SS- 100-AG-MAN-010

DAMAGE CONTROL AND FIREFIGHTING EQUIPMENT LAYOUT BOOKLET

PUBLISHED BY DIRECTION OF COMMANDER, NAVAL SEA SYSTEMS COMMAND

1 AUGUST 2002
CHANGE A

NAVSEA SS-100-AG-MAN-010
DAMAGE CONTROL AND FIREFIGHTING EQUIPMENT LAYOUT BOOKLET

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Change A 1 August 2002

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* Zero in this column indicates an original page

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RECORD OF CHANGES

Change No.	Date of Change	Title or Brief Description	Entered by

Damage Control & Firefighting Equipment Layout Booklet

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DAMAGE CONTROL/FIREFIGHTING EQUIPMENT LAYOUT BOOKLET

INTRODUCTION

This Damage Control / Firefighting Equipment Layout Booklet Change A, was prepared by the Naval Sea Systems Command at the request of damage control fleet personnel to improve knowledge of the shipboard damage control organization in damage control/firefighting equipment layout and usage.

The illustrated layouts in this booklet quickly convey the various Damage Control Evolutions for the functions of access, dewatering, desmoking, shoring, hull repair, pipe patching, personnel protection, firefighting, gas free / IDLH and self contained breathing apparatus (SCBA) changing evolution.

The layouts presented in this booklet provide shipboard repair party personnel with effective ways of utilizing damage control repair station equipment when combating casualties involving flooding, smoke, and fire.

This booklet can be used to assist shipboard personnel in training or in actual emergencies to identify equipment setups. The included sketches will illustrate the equipment's intended use so that repair party personnel can gather the proper equipment and arrange the layout as required.

The Damage Control/Firefighting Equipment Layout Booklet is dedicated with appreciation to all the personnel who have assisted in research, testing, validating and allowing us to draw on their years of fleet experience and knowledge.

Recommendations for improvements and additional sketches to this document are welcome. Please forward comments or suggestions related to this booklet using the form in the back to:

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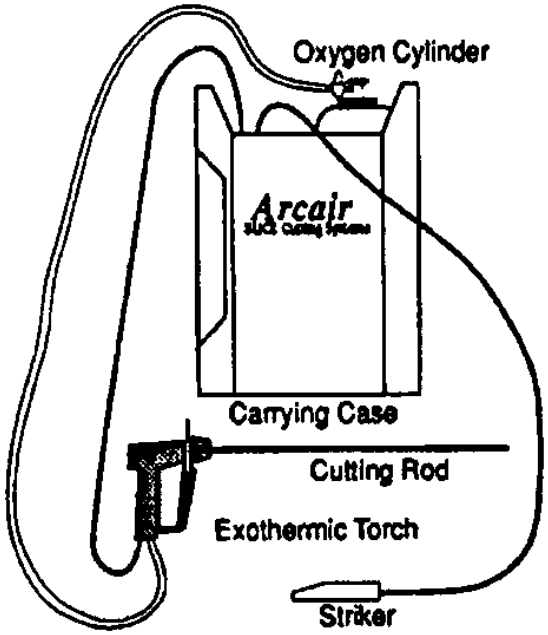
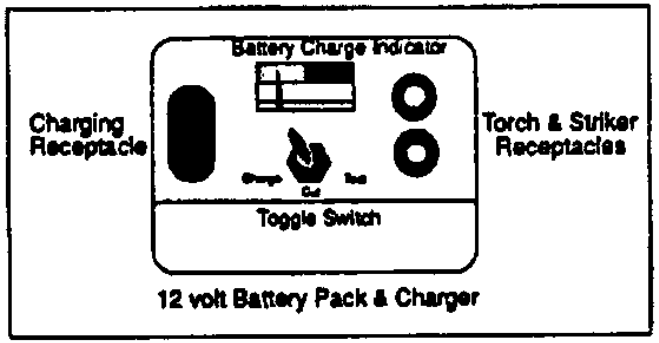
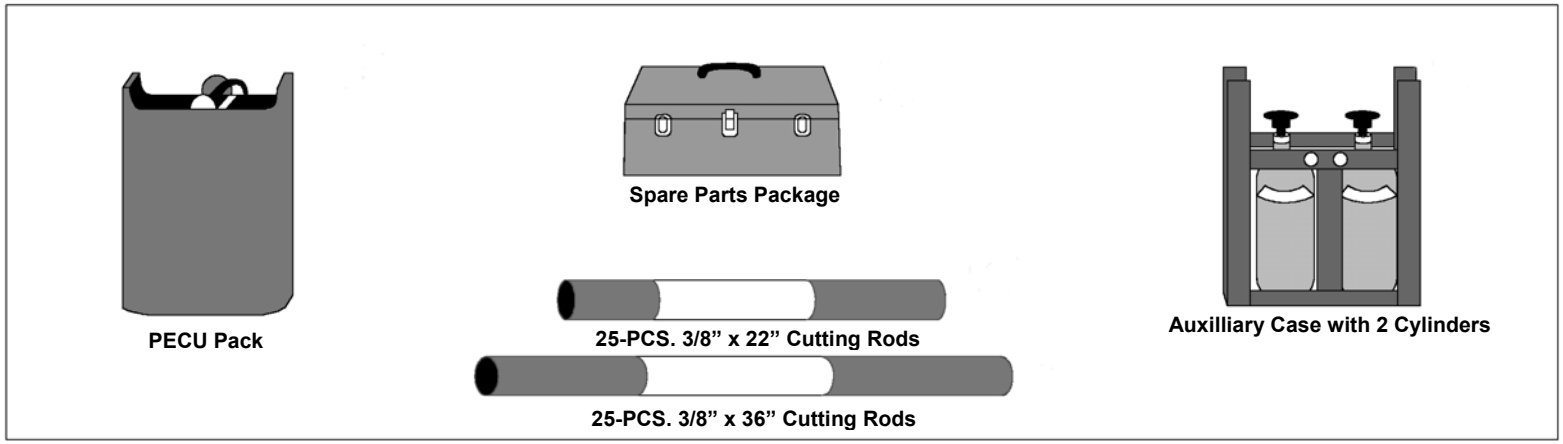
DAMAGE CONTROL LAYOUT SKETCHES

SECTION 1 - ACCESS EVOLUTION

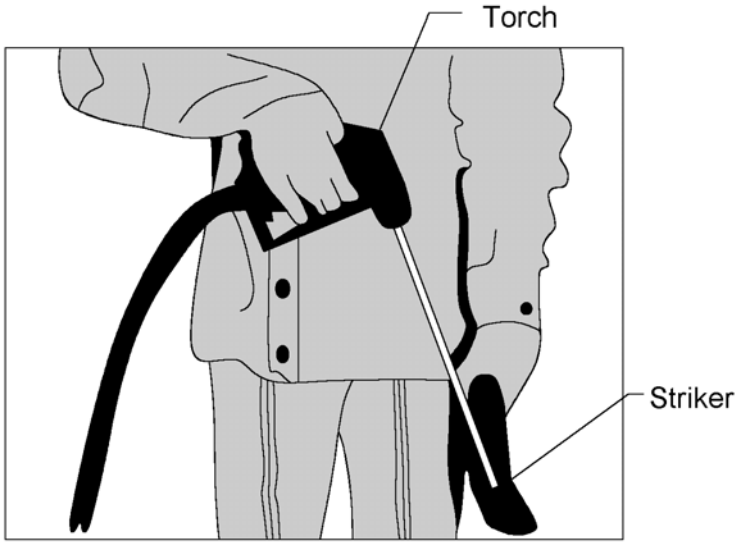




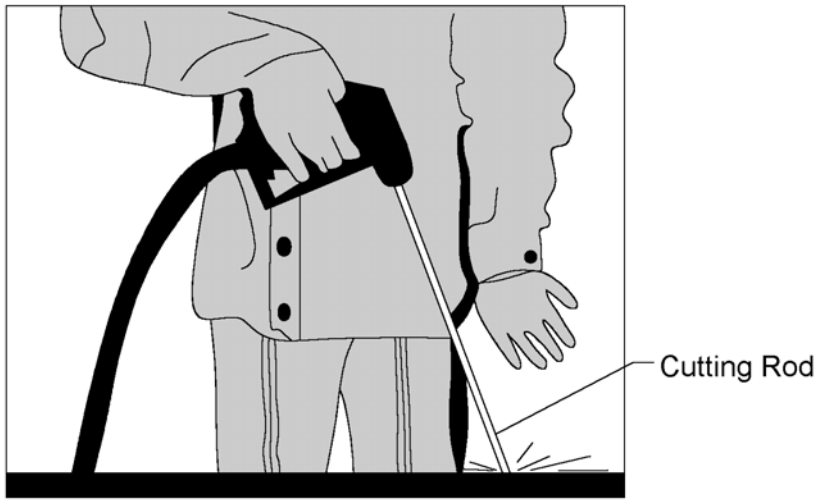
ACCESS EVOLUTION - SKETCH #001
Portable Exothermic Cutting Unit (PECU) Equipment



PECU ASSEMBLY

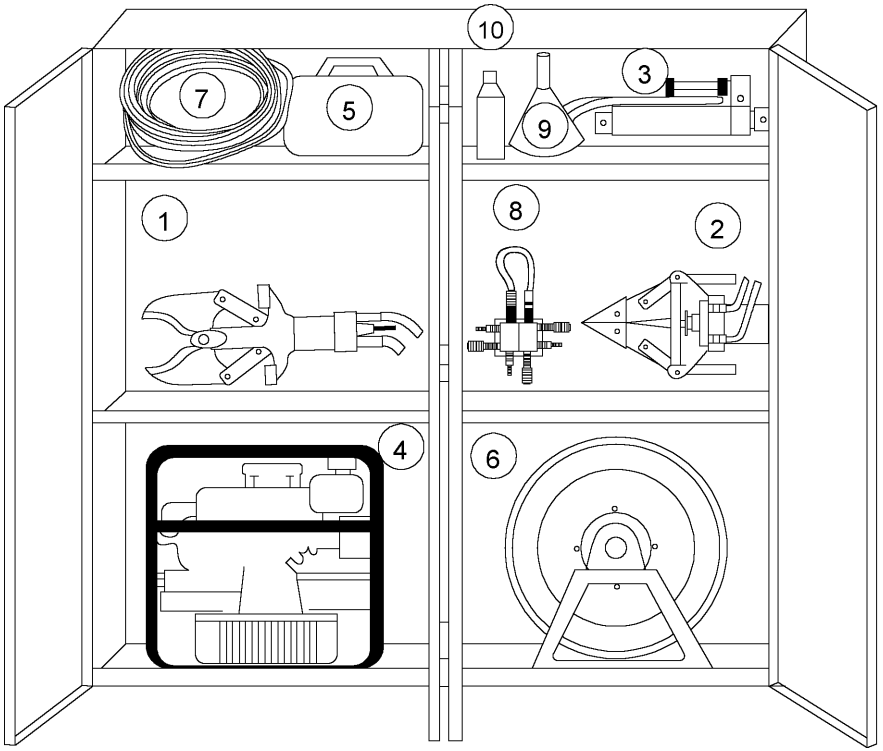


IGNITING PECU ROD



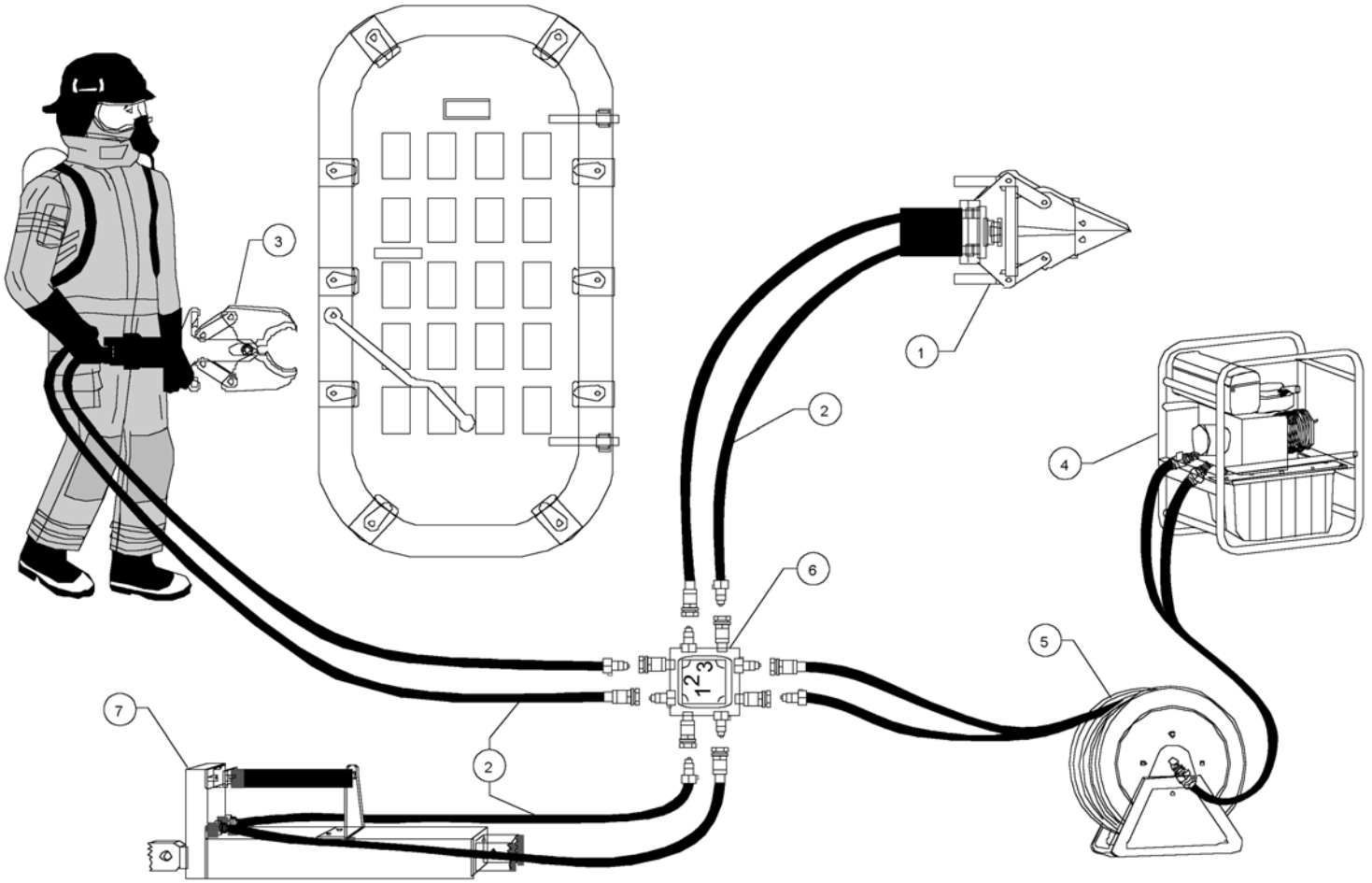
PIERCING THROUGH SURFACE

ACCESS EVOLUTION - SKETCH #002
Portable Exothermic Cutting Unit (PECU) - Gaining Access to Damaged Compartments Using PECU



