AFFF system incorporates a concentrate storage tank (225 gallon capacity), a motor driven pump and distribution pipes. This system is broken down into three main distribution methods. These methods are controlled by motorized and manual valves. The three methods are: 1. Hose Reels 2. Monitors 3. Machinery Room Bilge sprinklers 4. Overhead sprinklers in the Hangers, Incinerator rm. and SSDG # 3	Photo of AFFF station
AFFF inline eductors	Located around the ship are **inline eductors**. Used with 95 gpm vari-nozzles, inline eductors are inserted into 5 gallon containers of AFFF concentrate and provide the mixture of **3% AFFF and 97% water** to the nozzle. Using an inline eductor with a 5 gallon container of AFFF, the container will last approximately 50 seconds under continuous use.	
View of AFFF in-line eductors	 	
		

View of a Hose Reel Station And Monitor	

Installed Damage Control Systems

HFP System (FM200)

HFP System Overview	The HFP System is used to extinguish Class A, B or C fires in the Paint Locker, HazMat storage, and Flammable Storage Locker. The system uses Heptafluoropropane gas in cylinders pressurized with Nitrogen.
Location	• Flammable Liquid Stores 1-79-4-K • HazMat Stores 1-76-8-K • Paint Locker 1-76-6-K • Pull stations are located outside the main access (Main Deck)
CAUTION	Produces Toxic Gas when exposed to fire: **Personnel must EVACUATE space when activated!**
View of Pull Box and HFP tanks	

CO2 System

CO2 Systems overview	STRATTON has an installed CO_2 System in the Main Gas Turbine Enclosure. It is activated from a remote control station outside FMMR or at a local pull station on the port side aft upper level of FMMR. Once activated Audio and visual alarms will activate in FMMR to inform personnel in the space. The system has primary and secondary shots in case the first shot is insufficient.
CO2 caution!	Carbon dioxide displaces oxygen in a fire space in order to extinguish the fire. **Any personnel remaining in a space when CO2 is released risk death due to lack of oxygen**.
View of a "pull" box & Alarm Indicator	

Aqueous Potassium Carbonate

APC System Overview	The galley hood over the deep fat fryer and griddle is equipped with a "wet chemical solution extinguishing" fire protection system commonly referred to as a "Gaylord" hood. The system sprays an Aqueous Potassium Carbonate (APC) liquid through spray heads located under the hood.
Activating the galley hood system	The APC system will activate automatically (by a fusible link) when the temperature under the hood reaches a temperature of 360° F. There is also a manual operation capability that allows on-scene personnel to activate the extinguishing system if the need should arise. The remote actuator is located just inside the non-tight door (NTD) leading from the galley to the messdeck. The galley hood ventilation system and deep fat fryer are automatically secured when the extinguishing system is activated.
View of the APC system installed in the galley	

Counter Measure Washdown System

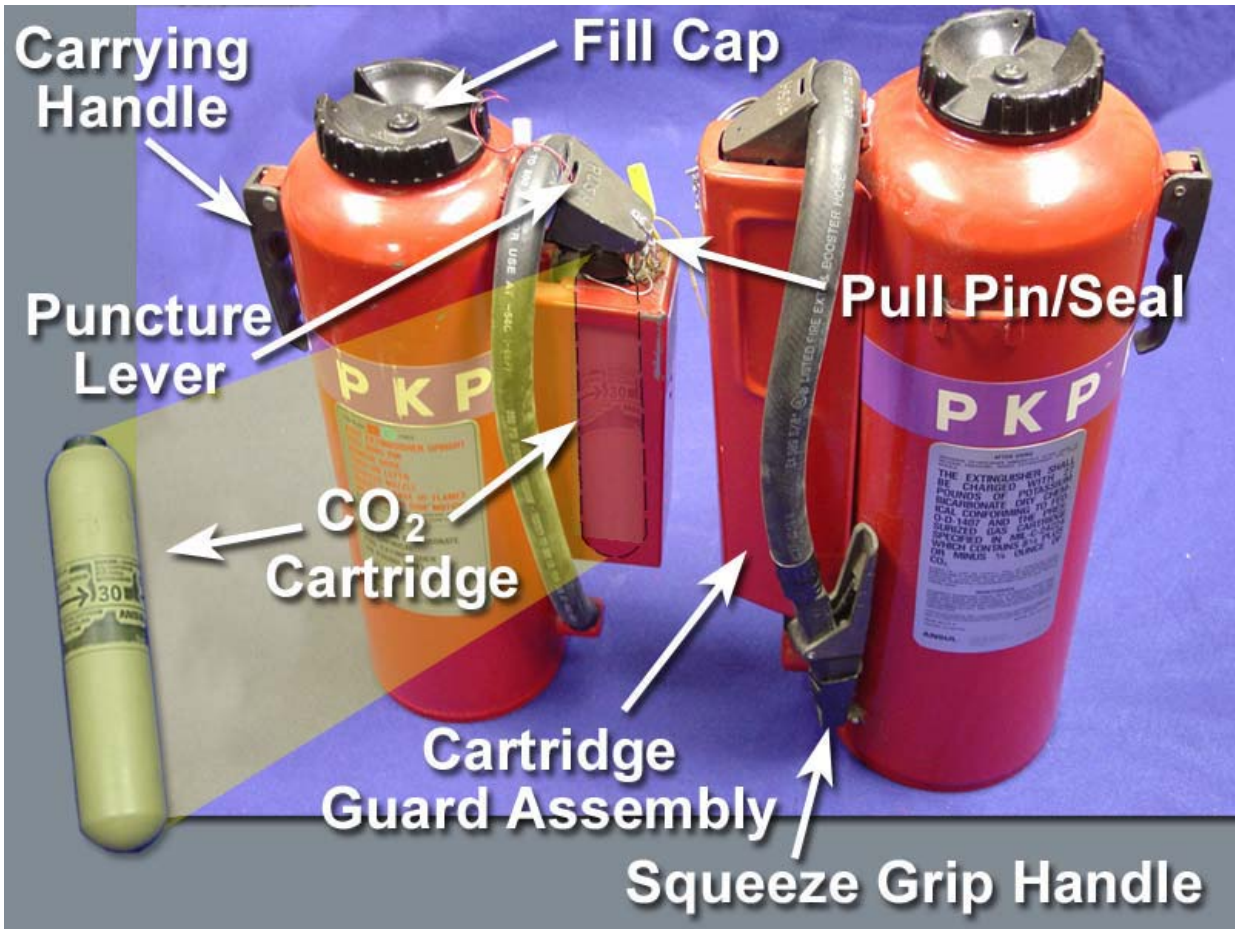
CMWD System Overview	The Counter Measure Wash Down System is separated into five zones: The Foc'sle, the forward superstructure, the aft superstructures, flight deck and the aft boat deck. The system is supplied by the firemain and can be operated locally or remotely using MCMS. The CMWD is used in the event of a suspected or actual chemical, biological, or nuclear attack. The system, if used early enough and properly, dramatically reduces the decontamination times for these attacks.
Activating the CMWD System	The CMWD system can be activated using local switches located near the five check valves, one for each of the zones in the system. The system can also be activated remotely using MCMS, the Machinery Control and Monitoring System. The system requires a minimum of four fire pumps to run, but it requires all five pumps for optimal performance.
View of the CMWD Zone 1 Check Valve	

Water Mist System

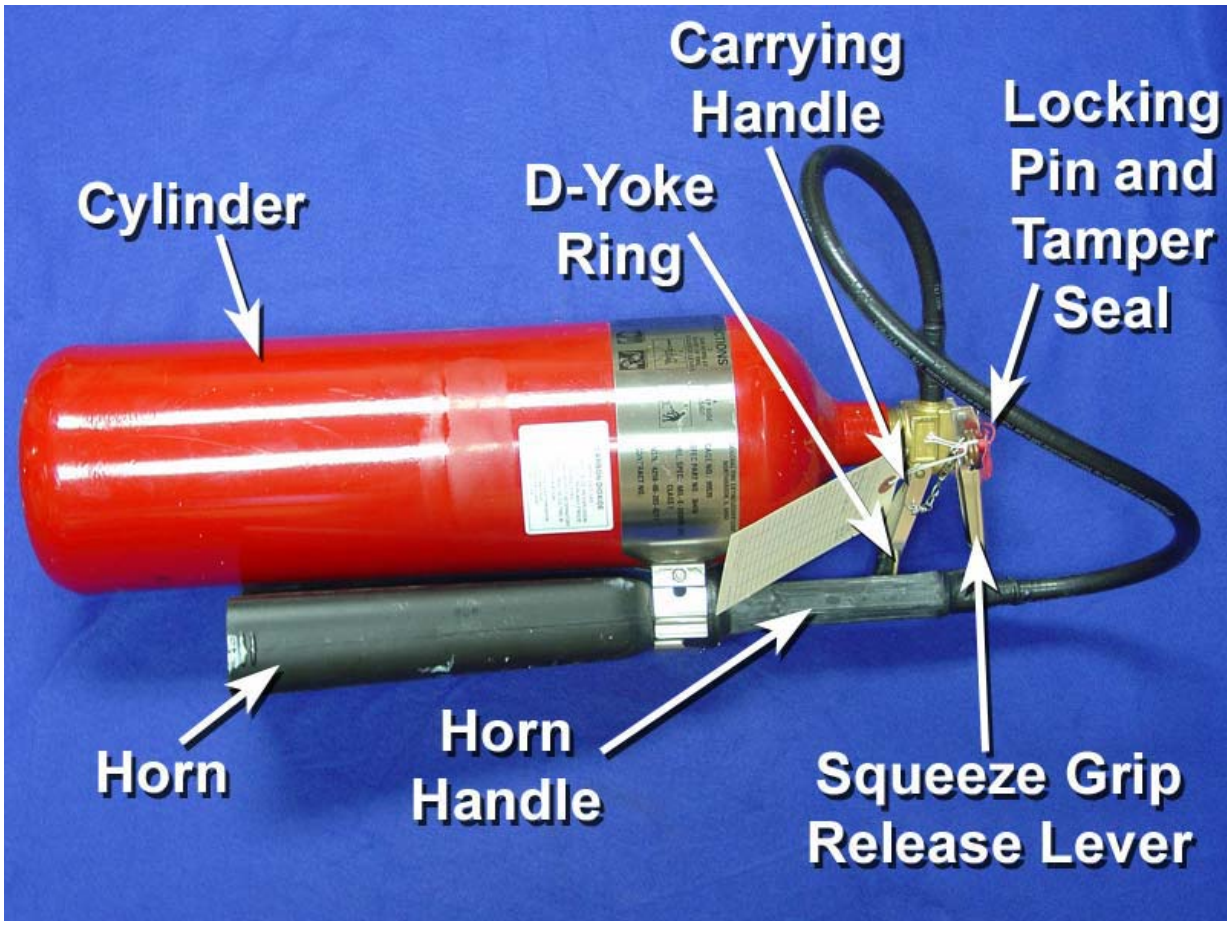
Water Mist System Overview	The water mist system is a fire suppression system for the machinery spaces that uses high pressure fresh water to create a fine mist that is safe even for electronics. The system is designed to put out fires by rapidly cooling the machinery spaces.
Water Mist System Features	The system is activated locally or through MCMS. There are two separate storage tanks for the water that are fed by the potable water system, one fore and one aft. Each tank has low pressure and high pressure pumps to raise the water pressure to the required levels. The system has a zebra segregation valve that divides it fore and aft, but if opened it allows either station to supply the sprinklers in any of the four machinery spaces.
View of the Forward Water Mist Station.	

Portable Damage Control Equipment

Overview	The primary portable DC equipment on board STRATTON consists of: • PKP extinguishers • CO2 extinguishers • AFFF Extinguishers • Portable pumps • DC supplies (pipe patching kit, plugging kit, shoring kit…)	
PKP Extinguisher Features	18 lb Extinguisher • Range: 19 ft • Duration: 14 seconds • Number: 15 • Location: Berthing/Office area • Two at entrance to area where Bravo Fire may occur	27 lb Extinguisher • Range: 21 ft • Duration: 20 seconds • Number: 8 • Location: Machinery Spaces
	PKP is used in short bursts to knock down flames with a **sweeping motion**. It is **highly corrosive to electrical components** and equipment.	

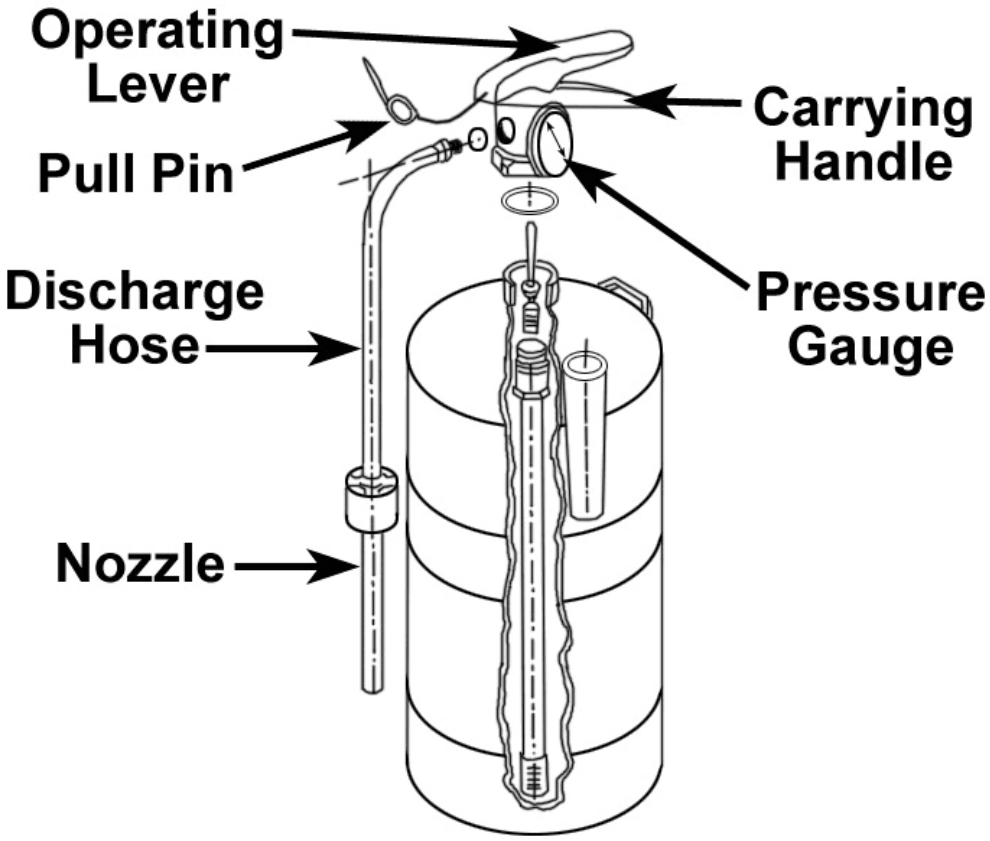


CO2 extinguisher features	15 lb Extinguisher • Duration: 40-45 • Range: 4-6 ft • Number: 72	**Ground the cylinder** to the deck to avoid static shock and keep hands clear of the horn to avoid frostbite.
	• Effective against class A and B, and is the preferred agent for class C fires. • CO2 extinguishers are provided to protect major electrical or electronic equipment such as generators, motors, switchboards, and equipment controls. • To use a 15lb CO2 extinguisher, stand with the outer horn **4-6 feet away** from the fire and **aim at the base**.	



Portable Damage Control Equipment

AFFF extinguisher features	• Number : 21 • 11 lb extinguisher • Range: 10-12 ft • Duration: 55 seconds Locations : #3 Gen Rm.; FMMR ; AMMR ; R/O Rm ; JP-5 Rm ; Bow Thruster Rm ; Passage way 2-88-0-L for steering gear Rms ; Fantail frame 86 boat/helo refueling ; Incinerator Rm ; Flight deck access doors ; 1 fwd in each hanger for port and Stbd refueling stations.



Portable Damage Control Equipment

P-100	• Number: 5 • Fuel Tank Capacity: 1.45 Gal / 2.75 hours • Pump Capacity: 100 GPM @ 83 psi w/ 20 ft lift 68 GPM @ 45 psi w/ 39 ft lift • Engine: Air cooled, single cylinder, four cycle diesel rated at 10 hp • Pumps can be rigged in tandem to provide deep suction for lower spaces • 3" inch suction, 2.5" discharge Locations of the pumps are Port and Stbd sides of the Foc'sle and fantail as well as 1 pump located in the Rescue Station

Eductors

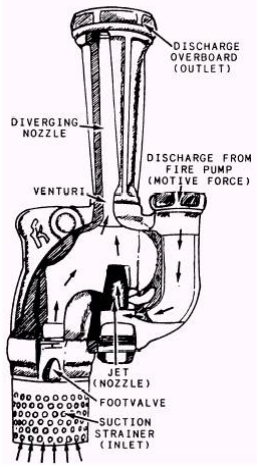
Portable eductors are used for dewatering operations and can pump contaminated water because they are powered by the flow of water through fixed jets instead of an electric motor. As a rule, an eductor will discharge twice the GPM it receives.

The maximum flow rate through the Peri-jet eductor is 530 GPM. It has a 2½" inlet and a 4" discharge with standard fire hose connections. It can pump small debris, including rags, up to 2" in size. Each repair locker has one Peri-jet eductor and one S-type eductor. The table below details the description and functions of the two portable eductor's onboard STRATTON:

TYPE	DESCRIPTION	FUNCTION
Peri-jet	2½ inch fire hose supply 4 inch fire hose discharge	Supplies water from source Discharges water Prevents backflush
S-type	1 ½ inch fire hose supply 2 ½ inch fire hose discharge	Supplies water from pump source Discharges water

TYPE	ADVANTAGE	DISADVANTAGE
Peri-jet	7% more efficient than Navy S-type Able to pass large debris up to 2½ inch diameter	Does not have a built in foot valve Does not have a strainer
S-type	Able to pass small debris Able to connect to any 1 ½ inch fire station	Does not have a built in strainer

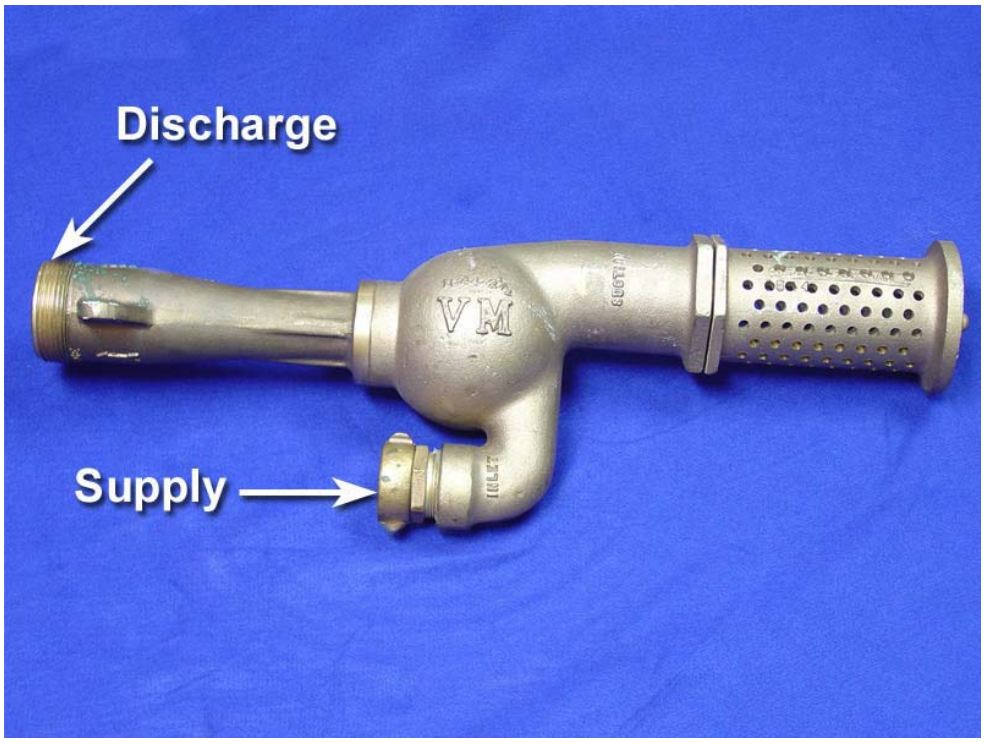
Set up a Portable Eductor following the steps below:



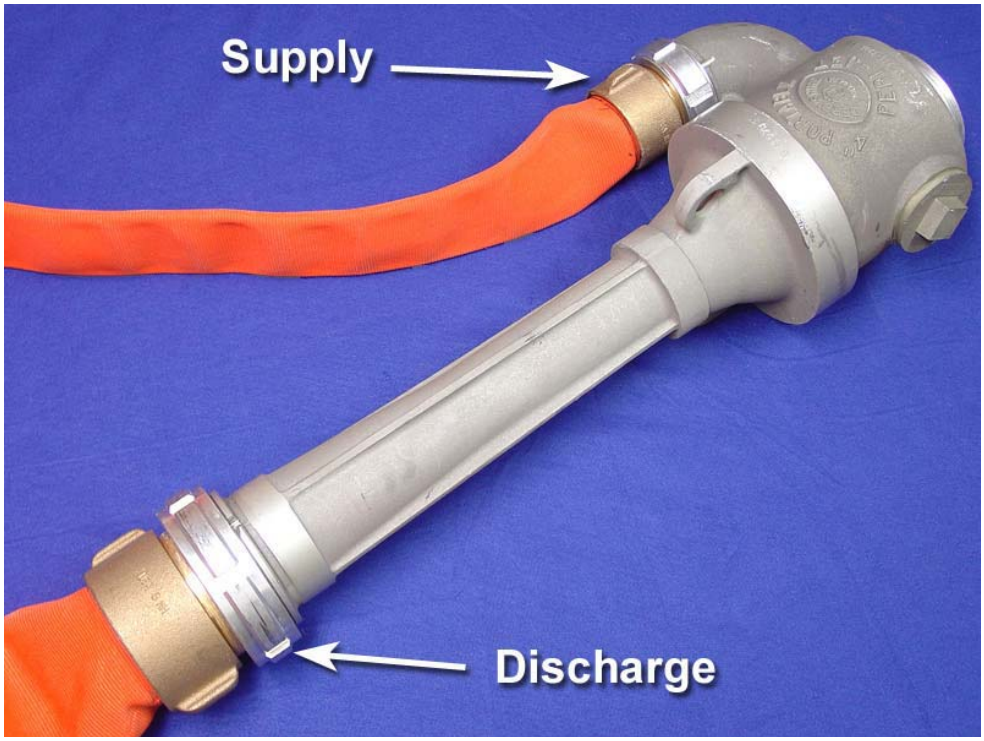
Connect a foot valve to the peri-jet (using a 3 inch to 4 inch adapter). Ensure that there aren't any kinks in the discharge hose and that the eductor has enough water pressure. Formula: static head x 1.3 = minimum pressure

Example: 50' x 1.3 = 64.95 psi

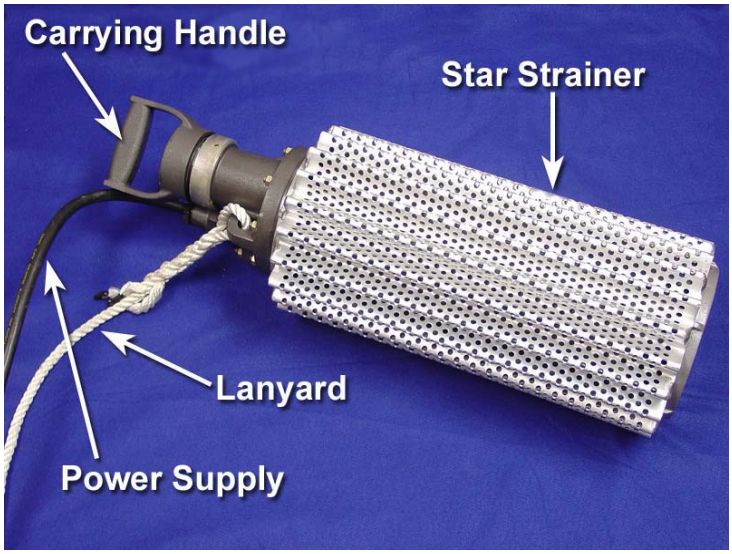
S-type



Peri-jet

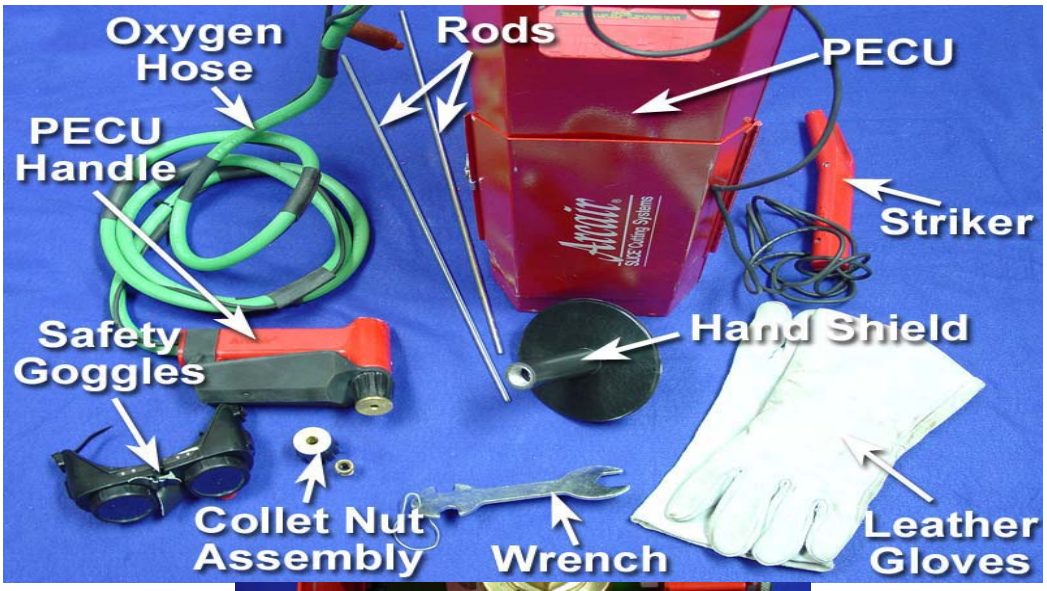


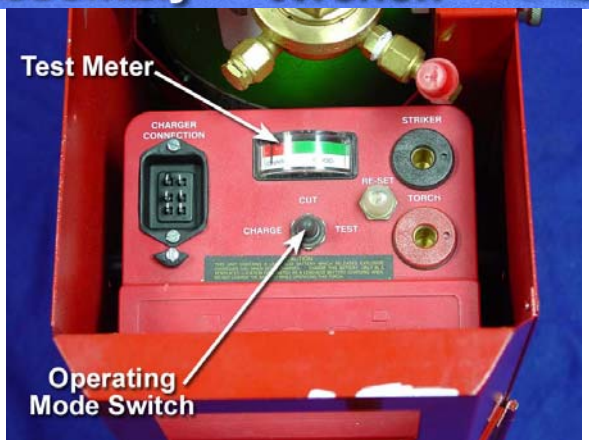
Portable Damage Control Equipment

Electrical submersible pumps	STRATTON is outfitted with 4 - 440V electrical submersible pumps (2 per Repair Locker). These pumps consists of : • Submersible pump • Star Strainer and Basket Strainer • Two 50' lengths of 2½ inch discharge hose (each) • 75' of electrical power cable, and a tool kit. (each) • Two can be run in **tandem** to increase the lift starting the **bottom pump first.** Need a **2½" double female adapter** to connect bottom pump discharge hose to top pump suction side.
Flow Rate	• 180 gallons per minute with a 50 foot static head • 140 gallons per minute with a 70 foot static head • **** No gasoline or heavy oils. Marine grade diesel can be pumped in an emergency. ****
Locations of Sub pump Outlets	2nd Deck, 1 per Watertight compartment • 2-10-0-A (FR 16 next to QAWTD) • 2-16-1-L (Next to Mag. check Valves) • 2-22-0-L (Ad to A/C Space Access) • 2-28-1-Q (Above AFFF Station) • 2-36-0-L (Outside SR 2-36-8-L) • 2-44-0-L (Outside FMMR Access) • 2-55-2-Q (DC Shop, Behind Welding Table) • 2-62-2 (AMMR Vestibule) • 2-64-2-L (Adj. to Up Ladder) • 2-70-2-L (Adj. to Down Ladder) • 2-76-2-L (Adj. FPL 100, 2-81-2) • 2-82-01-L (Adj. SR 2-82-4-L)
View of Submersible Pump and Pump Outlet	 

Portable Damage Control Equipment

Portable Exothermic Cutting Unit (PECU)	The PECU is used to cut holes in steel and aluminum decks or bulkheads so that a firefighting nozzle, or suction hose, may be inserted to fight a fire or control flooding. The unit can also be used to cut away mangled debris that would hinder access to personnel. The PECU uses the exothermic process; this is a chemical reaction between a carbon steel rod, heat, and oxygen. Oxygen flows through the rod. Once the oxygen is flowing through the rod, the tip of the rod is ignited with a spark from a 12 V battery. Once the reaction begins, the rod will continue to burn as long as the oxygen flow continues or until the rod is consumed. This process creates enough heat to cut or melt through most metals, glass, concrete, fiberglass and other materials. ***Always* ensure you have the proper safety gear. Proper safety gear includes steel toe boots, earplugs, leathers, hardhat, leather gloves and cutting goggles with a minimum shade protection of 5.**





Portable Damage Control Equipment

DC Supplies Overview	The cutter's fire and salvage equipment is primarily stored in the DC Repair Lockers, some materials however are distributed throughout the cutter to expedite access to them, and to minimize loss that could occur if everything was stored in one area that was damaged. Examples of these materials include • Self Contained Breathing Apparatus (SCBA) • Submersible pump outfits • Salvage pump kits • Exothermic cutting torch • Shoring materials • Portable Electric-Powered All-Purpose Rescue Set (PEARS)

Ship Structure

Ship's Components	• **Keel:** The backbone of the ship. All of the major components of the ship's watertight hull are attached to the keel. • **Frames:** The strength member within the watertight form that runs athwart ships, throughout the length of the hull. • **Hull plates:** The skin of the ship. • **Decks:** Provide additional hull strength and protection for the internal components. • **Bulkheads:** Vertical partitions between decks that run either transverse or longitudinally and serve, together with the ship's decks, to make up its compartmentation and subdivision. • **Superstructure**: Solid part of the ship above the main deck. Excludes masts, stacks, etc. • **Perpendiculars**: Vertical lines drawn from the forward- and aft-most points on the design waterline

Compartmentation

Compartment Numbering	Every space aboard STRATTON is assigned an identifying compartment number. This number is clearly marked by a label painted or secured to the door, hatch, or bulkhead of the space known as a "BULL'S-EYE".
View of a Compartment Number	Compartment numbers are made up of several components, all designed to give a quick orientation as to where the space is located on the cutter and what its general function is. (Figure 10-1)

(1) Compartment bull's eyes are to be applied in each space or compartment to identify the space, displaying the tac-number, the frames which bound the space and the division responsible for that space. An example is shown in Figure 10-1.

(2) A bull's eye should be visible from each access to the space.

(3) Lettering will be blue, two-inches in height and applied over a 12-inch high by 15-inch wide photo luminescent label.

(4) Spaces that can be accessed from the exterior of the ship will have painted bull's eyes, a yellow background with two inch high black letters.