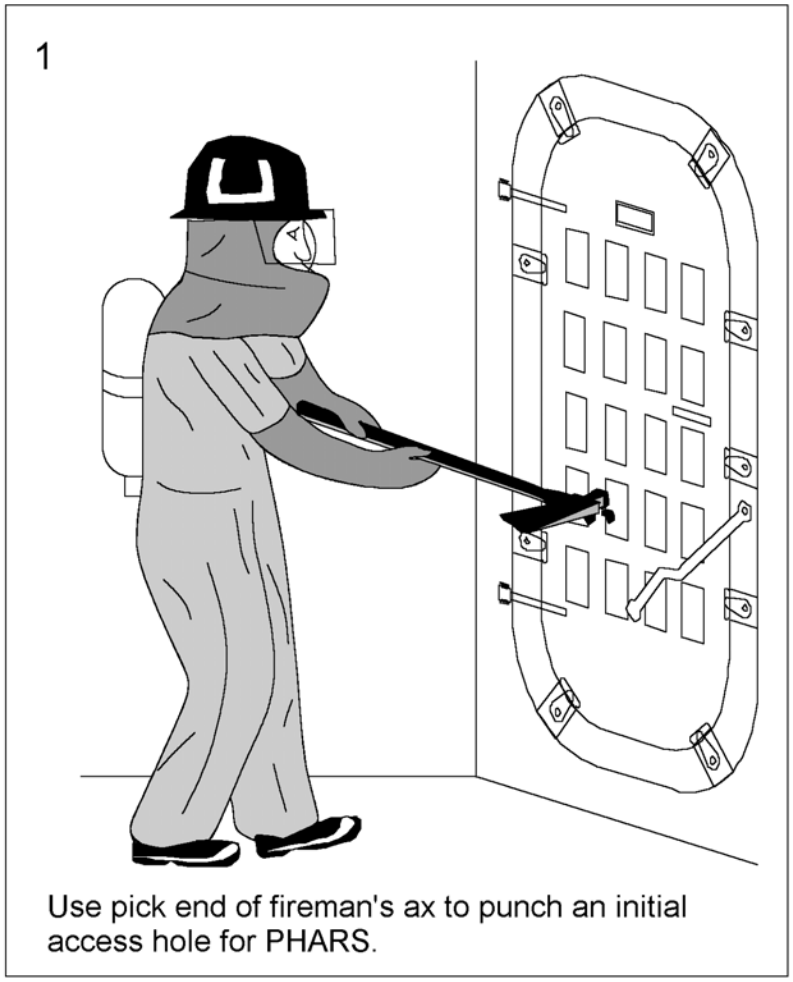
ITEM	EQUIPMENT
1	CUTTER, HYDRAULIC
2	SPREADER, HYDRAULIC
3	EXTENSION RAM, HYDRAULIC
4	DIESEL ENGINE
5	ATTACHMENT CASE
6	HOSE REEL - 100 FOOT WITH MANIFOLD ATTACHED TO HOSE
7	EXTENSION HOSE, 1” X 16’
8	MULTIPLE CONNECTION MANIFOLD
9	FUNNEL
10	OIL, CASE - 7 QUARTS (1 QT ILLUSTRATED)

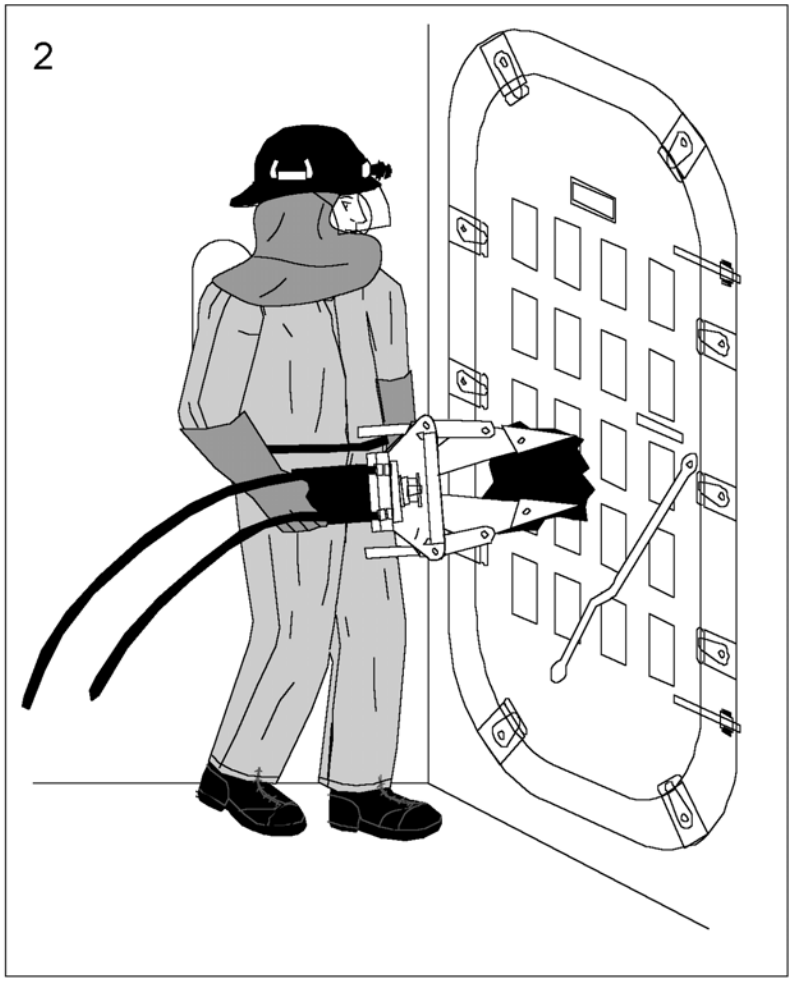
ACCESS EVOLUTION - SKETCH #003
Portable Hydraulic Access and Rescue System (PHARS) Equipment



ITEM	QTY	EQUIPMENT
1	1	HYDRAULIC SPREADER
2	AR	HOSE, 30 FOOT, HYDRAULIC EXTENSION
3	1	HYDRAULIC CUTTER
4	1	ENGINE, DIESEL
5	1	HYDRAULIC 100' HOSE REEL (TO ENGINE)
6	1	MULTIPLE CONNECTION MANIFOLD (2 OR 3 TOOLS)
7	1	HYDRAULIC EXTENSION RAM

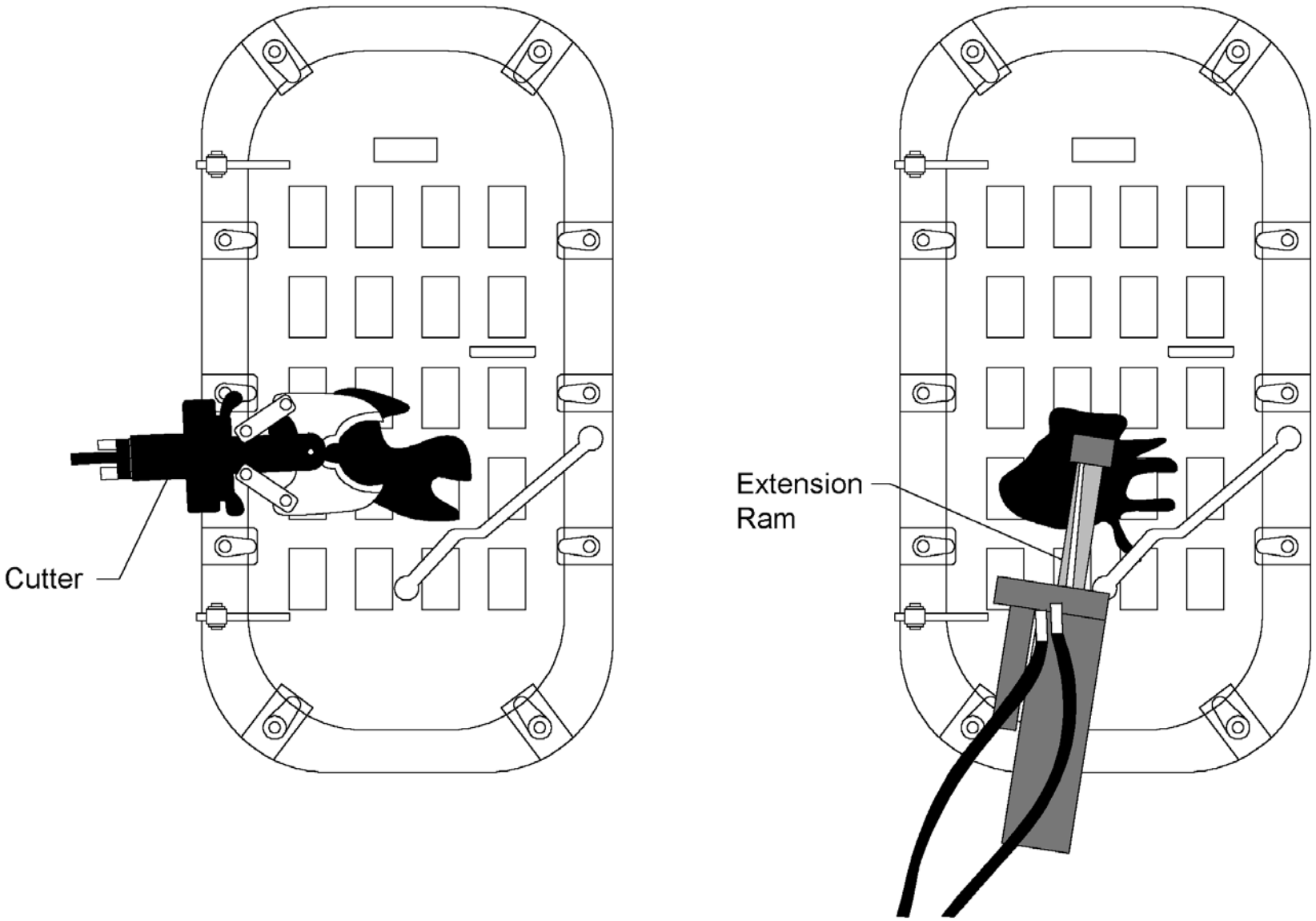
ACCESS EVOLUTION - SKETCH #004
Portable Hydraulic Access and Rescue Equipment (PHARS)



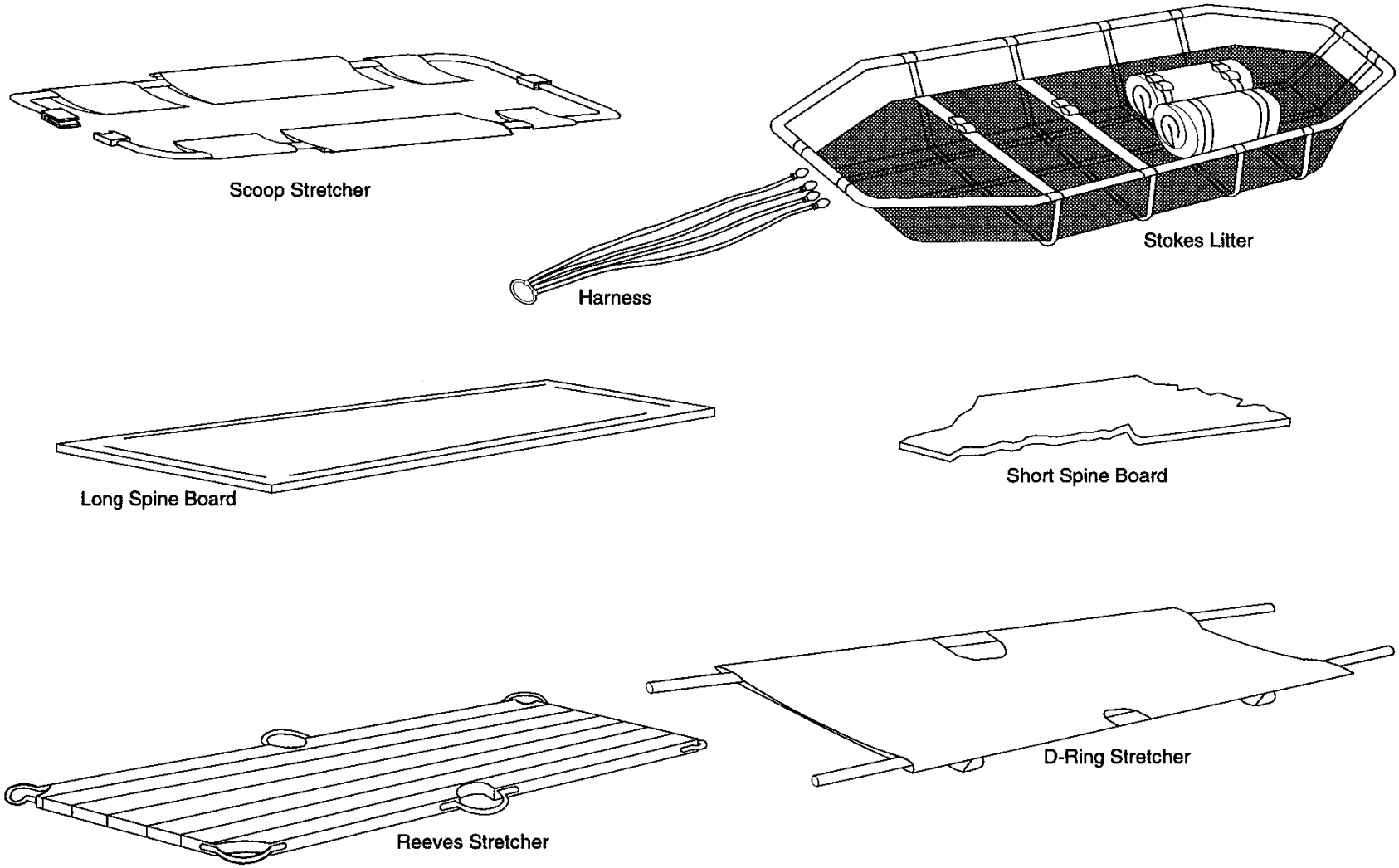


ACCESS EVOLUTION - SKETCH #005

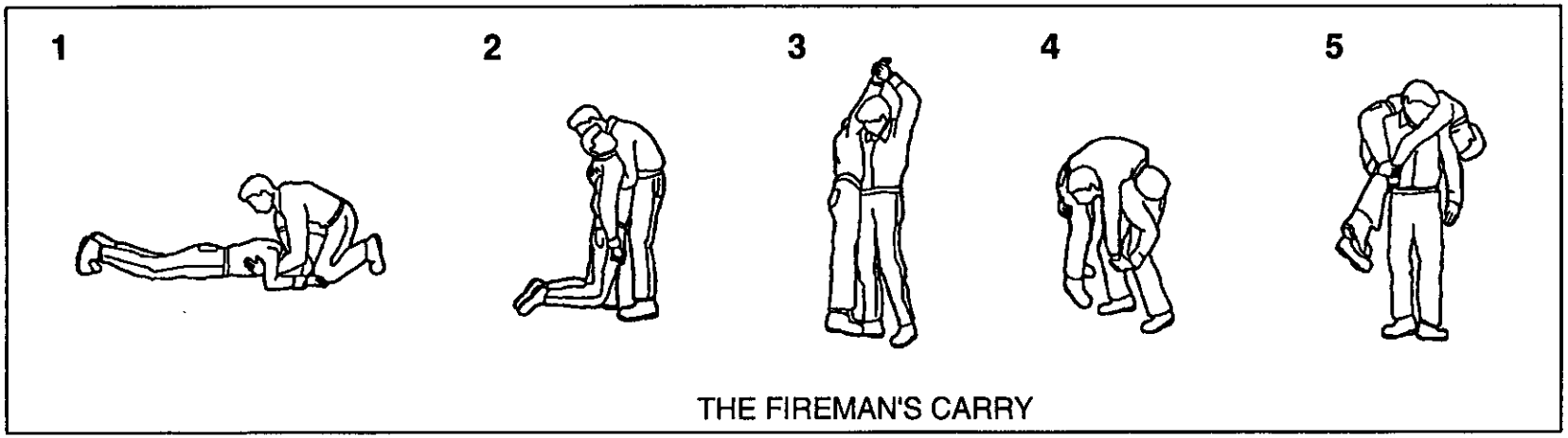
Portable Hydraulic Access and Rescue System (PHARS) - Gaining Access Through Watertight Door with Hydraulic Spreader



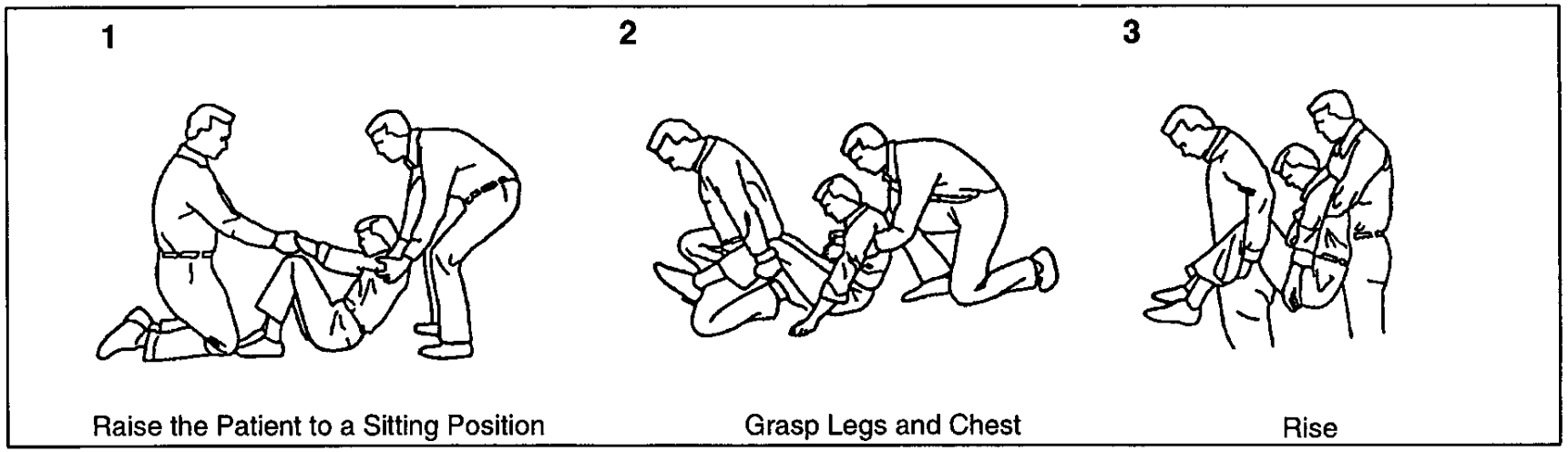
ACCESS EVOLUTION - SKETCH #006
Portable Hydraulic Access and Rescue System (PHARS)

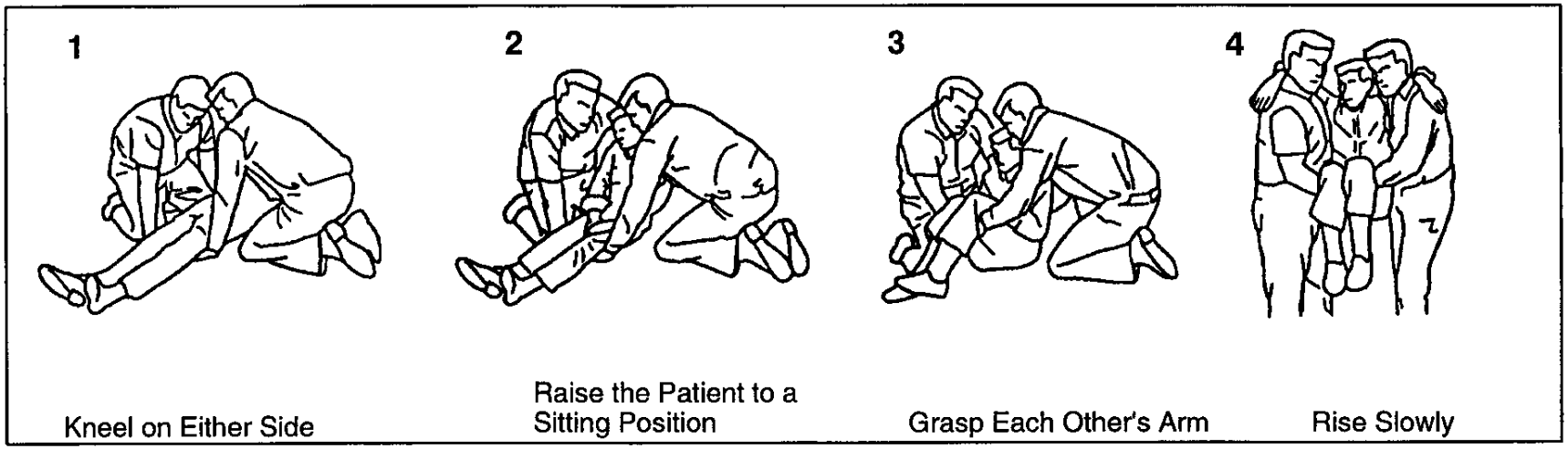


ACCESS EVOLUTION - SKETCH #007
Rescue and Patient Transportation Devices

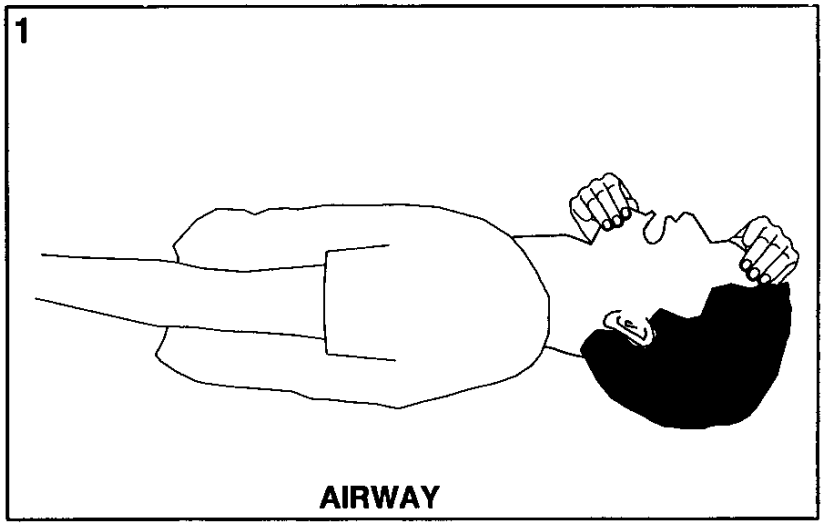


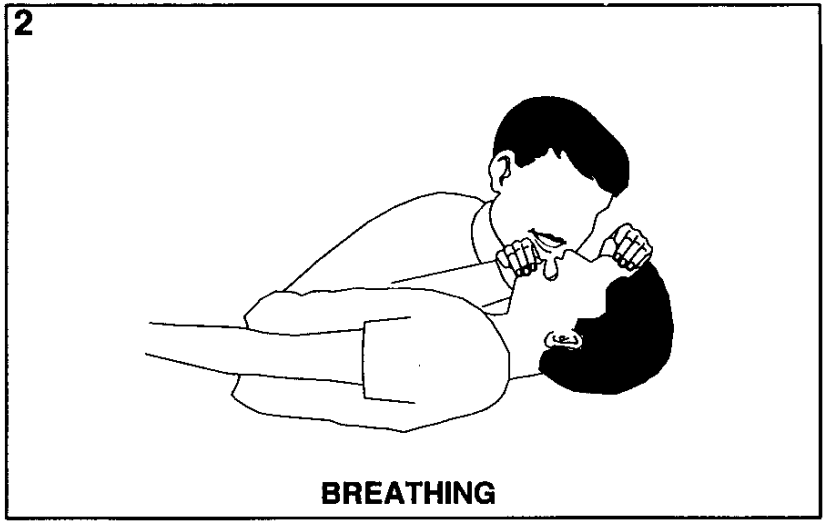
ACCESS EVOLUTION - SKETCH #008
One Man Moving a Casualty

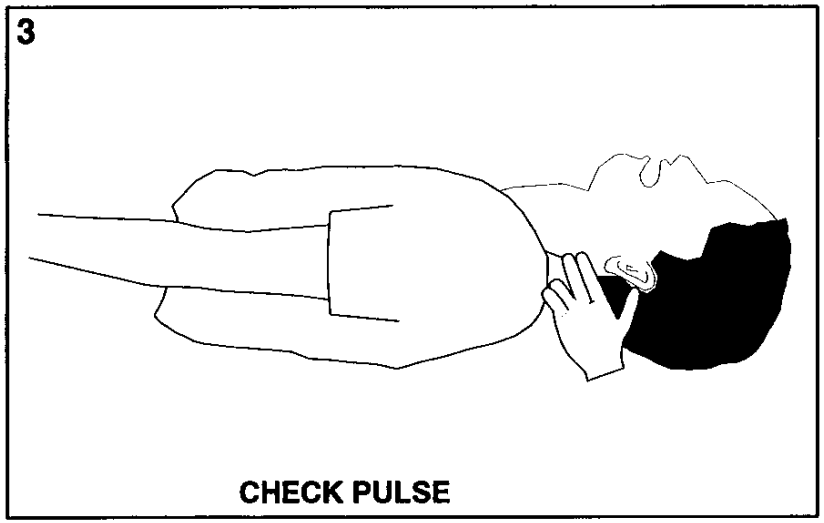


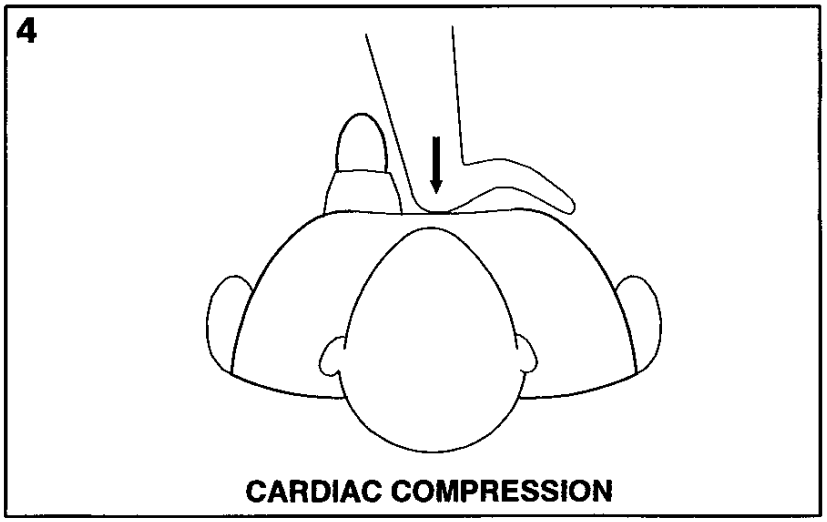


ACCESS EVOLUTION - SKETCH #009
Two-Man Carries

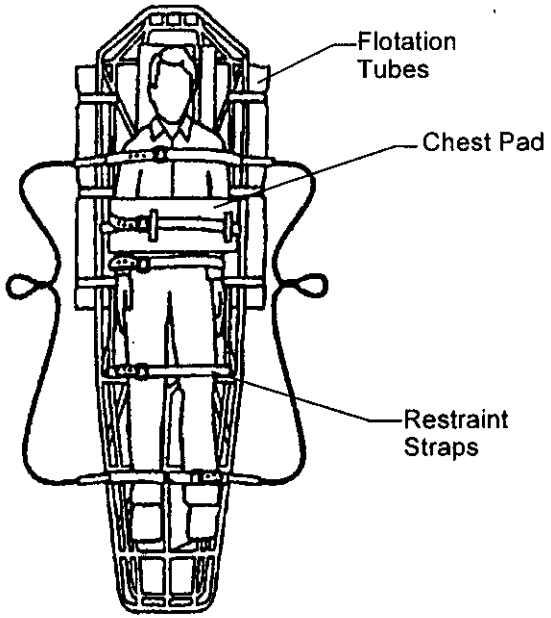




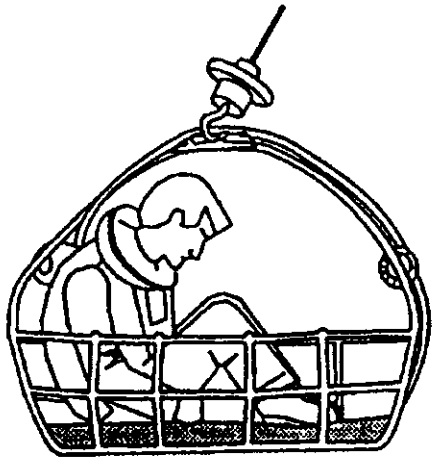




ACCESS EVOLUTION - SKETCH #010
Cardiopulmonary Resuscitation

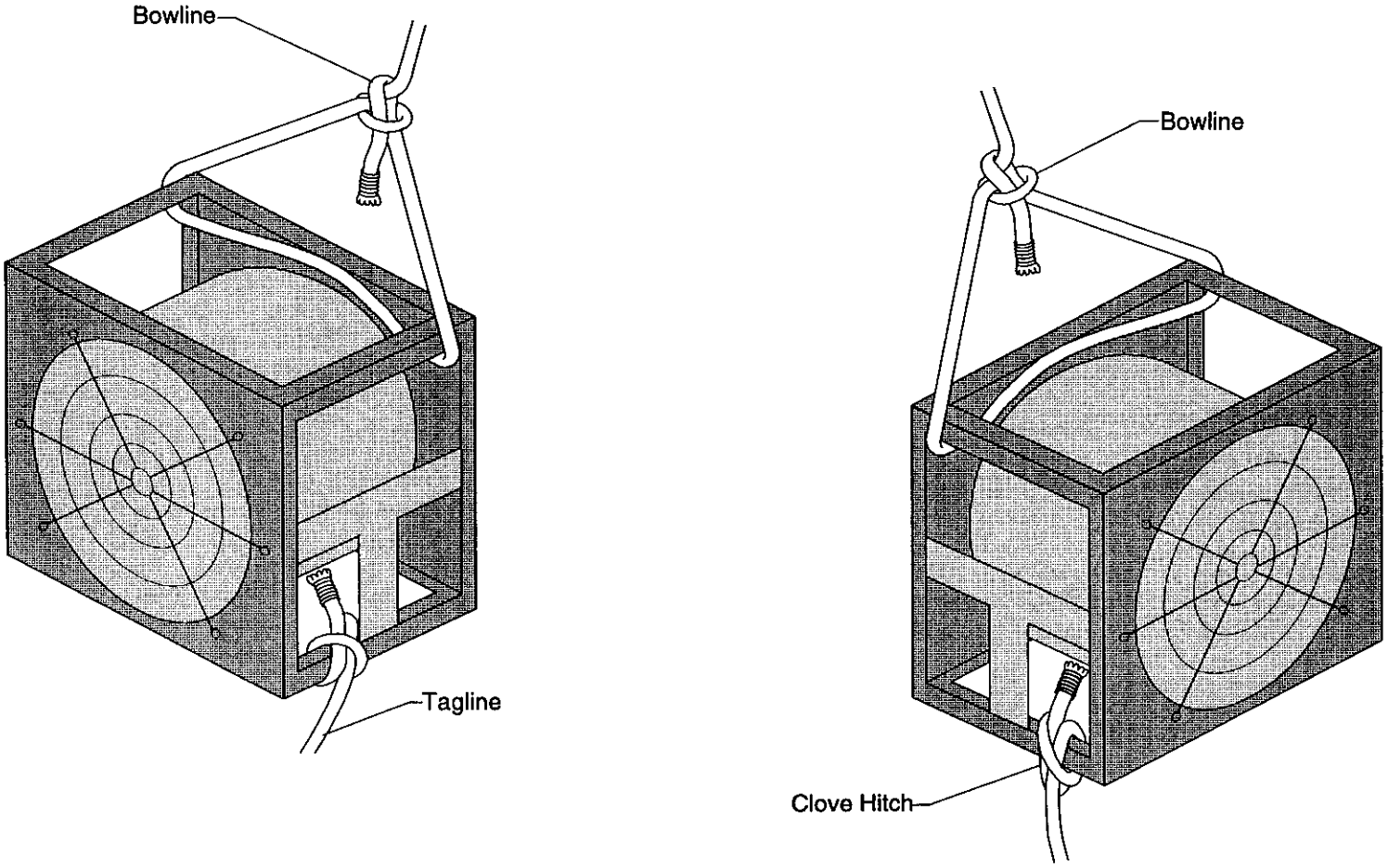


Stokes Litter



Rescue Basket

ACCESS EVOLUTION - SKETCH #011
Preparing a Victim for Helicopter Evacuation

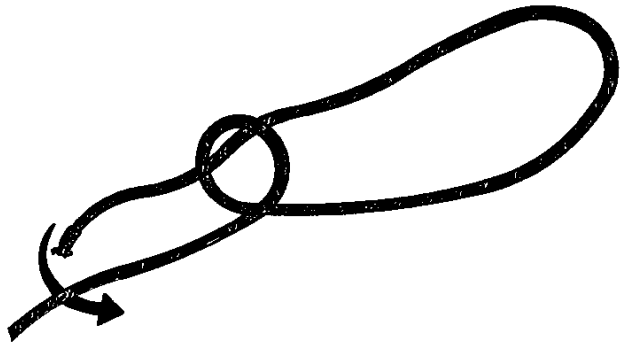


ACCESS EVOLUTION - SKETCH #012
Example of Hoisting Equipment Using a Bowline and a Clove Hitch