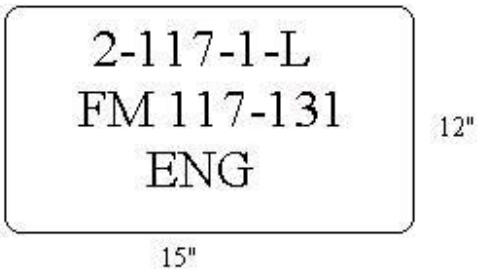


Figure 10-1 Compartment Bulls-Eye

Note: Last three letters designate what department is responsible for that space.

Compartment Numbering Components

This table describes each component of the following compartment number.

5-52-01-E

Component	Meaning	General Description
"5"	On the 5th deck	This is the lowest deck or level of the compartment. Some compartments span several decks, such as the main machinery rooms.
"52"	Forward bulkhead is on frame 52	This is the forward most bulkhead of the space. The STRATTON frames number from 0 to 99.
"01"	Majority of the space is on the Starboard side with some of the compartment on the port side	This number tells to which side, and how far away the space is from the centerline. • **0** = On the centerline • **1** and **3** (odd numbers) = Starboard of centerline (inboard to outboard) • **01** and **03** = Starboard side with some of the compartment crossing over centerline • **2** and **4** (even numbers) = Port of centerline (inboard to outboard) • **02** and **04** = Port side with some of the compartment crossing over centerline
"E"	Machinery space	This component describes the type of space (based on the following table).

A	Storage areas	M	Magazines
AA	Cargo holds	T	Vertical access
C	Command & Control	V	Voids
E	Machinery space	Q	All other spaces
WW	Cargo water tanks	W	Water tanks
FF	Cargo fuel tanks	F	Fuel tanks
L	Living spaces	J	JP-5

Frames forward of the Forward Perpendicular are given a single letter name (A, B, C, etc.) and frames aft of the Aft Perpendicular are given a double letter name (AA, BB, CC, etc.)

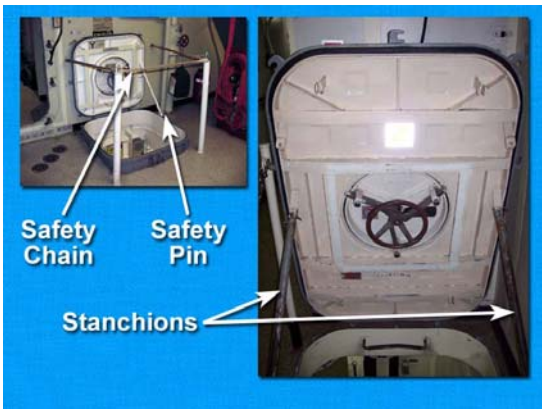
DC Closures and Material Conditions

Overview	A Compartment Check-off List (CCOL) identifies the DC closures and fittings in any given space (doors, hatches, scuttles, valves, vents, etc.). The list shows every DC fitting with classification, fire fighting system plugs and valves, communication locations, accesses, etc.
Compartment Check-off List locations	All CCOLs are posted in clear view near the access to a space. Compartments with more than one access will have more than one CCOL, labeled as "Duplicates". A master list of all the CCOLs is kept in DC Central.
View of CCOL	
Material Condition settings	Fittings and closures are classified by how they influence the cutter's watertight or airtight integrity. This integrity is maintained by setting a particular condition depending on operational requirements. Condition Yoke will be set outside of the workday in port, and prior to getting underway. Yoke is also checked at 1900 inport and underway. Any discrepancies will be checked against the DC Closure Log. (Note: WILLIAM is not a condition of readiness.)

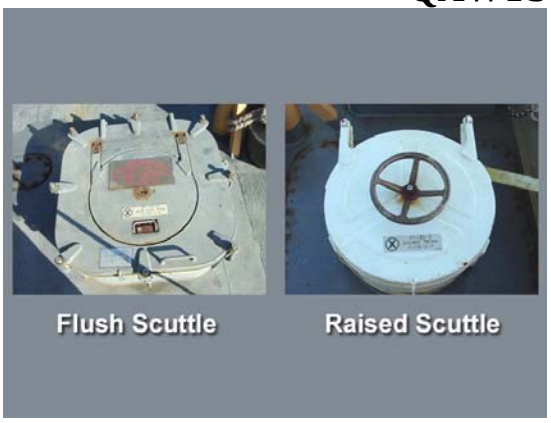
Watertight fittings	When dogging a watertight hatch, you should begin on the non-hinge side and work in a criss-cross pattern. This will prevent set dogs from coming loose while tightening the rest. When accessing a hatch to a space suspected of flooding, always loosen the dogs on the hinge side first. When closing a Quick Acting Watertight Door (QAWTD), you should ensure the handle is dogged-down completely. When opening a QAWTD, always grip the door handle from underneath. All scuttles should be turned closed until it can't be closed anymore. **Remember: Always keep hands, fingers and any other body part away from the fittings knife-edge! Always maintain positive control of all watertight fittings!** Not adhering to this warning could result in severe injuries to yourself or your shipmate.
Setting and opening fittings	It can't be stressed enough how vital the proper setting of material condition is to the ship's ability to stay afloat. All hands have responsibilities with regard to maintaining watertight integrity and having a basic knowledge of material conditions. No one will break the material condition set unless proper authorization is obtained from the Damage Control Officer in DCC. If DCC isn't manned, permission must be obtained from the OOD. **IF IT WAS CLOSED BEFORE YOU WENT TROUGHT IT, CLOSE IT BEHIND YOU!!!** **Remember: Always maintain positive control of all watertight fittings!**
DC Closure Log	The Damage Control Closure Log provides an accurate, up-to-date record of the ship's current material condition of readiness and any material condition violations. The DC Closure Log is kept on the Quarterdeck in port, the Bridge while Underway and DCC during GE or GQ conditions. This log will include your name, rate, and division, number, type, and classification of the fitting, reason for opening, time of action, and length of time the fitting is expected to be open. After the fitting has been closed, report back to DCC/OOD/QMOW to update the log.

Types of Fittings and Valves	ATC	- air test cap	QAWTD	- quick acting water tight door
	DDV	- deck drain valve	WTD	- water tight door
	COV	- cut out valve	WTH	- water tight hatch
	FP	- fire plug	WTS	- water tight scuttle
	FM	- firemain	QAWTS	- quick acting water tight scuttle
			QAWTH	- quick acting water tight hatch

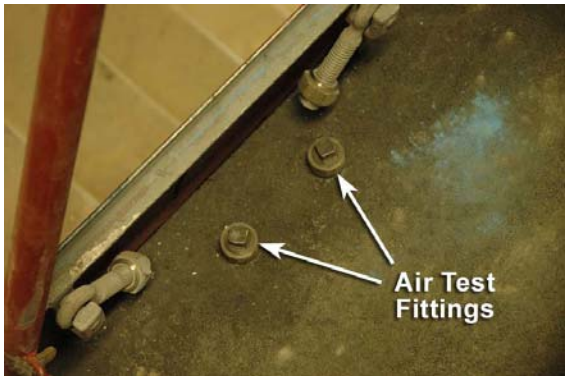
Ship Structure



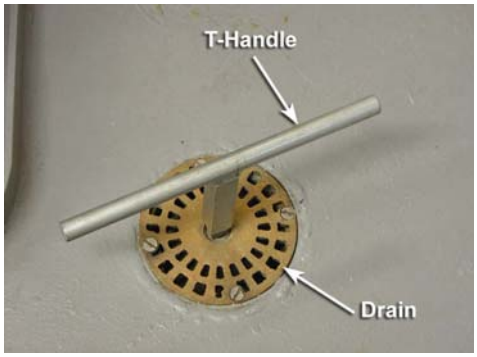
QAWTS & WTH



QAWTS **WTD**



Sounding Tube **ATC**



DDV

For this condition	close	
XRAY	all XRAY and Circle XRAY fittings	
YOKE	all XRAY, Circle XRAY, YOKE, and Circle YOKE fittings	
ZEBRA	all XRAY, Circle XRAY, YOKE, Circle Yoke, ZEBRA, Circle Zebra and Dog ZEBRA fittings	
Closure (Name)	**DC Situation**	**Sample closure/fitting**
W (William)	- Closures and fittings that should be open almost all the time to serve ship's vital services (ventilation, cooling water, firemain, etc.)	
Circle William	- Closures and fittings that are secured to prevent the spread of chemical, biological, and radiological contaminants	
X (X-ray)	- Closures that should be closed in port during the workday. - Fittings which should be closed almost all the time.	
Circle X-Ray	- Closures and fittings that may be opened by personnel proceeding to/from battle stations or as required for inspections without special permission.	
Y (Yoke)	- Closures and fittings closed in port after the workday is over and while underway.	
Circle Yoke	- Closures and fittings that may be opened by personnel proceeding to/from battle stations or as required for inspections without special permission.	
Z (Zebra)	- Closures and fittings which should be closed during general emergencies or heightened readiness as determined by the CO.	
Circle Zebra	- Closures and fittings that, when Zebra is set for extended periods, the CO may authorize the use of in order to facilitate the feeding of the crew.	
DZ (Dog-Zebra)	- Exterior opening closures and fittings to be kept closed for darkened ship conditions.	

Damage Control Communications

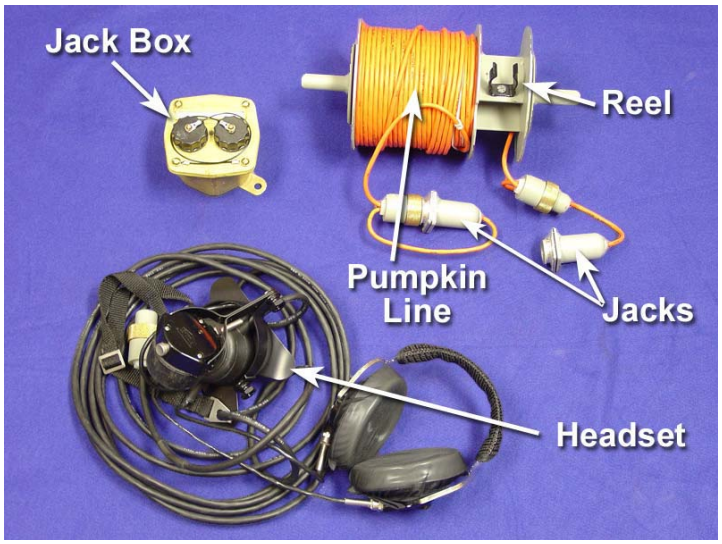
Overview	The cutter's interior communication system is made up of all the systems and components that transmit and receive orders and information within the cutter. These include the • Sound-powered phone (SPP) • Announcing systems (1MC) • Kite • Integrated Voice Communication System (IVCS)	
Sound-Powered Phone (SPP) System	The SPP system is designed to provide two-way voice communication between two or more shipboard stations. The SPP is unique because it is powered by the voice of the user and has no need for batteries or other power sources. There are two SPP circuit on STRATTON, the **X1JC** circuit and the JP circuit. The JP is used for gun control, the X1JC for DC.	
Locations	There are 12 SPP jacks for the X1JC circuit • Pilot house (03-29-0-C) • Comm Center (02-38-0-C) • Ops Center (02-29-0-C) • Fwd Repair Locker (2-22-0-Q) • DCC/ECR (2-52-1-E) 2 stations • AMMR (5-52-02-E) • Aft Repair Locker (2-82-0-Q) • Steering Gear Stbd (2-94-1-E) • Steering Gear Port (2-94-2-E) • Aux Machinery Rm (5-36-01-E) • FMMR (5-44-01-E)	There are 7 jacks for the JP circuit • 57mm GCR • 57mm mag. • Foc'sle • SRBOC deck • CIWS Deck • CIWS control room • Mk160 Operator station
Basic rules	1. Speak clearly and slowly. Message format: **Whom to, Whom from, What about**. 2. **Repeat** and record messages exactly as given, identifying the station originating them. 3. If in doubt, don't guess. Say "**SAY AGAIN**" for a message repeat. 4. Maintain a written log of all transmissions. DC symbology. 5. Be alert to pick up important info on the circuit even if it's not addressed to you. 6. Initiate periodic phone checks every 60 seconds as a minimum, especially after damage. 7. Comms lost; contact DCC to identify lost circuit and direct repair. 8. No unofficial talk. 9. Ensure proper stowage with SPP jack cover secured.	
Casualty Circuit	X40J and Pumpkin Line • Pumpkin Line: Orange sound powered phone line which can be routed as needed, even through watertight doors. Each end has a jack on it. • X40J: Permanent vertical riser cables and jack box assemblies on both the port and starboard sides of the ship • Pumpkin line can be used to link X40J jack boxes to create a new circuit, or pumpkin line alone may be used for short distances.	

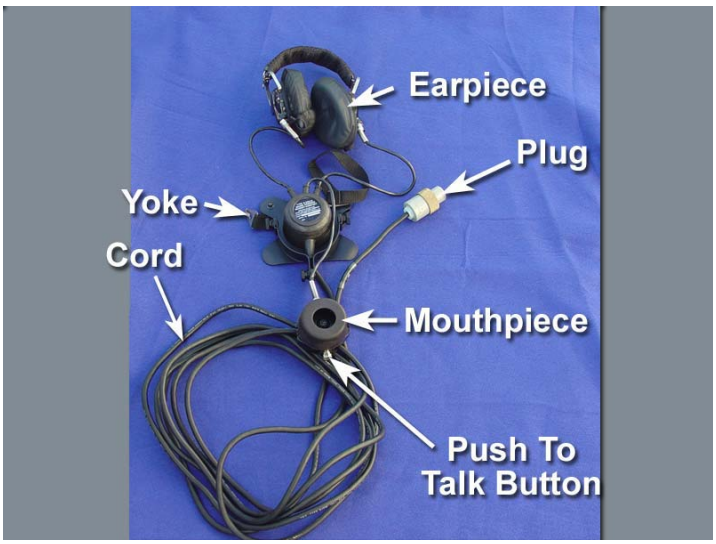
Damage Control Communications

Common Phrases	• Station on-line – immediately after manning sound powered phones announce, “All stations, <station>, on-line.” • “Silence on the line” - If a station needs to relay an important message it will call silence on the line - all stations be quiet to hear the message. • Changing phone talkers – changing station will call and announce “All stations, <station>, temporarily going off line to change phone talkers.” After the change “All stations, <station>, back on line.” • Phone checks – phone checks will be conducted immediately following any impact or collision to assist in assessing battle damage. Phone checks are the primary means of ensuring the communications network remains intact. “All stations, DCC, phone check.” “DCC, <station>, loud and clear.”
1MC	Ship-Wide Announcing System Used to spread information quickly throughout the ship. It is a one way transmitting system, and requires electrical power. Announcements (“Pipes”) can be made from the **Bridge, Quarterdeck, Forward Vestibule, Aft Vestibule, and DCC**. The ship’s alarms are sounded over the 1MC. These alarms include: **General Alarm, Collision Alarm, Chemical Alarm, Emergency Response Alarm, and Helo Crash on Deck Alarm**
Kite	KITE is part of IVCS (integrated voice communication system). It is a voice communications terminal that is capable of supporting C2 (command and control) operations when connected to the MARCOM IVCS switch. KITE is an efficient, programmable user interface that replaces legacy terminals used for Intercom, Interphone, Radio Nets, sound powered phone nets, telephone calls on/off ship, public announcements, and alarms. Key switch Integrated Terminal phones. Primary method of normal communication between spaces during normal operations. Use is effective during Damage Control due to ability to have 2 way communications. Battery back up lasts approximately one hour after the lights go out. Circuits can be plain or secure, point-to-point or nets, initiated by a dialed number or accessed by a single button. Locations of kite phones **CIC, CO Cabin, Fantail , Helo pad port side ,DCC, Bridge, Helo Central, Fueling Dk., Main Control MCMS Console**
Hand Held HYDRA Radios	Quick and portable method of communicating during a casualty. Allows for quick reporting from the location of damage. Effective throughout most of the ship, however there may bee “dead spots” in which no radio transmission is possible.

Damage Control Communications

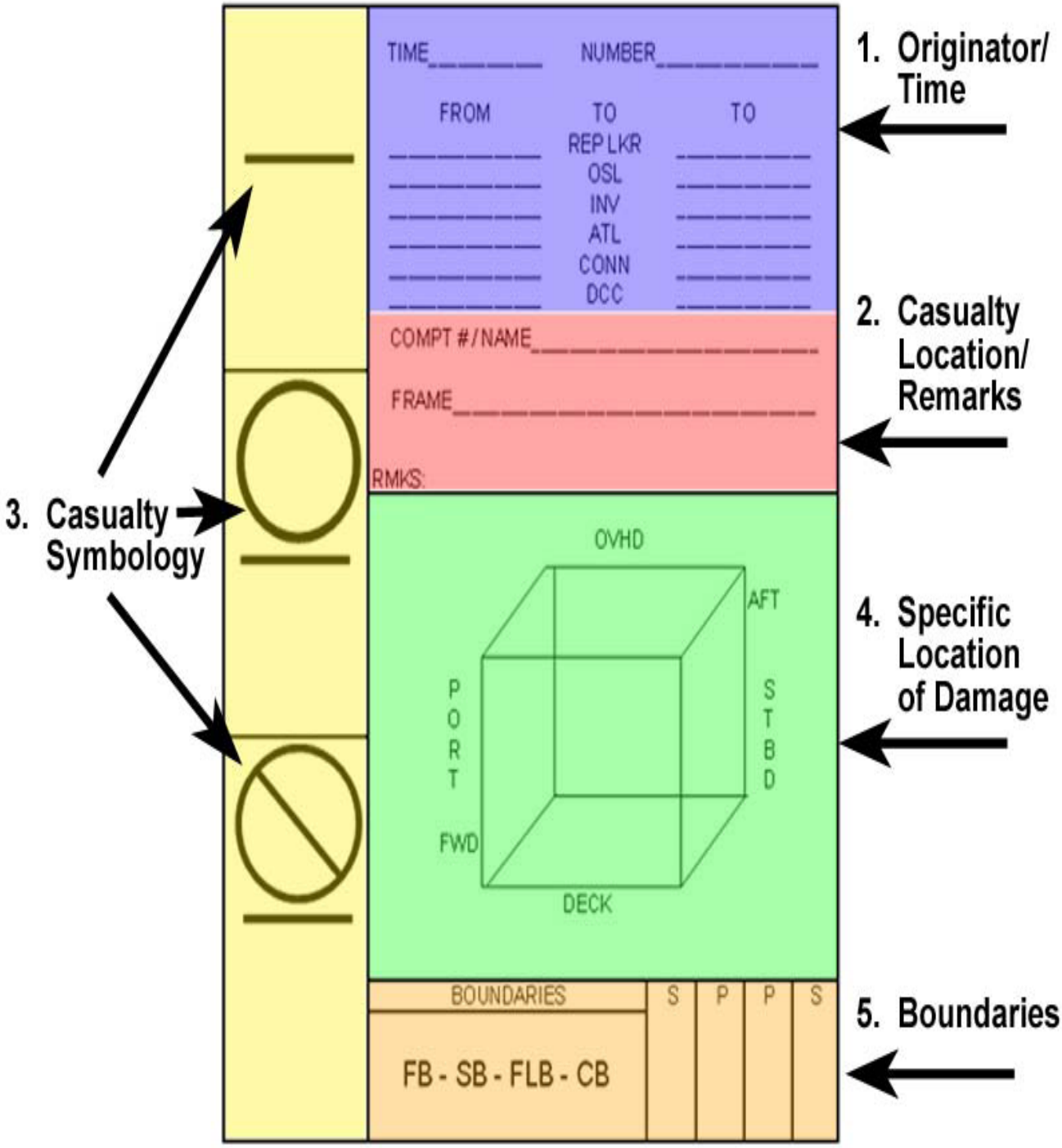
IVCS	Integrated Voice Communications System Four primary elements: Switch and Network Termination Assemblies, System Administration Terminal, and a set of user terminals/instruments. Acts as a general switch for all communications gear, integrating phones, faxes, alarms, and announcing systems into a single unit allowing one person to monitor and control all elements of the system. Has a 60 minute battery backup. Includes phones in all duty spaces, staterooms, and machinery spaces.
Ship Service Telephone	Primary method of normal communication between spaces during normal operations. Use is effective during Damage Control due to ability to have 2 way communications. Battery backup lasts approximately one hour after the lights go out.





Message Blanks

Used by the DC Organization to communicate and plot damage throughout the ship. Essential that all hands are able to use and understand all DC symbols in order to properly communicate damage during an emergency. Message blanks are the standard form of communication from the RLL to the OSL, and from the RLL to DCC. However, other methods, such as sound powered phones, hand held radios, and ship service telephones are quicker and may be more effective.

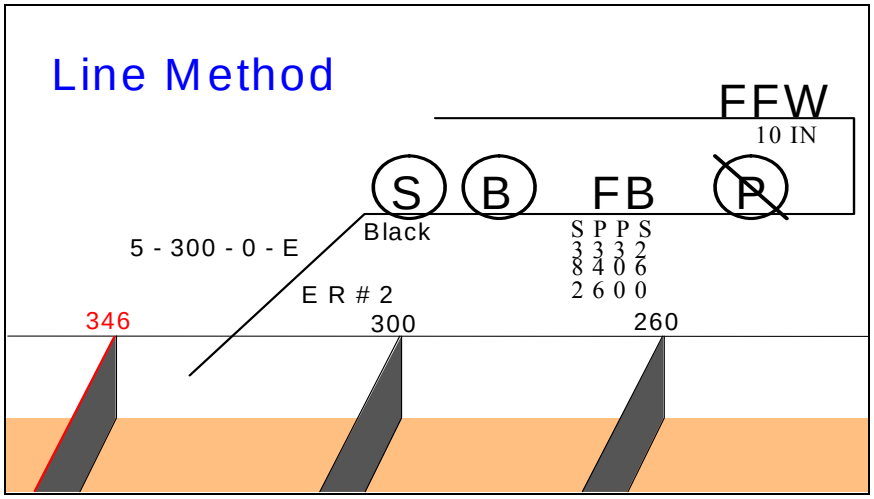


Damage Control Symbology

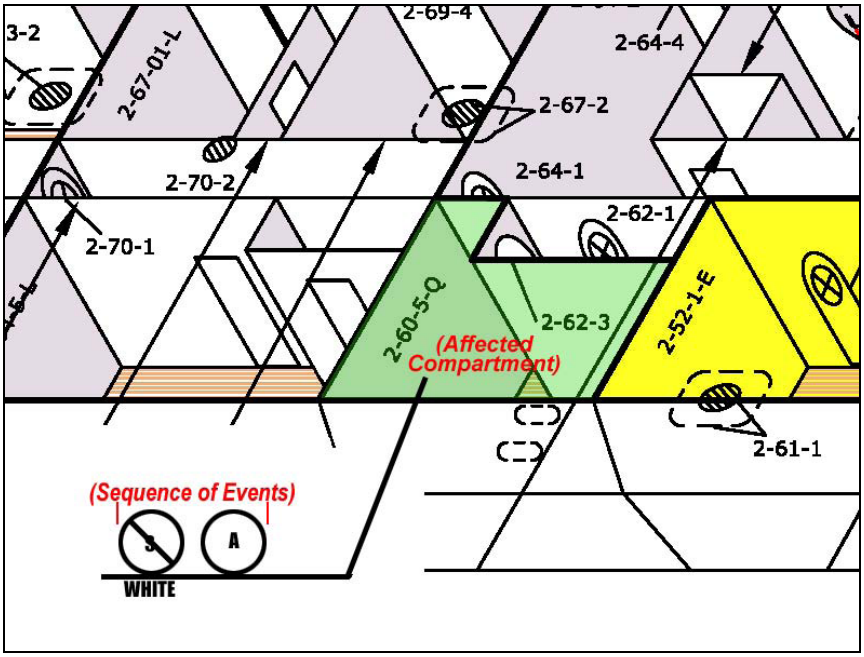
REPORT OF CASUALTY	SYMBOL	REQUIRED SUPPLEMENTAL INFO	———	○	⊘
FIRE BOUNDARIES	FB	PRIMARY AND SECONDARY	ORDERED	SET	N/A
SMOKE BOUNDARIES	SB	PRIMARY AND SECONDARY	ORDERED	SET	N/A
FLOODING BOUNDARIES	FLB	PRIMARY AND SECONDARY			
CASUALTY BOUNDARIES	CB	PRIMARY AND SECONDARY	ORDERED	SET	N/A
FIRE	A,B,C,D		REPORTED	ENGAGED	NO
SMOKE	S	COLOR AND REMOVAL METHOD	REPORTED	ENGAGED	NO
FIRE EXTINGUISHING SYSTEM	FES	SYSTEM TYPE	MANNED	ENGAGED	NO
FLOODING	FL	CLEAN/CONTAMINATED/ DEPTH/ REMOVAL METHOD	REPORTED	ENGAGED	NO
FIREFIGHTING WATER	FFW	DEPTH/REMOVAL METHOD	REPORTED	ENGAGED	NO
PROGRESSIVE FLOODING	PFL	RATE	REPORTED	ENGAGED	NO
RUPTURED PIPING	R	TYPE SYSTEM	REPORTED	ENGAGED	NO
STRUCTURAL DAMAGE	STR	SAG/PANT/TYPE SHORING	REPORTED	ENGAGED	NO
JAMED ACCESS	J	FITTING TYPE AND NUMBER	REPORTED	ENGAGED	NO
HOLE	H	SIZE	REPORTED	ENGAGED	NO
COMPARTMENT DEMOLISHED	CD		REPORTED	N/A	N/A
NO APPARENT DAMAGE	NAD		REPORTED	N/A	N/A
COMMS LOST	T	CIRCUIT	REPORTED	ENGAGED	NO
ELECTRICAL POWER LOST	E		REPORTED	ENGAGED	NO
ELECTRICAL DAMAGE	ED	EQUIPMENT	REPORTED	ENGAGED	NO
CASUALTY POWER ORDERED	CP		ORDERED	SET	NO
CASUALTY POWER DAMAGE	CPL		REPORTED	ENGAGED	NO
MECHANICAL FAILURE	M	EQUIPMENT/SYSTEM	REPORTED	ENGAGED	NO
MECHANICAL DAMAGE	MD	EQUIPMENT/SYSTEM	REPORTED	ENGAGED	NO
PERSONNEL CASUALTY	PFL	NAME/BILLET IF KNOWN	REPORTED	ENGAGED	NO
WEAPON CASUALTY	WPN	TYPE WEAPON	REPORTED	ENGAGED	NO
TOXIC GAS	TOX	HAZARD IF KNOWN	REPORTED	ENGAGED	NO
CHEMICAL CONTAMINATION	CHM	AGENT IF KNOWN/LOCATION	REPORTED	ENGAGED	NO
BIOLOGICAL CONTAMINATION	BIO	AGENT IF KNOWN/LOCATION	REPORTED	ENGAGED	NO

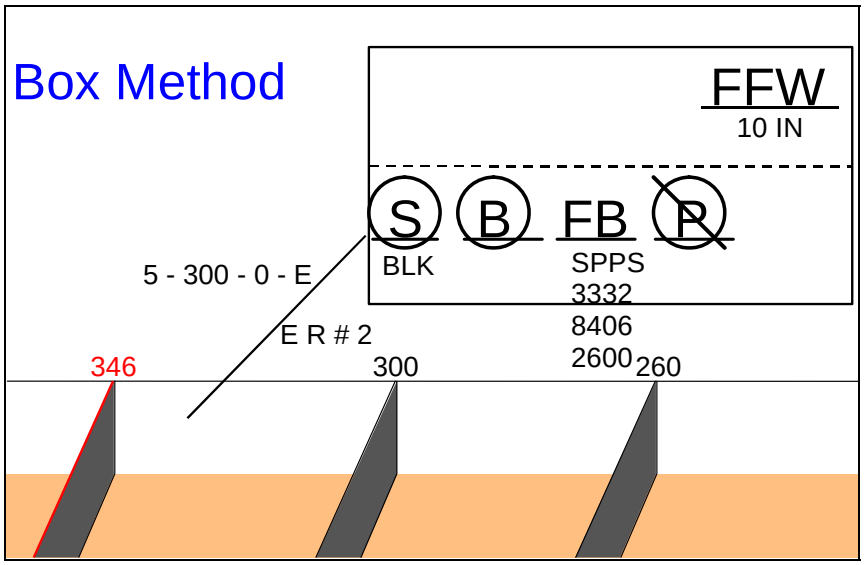
Plotting

Purpose: To provide a visual reference to the chronological development of casualties and corrective DC efforts. Through a system of standardized symbology, all DC stations record the progression of casualties throughout the ship, giving each station a ship-wide vision of the ship's status. Should the senior member of a DC station become incapacitated, the standardized plot allows for quick assumption of command at that station by replacement personnel.

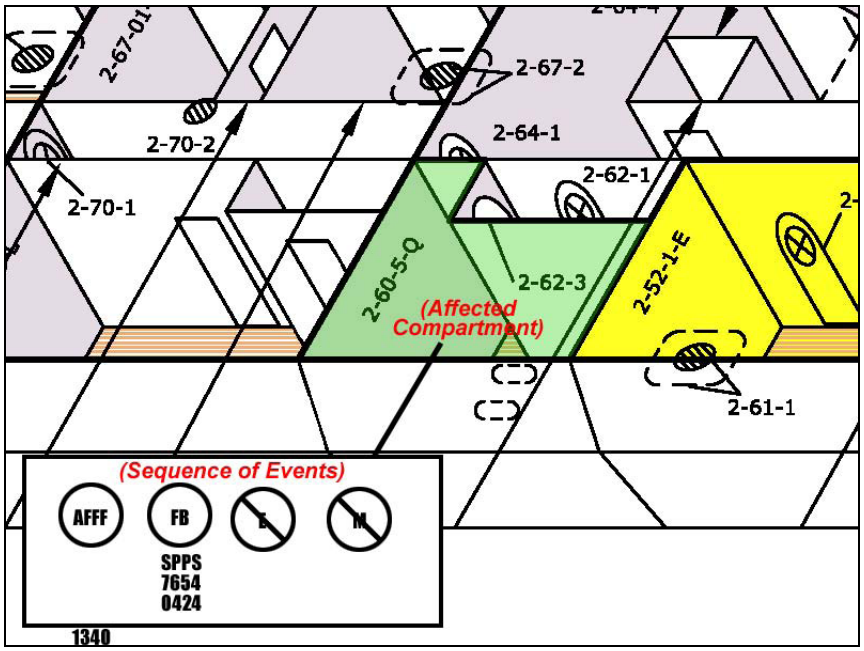


1. Draw a diagonal line from the affected space.
2. Write the space number on top of the line and the noun name under the line.
3. Plot along the horizontal line, using it as the <u>base</u> of all circles.
4. Update each symbol when updating the same piece of damage, do not plot updates separately.

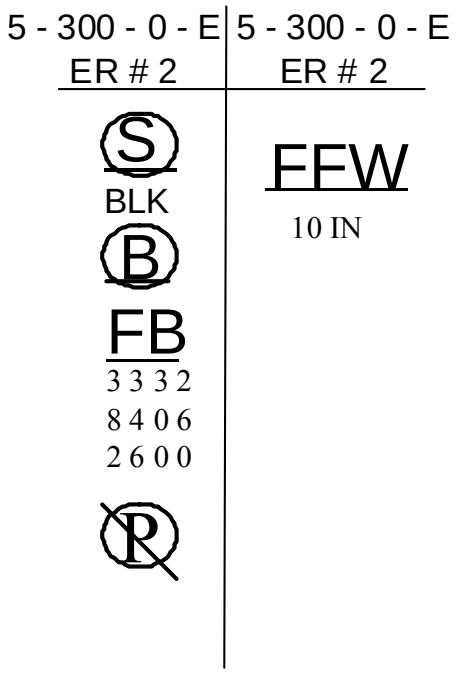




1. Draw and label diagonal line as done in the line method.
2. Connect diagonal line to a large box.
3. Plot damage inside box.