1

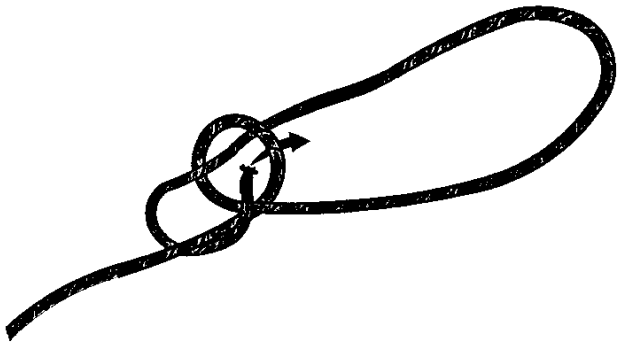
Measure off sufficient rope to form the size of the knot desired and form a loop in the standing part.

2



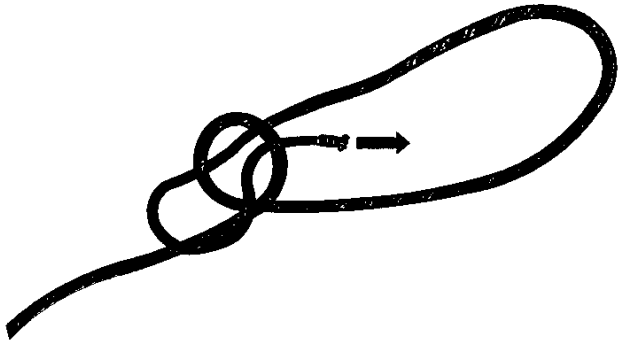
Pass the running part upward through the loop.

3



Pass the running part over the top of the loop under the standing part and bring the end of the running part completely around the standing part and down through the loop.

4

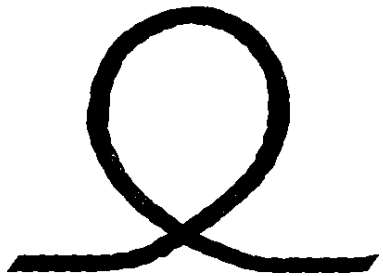


Pull the knot snugly into place, forming an "inside" bowline with the running part of the inside of the loop.

ACCESS EVOLUTION - SKETCH #013

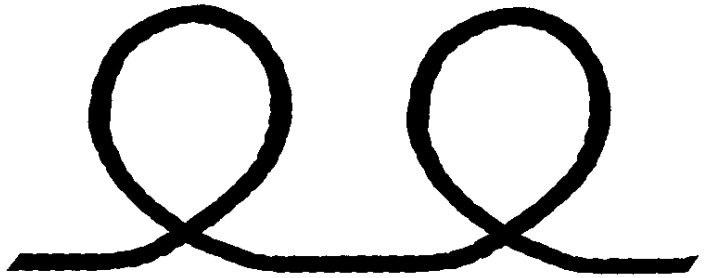
Bowline Knot - A Good Knot for Forming a Loop that will not Slip Under Strain and May be Easily Untied

1



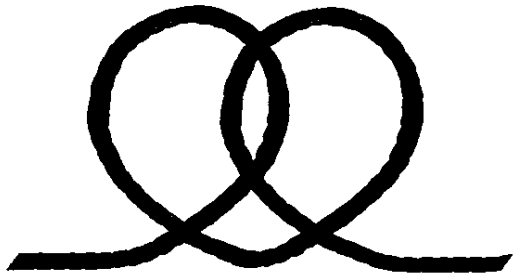
Form a loop in the left hand with the running part to the right crossing under the standing part.

2



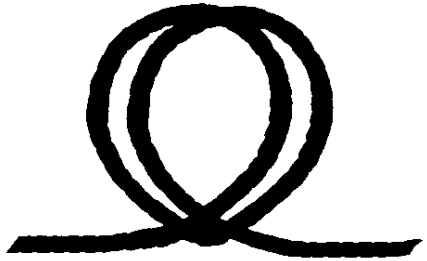
Slide another loop in the right hand again with the running part crossing under the standing part.

3



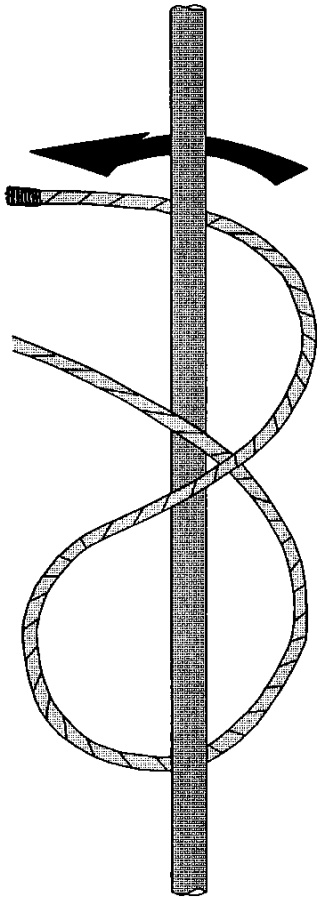
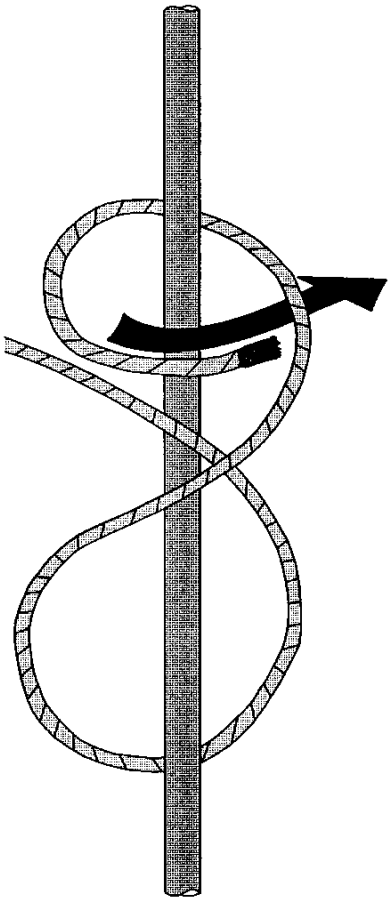
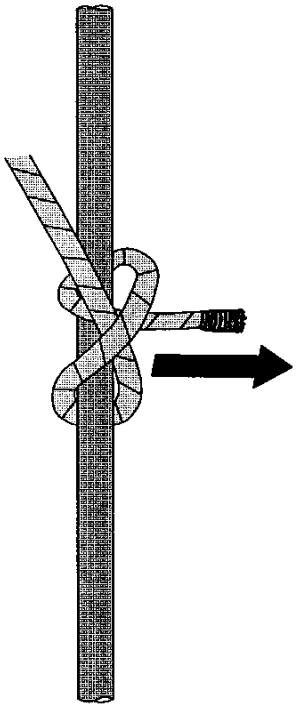
Slide the right hand loop on top of the left hand loop.

4



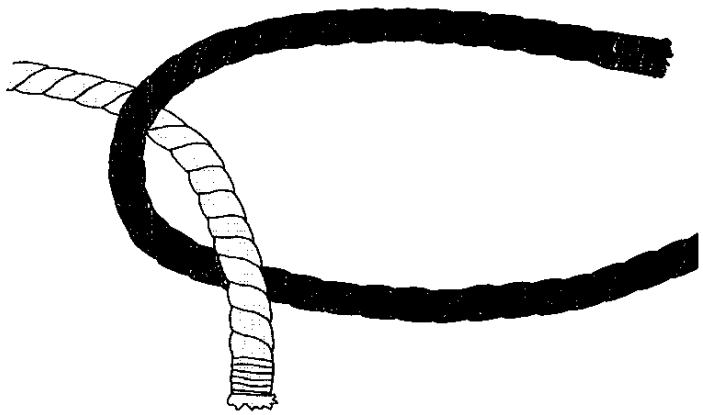
Hold the two loops together at the rope and thus form the clove hitch. Slip these loops over the object that the knot is to be tied around. Pull the ends in opposite directions to tighten.

ACCESS EVOLUTION - SKETCH #014
Clove Hitch Knot - Used for Attaching a Rope to an Object Such as a Pole, Post or Hose

1	2	3
		
Make one complete loop around the object and bring the running part below the standing parts.	Cross the running part over the standing part and complete the "round turn" about the object just above the first loop.	Pass the running part end under the upper wrap just above the cross and by pulling, properly set the hitch.

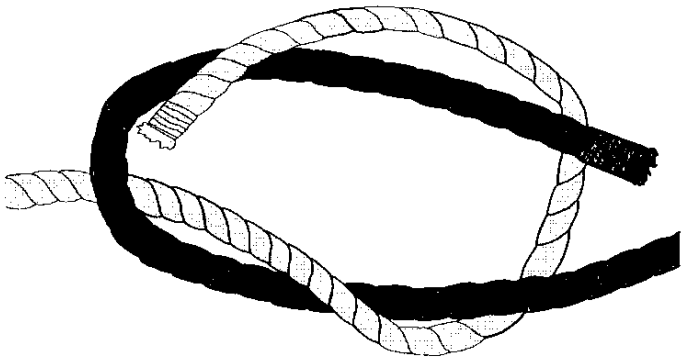
ACCESS EVOLUTION - SKETCH #015
Clove Hitch Knot - Tying the Clove Hitch Around an Object

1



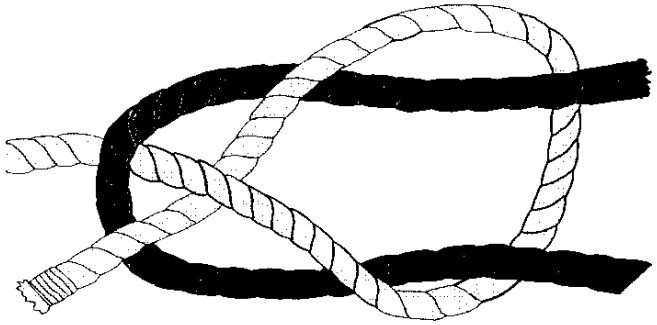
Form a bight in one of the ends to be tied (if two ropes of unequal diameter are being tied, the bight always goes in the larger of the two) and pass the other end through the bight.

2



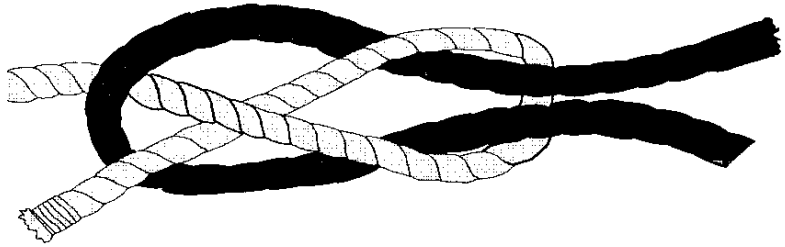
Bring the loose end around both parts of the bight.

3



Tuck this end under its own standing part and over the bight standing part.