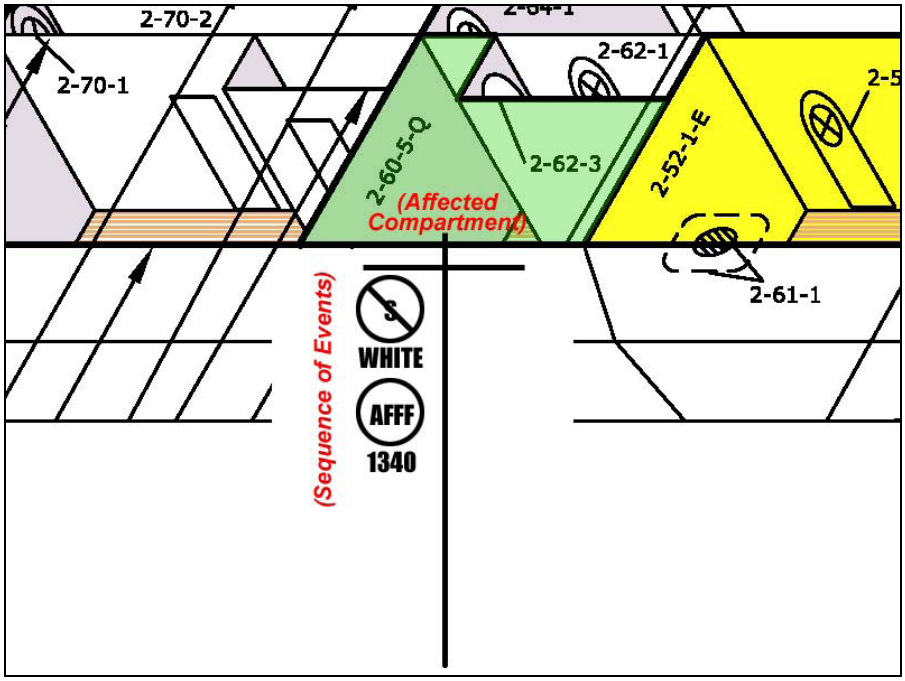


Column Method

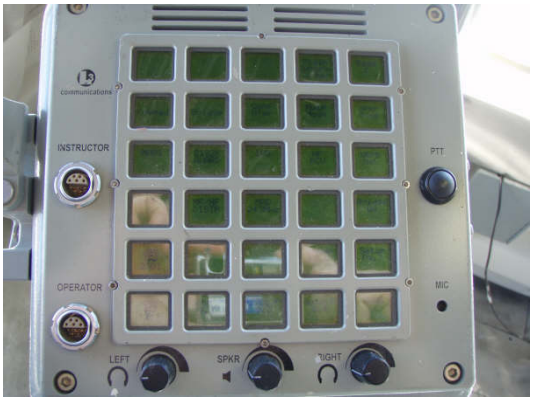


1. Off to one side of Damage Control Diagram make a column or series of columns with compartment numbers at top of each column.

2. Below each compartment number plot damage vertically.



Damage Control Alarm Systems

Microphone Control Station Locations (1MC)	There are 3 “1MC” stations on the cutter: • BRIDGE • DCC/ECR • QUARTER DK. Portable station
Alarm Capabilities of the System	The general, collision, and chemical alarms can be activated over the general announcing system from any of the three stations. The alarm contact switches are located next to all of the microphone control stations.
View of Alarm Switches & 1MC Station	
Main Alarms	**General alarm** Single, pulsating tone, 100 pulses per minute - - - - - - **Collision alarm** Cycles of three high pitch beeps at 100 cycles per minute **... ... ...** **Chemical alarm** Continuous and steady high pitch tone **_____** **Helo Flight Crash** Alternating tone from high pitch to low pitch (like an ambulance) / / / / / / /

STRATTON'S DAMAGE CONTROL ORGANIZATION

The function of the Damage Control Organization is to take all practical preliminary actions before damage occurs, to minimize and localize such damage, which does occur, and to accomplish emergency repairs/restoration as quickly as possible.

The primary function of Command Control during emergency conditions, in relation to damage control, is to maneuver/ defend the ship in order to prevent damage or prevent further damage from occurring. Command Control operates in the Pilothouse.

DAMAGE CONTROL TRAINING TEAM (DCTT)

The Damage Control Training Team is a group of experienced, rate-diversified sailors tasked with educating and training crew personnel in proper Fire Fighting Techniques, Shipboard Damage Control techniques and First Aid. Through training, crewmembers learn how to protect themselves, their shipmates and the ship.

BATTLE ORGANIZATION

DAMAGE CONTROL CENTRAL (DCC)

DCC is at the top of the Damage Control Organization. The Engineer Officer (EO), also the Damage Control Officer (DCO), mans DCC (log office or 1st class mess) and is in charge of all damage control actions during a casualty. DCC keeps the Commanding Officer (CO) informed of all damage that has occurred to the cutter and what actions are being taken to improve the situation. DCC must maintain an accurate plot of all damage control, stability and material conditions issued during a damage control situation. DCC can be relocated at the EO's discretion.

RAPID RESPONSE TEAM (RRT)

Organized IAW NWP 3-20.31 REV A, the RRT is the first line of defense for any casualty involving fire or flooding. They are responsible for assessing the situation, taking initial action in the form of setting boundaries, securing ventilation, using portable extinguishers, operating installed fire suppression systems and the control of flooding by lining up the fixed eductor system. RRT members usually consist of ship's DCTT personnel. After taking initial action, the RRT remains on scene and is only relieved after all the pertinent information is passed to the INVESTIGATORS or ON SCENE LEADER (OSL).

REPAIR LOCKERS

Work in close coordination under the direction of DCC to combat, contain, repair, and recover from all fire, flooding, and hull damage. The most effective and valuable member of a repair party is one who can step into any role.

REPAIR LOCKER LEADER (RLL)

Is in charge of all personnel within the repair locker. The RLL organizes repair parties and ensures all information is passed to DCC. The RLL and DCC work as a team to determine the best plan of action to use personnel effectively to battle damage and control further damage. Takes reports from the investigators and On-Scene Leader, tasks other repair members based on the information, and notifies DCC of report and actions taken. The RLL should always anticipate the gear required for the casualty at hand and have it ready to deliver to the scene.

PHONE TALKER/PLOTTER
Assistant to the Locker Leader. Maintains communications with DCC and passes all information between DCC and the RLL. Plots damage and actions taken on Damage Control Plates.

ON-SCENE LEADER (OSL)
Assess the extent of damage and makes reports to the RLL. The OSL is in charge at the scene and gives the RLL & DCC the overall picture of the situation. The OSL directs repair parties at the scene and keeps communications with the Attack Team Leader (ATL); RLL & DCC to determine each step in the fire fighting/ damage control process.

ATTACK TEAM LEADER (ATL)
The ATL carries the Talisman K 90 Thermal Imager and is in charge of directing the Fire party to the fire. The ATL reports to OSL all progress being made during Fire Fighting and Damage Control efforts.

INVESTIGATORS
Investigators are usually first on scene of most casualties and don't leave until relieved by the hose team. They are responsible for making continuous rounds throughout the ship during a casualty, investigating all areas of damage, maintaining primary and secondary boundaries and reporting their findings to the RLL. Investigators live by the four principles of investigation: ***Thoroughly, Cautiously, Report and Repeat!***

BOUNDARY SETTERS
Set and maintain boundaries, in order to prevent damage from spreading throughout the ship. Install/set smoke curtains. Remove/relocate flammables as necessary. Cool boundaries.

MESSENGER
Serve as communications link between the Repair Locker Leader and the On Scene Leader. The messenger must be fluent in DC Symbology and have a sound knowledge of the configuration of the ship's compartments.

HOSE TEAM
A hose team onboard STRATTON consist of an Attack Team Leader, a Nozzle man, Hoseman & a Plugman. The Nozzleman's duties are: Protect the fire party on entry, combat the fire and set the re-flash watch. The Hoseman helps control the hose and assists the Nozzleman. The Plugman is responsible for energizing the fireplug, using AFFF w/ the in-line proportioner. The Plugman must stay within site of the plug at all times and assist with hose handling within the area of the plug.

P-100 Pump

P-100 PUMP A commercial diesel engine driven portable pump unit designed for firefighting and limited dewatering functions aboard ships. The pump unit engine is fueled with diesel fuels. The design features of the pump are described in the following paragraphs.

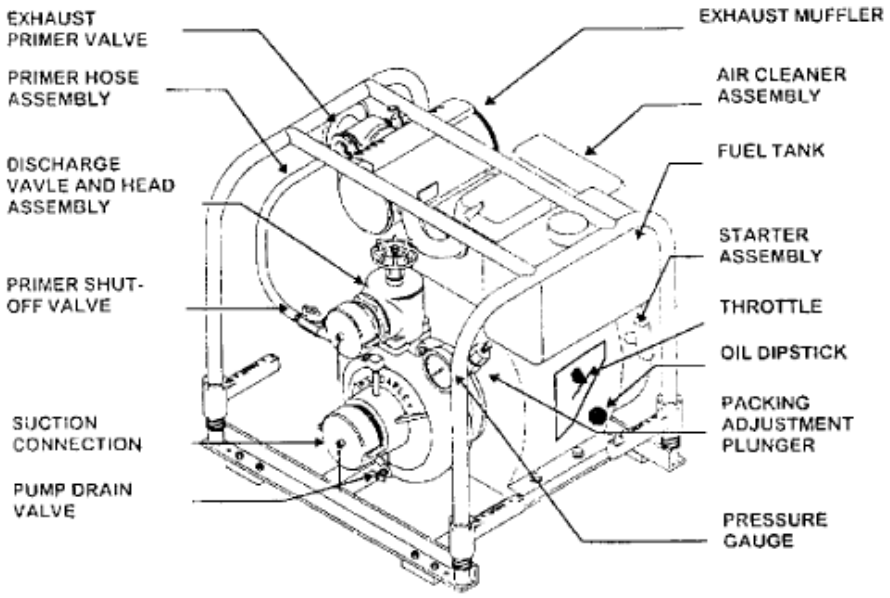


Figure 555-4-23 P-100 Portable Diesel Engine Driven Centrifugal Pump

Pump Assembly The pump assembly consists of the engine, centrifugal pump, exhaust primer, discharge valve, recoil starter and compound pressure gage.

Engine The engine is an air-cooled, one cylinder, and four-cycle diesel engine rated at 10 horsepower. Ignition is achieved by compression, which is initially aided by a compression release lever.

Pump The pump is a single suction, single stage centrifugal pump complete with a compound pressure gage, drain valve, and primer connection. The impeller is a closed design and a unique pelletized packing gland seals the shaft. The suction and discharge connections have male threads, which receive 3-inch, and 2-1/2 inch hoses, respectively.

Exhaust Primer The engine exhaust muffler is constructed to incorporate a jet type ejector and receive an insulated exhaust hose. When the primer is operated, the main exhaust port is blocked by the cylinder valve forcing the exhaust flow through the priming jet. The vacuum developed by the exhaust jet evacuates the air from the pump casing and suction hose. Because of the vacuum developed, atmospheric pressure forces water up through the suction hose and into the pump casing.

Tri-gate: A special Tri-gate is attached to the discharge side of the pump. The tri-gate allows water to be discharged to (1) 2 ½ inch hose and/or (2) 1 ½ inch hoses.

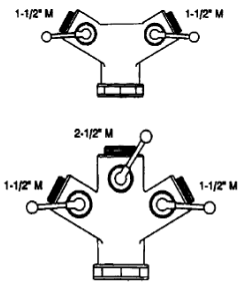


Figure 555-4-25 Wye-Gate and Tri-Gate Valves

Hoses The suction hose is a 3 inch black hard rubber. The suction hoses are in 10 ft lengths and stored in the hangar. Attached to the bottom of the suction hose is a foot valve and strainer. The strainer prevents debris from being sucked into the pump and the foot valve allows the suction hoses to be primed.

Preparation of the P-100 Pump Before operating the P-100, be sure that all suction hose connections between the foot valve and the pump are tight, and that the strainer is completely submerged in water. If the exhaust primer fails to lift water, or if the discharge shows an uneven stream, the most probable cause is air leaking into the suction through a poor connection. Be sure to support the suction hose so that the weight of the hose will not be borne by the pump casing. Make certain that the foot valve is completely submerged during the entire period of pump operation; otherwise severe damage to the equipment may result. Operation of the P-100 Pump

Operation of the P-100 Pump

WARNING – Do not operate the pump in an enclosed area without the engine exhaust hose connected and routed safely to atmosphere. Exhaust gases contain carbon monoxide, which is odorless and poisonous, and can cause injury or death when inhaled.

WARNING – High temperatures exist in the vicinity of exhaust components, connections and exhaust hose discharge. Wear firefighter gloves at all times when handling exhaust hoses.

1. Connect hoses to suction and discharge connections and where required, connect the exhaust hose. Check coupling gaskets and ensure proper tightening of all connections.

2. Close the pump drain valve and all other openings into the pump casing.

3. No lubrication is required except for the engine. Check engine lube oil for proper level prior to attempting to start.

4. Close the pump discharge valve until it is only partially open.

5. Open the primer line shut-off valve located between the primer jet and the pump suction.

6. Open the fuel tank isolation valve located under the fuel tank.

7. Set the engine throttle control to the ″START” position.

8. Slowly pull on the recoil starter-checking engine and pump for freedom of movement. Depress the compression release lever ensuring that it remains depressed. The compression release lever will spring shut when the engine rotates during starting attempts.

9. Start the engine by pulling the recoil starter rope. A strong deliberate pull is required to prevent engine kickback and possible starting in the reverse rotational direction. If this does occur, immediately shut down the engine. Operation in the reverse direction is characterized by the evidence of exhaust gases coming out of the intake filter. Reverse operation does not allow full power operation, positive priming, and will cause damage to the unit.

10. Shift the exhaust valve to the prime position blocking the main exhaust opening.

11. When a steady stream of water appears at the discharge of the priming jet, close the primer line shut-off valve and return the engine exhaust valve to the normal position. Open the pump discharge valve.

12. Repeat the priming operation if the pump fails to hold its prime. If the pump does not deliver water within one minute, stop the engine and check for air leaks at suction connections and/or the pump packing gland, or failure of the priming jet to produce vacuum.

CAUTION

The gland adjustment nuts should be kept sufficiently tight to prevent excessive leakage only. Slight leakage is always required during operation to cool the packing and prevent damage to the impeller shaft.

13. While the pump unit is running, occasionally monitor the pump discharge gage and fuel tank level. For periods of extended operation, refueling may be necessary. Extreme caution is required when refueling a hot or running engine. An additional crewmember must standby with a portable Aqueous Film Forming Foam (AFFF) fire extinguisher or a portable dry chemical (PKP) fire extinguisher in the event that fuel is inadvertently spilled on hot engine parts.

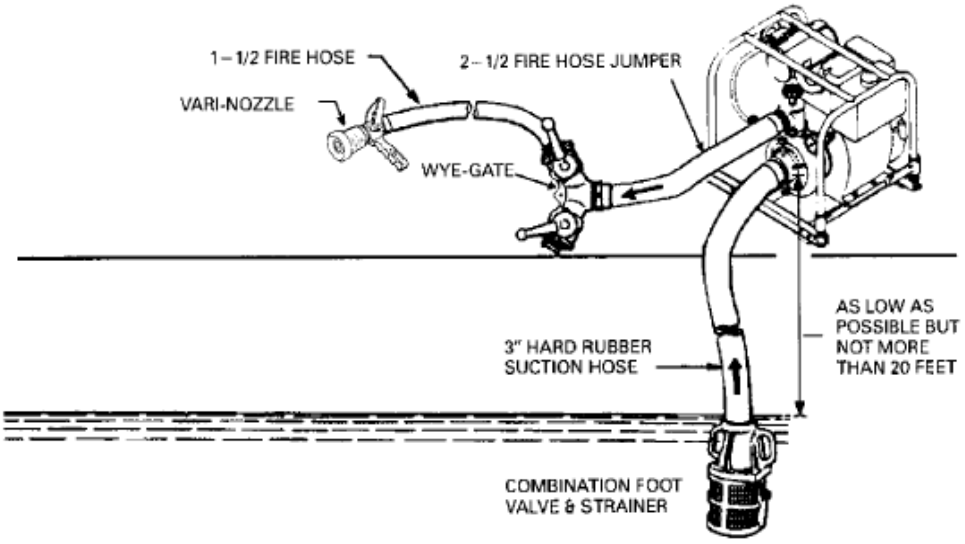
14. To stop the pump unit, reduce engine speed to an idle speed and allow the engine to cool down for two minutes. Return the engine throttle control to the ″STOP″ position. If engine continues to run, shut the fuel tank isolation valve.

After Operating the P-100 Pump If the pump has been used to pump seawater, the seawater must be drained from the pump by opening the pump casing drain valve. The pump must be flushed with fresh water to prevent corrosion and salt crystals from forming on close tolerance pump internals. After flushing the pump, apply a spray silicone compound to pump internals and replace hose connection caps.

Accessories for portable pumps are listed in the appropriate AEL's. The major accessories include a foot valve; wye-gate, tri-gate, peri-jet eductor, 3-inch hard suction hose, 4-inch hose, 1-1/2 inch fire hose, 2-1/2 inch fire hose, and engine exhaust hose.

Foot Valve The foot valve is attached to the male end of the 3-inch hard suction hose. It consists of a wire strainer, housing, and flapper valve, which is spring loaded to the closed position. The foot valve allows water to enter the suction hose freely and prevents the water from draining back, therefore keeping the fire pump primed if it should be shut down temporarily. The wire strainer serves to prevent larger foreign matter, which might damage the pump from entering the suction hose. The foot valve is provided with a valve release for draining the suction hose and reducing the weight when recovering the suction hose and foot valve. The length of the suction hose is 10 feet and length of exhaust hose is 10 feet.

Portable Pump Hookup for Firefighting When used as a fire pump, the engine throttle should be adjusted to the maximum pressure obtainable without over fueling of the engine, as is evident from black engine exhaust smoke. When using one 1-1/2″ length of hose equipped with a Elkhart 95gpm vari-nozzle and at suction lifts up to twenty feet, the pump unit should maintain a minimum pressure between 75 and 83 psi. Use of two 1-1/2″ length hoses is not recommended. The reduction in discharge pressure when flowing two hoses will increase hose kinking and deteriorate nozzle stream performance. Use of two 1–3/4 " hoses with the P-100 pump is permissible due to reduced pressure losses in larger diameter hose.



Pump Suction Straight suction to maximum of 20 feet may be taken either from overboard or from a flooded compartment. A combination strainer and foot valve at the lower end of the suction hose prevents foreign matter from entering and permits priming of the suction line and pump.

Deep Suction If the suction head is greater than 20 feet the P-100 must be rigged for deep suction. In this configuration a 2½ inch hose is run from the tri-gate to the supply side of a peri-jet eductor. A 4 inch to 3 inch reducing fitting is attached to the discharge side of the peri-jet, and 3 inch hard rubber hoses are run from the discharge side of the peri-jet to the inlet side of the P-100. A strainer is attached to the peri-jet and lowered into the space. 1½ inch hoses are used to discharge the water overboard.

Dewatering with Eductors The P-100 pump takes suction in the usual way from the flooded compartment, raising the water overboard through the 2-1/2 inch fire hose; the hose is led to an eductor located in the flooded compartment. In the eductor, the velocity of the high pressure water jet creates a difference in pressure which allows additional water to be pumped from the flooded output consists of the entire capacity of the P-100 pump being used and the water picked up from the compartment by the eductors. While at first glance it appears as if something was obtained from nothing, it actually represents a conversion process in which a high-pressure water stream of certain volume contains sufficient energy to move a water stream of larger volume against a low pressure. While this process in not 100 percent efficient, when compared with straight pumping, it results in increased dewatering capacities at static heads of 55' or less. The discharge capacity of an eductor increases with a decrease in static head. It is recommended that the discharge outlet be placed at the shortest practicable distance above the discharge level.

Dewatering by sucking directly from the space The suction hose is placed directly into the space with a foot valve attached. The water is discharged overboard. This is the quickest method to set up and will dewater at 100 gpm. The maximum suction head (vertical distance the water is being pumped) is 20 feet using this configuration.

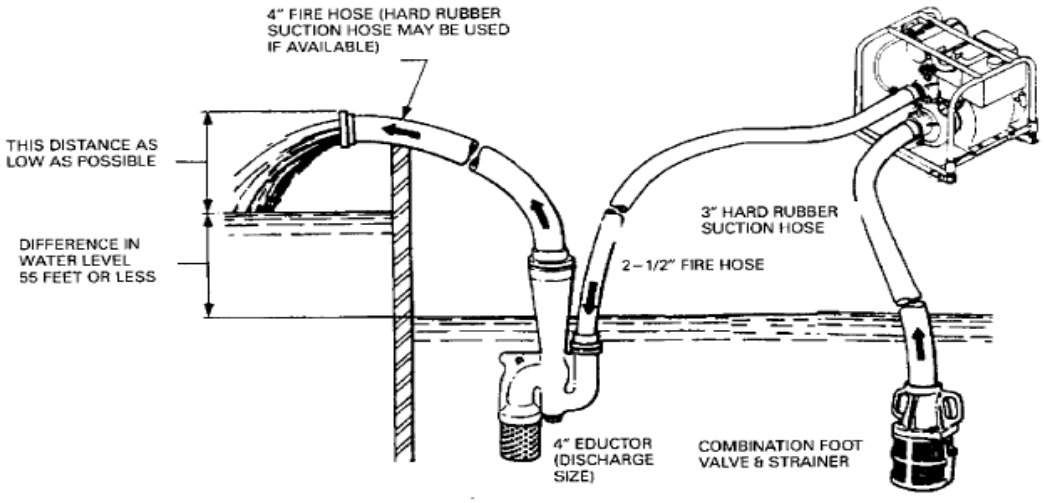


Figure 555-4-31 P-100 Pump Dewatering

TROUBLESHOOTING

The following are some basic points to check when problems are encountered during starting and priming evolutions.

When the engine will not start:

(1) Is there enough fuel? Is it the correct type of fuel?
(2) Is the fuel cock at the "OPEN" position?
(3) Is diesel fuel reaching the fuel injection pump or nozzle?
(4) Is the speed control lever in the "START" position?
(5) Is the lube oil level correct?
(6) Is the fuel injection nozzle working properly?
(7) Is the recoil starter pulled sufficiently quick and firm?

CHECK LIST FOR PUMP PRIMING FAILURES

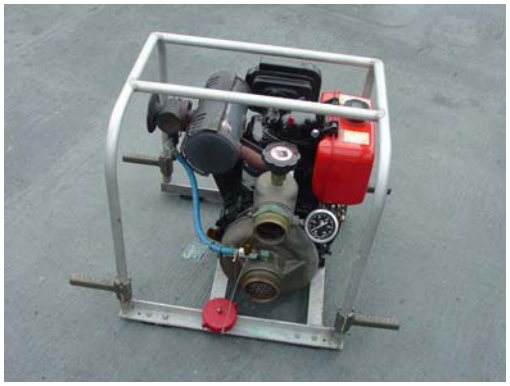
Problem: Engine speed too low.
Solution: When priming, run engine at high RPM.

Problem: Air leak through packing (or excessive water leakage when primed).
Solution: Tighten packing while pumping at 50 psi by tightening packing screw. Adjust packing to 5 to 60 drops per minute. Do not allow packing to be drip free -- lubrication of the pump packing is necessary to prevent damage to the shaft.

Problem: Suction hose.
Solution: Make sure that the strainer at the end of the suction is fully emerged in the water, and free of debris. Air leaks through the suction hose gasket are the most common reason for failure to prime. Replace gasket if necessary.

Problem: Pump drain is open.
Solution: Check pump drain to make sure that it is closed when priming.

Problem: Primer line is closed.
Solution: Open primer line valve located near suction inlet and close once pump is primed.



FIRE FINDER (model 955)

Has an infrared heat sensor and aids the user in locating hot spots and fires. The Fire Finder operates on two 9-volt batteries. The Fire Finder's maximum detection distance is 15 feet with a 2-½ inch wide angle and will detect temperatures above 200 degrees. When the Fire Finder is turned on it will give off a sound that will decrease to zero in approximately one second. This sound is the same alarm that the unit makes when pointed at a fire or heat source, it will continue to make a ticking sound, this is the unit doing a self check for proper operation. If the Fire Finder doesn't make a noise when turned on, or is making erratic noise, replace the batteries. Fire Finders are best used by the Investigators checking cableways, ventilation duct and bulkhead temperatures during a fire.

Talisman XL and the Fire Warrior Firefighting Thermal Imagers

These devices allow the users to see through dense smoke and light steam by sensing the difference in infrared radiation given off by objects. These units are **obstructed** by stone, **glass,** snow, ice, and most plastics. A TV like black and white image is displayed on the rear of each imager. When looking through the viewing lens, the image presented looks like a negative picture, with hotter objects appearing lighter than cooler objects. STRATTON will have two of each of these units. The Talisman XL can be operated off of 2 AA batteries or a rechargeable battery which is included. The Fire Warrior however only operates off of 2 AA batteries.

OCENCO EMERGENCY ESCAPE BREATHING DEVICE (EEBD)

The Ocenco EEBD is a **10-minute** escape-breathing device. EEBD's are located in all crew staterooms and work spaces where emergency escape may be warranted, usually below the main deck. **The Ocenco EEBD should not be used for fighting a fire!** Always make sure before using an EEBD, the gauge is in the green. The following steps are for proper operation of the Ocenco EEBD:

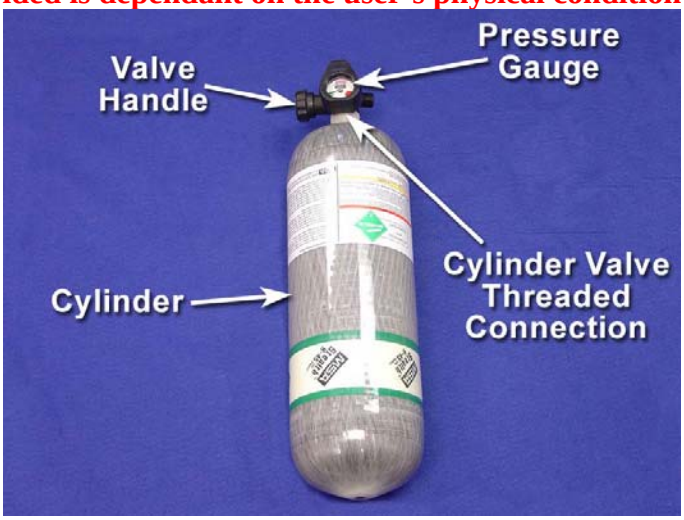
1. REMOVE FROM ORANGE CASE.
2. LIFT YELLOW LEVER AND DISCARD COVER.
3. REMOVE UNIT: PULL YELLOW NECK STRAP UPWARDS.
4. INSERT YELLOW MOUTHPIECE, FIT YELLOW NOSE CUP.
5. ESCAPE.
6. FIT/ADJUST YELLOW NECK STRAP AND FACE SHIELD.
7. REMOVE WHEN BAG REMAINS FLAT.

SELF CONTAINED BREATHING APPARATUS (SCBA)

SCBA DESCRIPTION: Compressed air self-contained breathing apparatus supply breathable air to the user from pressurized air cylinders carried by the user. Exhaled air is expelled to the atmosphere. The major parts of a typical compressed air SCBA include an air cylinder support harness, one air cylinder, regulator, alarm, and face piece. Some models use a body-mounted regulator connected to the face piece by a breathing tube, and others use a regulator mounted directly onto the face piece.

Air Cylinder

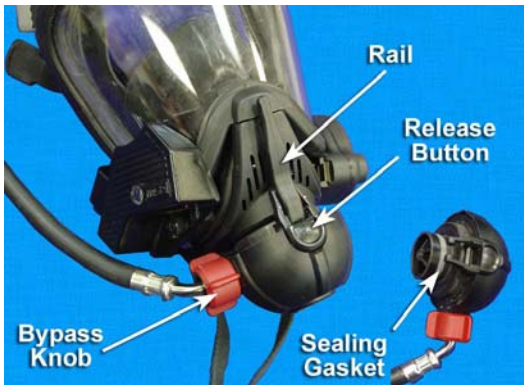
Air cylinders may be constructed of metal or a lightweight composite material. Air cylinders are rated in terms of the number of minutes of air they will provide to a user. **NOTE: Actual number of minutes of air provided is dependant on the user's physical condition and wok load.**



Regulator

The regulator may be a pressure demand type regulator or a demand type regulator. A pressure demand regulator forces air into the face piece at all times. This provides a positive pressure inside the face piece, keeping out any harmful atmosphere should the face piece not be completely airtight. A demand regulator does not maintain a positive pressure inside the face piece. The user has to inhale to draw in fresh air from the regulator. A dual-purpose regulator may also be supplied with the equipment, which allows an airline to be used as an alternate source of air.

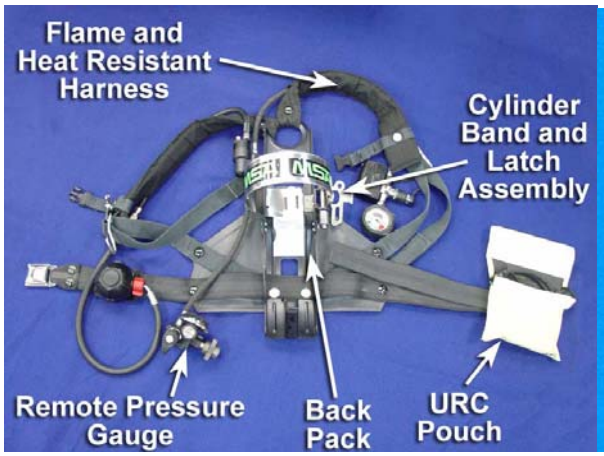
Pressure Demand Type	Forces air into the face piece at all times Keeps out any harmful atmosphere should the face piece not be airtight
Demand Type	Does not maintain a positive pressure inside the face piece User must inhale to draw in fresh air from the regulator.
Dual-Purpose	Allows an airline to be used as an alternate source of air.