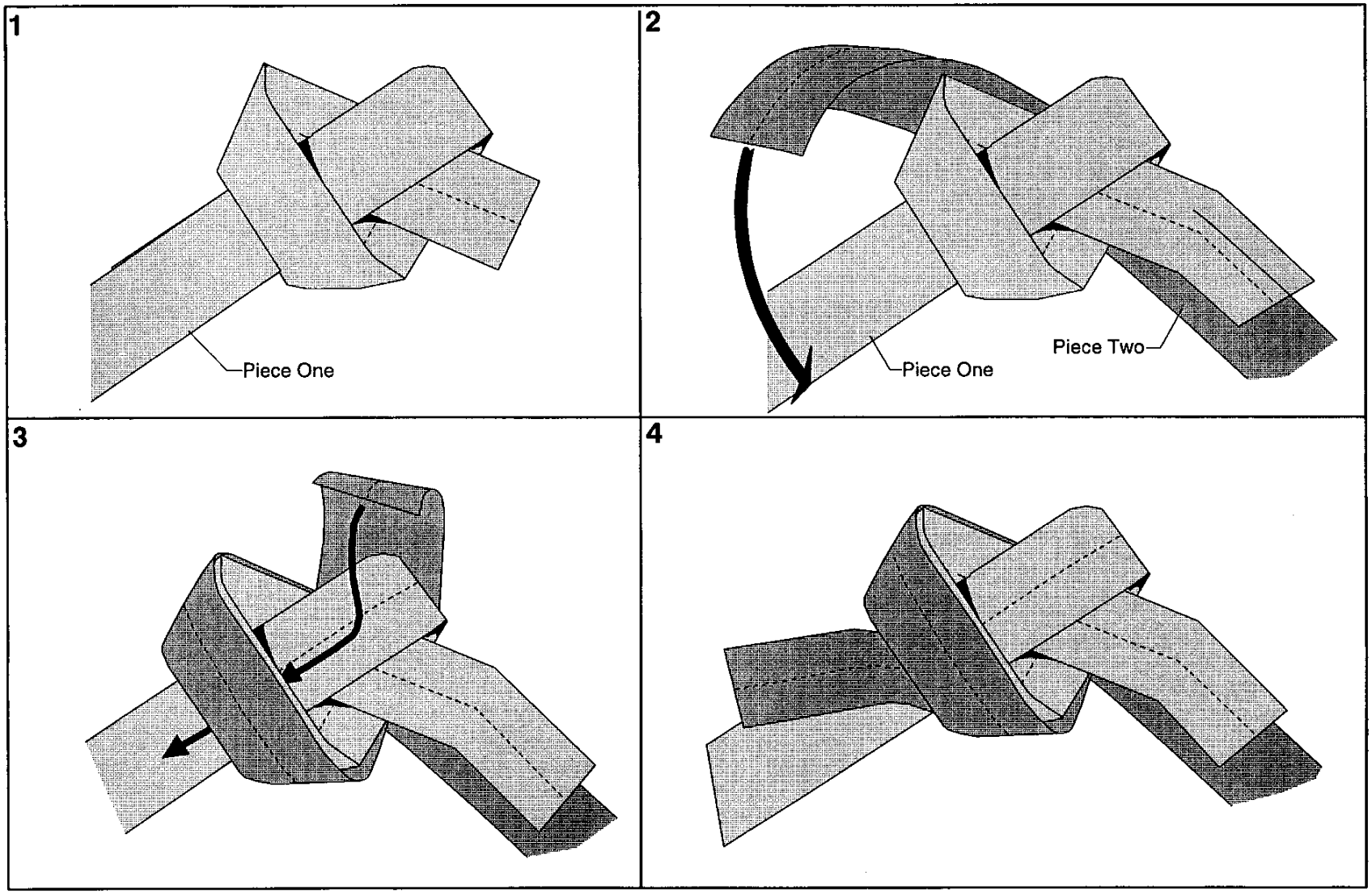
4



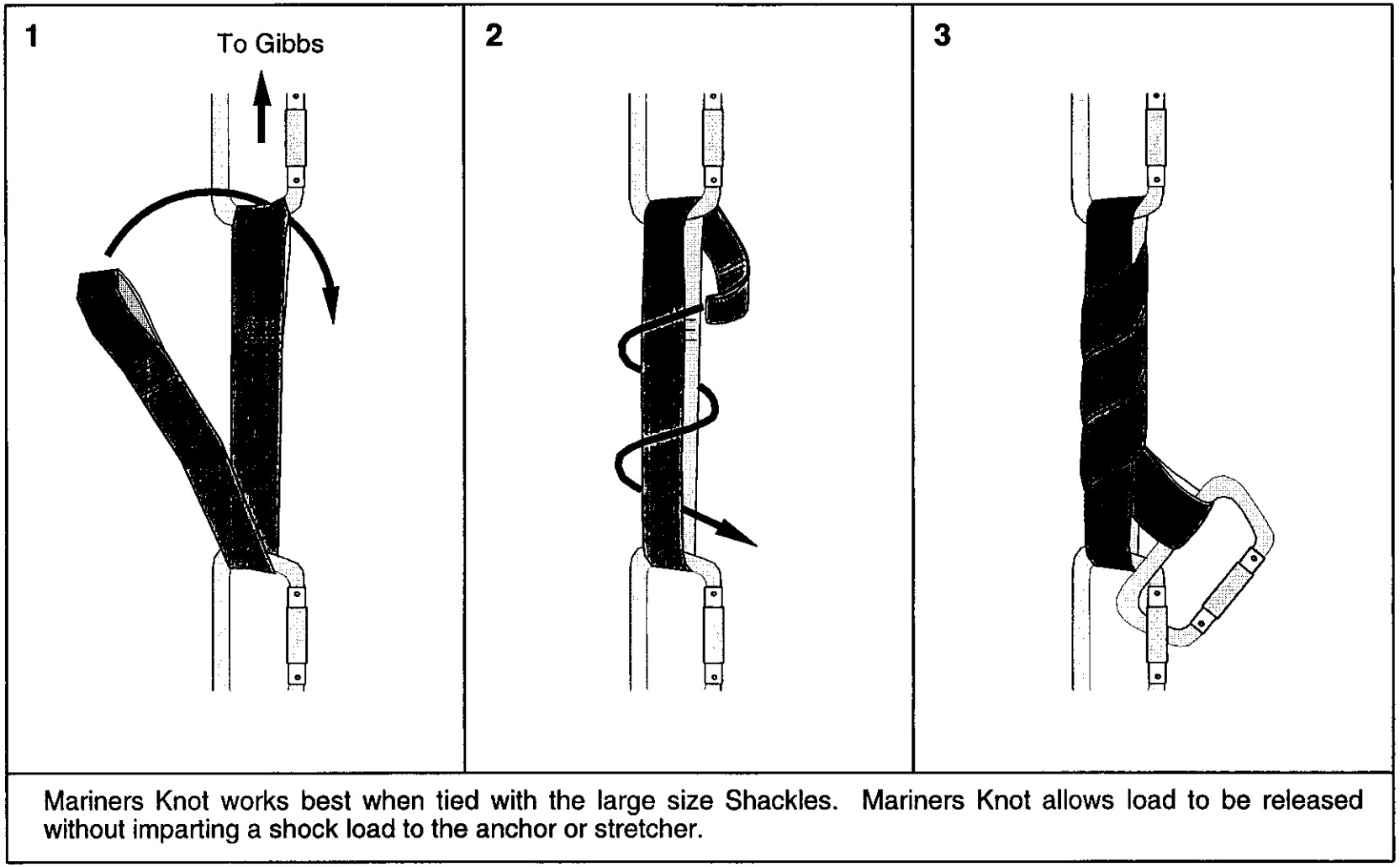
Draw the knot down snug.

ACCESS EVOLUTION - SKETCH #016

Becket or Sheet Bend Knot - Used for Joining Two Ropes (Well-Suited for Joining Ropes of Unequal Diameters)

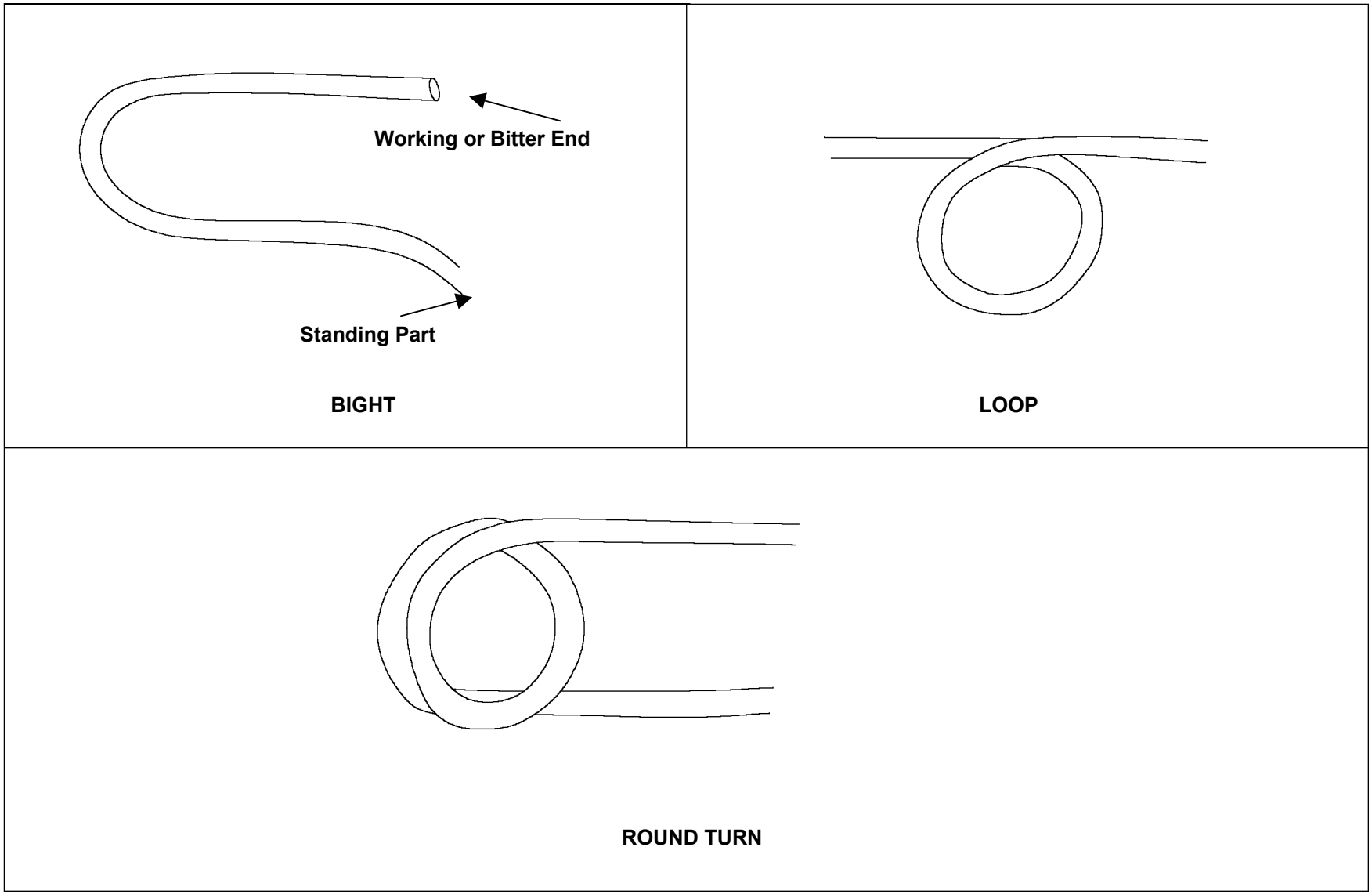


ACCESS EVOLUTION - SKETCH #017
Water Knot - Used for Joining Two Strips of Canvas or Rope

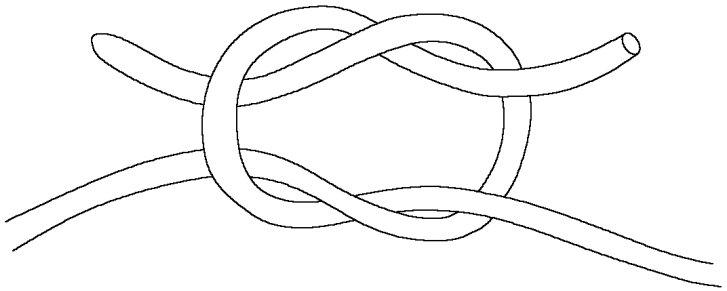


Mariners Knot works best when tied with the large size Shackles. Mariners Knot allows load to be released without imparting a shock load to the anchor or stretcher.

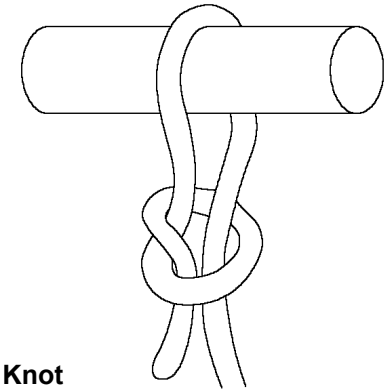
ACCESS EVOLUTION - SKETCH #018
Mariners Knot - a Knot System that can be Released Under Load



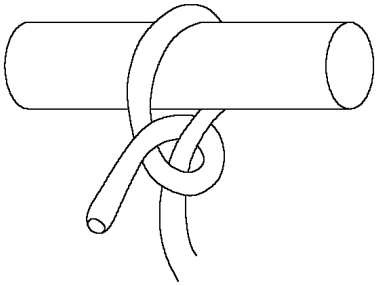
ACCESS EVOLUTION - SKETCH #019
Terminology Used in Working with Life Lines (Bight, Loop and Round Turn)