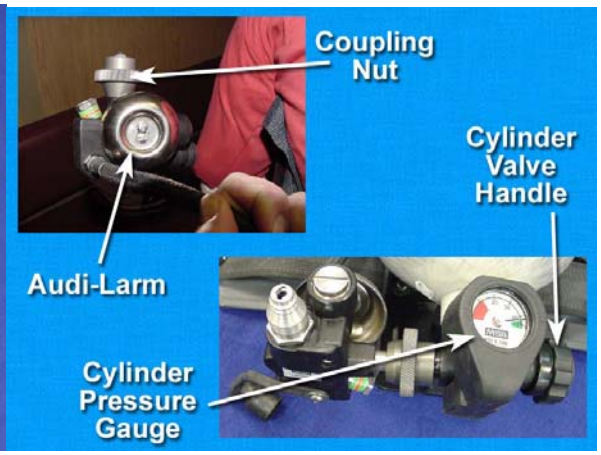


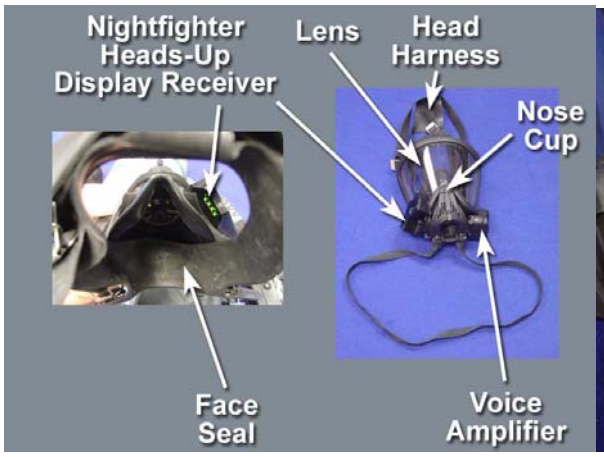
The **SCBA's** on STRATTON are made by **MSA** consisting of:

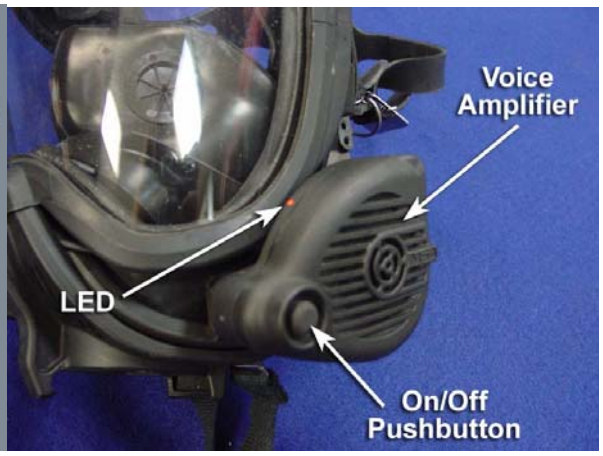
(1) **Vulcan Firehawk** carrier and harness assembly	
(1) **Ultra Elite MMR** air mask with **Voicemitter** (2) AAA	
(1) **MSA Stealth H-45** Air Cylinder and Valve	• 66 square cubic feet at **4500 psi** • Rated capacity - **45 minutes** (differs for each person)
(1) **Audi-Larm** Audible Alarm with Quick Fill URC	• Rings when approximately **25% time left** in the SCBA • Quick fill Universal Rescue Connection used for emergency filling of the cylinder still on the wearers back
(1) **Night Fighter** System with Standard Gauge and Quick Fill URC 	• Gauge glows in the dark • Transmitter uses (4) C (double flashes yellow when low) and sends the air mask cylinder content readings • Receiver uses (3) AAA (single flashes yellow when low) and reads the cylinder content with **LED lights** • **4 Green lights 76-100%** • **3 Green lights 75-51%** • **2 Yellow lights flashing 51-26%** • **1 Red light flashing 25-0%**
(1) **Firehawk** Second Stage Regulator	• Slide clip on top connects to mask and push in connection • Breathe in to receive air
(1) **Pass Device**	• Emits audio alert if senses no physical movement over an allotted time period

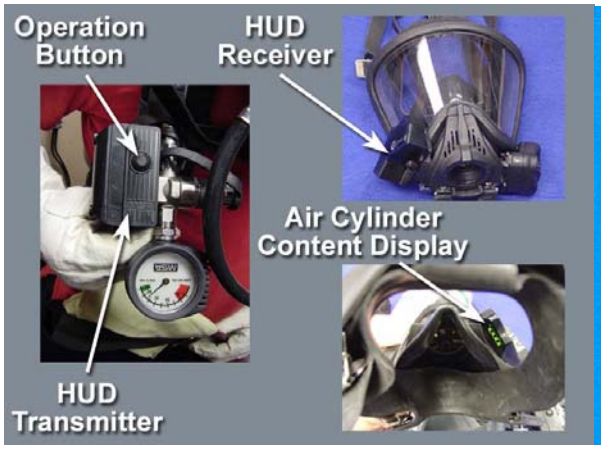
PPE

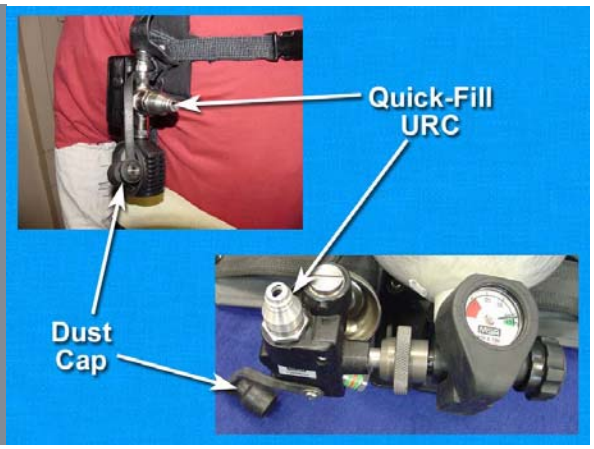

Flame and Heat Resistant Harness
Cylinder Band and Latch Assembly
Remote Pressure Gauge
Back Pack
URC Pouch


Coupling Nut
Cylinder Valve Handle
Audi-Larm
Cylinder Pressure Gauge


Nightfighter Heads-Up Display Receiver
Lens
Head Harness
Nose Cup
Face Seal
Voice Amplifier


Voice Amplifier
LED
On/Off Pushbutton


Operation Button
HUD Receiver
Air Cylinder Content Display
HUD Transmitter

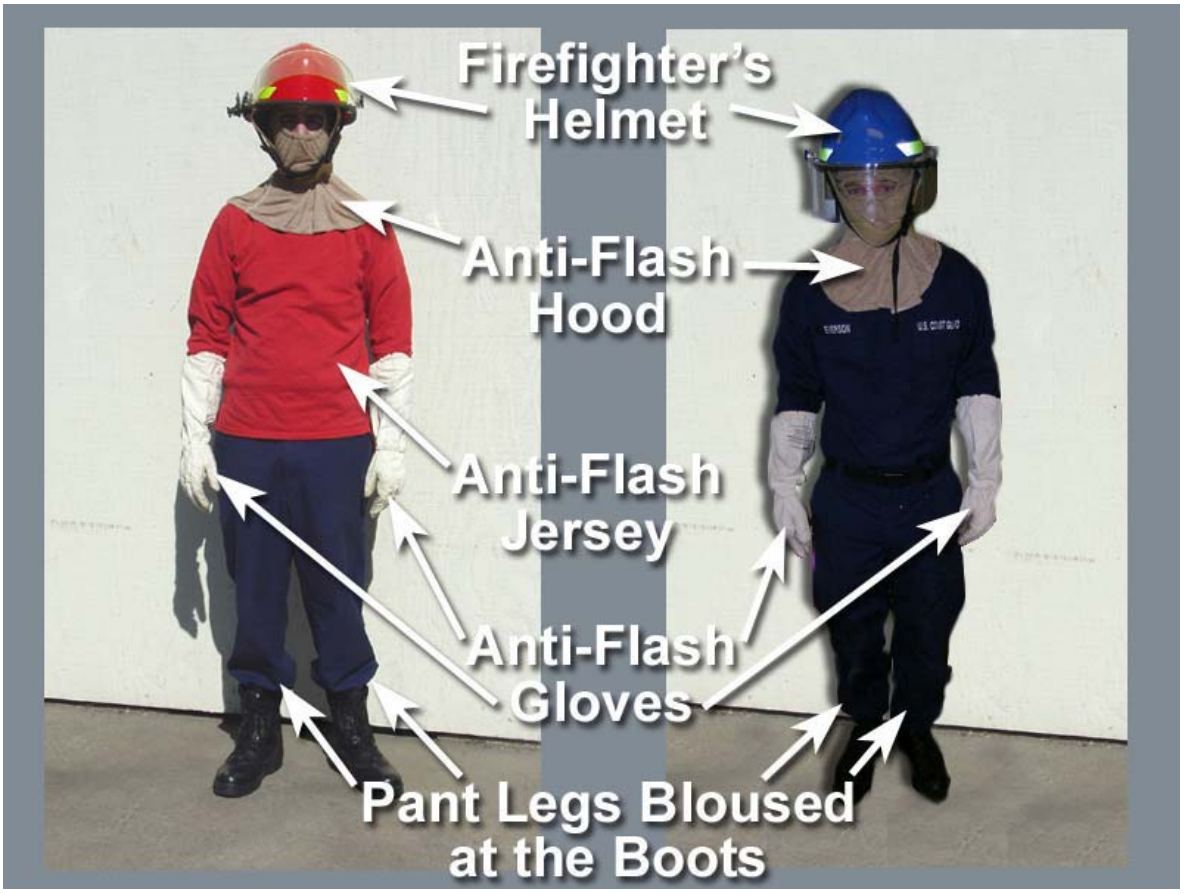

Quick-Fill URC
Dust Cap

Firefighting Dress Code

Battle Dress (initial action)
1. Tuck pants into socks and steel-toed boots
2. Button shirt top
3. Cover head with a Flash Hood and a Firefighters Helmet or Battle Helmet
4. Sleeves rolled down with Flash Gloves over forearm
5. Red jersey (mandatory when part of the repair locker)

Function	• Protect the wearer against heat, steam, and flash burns. • Worn at all times during GQ and during GE (non-Machinery Space fires)
Donning	• Nomex flash gear: Red long sleeve jersey, Flash Hood, Flash Gloves • Battle helmet or Firefighters helmet, and (Rubber Fire fighting) boots. • ODU blouse with sleeves down can be used in place of the flash jersey. • ODU pants must be bloused or tucked into socks.

Repair Locker Personnel
1. Battle helmet
2. Nomex flash gear (red jersey, flash hood, flash gloves)



FFE - Fire Protective Gear (for fire party)

1. Made of Nomex outer shell, Gortex vapor barrier, and quilted inner liner
2. Consists of:
    a. Protective coverall
    b. Flash gear
    c. Firefighters helmet
    d. Firefighters boots (steel toe and shank rubber)
    e. Firefighters gloves
    f. Storage bag
    g. Stored in the canvas bag with the boots in the pant legs to speed up dress out time and the coveralls pushed down around the boots
    h. Wearing for log period of time can cause heat stress

Function	Limited protection from heat, cold, steam, water, and sharp object. Primary use: machinery space fires (temps can be upwards of 1000° F). Outside of machinery space fires: the necessity of the FFE is the discretion of the OSL and is dependent upon the situation.
Donning	• Protective coverall (Nomex shell, Gortex vapor barrier, quilted liner) • Flash Hood • Firefighters gloves and helmet • Rubber Firefighters boots (steel toe and steel shank, rubber) Stored in a canvas bag with boots in the pant legs to reduce dress out time
Wearing the FFE	• The "standby" position: sleeves tied around waste. • Drink water prior to and after fire fighting efforts when ever possible. • If you get wet while fighting a fire, ensure to be kept wet, otherwise the water will steam off the FPG and you will be cooked inside • It is very important to ensure the layers are donned correctly and that they leave no exposed skin. Exposed skin will burn. • Wearing for log period of time can cause heat stress

Damage

Principle Types and Causes

Fire	• Hot Work (e.g. welding) is a common cause of fires aboard ships. • Can result from a variety of causes. The biggest risks for fire aboard STRATTON are the Engine Rooms due to the heat of the running machinery combined with the flammable liquids that allow them to run.
Flooding	• Hull rupture: Flooding usually results from a rupture in the hull that allows the sea into the ship. Collision and grounding are the most likely causes for a hull rupture. • Ruptured System: Certain shipboard systems, if ruptured, also have the potential to cause flooding. The fire main and auxiliary seawater cooling system are the two most likely to cause flooding. • Negatively effects stability: The entry of flooding water into the ship typically has a negative effect on the stability of the vessel. This could lead to the sinking of the ship.
Battle Damage	• Combat scenario • Fire and/or flooding damage from being hit by enemy weapons

Reporting Casualties

Whom to Report to	• Inport, report fires to the quarterdeck (**Ext 2400**) • Underway, report to the bridge (**Ext 7100**)
What to Report	• Make report in person if appropriate, or by phone • Warn personnel in the area • Give **LOCATION** (include compartment name and number) • Describe casualty (Fire: Class and extent; Flooding: Extent, rate, and cause; Approximate frame number of the casualty) • Action taken, if any • Give your name and telephone number (if applicable)

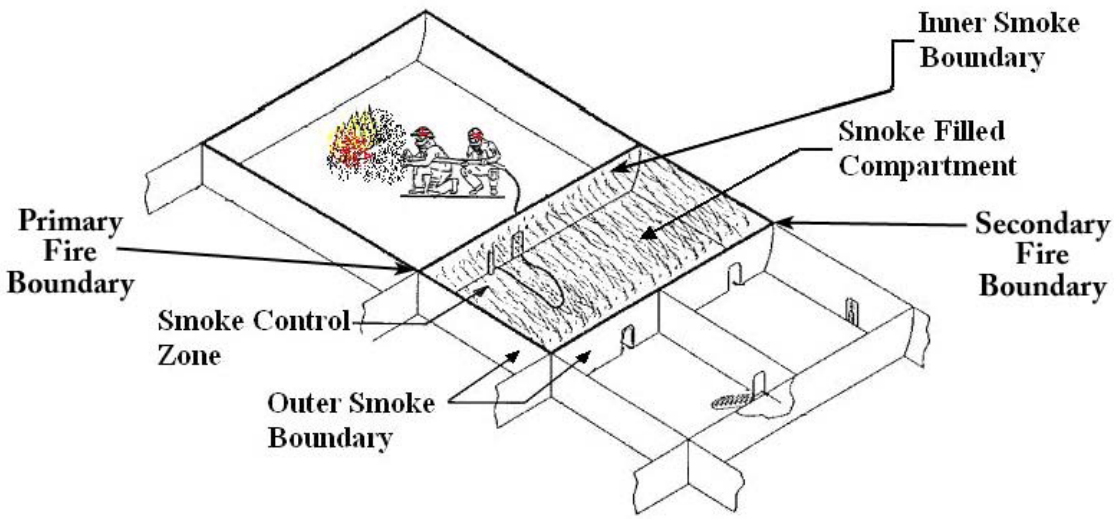
Initial and/or Corrective Actions

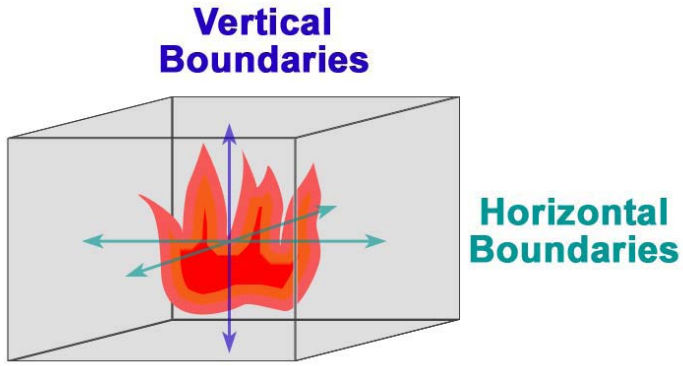
After report, *make every effort to minimize the spread of the casualty or damage*	
Fire	• If practical, attempt to extinguish using portable extinguishers and fixed systems (CO2, APC, etc.) • Clear space and back out. Be sure to isolate space (close all accesses) • If possible, remove all combustibles in the area, fake out fire hoses, set fire and smoke boundaries
Flooding/hull damage	• If practical take action to lessen the flooding / damage (stuff your ODU blouse in the hole). • Back out, being sure to isolate space (close all accesses
Toxic Gas Leak	▪ If practical take action to secure the leak (close the nearest valve in the system on the supply side). ▪ Back out, being sure to isolate space (close all accesses)
Reporting to GQ / GE stations	Traffic patterns aboard ship: • Up and forward on the starboard side. • Down and aft on the port side "Keep Right Side to the Sea"

Boundaries

Fire Boundaries

General	• Composed of the decks, bulkheads and overhead surrounding the six sides of the fire commonly referred to as "THE BOX". • Move combustibles minimum of 12" away from the bulkheads • Fake out fire hoses closest to area • Cool bulkheads with 4' pattern for 15 seconds. • Remember: ***No more than a 1" on deck at a time for cooling!***
Primary	The bulkheads, deck, and overhead immediately adjacent to the fire. • Isolates the entire effected space from the rest of the ship. • Limits the extent of the damage
Secondary	The next set of fume tight (at minimum) closures adjacent to the primary boundaries. Further limit the spread of fire by not allowing convection or conduction to occur.





Boundaries

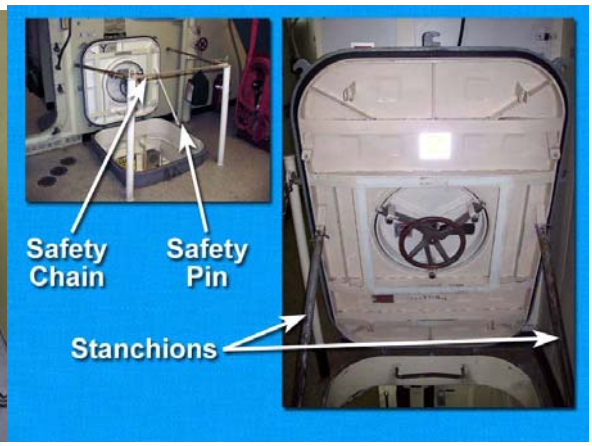
Smoke and Toxic Gas Boundaries:

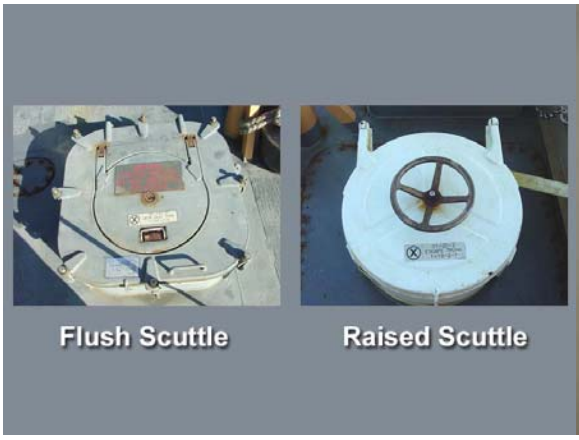
Smoke Control	Installation of smoke curtains or blankets where hatches and doors must stay open for fire fighting purposes
Smoke Boundaries	Prevent the passage of smoke by closing fittings that access the affected space
Setting Smoke and Gas Boundaries	• Closing all doors, hatches, scuttles, passing tubes, ventilation closures, etc. • Secure ventilation in the area. • Smoke curtains: that to minimize smoke spread
Smoke Curtains/Blankets	• Smoke Blankets: Installed over hatches or deck openings. • Smoke Curtains: Installed in doors or bulkhead openings • Used on fittings that must be open for Damage Control efforts. • Must be clamped to the knife-edge of the fitting (Spring clamps, Vise grips, C-clamps)

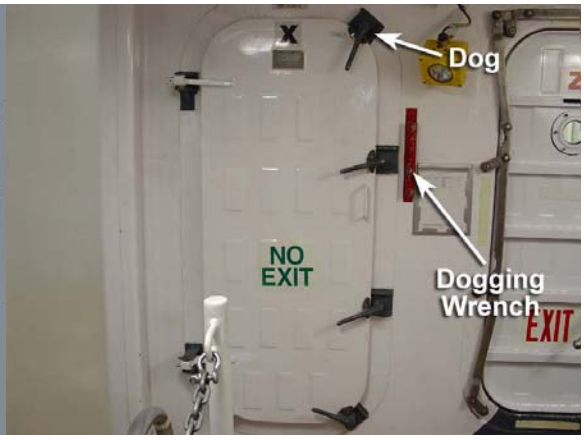
Boundaries

Flooding/ Progressive Flooding Boundaries

General	Progressive flooding occurs when one compartment begins overflowing into an adjacent compartment due to failure in watertight integrity. Progressive flooding has the negative effect of magnifying any damage in spaces adjacent to the original flooding. The ship's stability will be greatly affected by progressive flooding. Once set, flooding boundaries should be constantly monitored for leaks. If leaks are found, they should be immediately reported to the RPL and action must be taken to limit the flow.
Primary	First set of watertight bulkheads directly adjacent to the flooding compartment forward and aft
Secondary	Next set of watertight bulkheads adjacent to the primary boundaries forward and aft

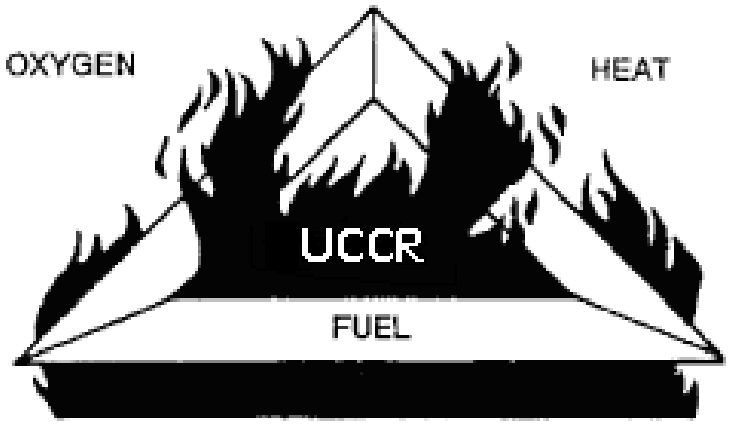


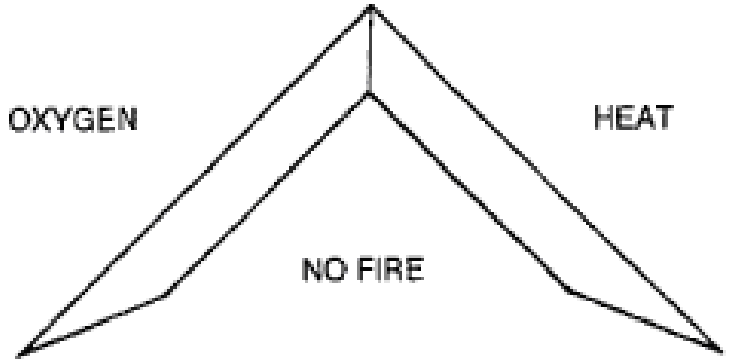




Fire Tetrahedron

Fuel	To vaporize and burn • Solid: wood, rubber, paper, and cloth • Liquid: gasoline, hydraulics, oil base paints/solvents • Flammable gases: acetylene, propane
Heat	To raise the temperature of vapor to ignite
Oxygen	To combine with fuel vapor • Greater than 15% for flaming combustion • Greater than 3% for smoldering
Uninhibited Chemical Chain Reaction	Completes Combustion

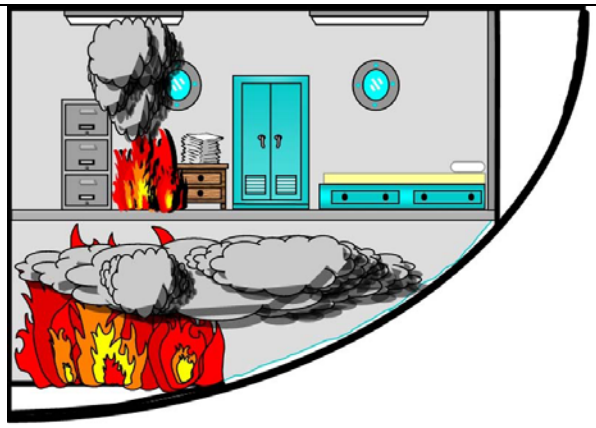




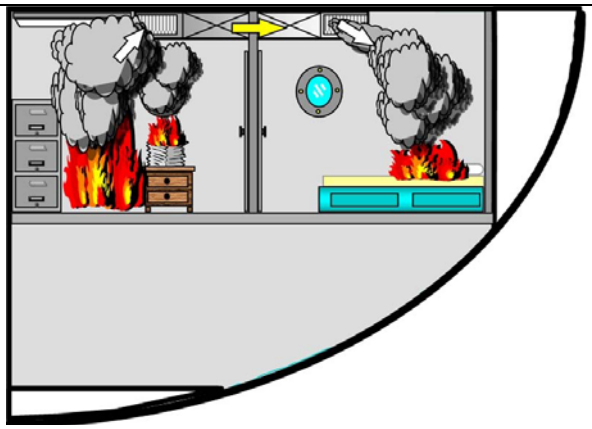
**** If any side is removed, the fire will go out ****

Heat Transfer

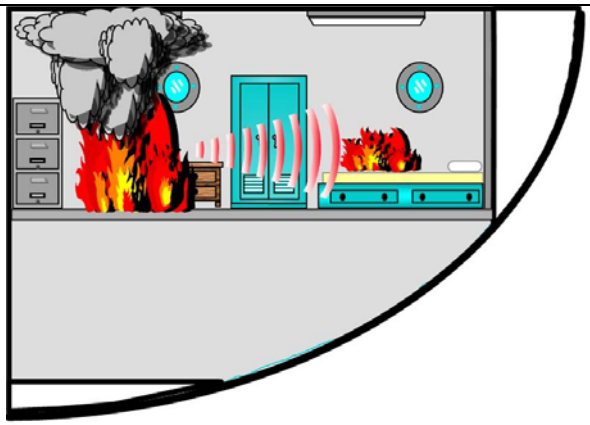
Conduction	Transfer of heat through an object like metal



Convection	Transfer of heat through a motion of gases or liquids • gases are lighter than air and will rise • gases become hot enough to ignite other fuels in its path



Radiation	Transfer of heat across a gap (feel heat w/out touching the flame)



** **Spontaneous ignition**: Tightly packed materials saturated in greases, paints, animal and vegetable oil or fats can ignite if there is insufficient airflow to remove the fumes. **

General Shipboard Firefighting

Fire Classification

	Characteristics	Smoke	Extinguishing Agent	Overhaul Method
Alpha	Embers, Ash, Wood or Paper products	White Grey	Water or AFFF	Break up embers Straight Stream
Bravo	Flammable Liquids	Black	AFFF (preferred) PKP, CO2	Cool fuel source
Charlie	Energized Electrical (sparking, arcing)	Blue	Secure power, CO2 Water fog from 4' (short bursts)	Performed by Electrician
Delta	Combustible Metals (magnesium, titanium)	Varies	Water in quantity from a safe distance Sand, Jettison	Get Rid of it

Extinguishing Agents

Water	**Removes Heat** • Straight stream: applied to seat from a greater distance to cool and to break up burning material • Narrow angle: 30 deg pattern, removes heat, water shield for personnel • Wide angle: 90 deg pattern creates protective shield for fire fighters. Too much water creates steam (Steam absorbs heat and displaces oxygen) What ever you put in you have to take out **(no more than 1" on deck)**
CO2	• Colorless, odorless and is heavier than air (**Displaces O2**) • Stored under pressure in a liquid state then released as a gas • Does not cool a fire (Can be used for reflash)
AFFF	• 97% Water to 3% foam • Mixed in in-line inductor (5 gallon jug) or by fixed system • Floats on top of liquid fuels (**Forms vapor barrier, cools**)
PKP	• Non-toxic; does not prevent reflash • **Interrupts chemical chain reaction** (Does not displace O2 or remove heat)
APC	• Extinguishes cooking oil and grease fires (**Creates foam vapor barrier**) • Fixed systems are activated manually or automatically • 42% potassium carbonate, 58% water

Initial Actions

1. **Sound alarm immediately.**
2. **Report fire and its location (compartment number and name) to OOD and any crewmembers in the vicinity using whatever many methods of communications onboard.**
3. **Extinguish if you can (preferably two extinguishers simultaneously, however use no more than two CO2 in a single space)**
4. **Contain and isolate if unable to extinguish (secure the fuel source of the fire: valves, breakers, ventilation); secure surrounding area (doors, hatches, etc).**
5. **All non-essential personnel shall leave the fire area.**

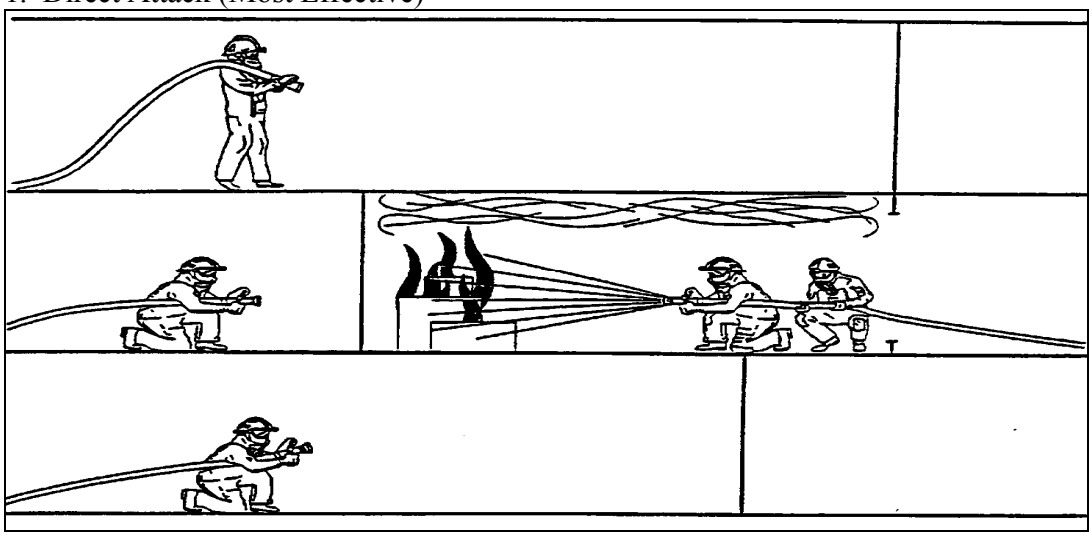
* Personnel not wearing breathing apparatus should evacuate smoke filled spaces *

The Fire Lifecycle

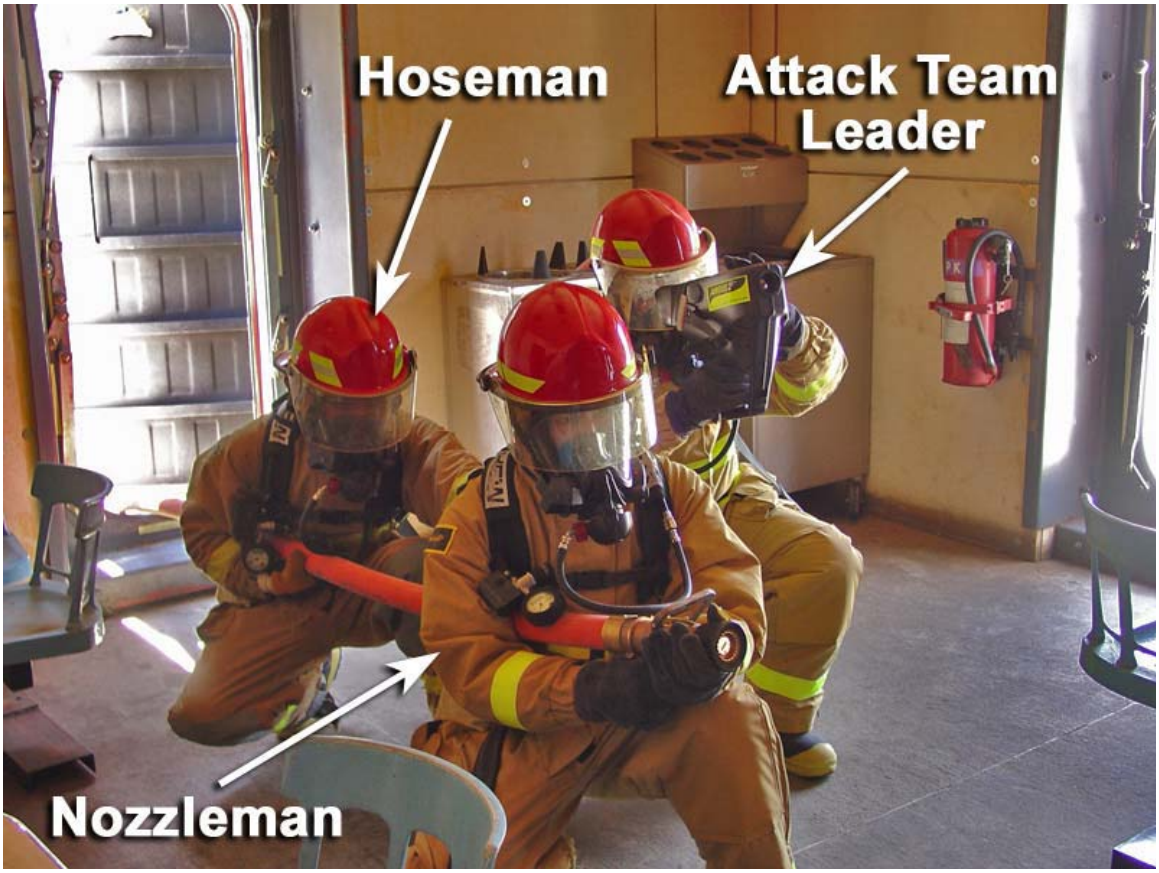
Growth	Temperature is low, fire is localized in the vicinity of its origin
Rollover	Formation of flame front of burning gases across the overhead of the space
Flashover	Sudden spread of flame to all remaining combustibles in the fire space
Fully Developed	All combustibles in the space are burning. Burning limited only by the amount of oxygen available. Space may be too hot, require indirect attack.
Decay	Fire consumes all available fuel, combustion slows (decays) and dies out
Back draft	If a fire self extinguishes because of lack of oxygen, flammable materials will be present in the space at or above their ignition temperature. If fresh air (more oxygen) is introduced to the space the three sides of the fire triangle are present again and the fire will re-ignite, possibly explosively.