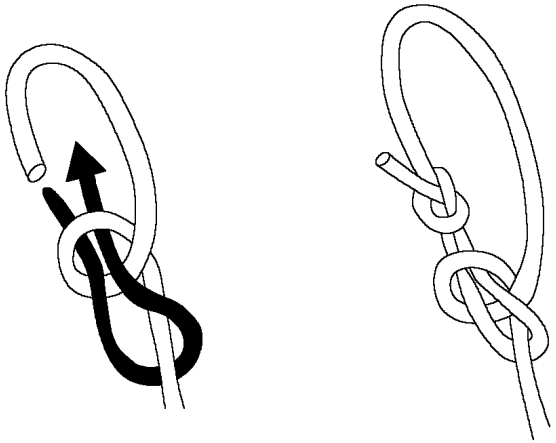
Square Knot



Overhand Knot

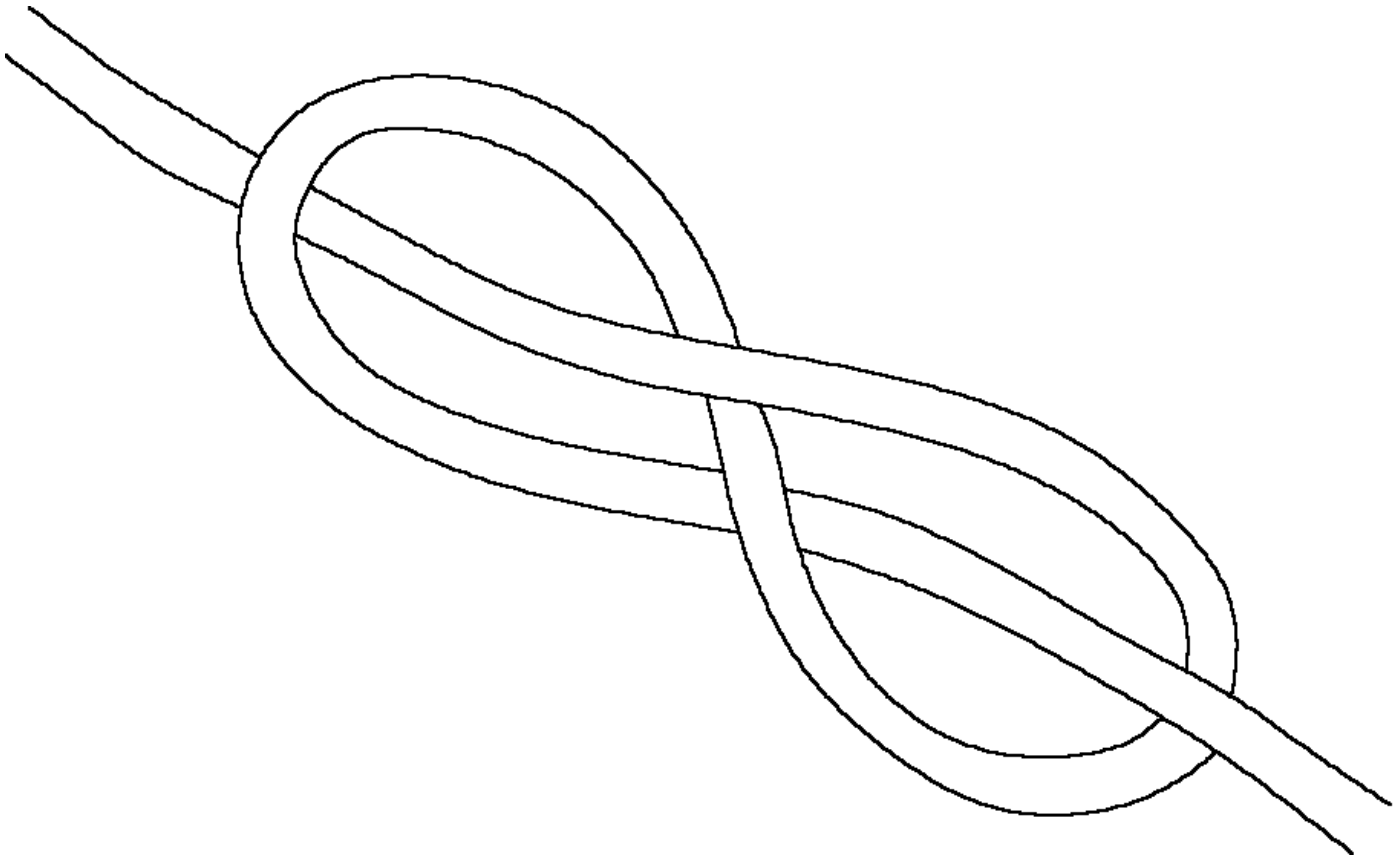


Half Hitch

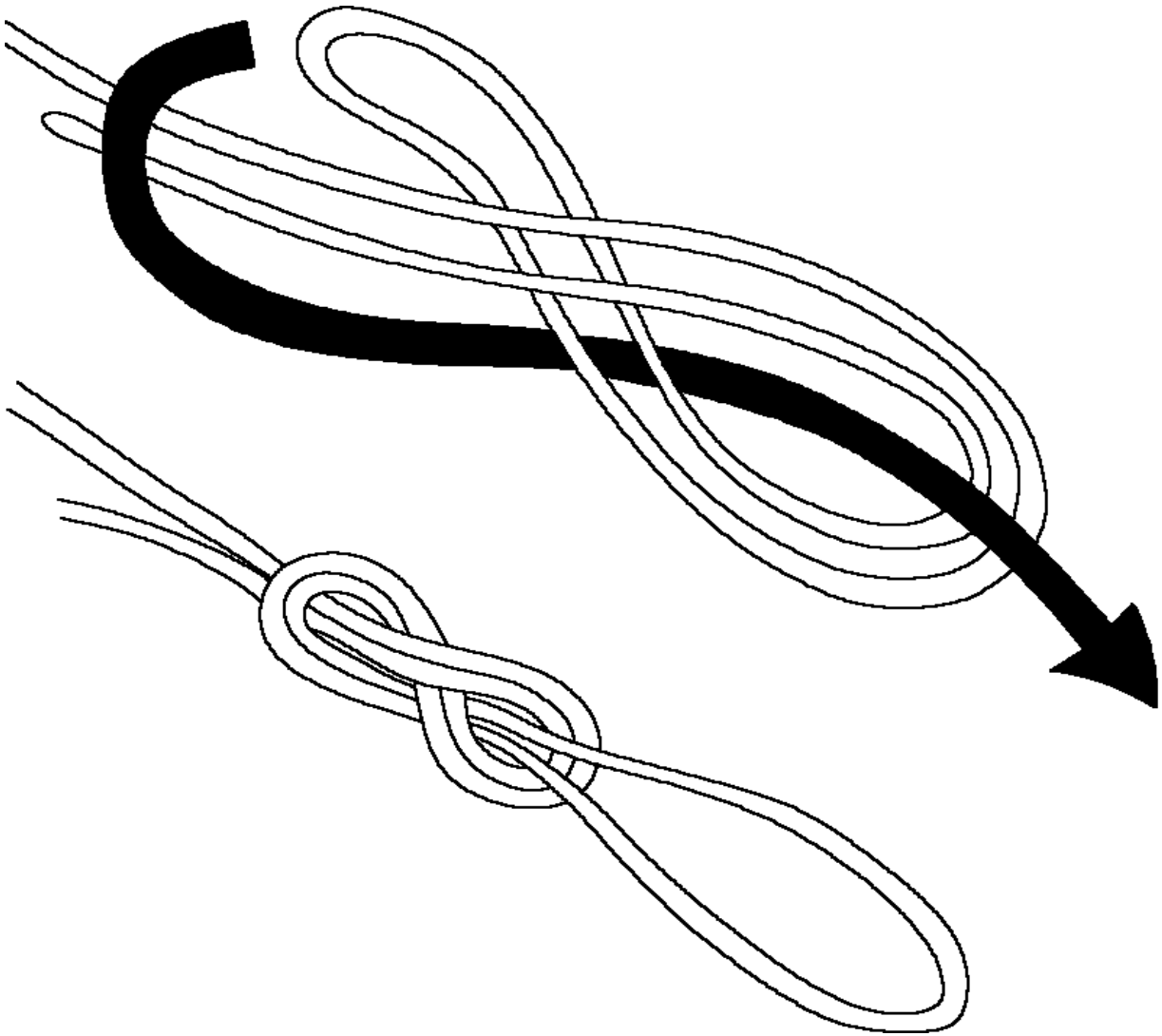


Bowline with a Safety

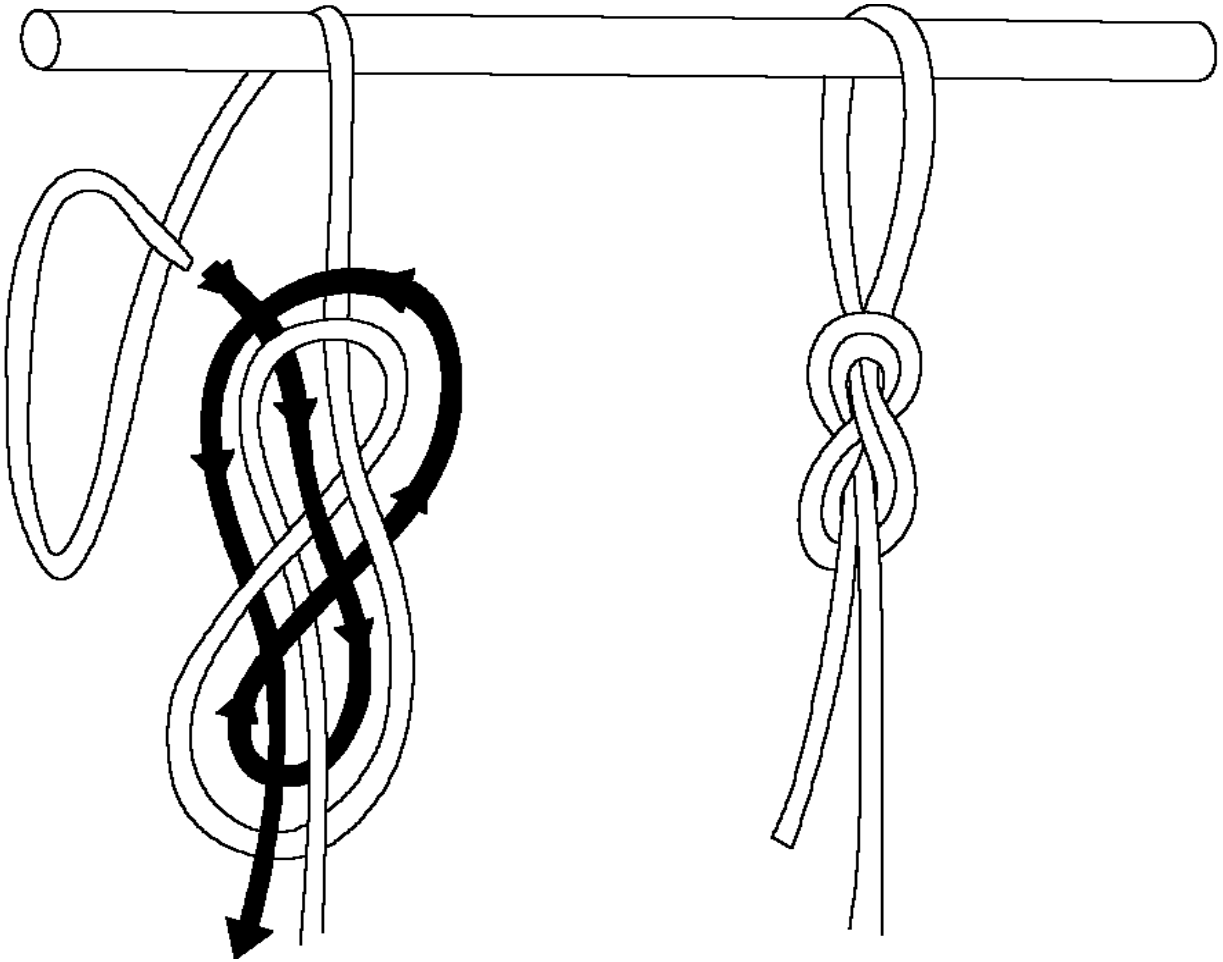
ACCESS EVOLUTION - SKETCH #020
Some Basic Knots (Square, Overhand, Half Hitch and Bowline with a Safety)



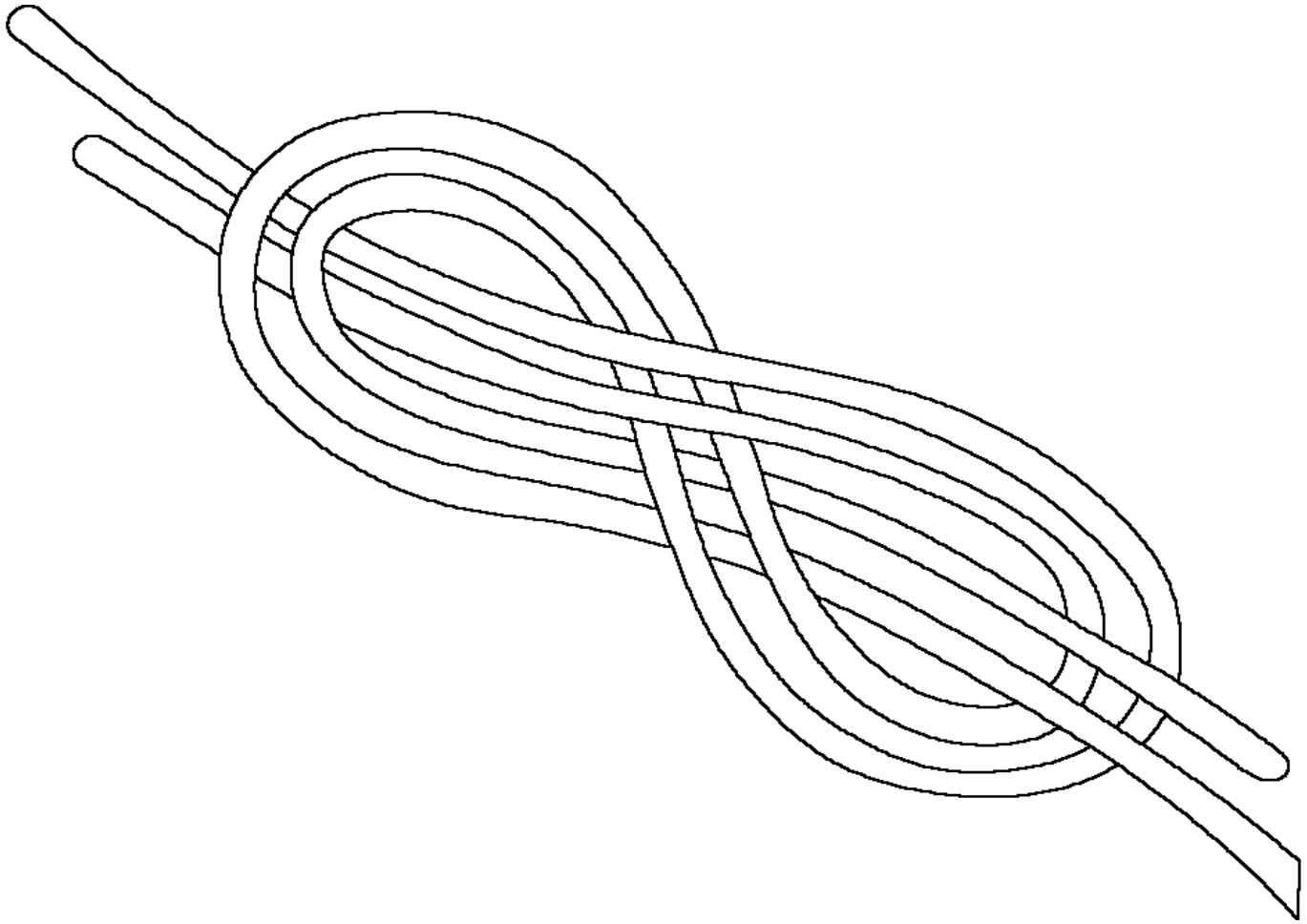
ACCESS EVOLUTION - SKETCH #021
Figure Eight Stopper Knot - A Single Figure Eight Knot



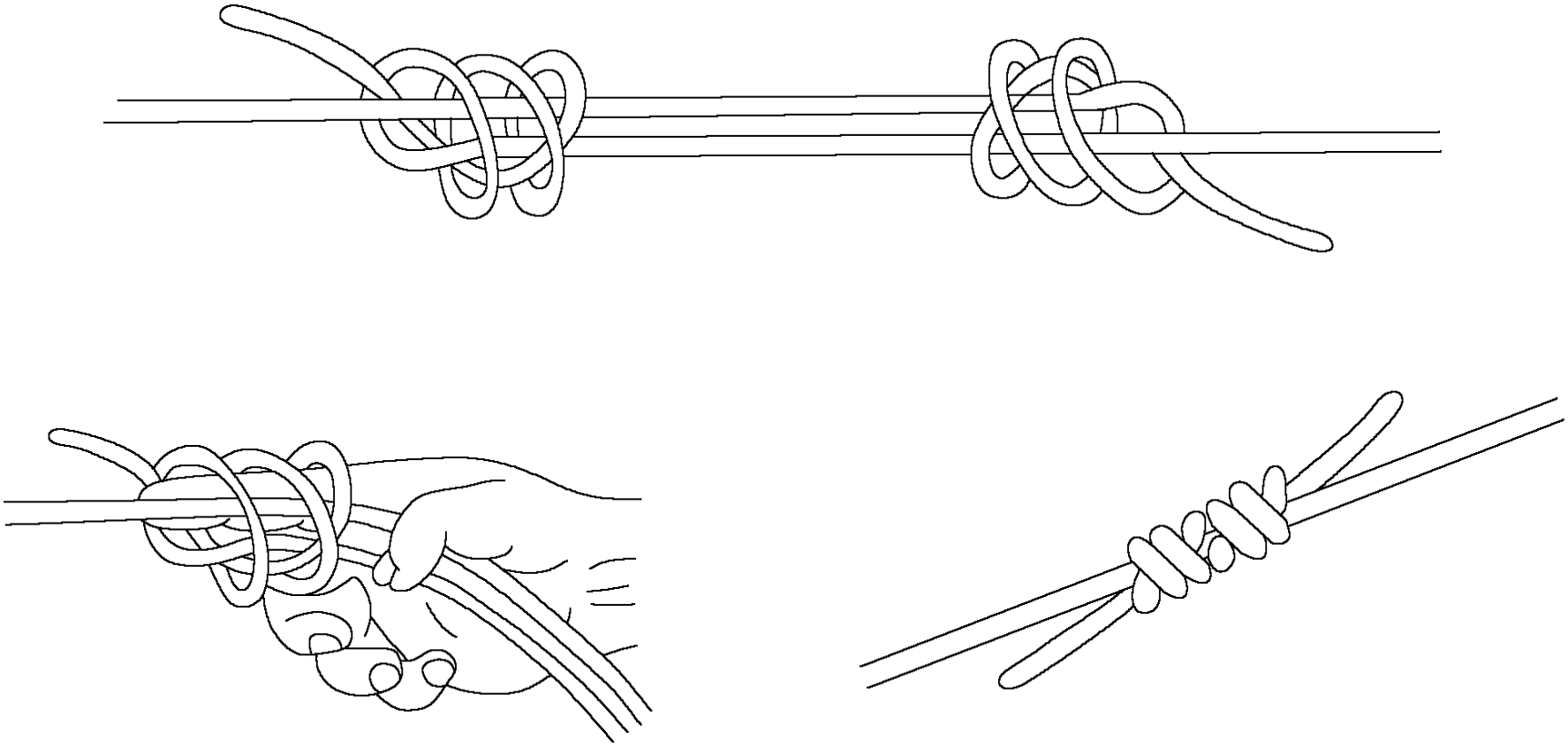
ACCESS EVOLUTION - SKETCH #022
Figure Eight on a Bight Knot