Firefighting Procedures:

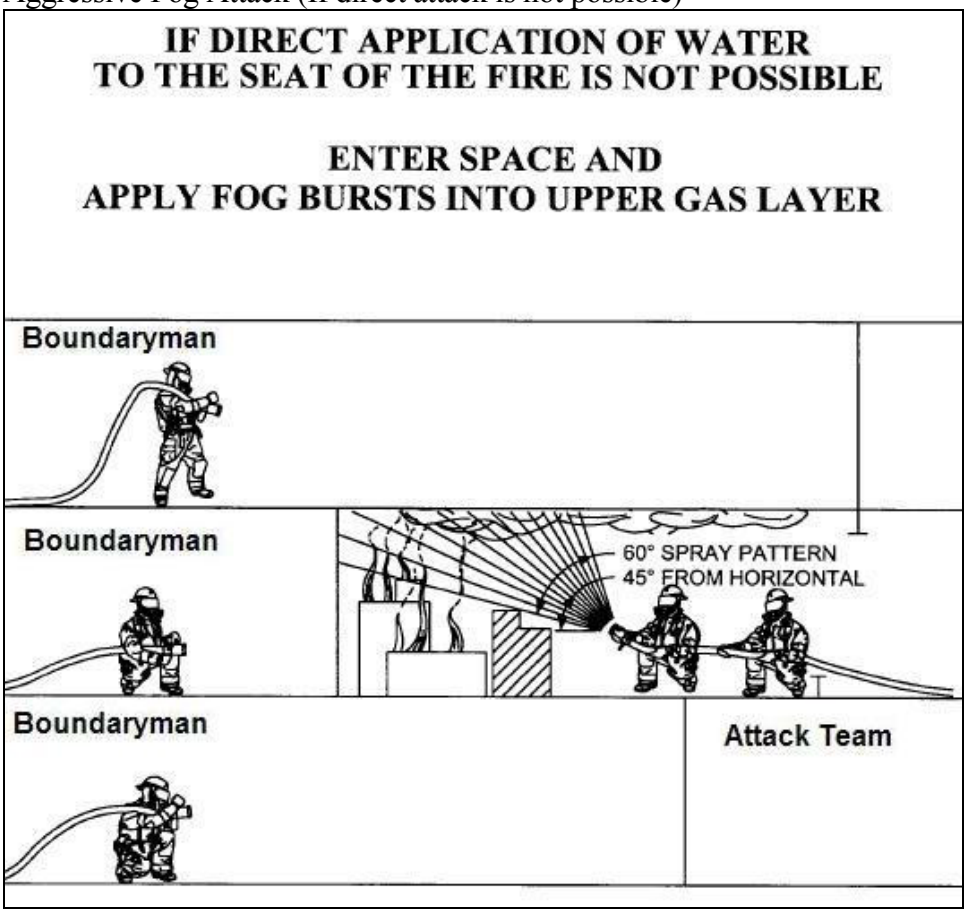
1. Direct Attack (Most Effective)



- Keep low and try to stay dry.
- Use short bursts of narrow angle fog / straight stream. Hit the seat of the fire! Use the minimum amount of agent necessary to extinguish the fire.
- Don't hit overheads / bulkheads.
- Set fire boundaries, cool as needed.



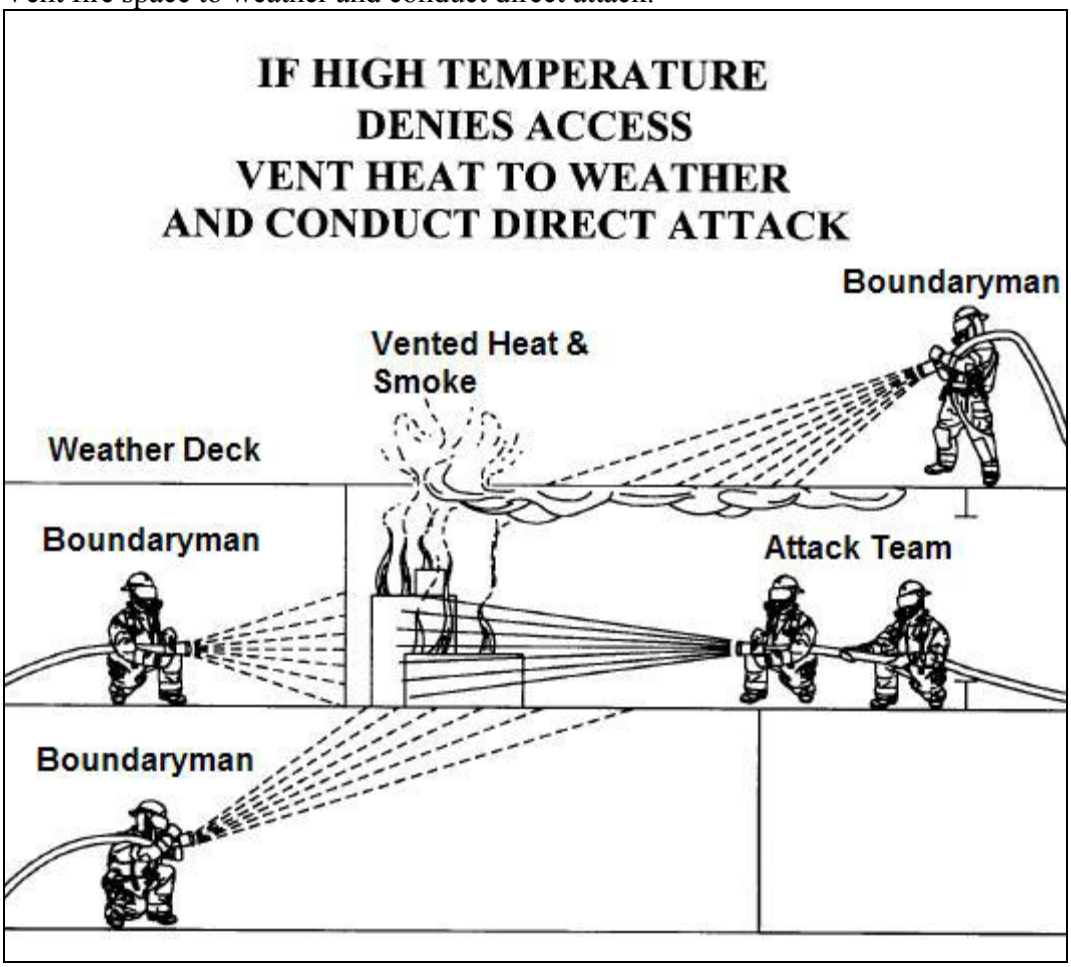
2. Aggressive Fog Attack (If direct attack is not possible)



a. Used when the following conditions exist:
   (1) Overhead gases are burning (Rollover is occurring).
   (2) The seat of the fire is obstructed.
   (3) Multiple seats of the fire are present.

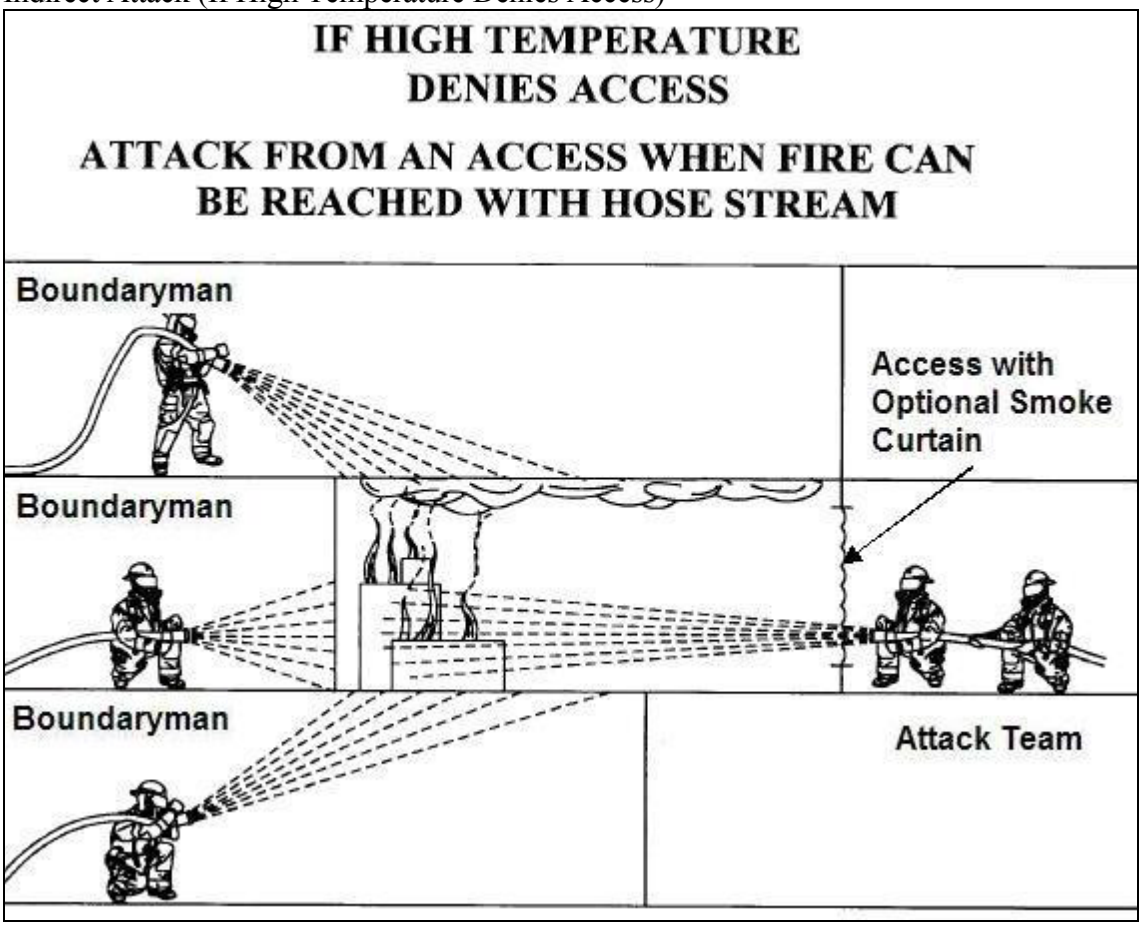
- Keep low and try to stay dry.
- Use short bursts (2-3 seconds) of water directed into the overhead at a 45^0 angle from a vari-nozzle in a medium (60°) fog pattern.
- Pause several seconds between bursts to minimize steam generation and to check for flames.
- Advance to the seat of the fire and conduct direct attack.
- Set fire boundaries, cool as needed.

3. Vent fire space to weather and conduct direct attack.



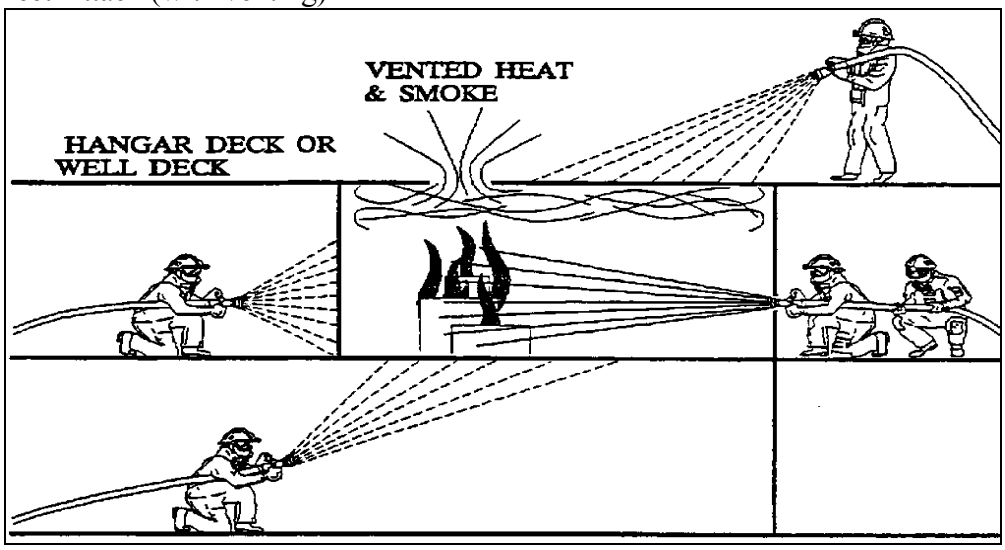
- Cut hole in overhead above fire. Minimum one square foot. (three feet square desired).
- Holes should be cut from weather deck or spaces open to weather (i.e. hanger decks, well decks).
- Fire boundary watch above fire must avoid directing water into vent hole as this disrupts the venting process.
- As temperature drops / conditions permit, enter and conduct direct attack.
- Keep low and try to stay dry.

4. Indirect Attack (If High Temperature Denies Access)



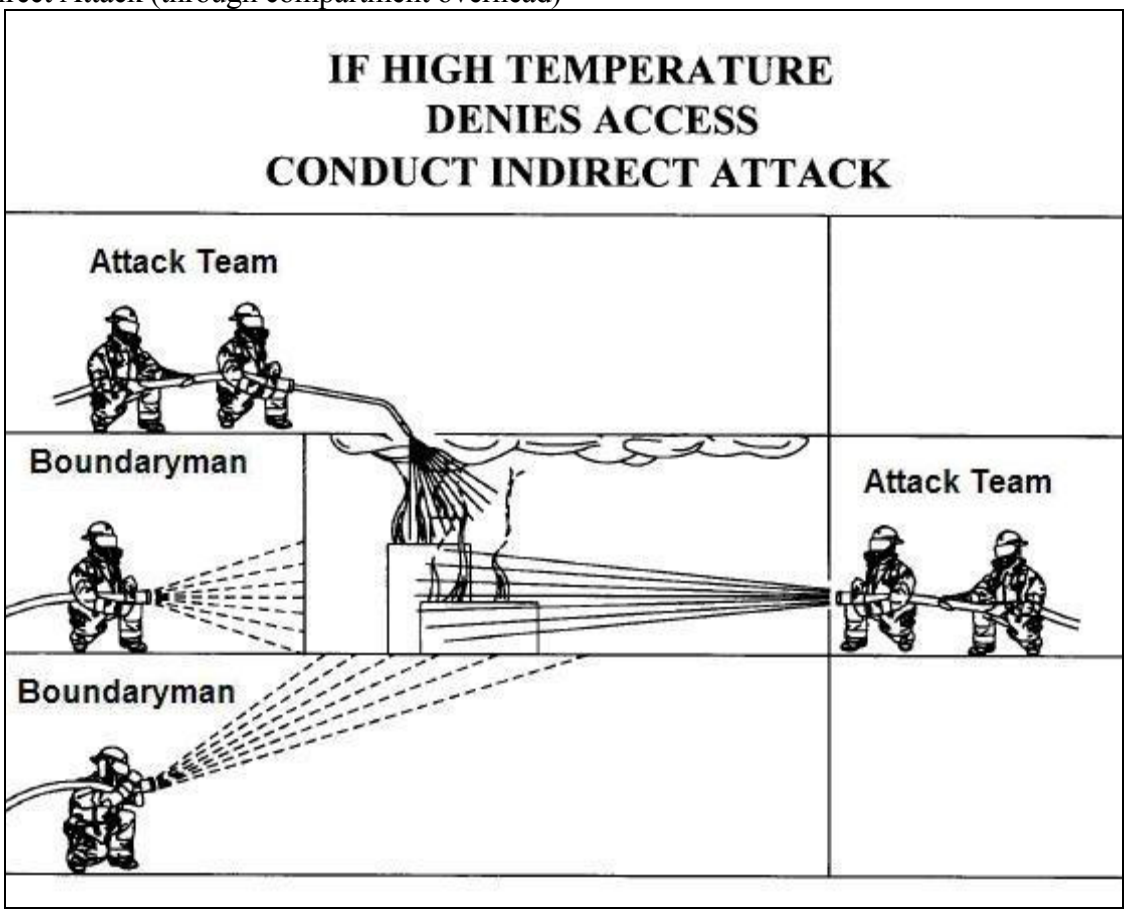
- Attack from an access that can reach the fire.
- Keep low and try to stay dry.
- Use narrow angle fog / straight stream. Hit the seat of the fire. (If possible).
- The use of a smoke curtain at the entrance will provide excellent protection to the fire party.
- Use aggressive fog attack as needed.
- Set fire boundaries, cool as needed.

5. Indirect Attack (with venting)



- Cut hole in overhead above fire. Minimum one square foot. (three feet square desired).
- Holes should be cut from weather deck or spaces open to weather (i.e. hanger decks, well decks).
- Fire boundary watch above fire must avoid directing water into vent hole as this disrupts the venting process.
- The use of a smoke curtain at the entrance will provide excellent protection to the fire party.
- As temperature drops / conditions permit, enter and conduct direct attack.
- Keep low and try to stay dry.

6. Indirect Attack (through compartment overhead)



- To cool fire space, apply water fog from a small hole cut in the overhead / from space access.
- As temperature drops / conditions permit, enter and conduct direct attack.
- Keep low and try to stay dry.
- Set fire boundaries, cool as needed.

NOTE: Indirect Attacks

- <u>Always</u> followed up by a direct attack.

- <u>Never</u> conducted with personnel in the affected space.

Attack Team Relief

To compensate for fatigue and heat stress during a prolonged attack, additional personnel should be provided to relieve hose crews. In a high heat stress environment, personnel endurance in a firefighter's ensemble may be limited to less than 10 minutes. The maximum time for personnel to function in a firefighter's ensemble is 30 minutes. If personnel are relieved before becoming completely exhausted, they may be able to return to firefighting duties after a brief rest.

Primary objective of orderly attack team relief is to maintain an uninterrupted attack on the fire. A secondary objective is to relieve personnel frequently enough to avoid losing personnel to heat strain for the duration of the firefighting effort.

Relieve as a team or individually. Relieving individually may allow the attack hose to remain functional throughout the relieving process.

A single point of contact identified by the DCA shall manage the relief process.

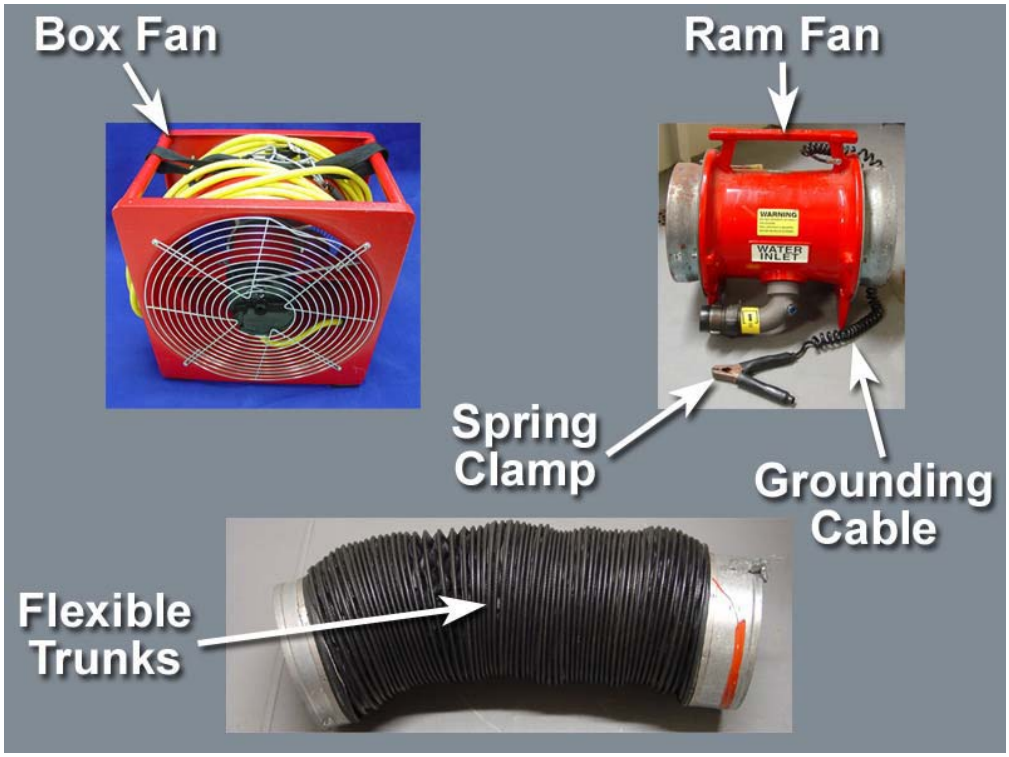
Personnel standing by should minimize heat stress while waiting. (i.e. wear the firefighter's ensemble at the waist until called to relieve, stay out of the sun, etc.)

Personnel relieved should proceed to fresh air, cool off and replenish body fluids. ENSURE relieved personnel are monitored during the recovery period for signs of heat exhaustion or other problems.

Desmoking

Desmoking

One Complete Air Change	• Moving from a space the volume of air the space contains (i.e., for a 10'x10'x10' room one complete air change requires moving 1000 cubic ft. of air) • Four complete air changes removes 95% of the smoke and toxins from a compartment
Desmoking Route	Route by which smoke will be removed from a compartment. • Recommended by OSL, approved by DCA (or RLL) • If applicable, use smoke curtains along desmoking path to ensure proper movement of the smoke from the ship. Short Circuiting: ineffective ventilation, occurs in one of two ways: • Exhaust is rigged such that the discharge is positioned too close to supply intake. • Portable ventilation ducting not inserted far enough into the space, and make up air is drawn into the suction.
Installed Ventilation	Installed system of fans and ducting normally supplying the ship's ventilation. Three fan / ducting networks: • *Supply* from the weather decks into the skin of the ship • *Recirculation* within the ship • *Exhaust* from inside the skin of the ship to the weather decks • Can also be used to desmoke a compartment. • Electrician determines ventilation system is electrically sound. • EO's permission is required.



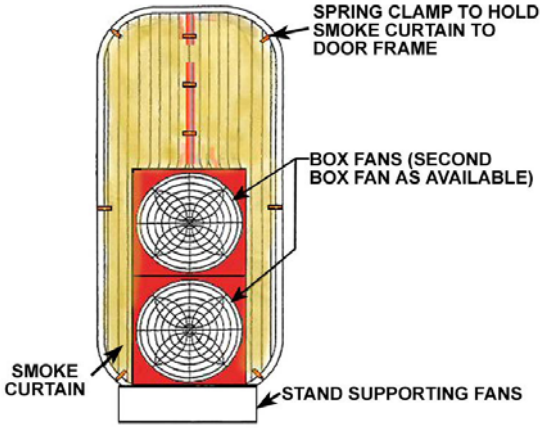
Desmoking

Method of Air Changes

Natural Ventilation	Opening accesses of a space to the weather deck (or other compartments) and allowing free exchange between the smoke and fresh air. Not ideal - very slow.
Negative Ventilation	Creates a low (negative) pressure area to which the smoke/toxic gases within the space flow. Ideal situation - "sucks" from the space.
Positive Ventilation	Creates a high (positive) pressure area in the space. High pressure in space flows to lower pressure areas, usually along set path. Not ideal – forcing air into spaces containing explosive gases can cause explosions.
Make-Up Air	"Clean, fresh" air that enters the space due to the negative pressure created in the space, replaces the smoke that has been removed.

Portable Ventilation Equipment

Vari-nozzle	• Effective and easy for desmoking spaces with weather deck access. • Set nozzle between the high and low velocity fog patterns. • Position nozzle discharge 3 ft inside the weather access resulting in a water pattern covering 85-90 percent of the access opening. • Low pressure area created by nozzle discharge will desmoke space.
Box Fan	• For spaces near weather decks where exhaust ducting not required. • Creates positive/negative pressure areas to aid desmoking. • 3200 cubic feet of air per minute (cfm) • 115 volt AC power • Electrical checks required prior to use for post fire desmoking due to possibility of explosive atmosphere. Fan is explosive proof only if tamper seal on upper left motor casing bolt is present/intact. • Fan motor has an overheat protection shut off switch. • Stowage: 2 each in Repair II and Repair III.



<table>
<tr><td>RAMFAN 2000</td><td>

Grounding strap - prevents static electricity build-up. *Must Use*
Stowage: One each in Repair II and Repair III
Powered by fire main pressure via 1 ½” hose
May be used in any toxic or explosive atmosphere
Air moving capacity

<table>
<tr><th>Firemain pressure</th><th>CFM</th></tr>
<tr><td>90 psi</td><td>1640</td></tr>
<tr><td>100 psi</td><td>1750</td></tr>
<tr><td>125 psi</td><td>1950</td></tr>
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</td></tr>
<tr><td>Collapsible Ducting (Elephant Trunks)</td><td>

10” diameter.
Adapter collars allow the connection of appropriate ducting.
Serves as portable ducting for Ram Fan.

Safety Precautions

Use as few lengths of ducting, and the shortest/straightest run.
Do not lay desmoking equipment over ladders, steps, or walkways in such a manner as to create a trip hazard.
Rig ducting to prevent it from becoming clogged by debris
All connections shall be wrapped in duct tape to an airtight seal
Stowage: Repair II and III annex locker areas

</td></tr>
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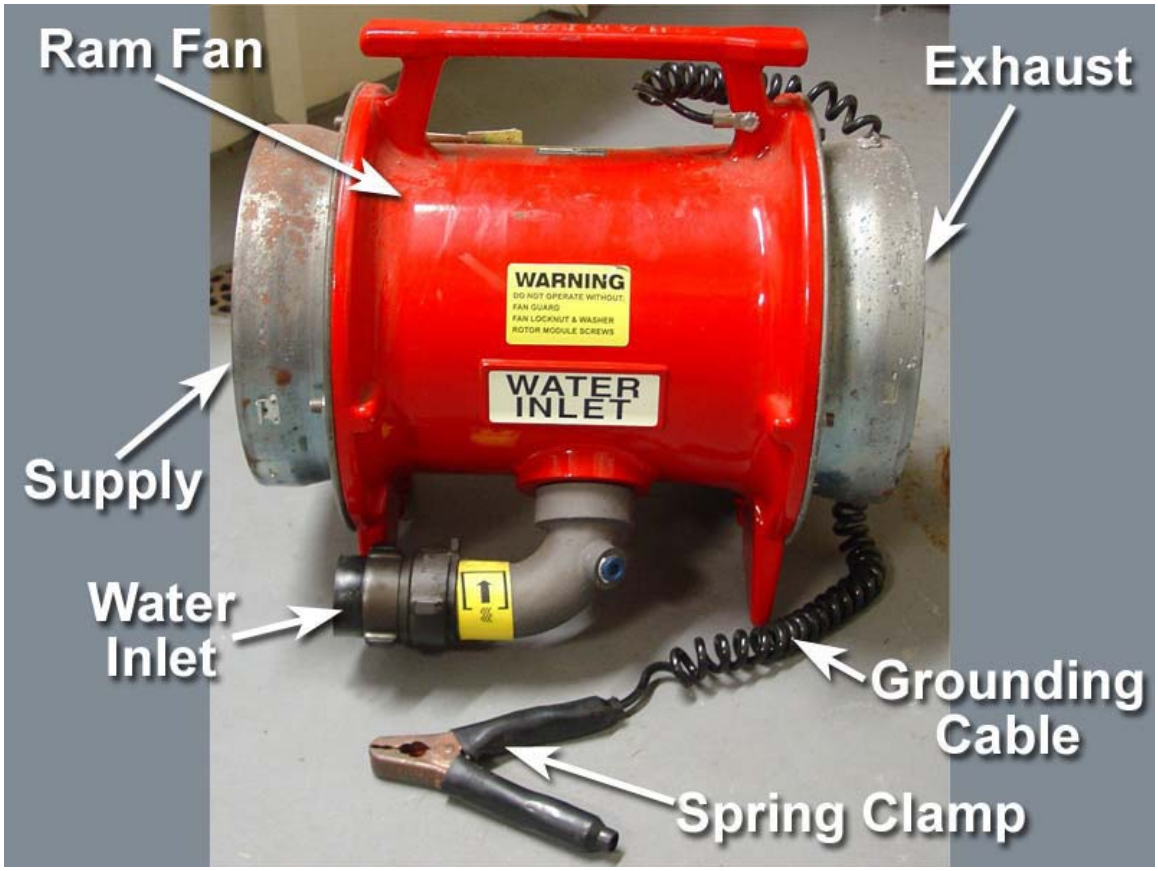
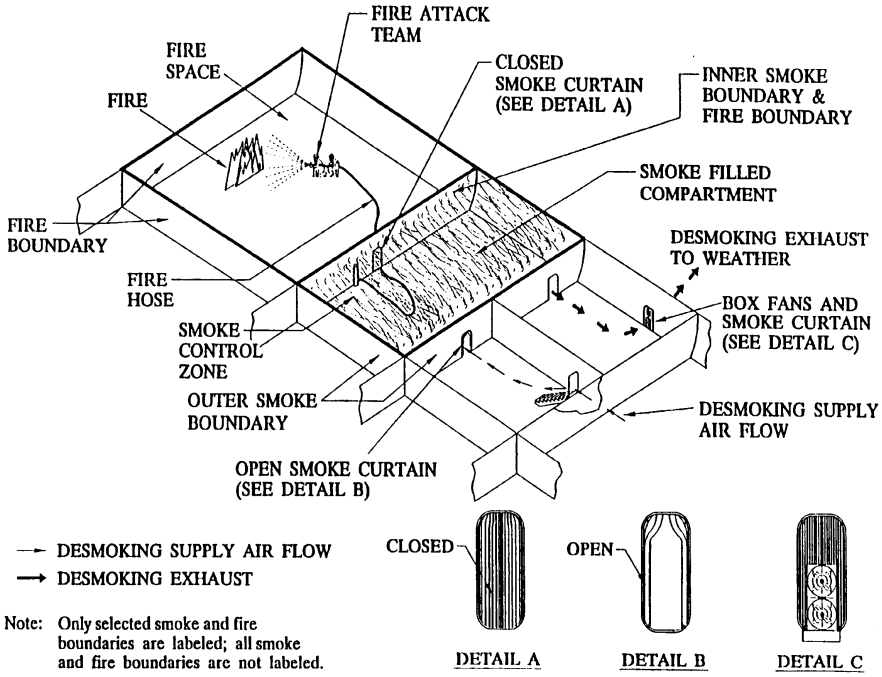


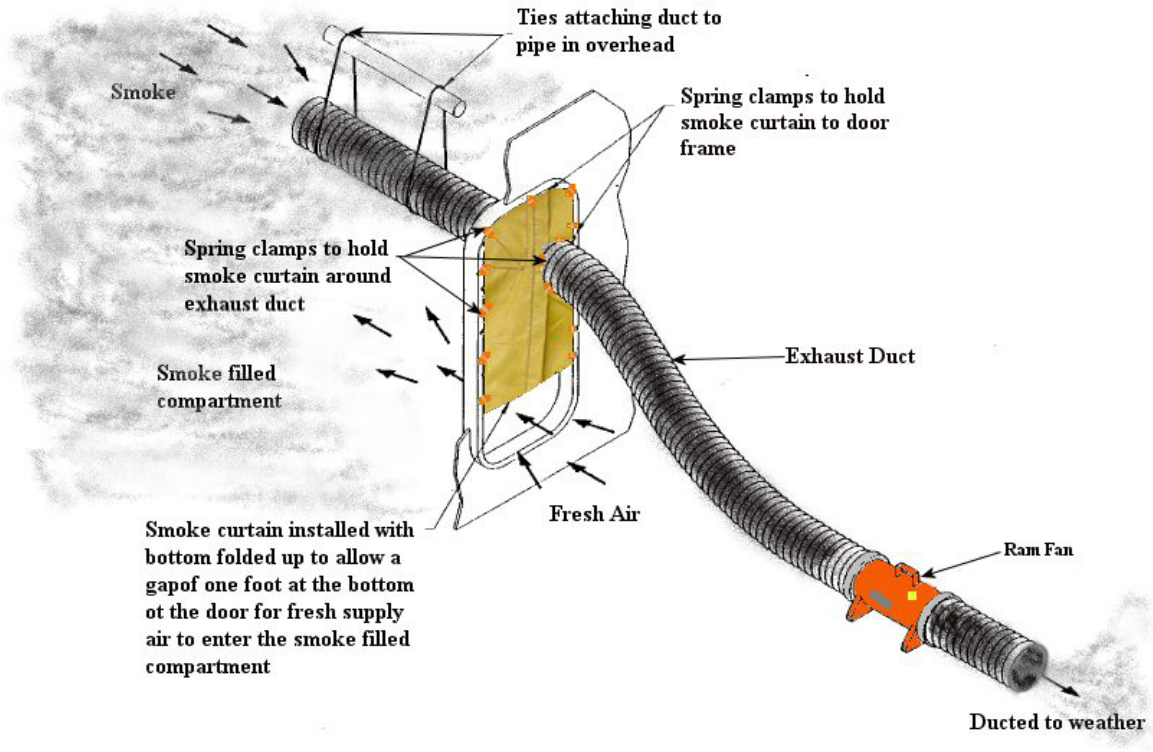
Desmoking

Active Desmoking

Definition	• Removal of smoke and heat from the smoke control zone, primarily between the inner smoke boundary and the outer smoke boundary, prior to extinguishment of the fire. • Reduces/controls spread of smoke throughout the ship, and allows fire fighters to better pin point, fight, and overhaul the fire
Function	• Used primarily with Class A and C fires. • Implemented if initial attack on fire is unsuccessful and attack is likely to go on for an extended period of time. • Smoke or heat in spaces beyond fire space is impeding attack.
Cautions	• Not suitable for Class B fires. May contribute to the ignition of combustible vapors outside the fire space. • Initial attack should not be delayed by active desmoking.
Procedure	• *Establish Smoke Control Boundaries*. Set primary/secondary smoke boundaries using doors or smoke curtains. • *Establish Smoke Removal Zone*. Identify Exhaust Point and Make up Air Point. Isolate all accesses along smoke removal zone, using passageway as a ventilation path for smoke removal. • *Establish Exhaust point*. Stack two box fans in door with smoke blanket sealing around door. Turn on both box fans to create a negative pressure in the Smoke Control Zone. • *Establish Make Up Air Point*. Open access door to weather, allowing fresh air to enter smoke removal zone. Ship maneuvering may be required. Installed ventilation systems in the smoke removal zone must be secured. Make up air volume should not exceed exhaust. (Positive Pressure).



Desmoking


Ties attaching duct to pipe in overhead
Smoke
Spring clamps to hold smoke curtain to door frame
Spring clamps to hold smoke curtain around exhaust duct
Exhaust Duct
Smoke filled compartment
Fresh Air
Smoke curtain installed with bottom folded up to allow a gapof one foot at the bottom ot the door for fresh supply air to enter the smoke filled compartment
Ram Fan
Ducted to weather

Atmospheric Testing Equipment

After desmoking or ventilating a compartment, personnel are still not permitted to enter the area until it has been certified, "gas free" by the Gas Free Engineer (DCA). There are three tests that must be conducted in a specific order to determine if the atmosphere is safe. They are: **presence of sufficient oxygen, absence of explosive gases and absence of toxic gases.** The following equipment is used to conduct these tests:

Explosive Meter Model 2A

Combustible gas indicators are quick, safe and accurate means of detecting combustible gas or vapors mixed with air. The combustible gas indicator does not identify the type of combustible gases; it simply indicates that one or more is present. The explosive meter must be set to zero in a clean atmosphere by using the knob on top and squeezing the aspirator bulb. The following definitions will help you understand how the explosive meter works.

Lower Explosive Limit (LEL) is the minimum percent by volume of a gas that, when mixed with air at normal temperature and pressure, will form a flammable mixture.

Explosive Range is the range in-between LEL and UEL at which the fuel air mixture is most likely to explode. Upper Explosive Limit (UEL) is the point at which the fuel air mixture is too rich for an explosion.

Explosive meters can measure only small quantities of flammable gases or vapors in the LEL and can only detect a UEL condition. Test descriptions are:
Safe if reading is below 10% LEL.
Unsafe if reading is above 10% LEL.
Unsafe if reading detects UEL conditions.

DRAGER MULTIGAS DETECTOR

This toxic gas detector is used to determine the concentration of various types of toxic gases in a space. It consists of bellows and various tubes. Each glass tube can only test the toxic gas indicated for that tube. To take a test sample, each end of the tube is broken off, and the tube is inserted into the Dragger. The number of squeezes varies with each tube. The instructions in each tube case will give you the information needed to take each test. The level of toxic gas is indicated by a color change in the tube. If toxic gas is detected, additional ventilation is needed.

PHD ULTRA MULTI GAS DETECTOR (4 GAS ANALYZER)

The PHD Ultra is a personal, portable microprocessor controlled data logging gas detector that can monitor up to four atmospheric hazards simultaneously. The PHD Ultra measures: **oxygen (O2), combustible gas, hydrogen sulfide (H2S) and carbon monoxide (CO).** All four gases can be monitored at one time. The PHD Ultra will alarm when concentrations reach their minimum parts per million reading. The PHD Ultra has an installed mechanical pump that draws in a sample through the meter, attachable sample probe or tube and float ball. The PHD Ultra should only be used by the GFE or an equally qualified person. Calibration of the PHD Ultra can be done two ways, the first is to turn on the unit in a clean atmosphere and allow the unit to stabilize for three minutes

until all readings are at zero, and the second way is to use the calibration gas. To operate the PHD Ultra:

1. Turn the unit on by pressing the large black button on top of the PHD Ultra (This will begin a self- test).

2. After the self-test is complete, the unit is ready to take measurements.

For further options, refer to the owner's manual.

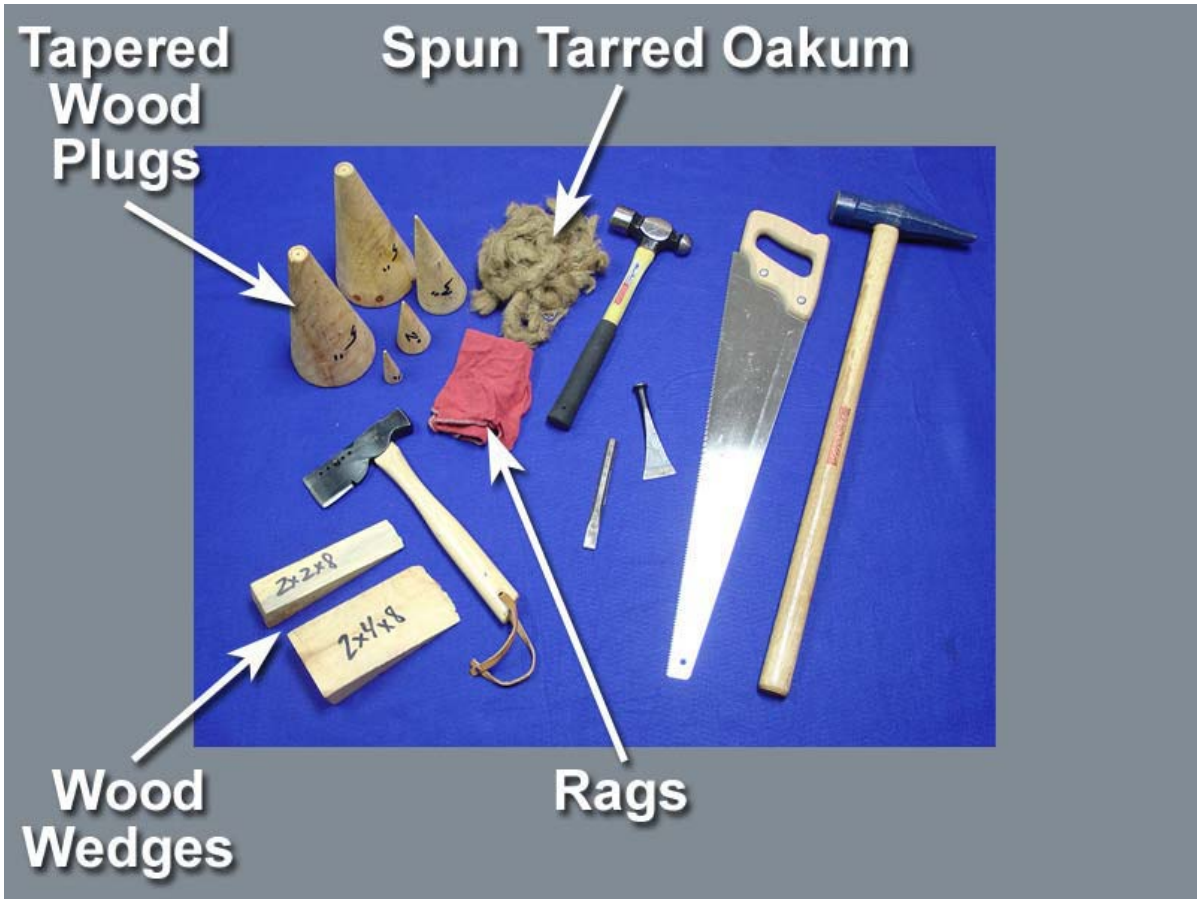
All atmospheric tests should be done by checking the entrance and all ten points of a compartment, the definition of a ten-point check is: Check high and low in each corner and high and low in the middle of a compartment. More than ten checks can be done, but the ten-point check is the minimum.

HAZARD	ODOR	FLAM	DENSITY	SOURCE	DEATH
Carbon Monoxide	None	Yes	Lighter than air	Incomplete combustion	Subtle asphyxiant
Carbon Dioxide	None	No	Heavier than air	Complete combustion	Blunt asphyxiant
Nitrogen Dioxide	Acrid	No	Heavier than air	Post fire atmosphere	Choking agent
Hydrogen Sulfide	Rotten eggs	Yes	Heavier than air	Anaerobic organic decay	Nerve agent
Methane	None	Yes	Lighter than air	Anaerobic organic decay	Explosion
Ammonia	Pungent	Yes	Lighter than air	Cleaning gear, urinals	Choking agent
Hydrogen	None	Yes	Lighter than air	Rust, batteries	Explosion
Refrigerant R-134, R-22	None	No	Heavier than air	A/C, freezers, chillers	Blunt asphyxiant

Plugging and Patching

When flooding occurs steps should be taken to stop or control the rate of flooding (e.g. dewatering equipment, shoring, pipe patching & plugging). Always remember, there are two types of repairs: Permanent & Temporary.

Wooden Plugs	• Made of soft wood (Douglas fir, yellow pine) • Variety of sizes (1” to 12” in dia.) • Cone Shaped • Small end hammered into hole with oakum or soft rags • Any **plug 10”** in diameter or larger must be **shored in place**

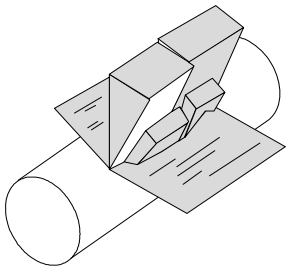


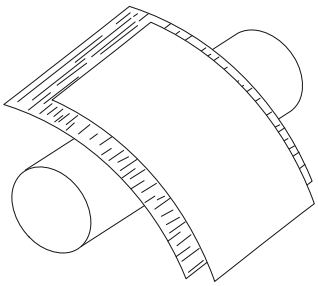
Soft Patch

For small holes or cracks in low pressure (**150 psi**) piping.

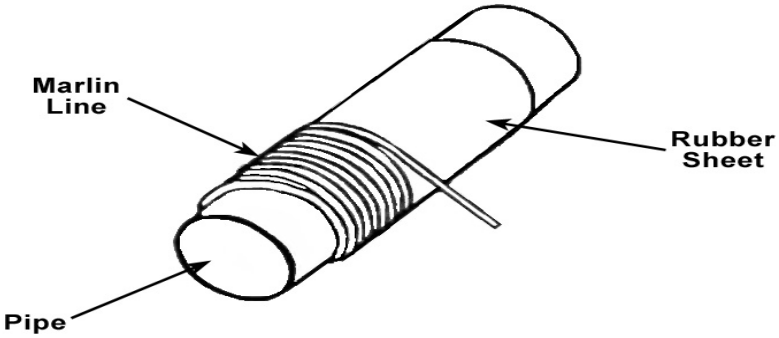
When possible, reduce the area of the hole using the following steps:

1. Reduce system pressure (i.e. secure system, or Cut-Out Valve upstream of rupture) if possible. Remove rough edges on pipe.
2. Drive softwood wedges into the hole.
3. Mark a line on the wedges along pipe and remove from the hole.
4. Cut wedge ends off **one-half inch below the marked line** (so fluid flow is not impeded) and wrap wedges with cloth or oakum.





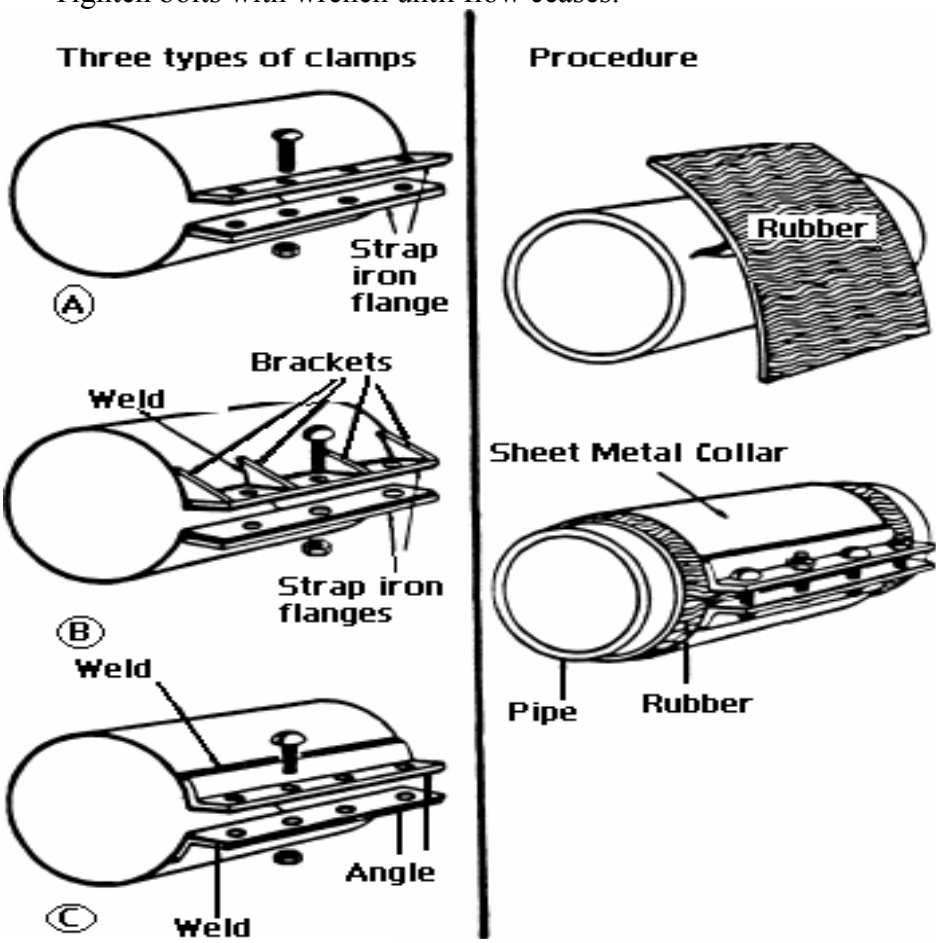
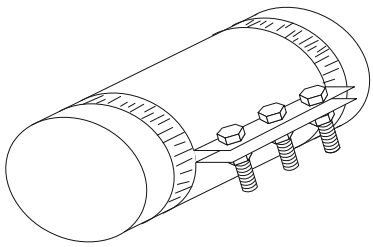
5. Insert wrapped wedges into pipe, trim flush with outside of pipe.
6. Measure and cut sheet rubber packing so it **extends 2 inches** on either side of damaged area and will wrap around the pipe, leaving a ½" gap between ends.
7. Place sheet rubber on pipe and cover with **canvas** extending **2**" on either side of damaged area and wraps completely around pipe.
8. Start wrapping marlin at center of rubber leaving 12" extra. Wrap marlin from center out ½" beyond edge of rubber sheet. Wrap marlin back toward center of patch and ½" beyond other edge of rubber sheet. Wrap back to center and tie off to other end of line.



**** To stop the spread of a crack, drill a ¼" hole on each side. ****

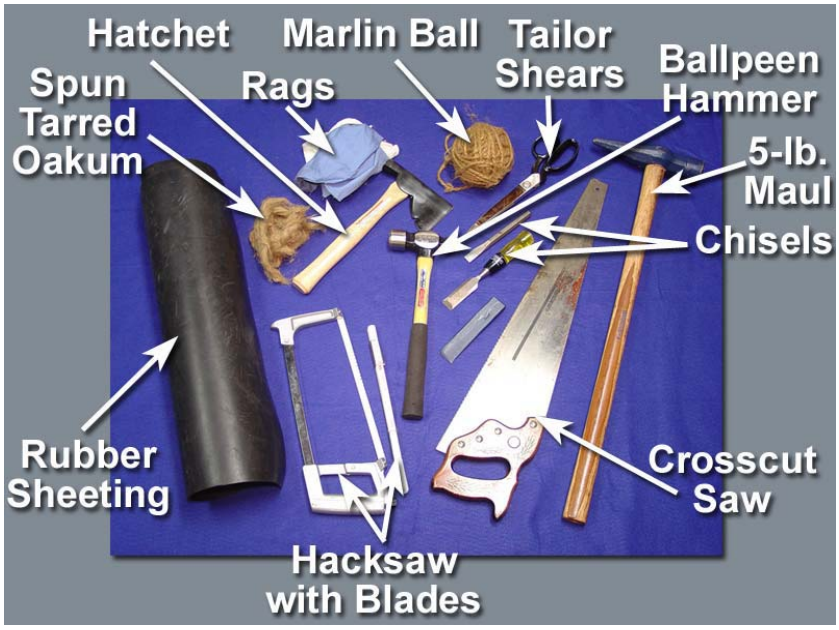
Plugging and Patching

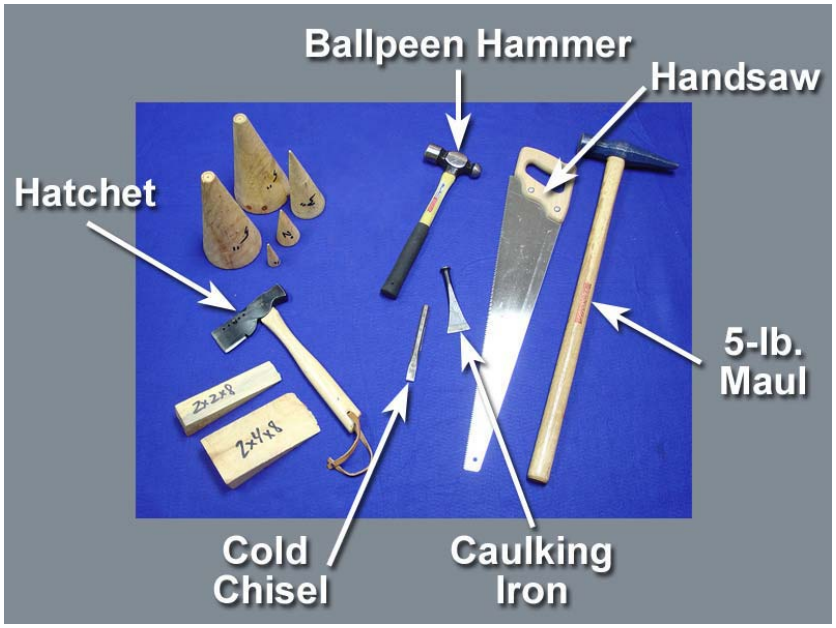
Syntho-Glass or EWARP (Emergency Water Activated Repair Patch)	• Fiberglass patch will **harden** around a rupture in about **30 minutes**. • Limits: Pressure: **150 psi**; Temperatures: 2**00 degrees** F. • Can be used on straight pipe or around bends. • Authorized for use on flammable liquid systems but not recommended. DO NOT USE on potable water systems. • It comes in a pouch, and should be soft. If not soft, it has expired. • Two sizes available: 3" x 9' and 4" x 15' • Safety glasses and gloves must be worn and system must be secured Procedure • Secure pressure to piping system • Clean and rough up area to be repaired • Using enclosed gloves, remove patch, soak in water for 20 seconds. • Quickly apply by firmly wrapping damaged area. Extend several inches beyond damage. Use entire contents: unused Syntho-Glass cannot be saved for later. • Must be molded, shaped, and pressed against surfaces until it has lost tackiness. The setting time will take up to 30 minutes.

Jubilee Pipe Patch	• Prefabricated sheet metal, gasket and bolts, preformed to pipe sizes. • Can be applied without securing the system. • Quick temporary patch, can withstand pressures up to **100 psi**. • For use on fresh water, salt water, and low pressure steam lines. • Cannot be used on flammable liquid piping or jagged edges. Procedure • Put patch around pipe downstream of rupture, nut side down and engage bolts into slots. • Slide patch over rupture, equalizing spray on both sides. • Tighten bolts with wrench until flow ceases.  

Plugging and Patching

Patch Type	Temperature	Pressure	System
Soft	no restrictions	up to 150 psi	non-steam, non-flammable systems
Jubilee	no restrictions	up to 100 psi	LP, non-flammable systems
EWARP	up to 200°F	up to 150 psi	approved for flammable systems but not recommended





Shoring

Description

- Placing supports around a weakened structure to provide additional strength
- Prevents metal fatigue, sagging and bulging, and supports ruptured decks and bulkheads that have been weakened by storm, collision, or battle damage.
- Secures plugs/patches that have been installed to combat flooding.

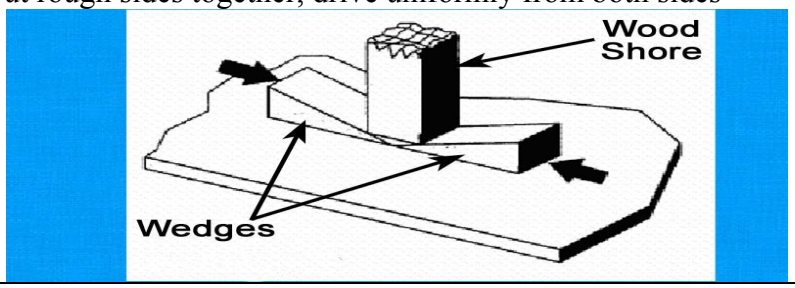
There are two main objectives of shoring:

- To reinforce straining bulkheads, doors and hatches against abnormal conditions.
- To support damaged and weakened structures and fittings.

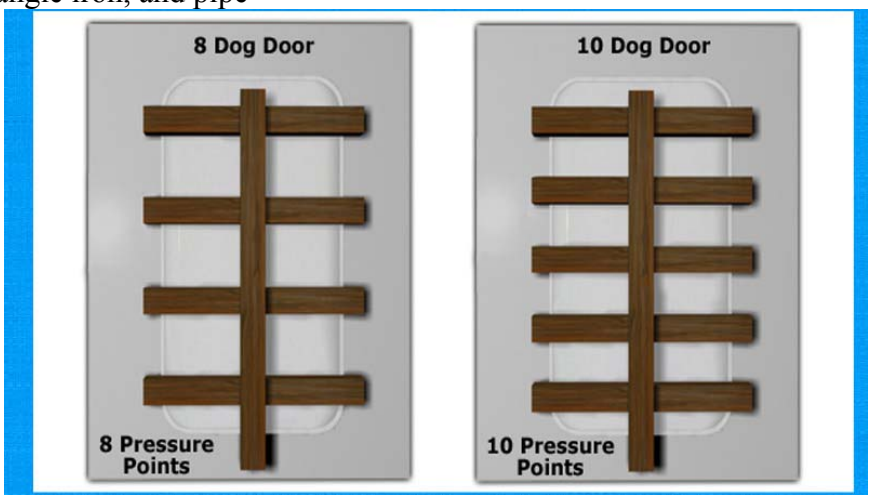
Symptoms of Strain

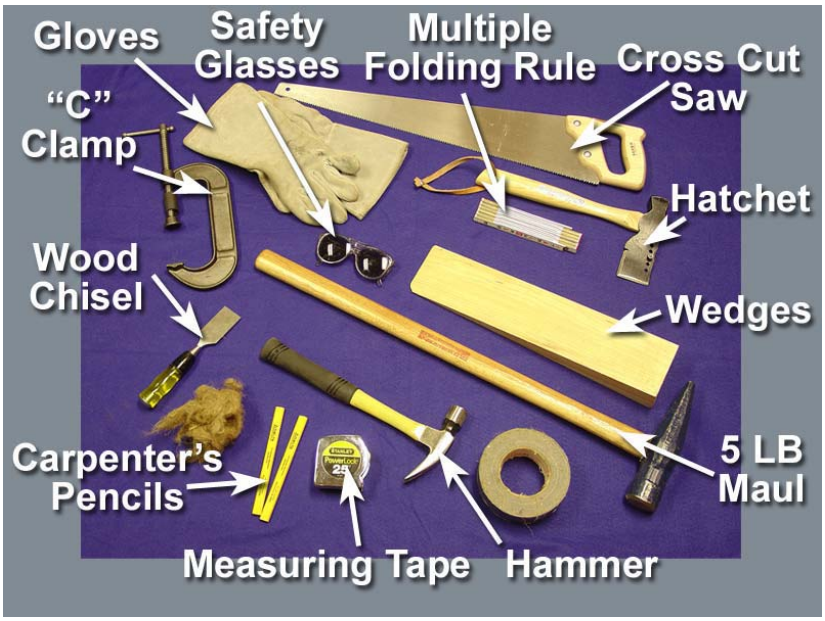
Panting	• Alternate bulging and contraction of plating resulting in metal fatigue • Often accompanied by a groaning or pinging sound
Buckling	• Deck beams or bulkhead stiffeners
Bulging	• Bulkheads or deck plating
Fracture	• Splitting of plating, especially alongside stiffeners or where bulkheads and decks meet hull plating
Shoring Watch	• 24 hour live watch at sight of any shoring • Monitor the shoring • Tighten the wedges if they start to work loose • Add wedges if necessary, but never remove any wedge
Shoring Safety	• Firefighters helmet • Steel toed boots • Watch where you are swinging the hammers • Keep calm and stay focused

Shoring Materials

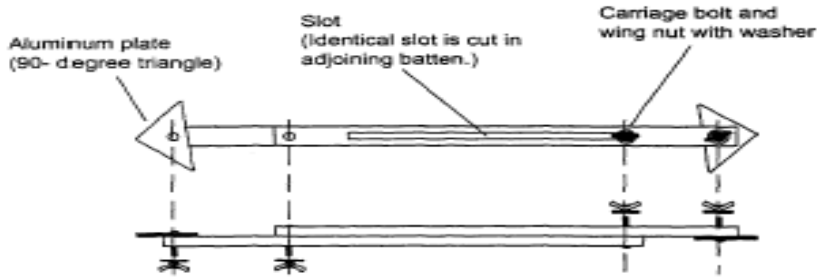
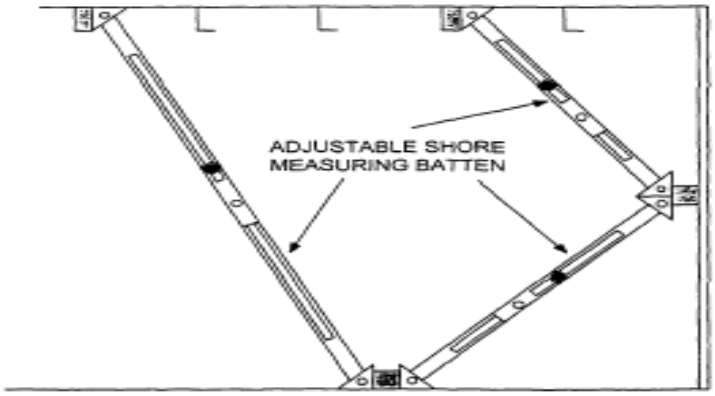
Wood Wedges	• Wooden block, triangular sides, rectangular butt end • Used to strengthen shoring structure • Total length: **6x's the minimum butt thickness** • Put rough sides together, drive uniformly from both sides 

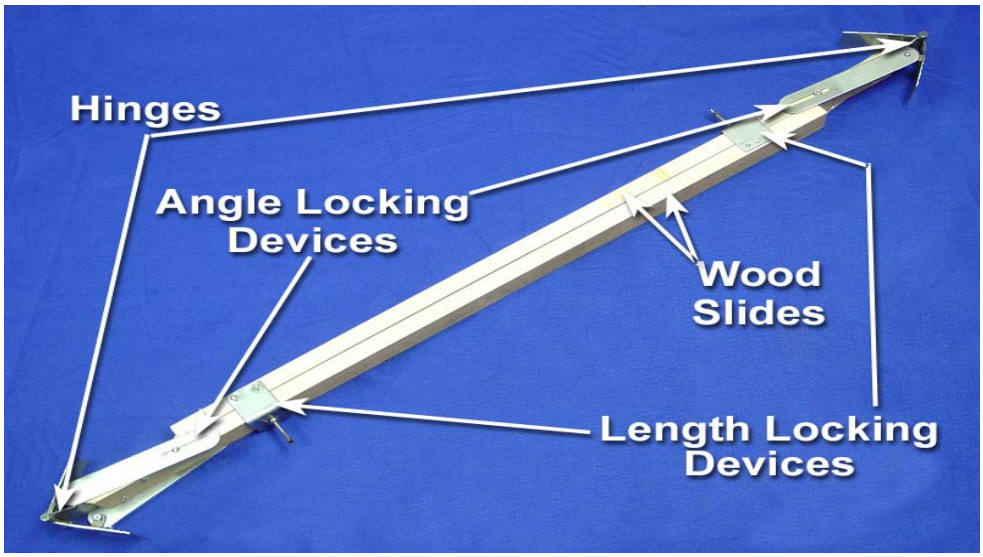
Shoring

Sholes	• Flat plate, distributes weight/pressure of shore evenly • 1” thick, 8-12” wide • Can be notched to cover irregular surface to distribute pressure
Strong backs	• Bar/beam used to distribute pressure for a patch or shore • Can be scraps of wood from cutting shores, heavy planks, steel bars, angle iron, and pipe 
Framing Square	• Use the 1/12 side (1 inch = 1 foot) • 3 parts: tongue, heel, and blade • **Tongue**: the **rise** (**vertical** distance: deck to damage) • **Blade**: the **run** (**horizontal** distance: anchor to strong back) • **Left hand** holds the **tongue**; **right hand** holds the **blade**. **When measuring shoring, stay on one side of shore and keep square in same hand at all times to mark angles on both ends.**



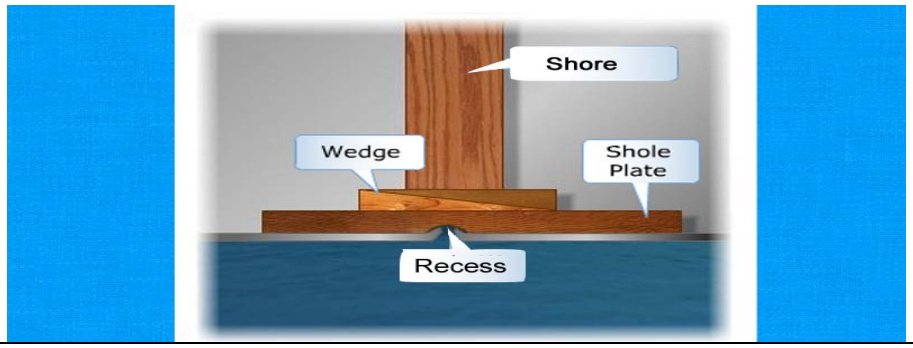
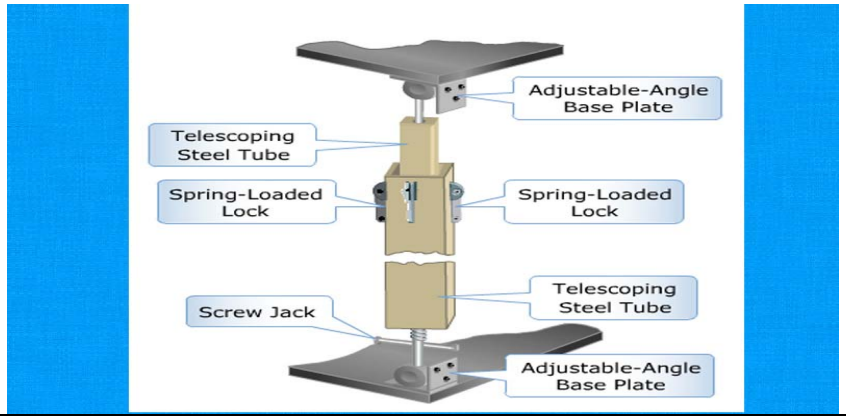
Shoring

Shoring Batten	• Pre-fabricated measuring tool • Allows quick measurements of shoring length and angles • Placed on wood shore to mark cuts **Caution: Do not disturb measurements while transiting**  Notes: • Wood battens should be 1-inch x 2-inch hardwood. • Hardware should be stainless steel. • Length of battens and length of slots are builders choice. • Aluminum plate is 1/4-inch with slightly rounded corners. • Bolt ends are peened over to keep wing nuts from falling off. 