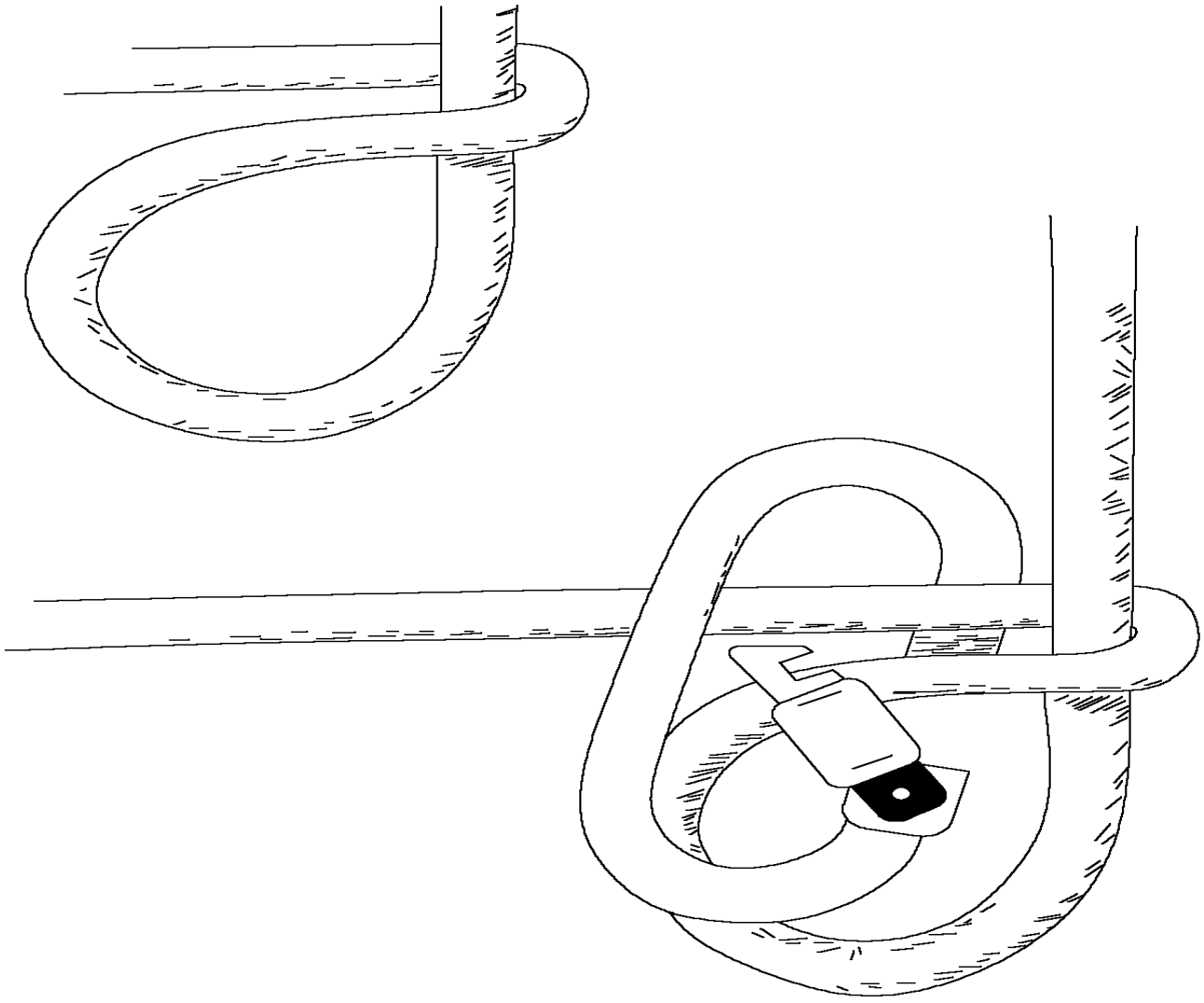
ACCESS EVOLUTION - SKETCH #023
Figure Eight Follow-Through Knot



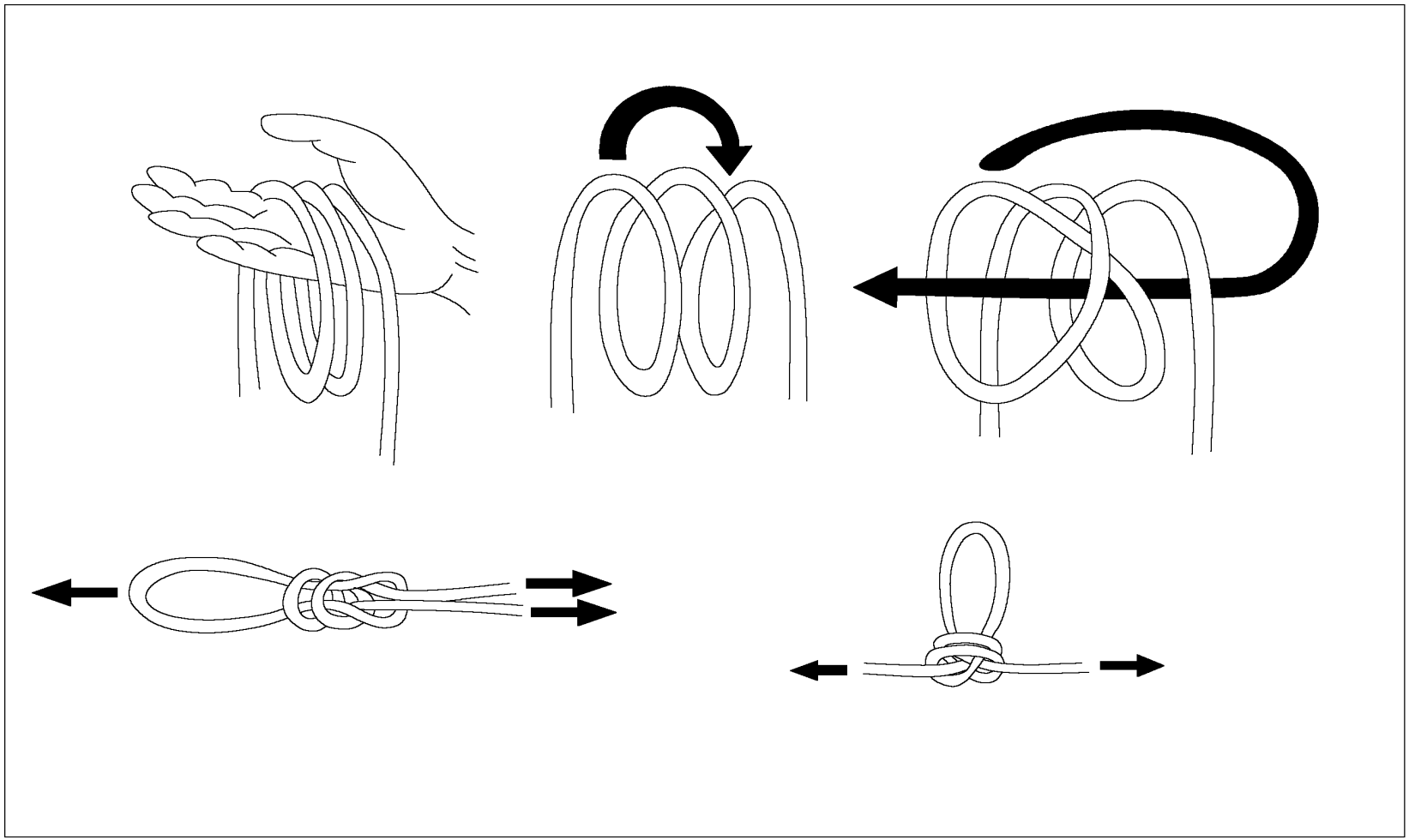
ACCESS EVOLUTION - SKETCH #024
Figure Eight Bend Knot



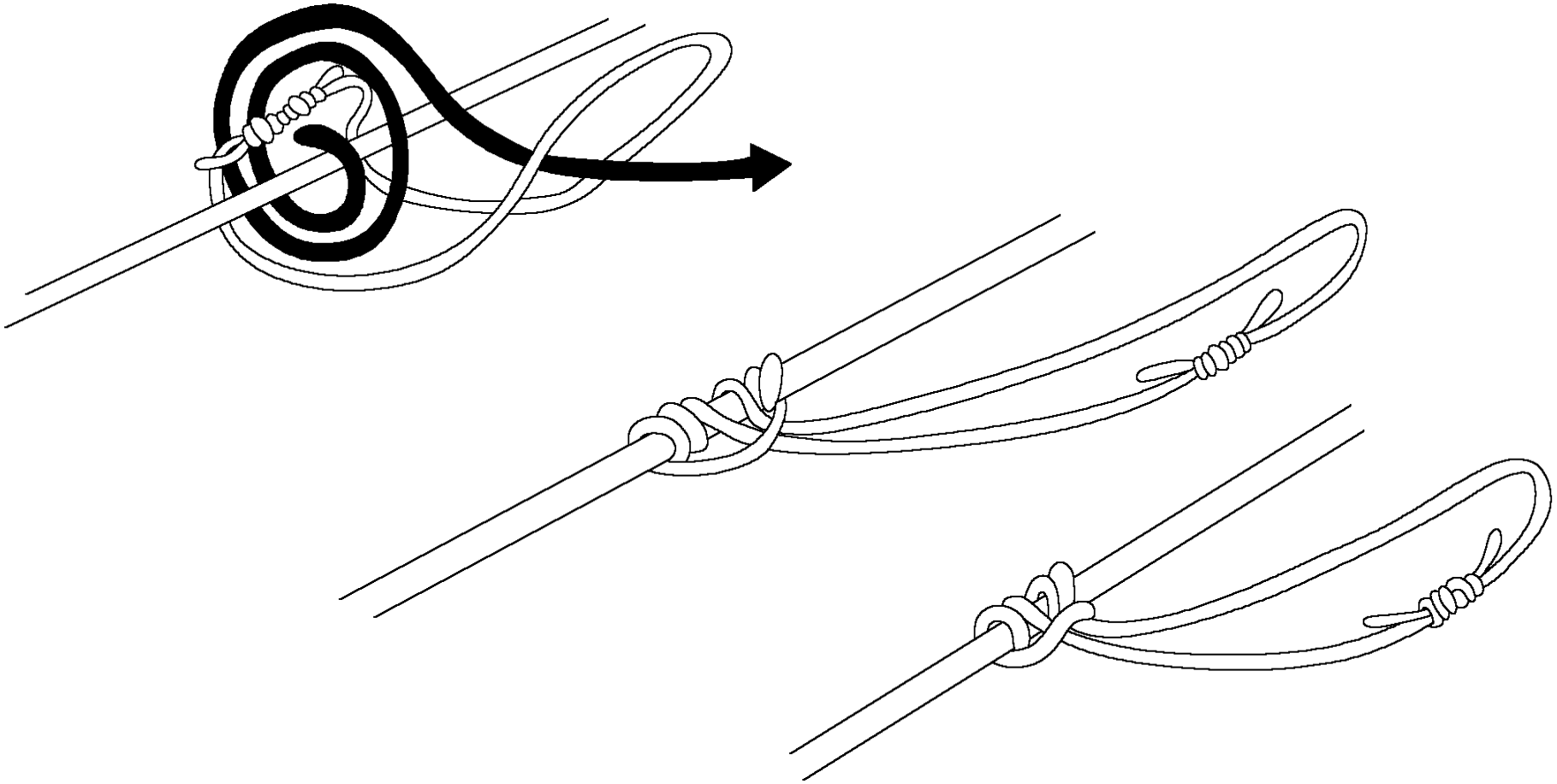
ACCESS EVOLUTION - SKETCH #025
Double Fisherman's Bend Knot



ACCESS EVOLUTION - SKETCH #026
Munter Hitch Knot



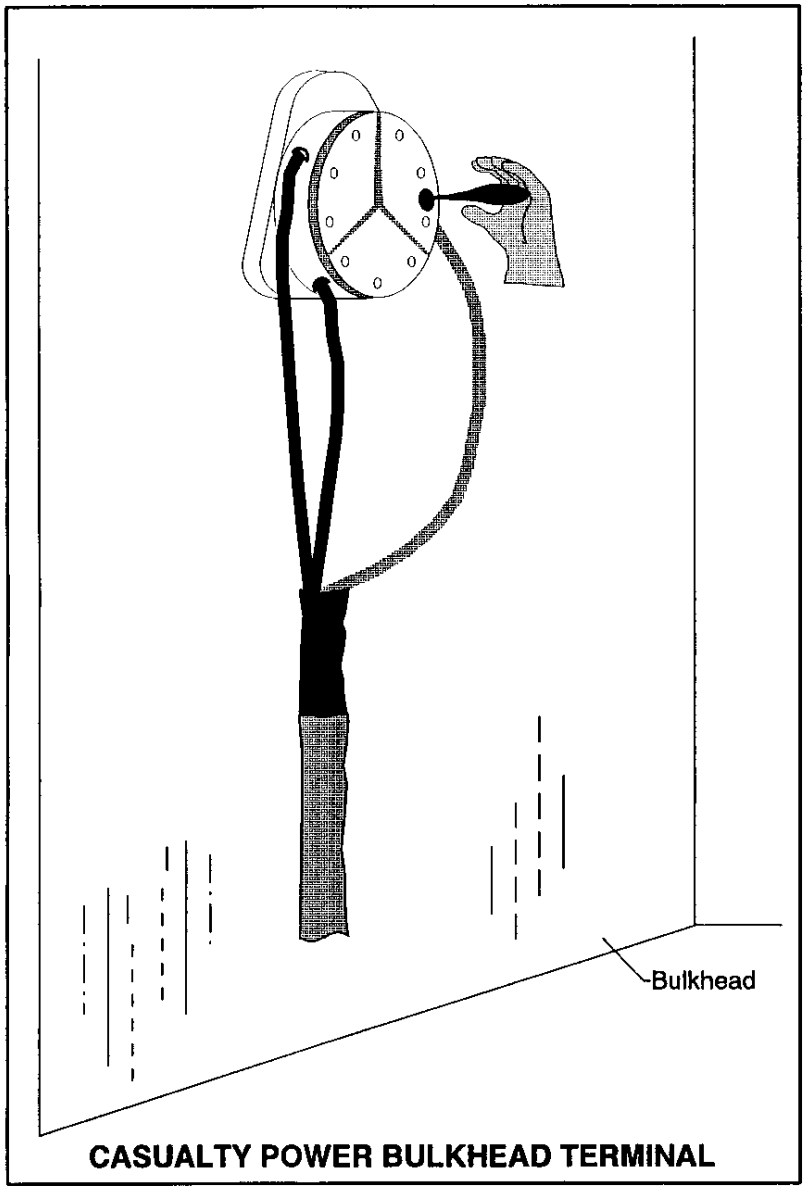
ACCESS EVOLUTION - SKETCH #027
Butterfly Knot