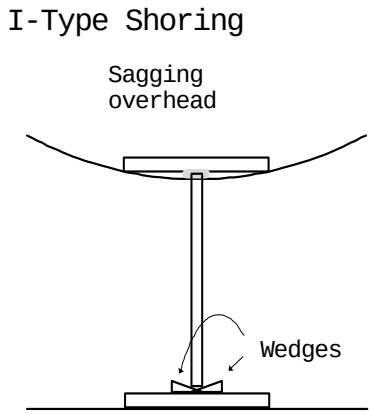
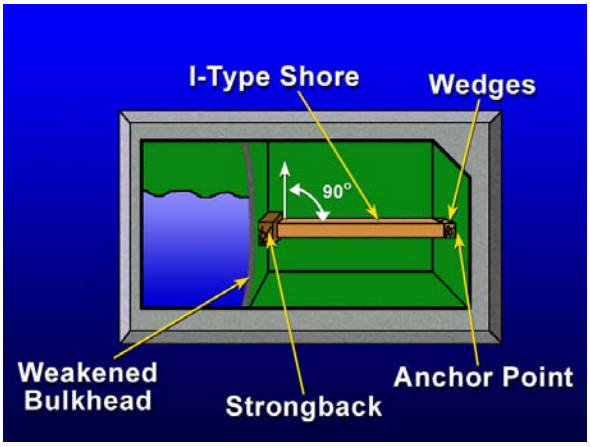
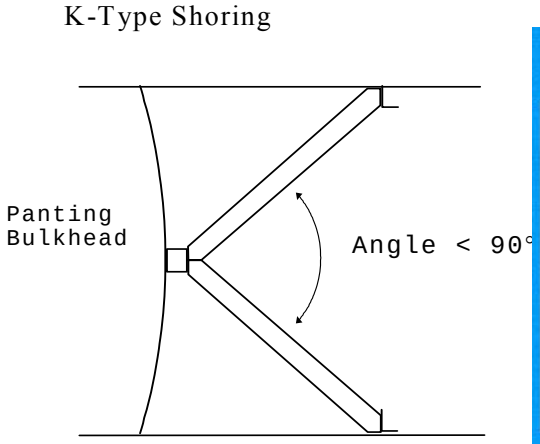
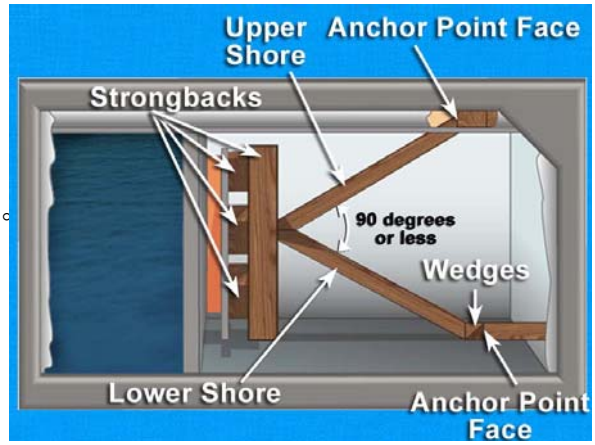


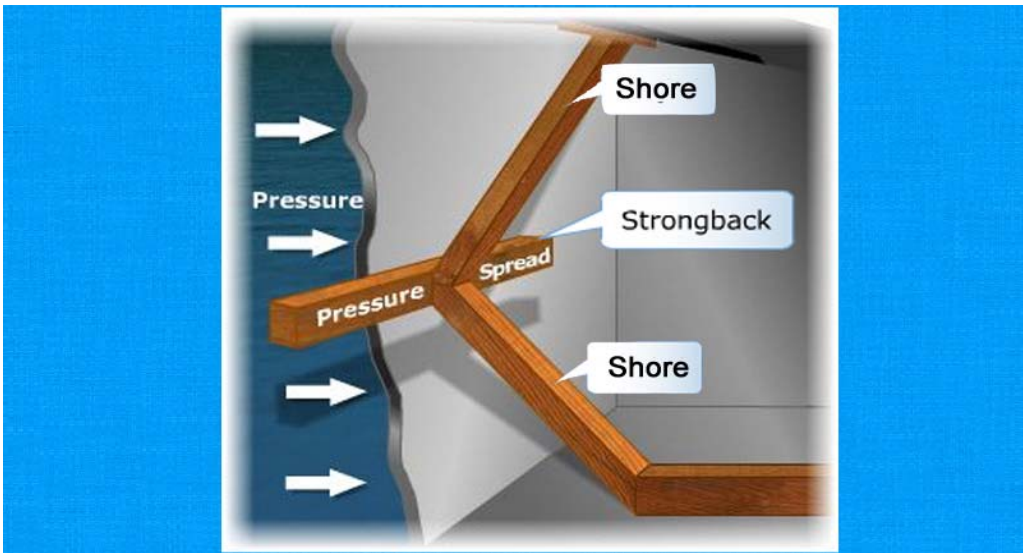
Shoring

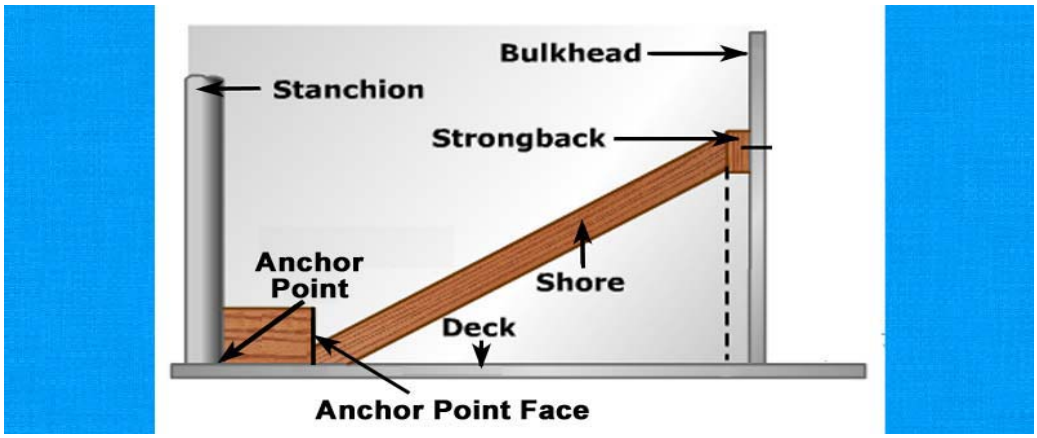
Types of Shoring

Wood Shoring	Douglas fir and yellow pine: absorbs water and expands. Rule of thumb: maximum length is **30x's the maximum butt thickness.** (E.g. if using 4x4's, 30 x 4 = 120 divided by 12 = 10 feet). Should be cut a **½"** shorter to allow room for **wedges.** **Note: Wood shores and wood shoring material must *never* be painted unless with a fire resistant chemical!** **<u>Advantages</u>** • Inexpensive • Light weight • Can absorb water • Floats 
Steel Shoring	• **Model 3–5:** Adjustable from a minimum of 3 feet (+/- 3") to a maximum of 5 feet (+/- 3"). Carries a vertical load when closed (but extended one inch on screw jack) of **20,000** pounds, but only **12,000** pounds when extended to the maximum setting. • **Model 6–11:** Adjustable from a minimum of 6 feet (+/- 3") to a maximum of 11 feet (+/- 3"). Carries a vertical load when closed (but extended one inch on screw jack) of **20,000** pounds, but only **6,000** pounds when extended to the maximum setting. **<u>Advantages</u>** • Fire proof • Prefabricated and adjustable • Stronger than wood • Saves space 

Shoring

I-Type (Direct Compression)	• Simplest and strongest • Pressure is exerted against the long axis of the shore How to rig it: (a) Lay out sufficient strong backs on the item to be shored. (b) Cut one or more shores to appropriate length (distance from strong backs to anchor point). Adjust for wedges as necessary. (c) Secure with wedges (if applicable).  
K-Type (Triangulation)	• Next best type of shoring • Two shores are cut at an angle to form a triangle not to exceed 90 degrees Rigging K-type shoring (a) Use the side of the framing square measured in 12th s of an inch. (b) Hold the square with the tongue (short end) in the left hand and the body (big end) in the right hand. (c) Always stay on one side of the shore while transferring measurements and angles.  

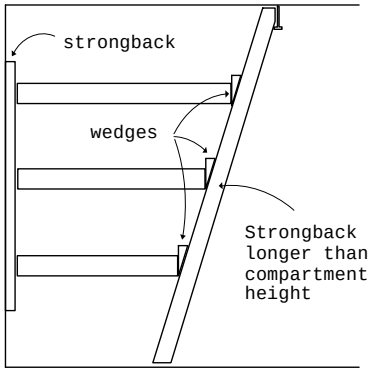

Shore
Pressure
Strongback
Spread
Pressure
Shore

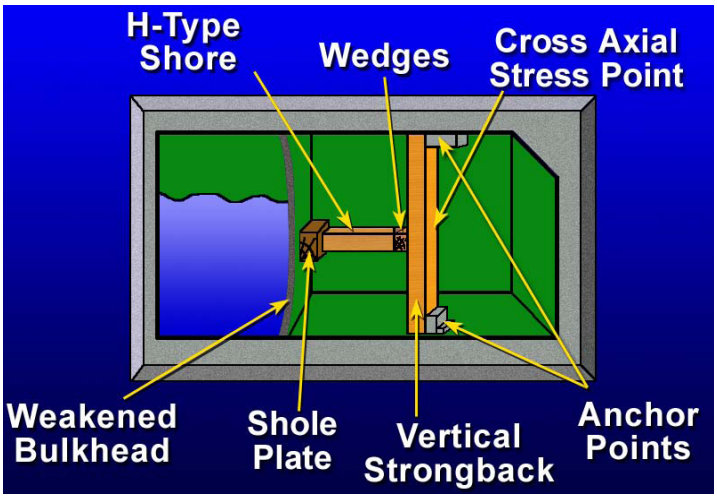

Bulkhead
Stanchion
Strongback
Anchor Point
Shore
Deck
Anchor Point Face

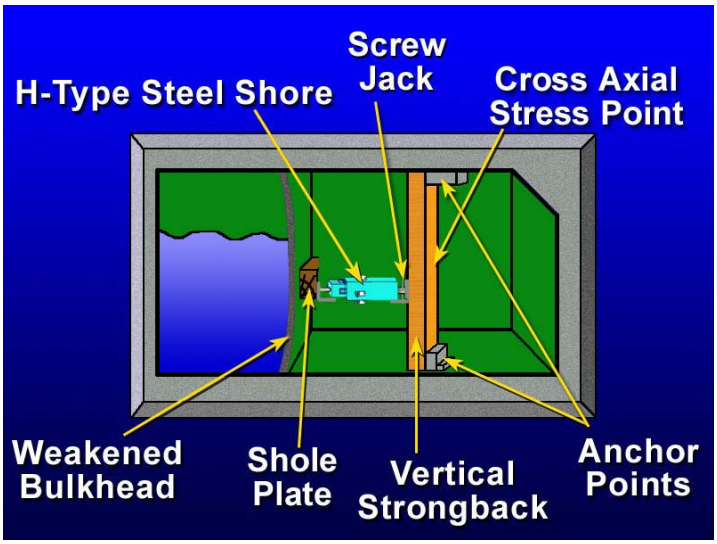
H-Type

- Weakest type of shoring due to Cross-axial stress
- Avoid if possible

No deck anchorage type shore







DO YOU KNOW WHERE TO FIND FIRST AID GEAR??

PRIMARY BATTLE DRESSING STATION

1-73-2-L Sick Bay and Ward

SECONDARY BATTLE DRESSING STATION

1-52-0-L MESS DECK
01-41-1-Q Battle Dressing Locker

GUN BAGS

As a general rule, gun-bags shall be placed every 100ft or 10 seconds from anywhere on the ship.

STOKES LITTER

FANTAIL
BOAT DECK

EMERGENCY EYEWASH STATION

* AFT STEERING
* ENGINE ROOM
* LAN/ GYRO
* PAINT LOCKER
* SICKBAY

This package is intended to serve as an instruction for non-medical personnel for the First Aid of Wounds and the Treatment of Poisoning. Medical aid should be sought in all cases as soon as feasible. These guidelines are general, and *should not* be substituted for sound judgment and common sense. For further guidance see your MDR or the NAVMED P-5095

First Aid

First aid is the emergency care given to sick and injured people until medical care can be given. There are two cardinal rules, they are:

First of all, do no harm
Second, if in doubt, refer to rule #1

Purposes	• To save life. • To prevent further injury. • To prevent infection.
Priorities	• Check the ABC's: Airway open, Breathing, Circulation. • Stop bleeding. • Prevent or reduce shock.
General Guidelines	• Assess the situation. • Is the situation still dangerous? To me? To the patient? • What caused the injury? • What resources are available to help? • What is the tactical situation? (Will I endanger the ship or the lives of the crew by leaving my post to treat the patient?)

General First Aid Rules:

a. Do not move a victim unless it is necessary for the safety of the victim (i.e. near fire, flooding, toxic gas, or gunfire).
b. Keep the victim lying down, head level with the body, until the injury can be diagnosed. The following are exceptions to this rule:
   (1) Shock – place victim on back with head slightly lower than feet
   (2) Vomiting or bleeding about the mouth / neck - place victim on belly with head turned to one side, lower than feet.
   (3) Shortness of breath – place victim in semi-sitting position.
c. Remove enough clothing to get a clear idea of the wounds by ripping or cutting it along the seams to prevent aggravating the injury.
d. Move the victim no more than absolutely necessary during examination.
e. Examine victim for hemorrhage, asphyxiation, and shock, all of which require immediate attention.
f. Do not touch open wounds or burns with fingers or other objects EXCEPT when sterile bandages are not available and it is absolutely necessary to stop severe bleeding.
g. Do not give an unconscious person any solid or liquid substance by the mouth. Vomiting may result and the victim could choke on the material.
h. Keep the victim reassured and comfortable.
i. Keep victim warm to maintain normal body temperature.
j. Do not allow the victim to see the injury.
k. When transporting an injured person, always make sure the litter is carried feet forward no matter what injuries the victim has sustained. This enables the rear bearer to observe the victim for any respiratory obstruction or stoppage.

Rescue Breathing:

a. Provides oxygen to the blood by manually inflating the victim's lungs.
b. Indications rescue breathing is needed:
   (1) Unable to see or feel the rise and fall of the chest
   (2) Blue coloration of the lips and nail beds (Cyanosis)
   (3) If the victim does not have a pulse, proceed with CPR
c. Rescue breathing is accomplished by
   (1) Place victim on back
   (2) Kneel by victim's shoulder
   (3) Open airway by placing one hand on the victim's forehead and tilting the head back and lifting the chin with the other hand.
   (4) Pinch the nostrils shut, make an air tight seal between you're and the victim's mouth and give two deep breaths (NOTE: if the victim's mouth is unsuitable for rescue breathing the nose may be used instead).
   (5) Watch victim's chest. Ensure chest moves with the breath. Feel victim exhale on your ear.
   (6) Check the victim's pulse. If a pulse is present, give one breath every five seconds. If no pulse is felt proceed with CPR.
   (7) Rescue breathing takes some time to be effective. Once started, rescue breathing should not be interrupted.
   (8) Continue rescue breathing until victim resumes normal breathing or dies.

Checking and maintaining circulation:

a. Blood circulation is essential to get oxygenated blood to the organs.
b. Circulation is checked by monitoring a victim's pulse at any of the body's pressure points.

Cardiopulmonary Resuscitation (CPR)

a. Circulates blood through the body by manually actuating the heart while simultaneously providing rescue breathing.
b. Cardiac arrest is the stopping of the heart muscle with a corresponding loss of blood circulation.
c. When properly performed CPR will provide adequate circulation to provide circulation (oxygen) to vital organs.
d. CPR will either result in the spontaneous resumption of the heartbeat or allow time to get the victim to adequate medical attention.
e. CPR is accomplished by:
   (1) Place victim on back, preferably on a hard surface.
   (2) Kneel by victim's shoulder
   (3) Open airway by placing one hand on the victim's forehead and tilting the head back and lifting the chin with the other hand.
   (4) Pinch the nostrils shut, make an air tight seal between you're and the victim's mouth and give two deep breaths (NOTE: if the victim's mouth is unsuitable for rescue breathing the nose may be used instead).
   (5) Watch victim's chest. Ensure chest moves with the breath. Feel victim exhale on your ear.

(6) Find the bottom of the victim's sternum. Place two fingers there as a spacer, then place the heel of your palm against your fingers (this will properly locate the palm on the lower one third of the victim's sternum). Place other hand atop first hand.
(7) Use your body weight to press down vertically on the victim's chest depressing the chest 1½-2 inches. Then release pressure. Compressions should be given at a rate of 100 per minute.
(8) For one person CPR the ratio is: **2** breaths followed by **30** compressions
(9) Two person CPR consists of one person breathing with the other person performing compressions.
(10) Every five cycles look for a return of spontaneous cardiac activity, by checking the victim's pulse, or a return of spontaneous respiration.
(11) CPR will be continued until the victim is revived, you are relived by medical personnel, or you are too physically exhausted to continue.

Hemorrhage

Condition in which there is an escape of blood from the circulatory system due to a break in the walls of one or more blood vessels. The average body contains five liters of blood. A loss of one liter generally is severe enough to have damaging effect on the body.	
Direct pressure	Pressure dressing, hand or finger pressure placed over the site of bleeding.
Elevation	Used with direct pressure, elevate limb higher than heart.
Pressure Points	Arteries that pass over or near a bone.
Tourniquet	Constricting band, applied on an extremity, directly above a wound, used to STOP the flow of blood. Use only as last resort! Once applied, must not be released except by the medical department.

Shock

Condition in which the circulation of blood throughout the body is seriously disrupted.	
Causes	Traumatic injuries, burns, hypothermia, poisoning, allergies, blast injuries & severe pain.
Common symptoms	Weak- rapid pulse, shallow- rapid breathing, pale skin color. In dark skinned people the skin will appear gray or "ashen" in color. Noticeable sweating and cool, clammy skin.
Prevention/ Treatment	Proper and prompt treatment can either prevent or interrupt the development of shock in all emergency situations.

Keep the patient lying flat until all injuries are evaluated. Place the patient in the shock position (**feet elevated, head down**) unless the patient's injuries cannot allow it. Keep the patient as quiet as possible, do not move them any more than necessary, and keep them warm and comfortable. Stop all bleeding and **do not** give any fluids.

Compound Fracture of the Jaw

1. Place victim on his back.
2. Apply direct pressure by pinching edges of the wound together.

** Do not place hand directly over exposed bones. **

3. Establish airway. Look, listen and feel.
4. Fold medium battle dressing in half, with the sterile side out. Place over wound open edge down and continue to apply direct pressure.
5. Bring the top ties around victim's neck and tie on top of dressing. Bottom ties should be tied around victim's head.

** Be sure dressing does not obstruct victim's mouth. **

6. Place victim in face down position with wound resting in victim's hands. Check for further injuries.

**** This adds more pressure to the wound. ****

7. Keep victim warm.

Electrical Shock

1. Secure power to the circuit. (If you know where)
   a. If you can't secure the power, remove victim from circuit, using Non-Conductive objects (wood cane, belt, etc.) things to pull victim from the power source. Evaluate. Get help.
2. Establish airway. If victim is unconscious, ensure correct head / jaw position. Use head-tilt, chin-lift technique. Give two full breaths. Make sure that breaths are effective.
3. Check carotid artery for pulse. If no pulse is found, initiate chest compression's.
4. Continue CPR (30:2) until properly relieved or victim revives on his own. Check for other injuries. Treat for shock (cover victim to keep warm). Reassure victim and monitor.

Compound Fracture/Lower Leg

**** Do not apply pressure over the exposed bones ****

1. Place victim on back and expose injury.
2. Apply direct pressure by pinching sides of wound together.
3. Wrap a large battle dressing over the leg, criss-crossing the ties, Bottom ties up and Top ties down, to maintain pressure on the wound.
4. Using the ball of the foot as a starting point, mold two wire splints to the uninjured leg making sure that it passes the knee. Once molded, place under injured leg.

**** Make sure that you support the leg when you place splint under it ****

5. Wrap with three (3") ace wraps, with the figure eight method at the foot and wrap upward above the knee.
6. Check for further injuries. Place in shock position with both legs elevated and supported and keep victim warm.

Burns

1. Call for medical assistance. Check for breathing, pulse, and other potentially life threatening injuries.
2. Treat burns:
   a. Expose burn. Don't break blisters!!!
   b. Cool the affected area with a clean, moist cloth (DO NOT ATTEMPT THIS WITH 3rd DEGREE BURNS)
   b. Place large battle dressing over burn by crises-crossing the ties.
   c. Elevate injury to allow for drainage.
   d. Treat for shock.
3. Advise medical/damage control of the degree and extent of the burn.
   i. First degree. (RED)
   ii. Second degree. (BLISTERS)
   iii. Third degree. (CHARRED SKIN)
   iv. Describe location of burn and size of burn. The palm of your hand is equal to 1%.
4. Maintain open airway.

Sucking Chest Wound

1. Place victim on back to expose wound.
2. Attempt to plug wound with the palm of your hand or pinch the sides together.
3. Cover the entire wound with the plastic wrap from the large battle dressing. Fold into quarters to cover wound. Hold plastic cover in place, and wipe off excess blood with the non-sterile side of a large battle dressing. Secure on three sides leaving the bottom portion open.
4. Cover plastic dressing with large battle dressing. Secure the bottom ties around the waist and tying a square knot over dressing. Secure the top ties by wrapping around shoulders and under armpits and tying over dressing.
5. Roll victim onto injured side and check for exit wound. Place victim on back to expose wound.

   **** If found repeat step 2-4 ****

6. Check for further injuries. Place victim in sitting position with legs extended and spread apart, preferably in a corner, and keep warm.

Abdominal Wound with Protruding Intestines

- Place victim on back and uncover injury.
  *** Do not touch intestines or try to put them back into the Abdominal Cavity ***
- Using sterile or fresh water only, saturate two large battle dressings. Sterile side up, slip the bottom of the first dressing underneath the intestines bring the top portion over the intestines to form a pouch. Tie the dressing in place by bringing the ties of one side under the small of the back and securing to the ties from the other side to the side of the dressing. **** Do not tie directly over wound ****
- Take the second dressing and apply it, sterile side down, same as before.
- Check for further injuries by rolling victim on side, (be sure to hold dressing and intestines in place.)
- Flex victim's knees together, turn toes inward, treat for shock. Keep victim warm.

First Aid

Amputation

1. Place victim on back with extremity elevated. Apply pressure to limb below the amputation by squeezing the pressure point with your fingers to stop blood flow.
2. Have someone apply a tourniquet 2-4" away from amputation; tie a square knot.

**** Do not use the buckle to secure tourniquet ****

3. Mark victim's forehead with a "T" and the time to indicate the use of a tourniquet.

**** Do not use blood or anything that can be easily removed ****

4. Cover the amputation with a large battle dressing. One tie is to be used to secure the four corners to the arm. The remaining three are to be crossed-crossed over the top of the amputation, one at a time, and secured by tucking under another tie.
5. Check victim for further injuries. Treat for shock.

Smoke Inhalation

1. Make sure first rescuer does not succumb to smoke. (i.e. Wear Protective Gear) Remove victim from area. Call for medical assistance. Check for other injuries.
2. Maintain open airway
   a. Look, listen and feel
   b. If unconscious, use head tilt/chin lift method.
3. Perform rescue breathing if necessary.
   a. One breath/five seconds
4. Check pulse
   a. CPR
   b. 30 compressions/2 breaths.
5. Treat for shock.
   a. Elevate feet
   b. Keep warm.

Wounds

1. Definition:
   a. Wound: Break in the continuity of the body tissues with an opening in the skin.
   b. Injury: Break in the continuity of the body tissues without opening the skin.
2. There are six types of wounds and injuries:
   i. **Abrasions**: scraping wounds i.e. skinned knees.
   ii. **Lacerations**: tearing of the skin by a blunt instrument causing ragged edges.
   iii. **Contusion**: results from the impact with a blunt instrument. I.e. hit with a bat.
   iv. **Punctures**: small, deep, penetrating wound. I.e. gunshot.
   v. **Incision**: clean cut. i.e. knife
   vi. **Mutilation**: causes disfigurement of body. I.e. avulsion, amputation.
3. Treatment:
   A. Initial Survey: ABC's
   B. Secondary Survey:
      1. Check for other injuries - Head to Toe Survey.
      2. Control hemorrhage
      3. Treat for shock
      4. Splint fractures
      5. Relieve pain, if possible.

Poisoning

1. A **toxin** (or poison) is a substance which through its chemical action usually kills, injures, or impairs a person. A toxic exposure may not cause immediate symptoms. When symptoms develop, the individual is considered poisoned. One of the goals of First Aid is to prevent toxic exposures from becoming poisonings.
2. An **overdose** is the excessive administration of a substance, that taken in normal doses is safe, but in large amounts can be toxic.
3. General instructions for the management and treatment of toxic exposures and/or overdoses are found in the NAVMED P-5095 (First Aid for Poisoning and Overdoses) located in the Poison Antidote Locker.

II. General Management of Exposure To Poison

1. There are six routes a poison can enter the body.
   a. Ingestion - Swallowing
   b. Eye exposure
   c. Skin exposure
   d. Inhalation - Breathing
   e. Bites of venomous animals
   f. Intravenous injection - Needle
2. In all cases, the responsibility of the non-medical personnel to the victim of a toxic (poison) exposure is to:
   a. Provide emergency First Aid and summon help.
   b. Prevent, when possible, further absorption of the toxic substance.

It is a common misbelief there are antidotes that reverse/neutralize the effects of toxins. There are a few antidotes, but they are not usually given by non-medical personnel.

III. Emergency First Aid

1. Send for medical help. The Phone number of the nearest Regional Poison Information Center is posted outside the antidote locker door.
2. Determine the substance contracted and the route of entry. Save all containers, labels, un-ingested tablets or anything which might help in identifying the agent.

NOTE: If the route of exposure is inhalation or via the skin, contamination of the rescuer is possible. DO NOT BECOME A CASUALTY YOURSELF.

3. If the victim is not breathing and/or no pulse, begin CPR.
4. Emesis - When victim is unconscious/sedated, lay them on the side with the head slightly lower than the trunk to allow their mouth to drain to prevent choking.
   NOTE: Never try and give liquids to an unconscious or sedated victim.
6. Seizure - If the victim is having a seizure, protect them from injury, but do not attempt to restrain the victim. Do not try and stop the seizure.

IV. Prevention of further Absorption

1. Eye Exposure - Flush eye(s) at an eyewash station, or with clean tap water, for minimum 20-30 minutes. Take care not to further injure the eye(s) while rinsing.
   a. Hold eyelids open.
   b. Flush for at least 20-30 minutes
2. Skin Exposure - Wash for minimum 20-30 minutes with soap and fresh water.

Take great care not to expose yourself by avoiding contaminated clothing.

a. Apply water while removing clothing
b. Use Soap and copious amount of water to wash body.

3. Inhaling - Get victim to a fresh air environment. They might need CPR. Be careful not to become a casualty yourself.
   a. Fresh air
   b. Loosen tight clothing
   c. CPR if needed
   d. Treat for shock
4. Animal/Insect/Reptile Venom - Keep the victim still and quit. (See Part IV of the NAVMED P-5095 for further management). Do not pack exposed part(s) in ice. Do not use tourniquets or hard splints.
5. Ingestion - Absorption from the stomach can be slowed or prevented, depending on type of poison, by swallowing one of the following.
   a. Water or Milk to dilute the poison.
   b. Syrup of Ipecac to cause vomiting.
   c. Activated Charcoal to bind the toxin.
   d. Magnesium Sulfate to cause an increase in the action of the bowels.

***ALWAYS REMEMBER:* "THE CHAIN OF SURVIVAL"**

1. IS THE SCENE SAFE?
2. EVALUATE THE PATIENT.
3. GET HELP!
4. START FIRST AID.

Heat Related Injuries

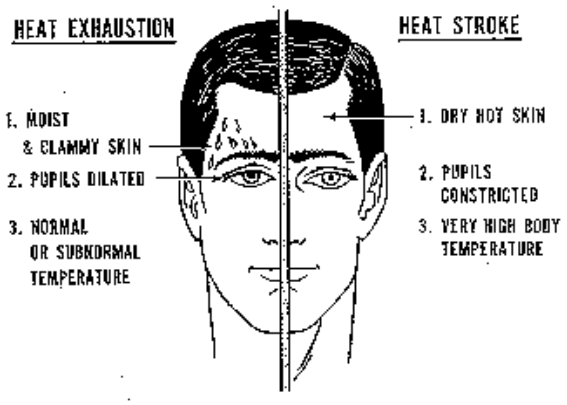
To prevent heat related casualties when working in hot conditions, increase consumption of water and salt over and above normal levels and limit exposure to high heat environments.

Types of heat related injuries

Heat Cramps	• Affects people working/exercising in hot environments. • Excessive sweating causes loss of liquids/salts from the body that may result in muscle cramps, spasm, and/or pain in abdomen, legs, or arms. • Cramps may also be caused by a rapid intake of cold liquids. • Often an early sign of heat exhaustion.
Heat Exhaustion	• Fatigue, weakness, and collapse due to an inadequate intake of water to compensate for the loss of fluids through sweating. • Symptoms: Normal body temperature, pale and clammy skin (moist skin), profuse perspiration, tiredness, weakness, weak pulse, increased thirst, headache, cramps, nausea, possible vomiting, dizziness, possible fainting, dilated pupils
Heat Stroke	• IMMEDIATE LIFE THREATENING EMERGENCY, caused by a breakdown of the body's cooling mechanism • Can result in permanent disability or death. • Symptoms: Extremely high temperature (can be upwards of 105 degrees F). Brain damage begins to occur at temperatures above 106. Headache, dizziness, nausea, weakness or sudden collapse, breathing will be deep and rapid initially, shallow and almost absent later. Victim will be flushed (reddened), very dry (not sweating), and very hot. Pupils constricted. Strong, rapid pulse.

Treatment

Heat Cramps	• Place victim in a cool environment and loosen clothing • Give the victim cool, lightly salted water (½ teaspoon per glass) or sports drinks. Do not give hot liquids or stimulants. • Exert firm pressure with your hands on the cramped muscles, or gently massage them, to help relieve the spasm.
Heat Exhaustion	• Place victim in a cool environment and loosen clothing • Give the victim cool, lightly salted water (½ teaspoon per glass) or sports drinks. Do not give hot liquids or stimulants. • Cool the victim with artificial cooling. • Treat for shock. • If victim vomits, do not give fluids. Obtain medical attention ASAP.
Heat Stroke	• The longer the victim is in an over-heated condition the worse the injury. • Immediately cool the body. Move casualty to the coolest area available. Remove clothes. Place ice packs under in arm pits and groin area. Sponge / spray body with cool / cold water. Call for help. • Prevent overcooling of the victim once the temperature is reduced below 102 degrees F. • If conscious, give the victim cool, lightly salted water (½ teaspoon per glass) or sports drinks. Do not give hot liquids or stimulants. • Treat for shock



Exposure (Cold) Related Injuries:

Tissue injury resulting from exposure to cold.

Types of Injuries

Frostbite and Trench foot	Types: • Non-freezing • Freezing: results in crystallization of water in skin and tissues Symptoms: Cold injuries lack strong warning signs and symptoms • In some cases there may be a transient tingling or numbness with the skin appearing red then pale white. • The limb may begin to feel stiff as the tissue hardens.
Hypothermia	• Leading cause of death among survivors of catastrophes at sea. • Occurs when a patient loses the ability to maintain body temperature. Symptoms: • Abnormal behavior: apathy, poor judgment, drowsiness • Unconsciousness or coma • Core body temperature lowers to 95 or below • Shivering (may not be present in victims with core temps below 90) • Heartbeat and blood pressure weak or undetectable • Cyanosis

Treatment

Frostbite and Trench foot	• Restrict victim's mobility • Give mild stimulants such as tea and coffee • Use care when removing clothing. Do not apply dry heat or massage the injured part • Re-warm the part in a controlled temperature water bath. • Prohibit the victim from alcohol and tobacco
Hypothermia	• Remove all wet clothing • Re-warm patient by all means necessary • Treat for shock • Seek immediate medical attention • Prohibit the victim from alcohol and tobacco

ENTRANCE INTO VOIDS OR SEALED COMPARTMENTS

No person will enter any closed compartment or poorly ventilated space until the Gas Free Engineer (GFE) indicates in writing that the applicable safety and entry requirements have been met. The space must be tested for toxic vapors, sufficient oxygen and explosive gases. Every person that enters these spaces, after certification, must have a safety observer with an SCBA standing immediately outside the space.

CARBON DIOXIDE IN AN UNVENTILATED SPACE

Carbon Dioxide (CO2) puts out a fire by displacing oxygen. After CO2 has been discharged into a compartment there is a 15 – 30 minute cool down period before re-entry into that compartment. The space must be certified "GAS FREE" by the GFE IAW NSTM Chapter 074, Volume 3, before it is safe for personnel.

Warning!!!!!!!

Use caution while handling portable CO2 extinguishers, CO2 "snow" that contacts skin or eyes can cause blistering, frostbite or even permanent blindness!

COMPRESSED GAS CYLINDER HANDLING

When transferring a large cylinder from one area to another, ensure the valve cap covers the valve stem. Make sure the cylinder, when stored, is well secured in a cradle or rack. If cylinders are dropped, struck or permitted to roll around and strike each other, the stem could break off and the cylinder will become a "missile hazard".

PORTABLE ELECTRIC TOOL PRECAUTIONS

Portable electric tools should always be clean, properly oiled, in good repair and tagged for inspection by an Electrician's Mate. The electric cord will be visually inspected for frays, exposed wires and burn marks prior to each use.

NEVER USE A SOLID STREAM OF WATER WHILE FIGHTING CLASS BRAVO (petroleum) & CLASS CHARLIE (electrical) FIRES

On a class "C" fire, it will act as a conductor and could electrocute the hose team. On a class "B" fire, it could cause splattering and spread the fire over a larger area.

INTERNAL COMBUSTION ENGINE DANGER

Carbon Monoxide (CO) is exhausted from internal combustion engines and should be properly ventilated while in operation within the skin of the ship. A build up of CO without proper ventilation could cause rapid drowsiness followed by ***death!***

EQUIPMENT TAG – OUT PROGRAM

A ***danger tag*** is red in color and prohibits the operational use of equipment that could jeopardize the safety of personnel or endanger equipment systems and components.

UNDER NO CIRCUMSTANCE WILL EQUIPMENT BE OPERATED WHEN TAGGED WITH A RED TAG!

A ***yellow tag*** (caution tag) is used when precautionary information and temporary special instructions are to be followed when operating equipment with a yellow tag.

TRAFFIC PATTERNS

In order to expedite manning of stations and to prevent "traffic jams", always remember: ***Keep the sea to your right!***

COMPARTMENT HAZARDS

Although there are many compartments containing a variety of different hazards, the following are the most dangerous: AFT Steering, JP-5, Engine Room, MSD Space, Paint Locker Incinerator, and confined spaces. Crewmembers must become familiar with all hazards in these spaces and all others onboard STRATTON.

CHARGED HOSE PRECAUTIONS

Never pick up a charged Fire hose by the bail assembly. (A hose is considered "charged" when the Fireplug is opened and the hose has water available to the nozzle). Improper handling procedures could result in a "wild hose" and could cause damage to equipment and/or serious injury to personnel. Remember: ***Always maintain positive control of a charged Fire hose!***

FIRE WATCH FUNDAMENTALS

Hot work is defined as: any work that produces spark, flame or temperatures above 400 degrees F.

PRECAUTIONS THAT MUST BE OBSERVED PRIOR TO AND AFTER HOT WORK OPERATIONS: prior to any hot work operations, a fire watch must be set and maintained until hot work is complete. When hot work is complete, the fire watch must remain on-scene for 30 minutes or until work is cool to the touch, which ever takes longer.

FIRE WATCH SAFETY GEAR: The fire watch must have the following protective equipment to stand fire watch: flash hood, flash jersey, anti-flash gloves, steel toed boots, cutting goggles (minimum shade 5) or welding goggles (minimum shade 10) and some type of portable extinguisher. In some cases when there is more than one fire watch, a portable radio is recommended.

PROCEDURES THAT MUST BE COMPLETED PRIOR TO HOT WORK:
Prior to starting any hot work the space must be inspected, gas freed by the GFE and certified safe for hot work/ safe for personnel. The OOD, EOW and the EO must sign a hot work/ gas free chit. Copies of the chit must be posted at the quarterdeck and outside the space where hot work is taking place.

Abandon Ship

- Do not panic.
- Write down all information passed over 1MC (e.g. distance, direction nearest to land, water temp, etc.)
- Muster at life raft location with Gumby suit and what ever you are to provide.
- Ensure you are fully clothed with cover.
- Leave the ship to the raft from the windward side of the cutter at the lowest point, if possible.
- When entering water, always enter water feet first.
- Once in life raft, account for personal, tend to injured, and inventory all equipment.
- Tie rafts together to make a large target for planes or helos to find you.
- Water discipline:
    a. Drink water before abandoning ship.
    b. Drink no water the first day.
    c. Drink a pint (16 ounces) a day after the first day.
    d. Never drink seawater or urine

Acronyms

ABT	Automatic Bus Transfer (Switch)	**MOGAS**	Motor Gasoline
A/C	Air Conditioning	**MOV**	Motor Operated Valve
AFFF	Aqueous Film Forming Foam	**MPDE**	Main Propulsion Diesel Engine
AMR	Auxiliary Machinery Room	**MRG**	Main Reduction Gear
AMMR	Aft Main Machinery Room	**NAVSEA**	Naval Sea Systems Command
AUX	Auxiliary	**NO.**	Number
BHP	Brake Horsepower	**NSTM**	Naval Ships Technical Manual
CBR	Chemical, Biological and Radiological	**OOC**	Out of Commission
CFM	Cubic Feet per Minute	**OPNAV**	Office of the Chief of Naval Operations
CHW	Chilled Water	**O/W**	Oily Waste
CIC	Combat Information Center	**PGT**	Propulsion Gas Turbine
CIWS	Close in Weapon System	**PMS**	Preventive Maintenance System
COMMS	Communications	**PNL**	Panel
CPP	Controllable Pitch Propeller	**PPM**	Parts per Million
CPS	Collective Protection System	**PSIG**	Pounds per Square Inch Gauge
DC	Damage Control	**RAS**	Refuel at Sea
DCRS	Damage Control Repair Station	**RCP**	Remote Control Panel
WDCM	Wash Down Counter Measure	**REEFER**	Refrigerator
DP	Differential Pressure	**REP**	Repair
FMMR	Forward Main Machinery Room	**R/G**	Reduction Gear
F/O	Fuel Oil	**RL**	Repair Locker
FOD	Foreign Object Damage	**R/O**	Reverse Osmosis
FM	Firemain	**RPM**	Revolutions per Minute
FR	Frame	**RTD**	Resistance Temperature Detector
FT	Foot/Feet	**RTRN**	Return
FZ	Fire Zone	**SHP**	Shaft Horsepower
GAL	Gallon	**SPLY**	Supply
GEN	Generator	**SPRG**	Sprinkling
GPM	Gallons Per Minute	**SRBOC**	Super Rapid Blooming Off board Chaff
HELO	Helicopter	**SRPM**	Shaft Revolutions per Minute
HIFR	Helicopter In-Flight Refueling	**SS**	Ship Service
HFP	Heptafluoropropane (FM200)	**SSAS**	Ship Service Air System
HMI	Human Machine Interface	**SSDG**	Ship Service Diesel Generator
HP	High Pressure	**SSS**	Synchronous Self Shifting
Hp	Horsepower	**STBY**	Standby
HVAC	Heating, Ventilation & Air Conditioning	**SUCT**	Suction
I/O	Input/Output	**SV**	Solenoid Valve
IVCS	Integrated Voice Communications System	**SVCE**	Service
KITE	Key switch Integrated Terminal phones	**S/W**	Seawater
LCP	Local Control Panel	**SWBD**	Switchboard
L/O	Lube Oil	**TCL**	Throttle Control Lever
LOP	Local Operating Panel	**TK**	Tank
LP	Low Pressure	**TLI**	Tank Level Indicator
MCC	Machinery Control Console	**UNREP**	Underway Replenishment
MCHRY	Machinery	**UPS**	Uninterruptible Power Supply
MCMS	Machinery Control & Monitoring System	**U/V**	Ultra violet
MCS	Machinery Control System	**VCHT**	Vacuum Collecting Holding & Transfer
MER	Main Engine Room	**WQS**	Watch Qualification System
MGT	Main Gas Turbine	**XFR**	Transfer

References

- TALISMAN K90 USERS MANUAL
- FIRE WARRIOR USERS MANUAL
- DAMAGE CONTROLMAN CLASS COURSE MATERIAL
- GENERAL SHIPBOARD FIREFIGHTING COURSE J-495-041
- NSTM CHAPTER 079 VOL 2 PRACTICAL DAMAGE CONTROL
- NSTM CHAPTER 555, REV. 12 SHIPBOARD FIREFIGHTING
- NWP 3-20.31 REV. A SURFACE SHIPS SURVIVABILITY
- P-100 PORTABLE PUMP UNIT TECHNICAL MANUAL
- REPAIR PARTY LEADER COURSE MATERIAL K-495-0040 CH2

INVESTIGATORS

1. What method of investigation is used to locate damage in tanks or voids?
Answer: Using a sounding tape and Liquid load list.

2. Why is it important to have an up to date Liquid load list?
Answer: To know the level of tanks or voids prior to damage.

3. How are air test fittings used to investigate for damage?
Answer: Loosen and listen for air escaping or check for water coming out.

4. Air escaping from an air test cap could indicate what type of damage?
Answer: Possible flooding. A sucking sound indicates a fire.

5. What method is used to check for hot doors and hatches?
Answer: Remove glove and check with back of hand ½" from door.

6. What are the tending line signals?
Answer: OATH: one pull-Ok, two pulls-Advance, three pulls-Take up slack, and four or more pulls –Help.

7. Should you ever pull anyone out of a space by the tending line?
Answer: No, an SCBA man should follow the tending line into the space to the person.

8. What should be used on a sounding tape when sounding a Fuel tank.
Answer: Water indicating paste.

9. What are the four principles of investigation?
Answer: Investigate thoroughly, cautiously, report quickly and clearly, repeat your investigation.

10. What should be used on a sounding tape when sounding a water tank?
Answer: Chalk.

11. Should you sound a fuel tank and a water tank with the same sounding tape?
Answer: NO. The fuel residue on the tape would contaminate the water tank.

12. How would you check a bulkhead for flooding on the other side?
Answer: Tap up the bulkhead listening for a change in sound. Look for sweating on the bulkhead.

ACCESS AND OVERHAUL MAN

1. What is the Access Man's job?
Answer: To open doors, Hatches, and scuttles and to clear routes as necessary to gain access to the affected space.

2. What equipment does the Access Man carry, as necessary?
Answer: A crowbar or pry bar, and a 10lb. Sledgehammer, bolt cutters, and PECU.

3. When opening and individual- dog watertight door or hatch, which side is undogged first?
Answer: The hinge side first.

4. What tools are used in overhauling a fire?
Answer: A fire axe, rake, and hose.

5. How do you overhaul a class ALPHA fire?
Answer: Break apart any smoldering and unburden materials. Use a fire hose with a fog pattern to soak while breaking apart with a rake.

6. How do you overhaul a class BRAVO fire?
Answer: Secure the source, cover the fuel with a blanket of AFFF, remove fuel if possible, and cool surrounding area.

7. How do you overhaul a class CHARLIE fire?
Answer: Secure the power.

ELECTRICIAN

1. When does the Electrician secure power and lighting?
Answer: When directed by the On-Scene Leader prior to entering the affected area. Lighting will normally remain energized.

2. Why does the Electrician de-energize all electrical equipment in a fire-affected area?
Answer: To protect personnel, equipment and to prevent possible explosions or flashbacks.

3. Why does the Electrician bring a voltage tester to the Scene?
Answer: To ensure all circuits are de-energized before attempting repairs.

4. What do you look for when checking for electrical damage?
Answer: Wires that may be cut, grounded, shorted or destroyed.

5. Why must and Electricians' rubber gloves be inspected for cracks or holes?
Answer: To prevent electrical shock.

6. How do you repair damaged wiring in a vital circuit?
Answer: Splice wire of the same gauge or larger into vital circuit after ensuring that both circuits are de-energized. Always working from the load to the source.

PKP

1. How is PKP used to extinguish fires in confined spaces?
Answer: Short Bursts

2. Where should PKP be directed?
Answer: At the base of the flames in a rapid sweeping motion.

3. What is the effective range of an 18-pound PKP extinguisher?
Answer: 19 feet.

CO2 FIRE EXTINGUISHER

1. What is the maximum effective range of a 15 lb. CO2 extinguisher?
Answer: 4 to 6 feet from the tip of the horn.

2. Why is CO2 recommended for class CHARLIE fires?
Answer: Its non –conductive, leaves no residue, and does not damage equipment.

3. How do you direct the CO2 when fighting a class CHARLIE fire?
Answer: At the base of the flames with a sweeping motion.

4. How does CO2 extinguish a fire?
Answer: Removes the oxygen to the extent that combustion cannot be sustained.

5. How can you tell when a CO2 bottle is empty?
Answer: The extinguisher makes a hollow or whistling sound.

6. How long will 15LB CO2 extinguishers last under continuous operation?
Answer: Approximately 40 seconds.

7. What must be worn when entering a compartment containing a high concentration of CO2?
Answer: SCBA

8. How long must you wait before entering a compartment that has been filled with CO2?
Answer: At least 15 minutes to allow burning material to cool below ignition point.

AFFF

1. What is the mixing ratio for AFFF and water?
Answer: 97 percent water, 3 percent AFFF.

2. Can AFFF be used on Class ALPHA fires?
Answer: Yes, because of the cooling effect of the water.

3. What is the shelf life of AFFF?
Answer: Indefinite.

4. What class of fire is AFFF normally used for?
Answer: Class BRAVO

5. Can you use AFFF in conjunction with PKP?
Answer: Yes.

6. Will AFFF float on top of fuel?
Answer: Yes, by doing this it is causing a vapor barrier over the fuel.

INLINE EDUCTOR

1. Which type of nozzle should be used with the Inline Eductor?
Answer: 95 GPM Vari Nozzle.

2. What should the fire main pressure be at the inlet side of the Inline Eductor?
Answer: 100 PSI.

3. How long will a five-gallon container of AFFF last under continuous use with the Inline Eductor?
Answer: Approx 60 to 90 seconds.

VARI NOZZLE

1. What is the flow rate for the Vari Nozzle that is used on USCGC STRATTON?
Answer 95 GPM.

2. Does the amount of water discharged from the Vari Nozzle change from straight stream to wide-angle fog?
Answer: No.

3. How should the Vari Nozzle be stowed?
Answer: Bail handle in closed position and nozzle set to narrow 30-degree angle.

4. What is the widest fog angle achieved by the Vari Nozzle?
Answer: 90-degree angle.

5. How many bail positions does the Vari Nozzle have?
Answer: TWO, Open and Closed.

TALISMAN K90

1. A rechargeable battery pack has a life of approximately how long?
Answer: Approx 5 hrs

2. How many bars will be illuminated in the lower left hand corner of the viewing screen with freshly recharged battery?
Answer: 10 bars

3. Can the Talisman K90 be used to locate fires by viewing through glass windows?
Answer: NO

FIRE WARRIOR

1. Two "AA" batteries will last approximately how long?
Answer: 3 hrs

2. What must you do when the red led light above the center of view screen illuminates?
Answer; Change batteries immediately

PORTABLE EMERGENCY CUTTING UNIT (PECU)

1. What is the burn rate of the fuel rods used with the PECU?
Answer: Approximately 30 inches per minute.

2. What should not be cut with the PECU?
Answer: Pressurized piping that contains flammable fluids or energized electrical cables.

3. The PECU is used to cut through what types of materials?
Answer: Steel, Aluminum, Laminates, Piping, and Cables.

4. What provides the power to initially ignite the fuel rod?
Answer: A 12-volt internal battery.

5. Who's permission is required prior to cutting holes in watertight bulkheads or decks, fire zones bulkheads or decks, strength decks, or hull plating?
Answer: The Commanding Officer.

6. How is the fuel rod extinguished?
Answer: Release the oxygen lever and turn off oxygen bottle.

7. Why is the PECU used to cut holes in the bulkheads, decks, and overheads?
Answer: To fight fires, vent smoke and heat, and drain fire fighting water, rescue trapped personnel.

DEWATERING EQUIPMENT

1. What are the two types of Portable Eductors used on STRATTON?
Answer: PERI-JET (CG) and S-Type.

2. What is the primary purpose of eductors?
Answer: To remove water.

3. What are some advantages of the PERI-JET eductor?
Answer: It will pass objects up to 2 ½ inches in diameter, remove contaminated water, and not produce heat/sparks that are possible when using engine driven pumps.

DEWATERING EQUIPMENT

1.How is the P-100 cooled?
Answer: By air from a flywheel.

2. What action should be taken if the P-100 fails to create water pressure after 45 seconds?
Answer: Stop pump, tighten all hose connections, and prime again.

3. What size reducer is used if an eductor is used on the suction side of a P-100 Pump.
Answer: 4 inch to 3 inch.

4. What are the primary purposes of the P-100 pump?
Answer: Firefighting and Dewatering.

5. What is the suction lift of the P-100 MOD 1 without utilizing an eductor?
Answer: 20 Feet.

6. How long will the 1.45 gallon fuel tank last for?
Answer: 2.75 hours.

7. What kind of fuel is used for the P-100?
Answer: Diesel.

8. Submersible pumps are not designed for pumping what types of liquid?
Answer: Gasoline, heavy oils, or hot water.

9. Why is a strainer used with a submersible pump?
Answer: To prevent debris from entering the pump.

10. How many gallons of liquid will the submersible pump deliver?
Answer: 200 GPM at a 50-foot discharge head: 140 GPM at a 70-foot discharge head.

11. What size discharge hose is used with the submersible pump?
Answer: A 2 ½".

12. When must the submersible pump be primed?
Answer: When a suction hose with a foot valve is attached to the pump.

13. Can the CG Peri-jet Eductor be used with the P-100?
Answer: Yes

DESMOKING COMPARTMENTS

1. What type of blowers are used to desmoke a compartment containing explosive gases?
Answer: RAMFAN, Super Vac Box Fan.

2. How many cubic feet of air can be removed (per minute) by a box fan?
Answer: 3200 Cubic Feet Per Minute

3. How many cubic feet of air per minute can be removed using a Ram Fan 2000?
Answer: 2000 CFM with 200 FT of 10-inch hose attached

4. How are portable blowers rigged when desmoking a space?
Answer: They are set on a weather deck rigged to take air out of affected spaces.

5. Which fan is designed to be suspended from a bar in a doorway?
Answer: Box fan.

6. Whose permission must be obtained prior to desmoking using the installed ventilation system?
Answer: Engineer Officer.

7. Which fan can be conveniently used to clear a space directly open to the weather?
Answer: Box Fan.

8. How many psi is needed to operate the RAMFAN?
Answer: 40 to 180 psi.

9. What size trunk is used with the RAMFAN?
Answer: 10 inch

10. What is the supplying source of the RAMFAN?
Answer: A 1-½ inch fire hose at 40 to 180 PSI.

11. Why must a grounding strap be used with the RAMFAN?
Answer: To prevent electric shock, the blower and hose creates a high voltage static charge.

ATMOSPHERIC TEST

1. What is the order of Atmospheric tests to be conducted after a Fire?
Answer: Oxygen, Explosive, Toxic gases.

2. What is the percentage of oxygen required to consider a space safe?
Answer: 19.5 to 22%

3. Explosive gas tests should be below what percentage of L.E.L. to be considered safe.
Answer: Below 10% L.E.L.

4. What is done if a space tests above 10% of the L.E.L. for explosive gases?
Answer: Continue to ventilate and retest

5. Who may conduct post fire atmospheric tests?
Answer: Gas-Free Engineers, Gas-Free Engineering Petty Officers (E-5 and above), or a PQS qualified repair party personnel with the approval of the CO.

FIRE AND FLOODING BOUNDARIES

1. What equipment is primarily used in setting a Fire Boundary?
Answer: 1 ¾ inch hose and nozzle or some other continuous means of cooling, IE. Garden Hose.

2. What is the minimum distance that combustibles must be removed form a primary fire boundary?
Answer: 12 inches

3. What is the proper procedure for combating a cableway fire?
Answer: Use short bursts of high velocity fog at a minimum distance of 4 feet from cables.

4. What are primary fire boundaries?
Answer: FWD, AFT, PORT, STBD, Top and Bottom of the affected space.

5. What is a primary flooding boundary?
Answer: Watertight FWD, AFT, PORT, STBD, Top and Bottom of the affected space.

PLUGGING

1. The rule of thumb for plugging is to use a plug how many inches bigger than the hole?
Answer: Two inches bigger than the hole.

2. All plugs 10 inch or larger should be?
Answer: Shored in.

3. What must be done to prevent cracks in bulkheads from spreading?
Answer: Drill ¼ holes at the end of the crack and plug the hole.

PIPE PATCHING

1. What are the three common patches used in the Coast Guard?
Answer: Soft Patch, Jubilee Patch, and EWARP (Syntho-glass).

2. What is the maximum pressure allowable on a soft patch?
Answer: 150 PSI

3. Soft patches are not recommended for what type of piping system?
Answer: High-pressure steam and flammable liquids.

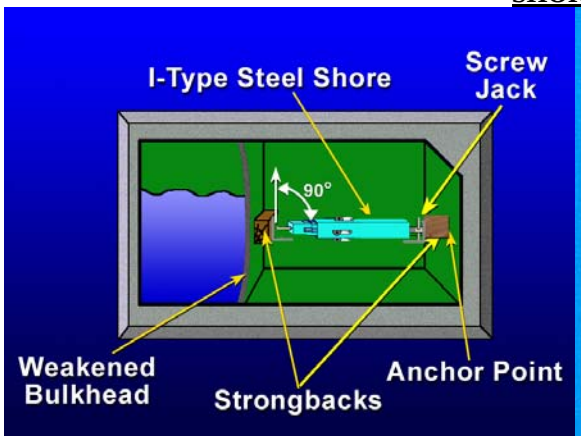
4. When applying a soft patch, why is the excess wedge length that would protrude into the pipe cut off?
Answer: To prevent restricting the flow of liquids.

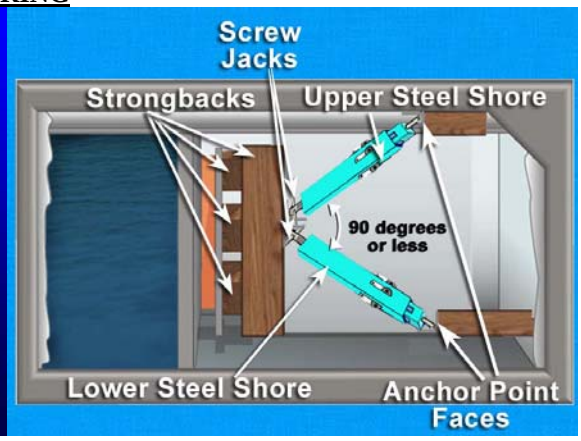
5. With a soft patch, how far should the rubber extend beyond the split?
Answer: About 2 inches.

6. How many layers of Marlin are applied to a soft patch?
Answer: Two layers

7. How far beyond the rubber is the Marlin wrapped?
Answer: Approximately ½ inch.

SHORING





1. What is the definition of shoring?
Answer: The process of placing supports against the side of underneath, or above a structure to prevent metal fatigue, sagging and bulging.

2. What are the 4 major components used in Damage control shoring?
Answer: Shore, Wedge, Shole, and Strongback.

3. What is a Shole?
Answer: A flat plate placed under the end of a shore to distribute weight or pressure?

4. What is a Strongback?
Answer: A bar or beam of wood or metal often shorter than a shore used to distribute pressure or serve as an anchor for a shore.

5. What are the best woods to use for shoring?
Answer: Douglas Fir and Yellow Pine.

6. What is the recommended length and width or shoring wedges?
Answer: 6 Times the minimum butt thickness and approximately as wide as the shoring.

7. What is the recommended safe length of a wooden shore?
Answer: 30 times its minimum thickness.

8. What is the definition of a run?
Answer: The distance from the bulkhead along the deck or overhead to and anchor point, less the thickness of the Strongbacks and wedges.

9. What is the definition of Rise?
Answer: The distance from the center of the bulkhead or door being shored to the deck or overhead.

10. What is the purpose of the shoring batten?
Answer: Provides a quick and easy way to measure lengths and angles of shores.

11. What is the purpose or using sand during shoring operations?
Answer: To provide a better grip for shores when the deck surface is oily/slippery.

12. In general, shores should be shortened how much to allow for wedges?
Answer: ½ inch.

13. What are the three types of shoring?
Answer: I (direct pressure), K (triangulation/perpendicular), and H (No deck anchorage)

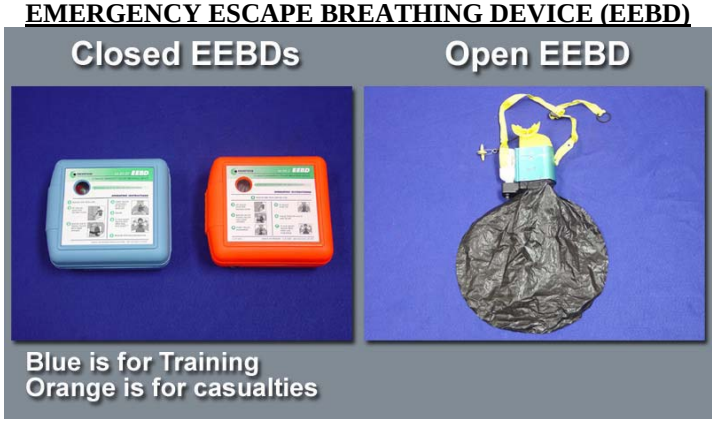
14. What are the two sizes of metal shores?
Answer: 3-5 FT and 6-11 FT.

15. What is the vertical load strength of a 3-5 FT metal shore?
Answer: 3 FT – 20,000 LBS, 5 FT – 12, 000LBS.

16. What is the vertical load strength of a 6-11 FT metal shore?
Answer: 6 Ft – 20,000 LBS, 11FT – 6, 000 LBS

17. What are the three parts of a framing square?
Answer: Tongue, Blade, and Heel

EMERGENCY ESCAPE BREATHING DEVICE (EEBD)



1. How long will an EEBD provide oxygen?
Answer: 10 minutes.

2. Can the EEBD be used to fight fires in and emergency?
Answer: NO, it is used only for escape or awaiting rescue in a toxic environment.

SCBA

1. What is the purpose of the Self Contained Breathing Apparatus (SCBA)?
Answer: To make the wearer independent of the surrounding atmosphere.

2. At what percentage will the bell alarm activate?
Answer: 25%

3. What is the PSI of a Stealth H-45 cylinder when fully charged?
Answer: 4500 PSI

4. What determines how long a cylinder will last?
Answer: Physical condition and amount of work being done by the wearer.

5. How often should the SCBA be inspected?
Answer: Daily by the DCPO and briefly before each use.

Thank You