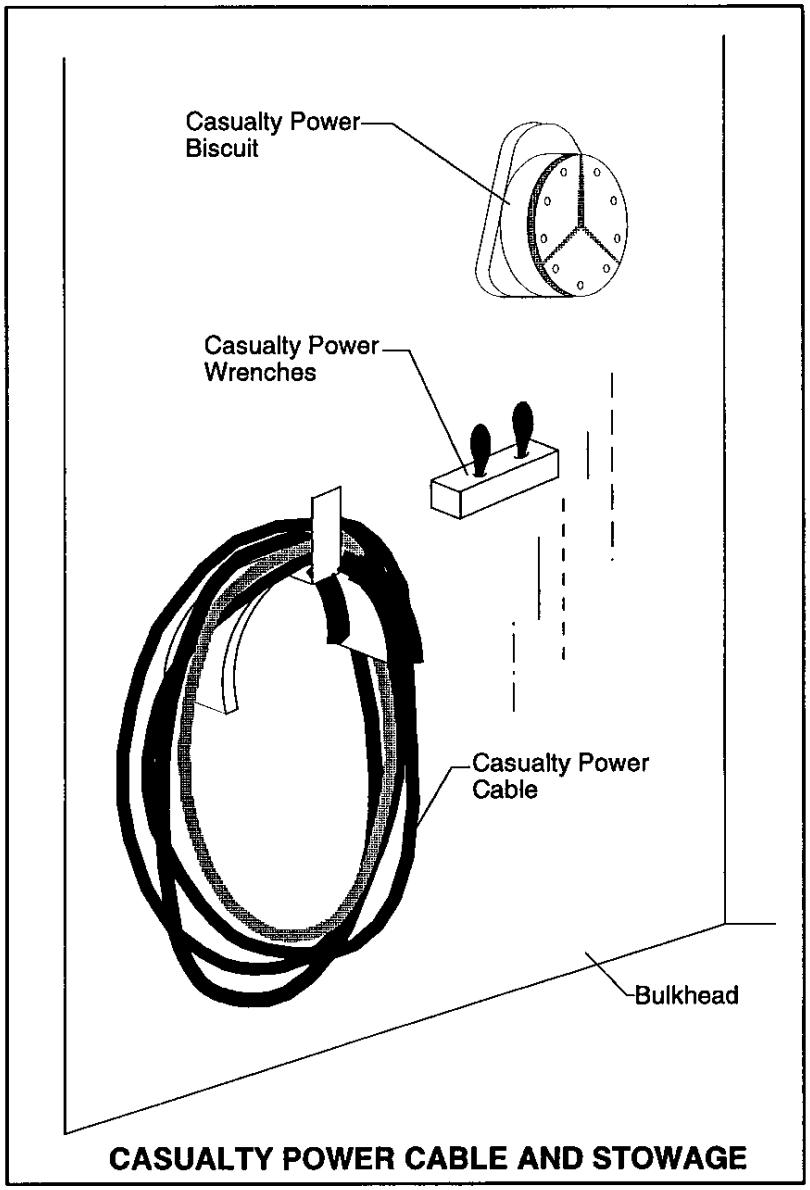


ACCESS EVOLUTION - SKETCH #028
Prusic Hitch Knot with Double and Triple Wrap

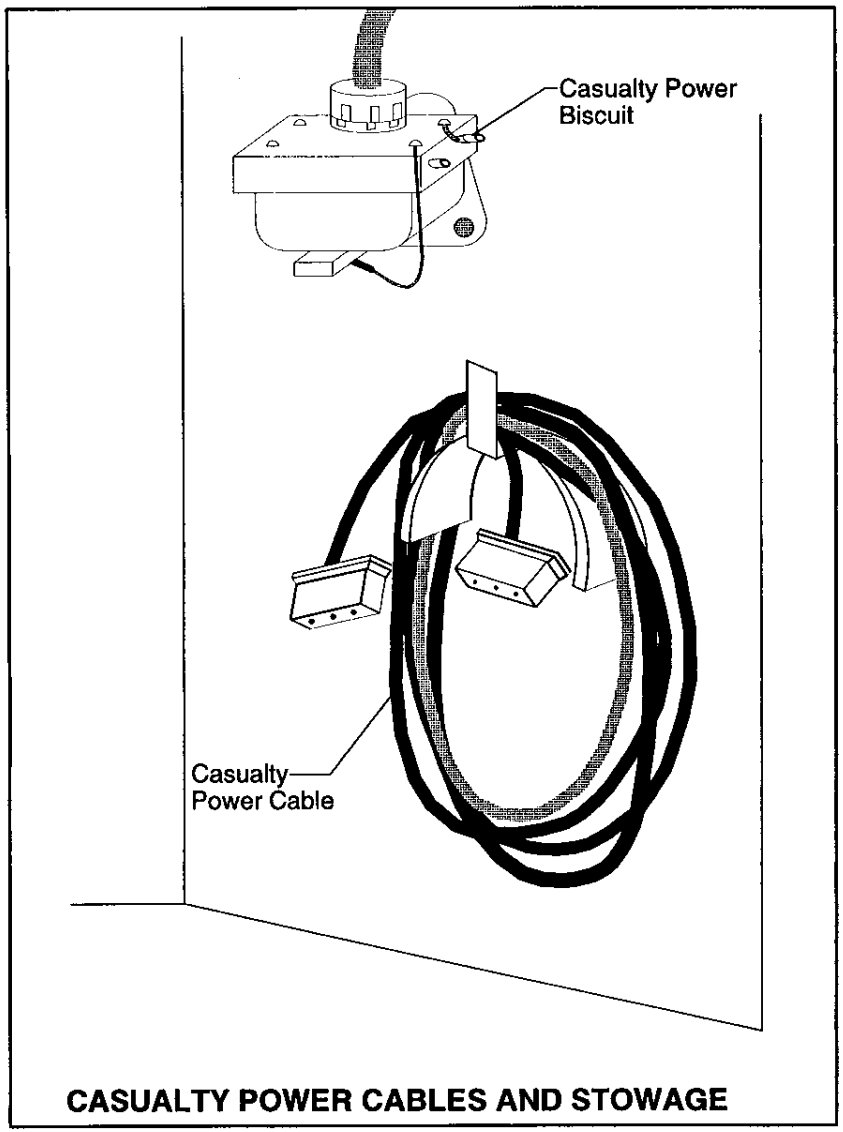
DAMAGE CONTROL LAYOUT SKETCHES

SECTION 2 - CASUALTY POWER SYSTEM

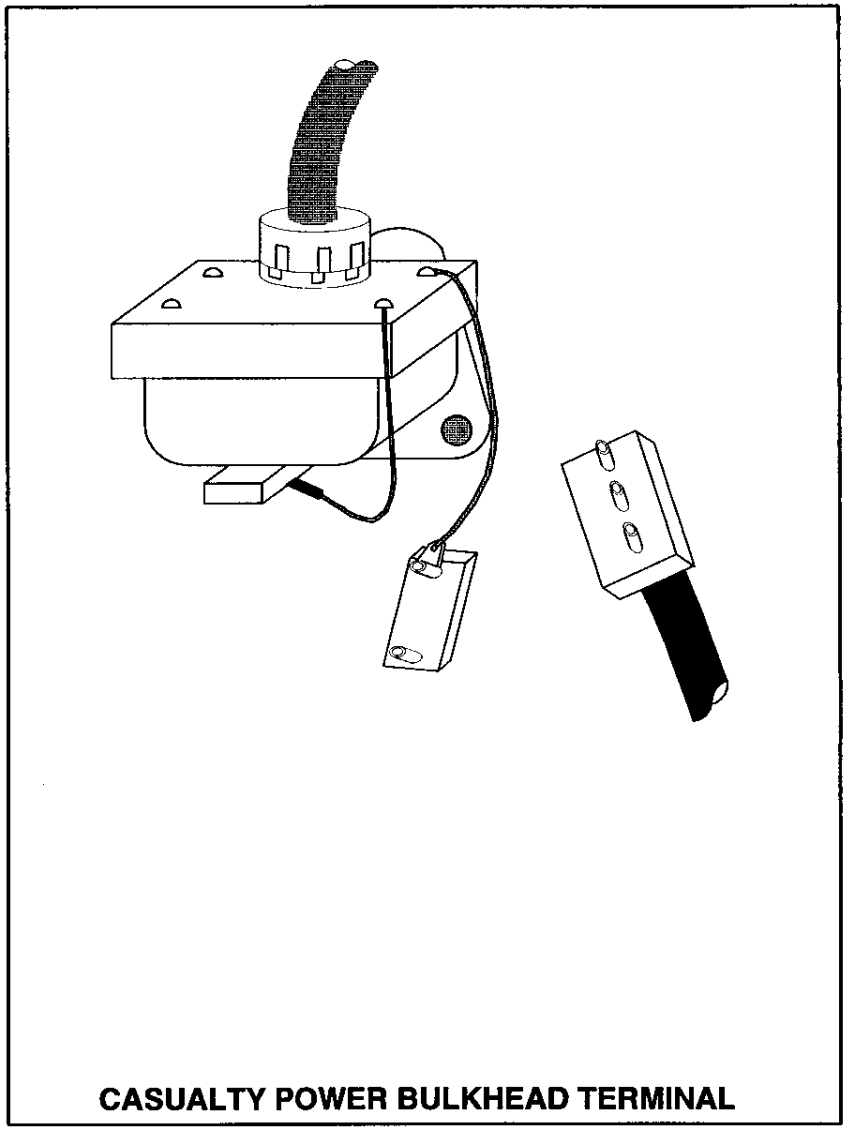




CASUALTY POWER SYSTEM - SKETCH #001
Bulkhead Terminal

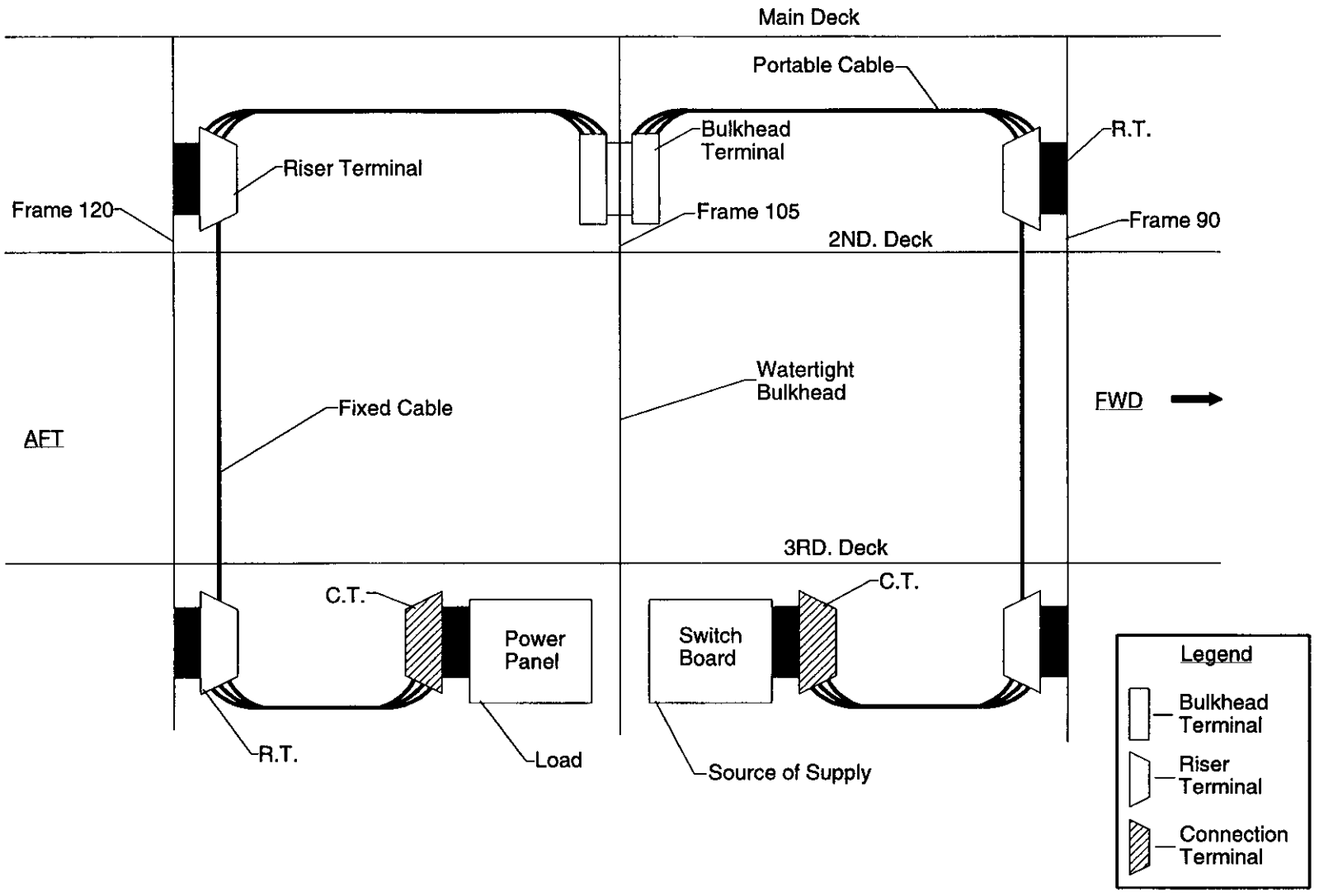


CASUALTY POWER CABLES AND STOWAGE

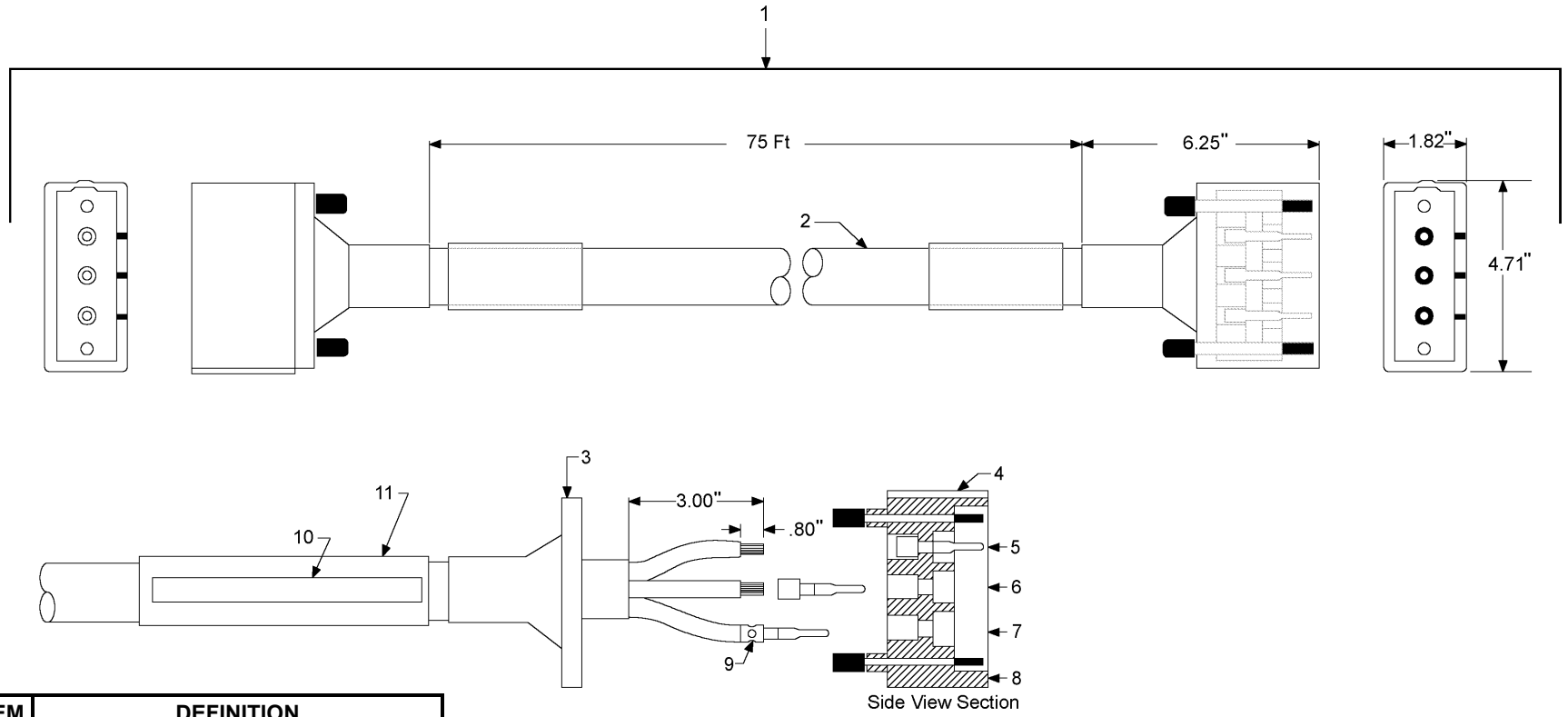


CASUALTY POWER BULKHEAD TERMINAL

CASUALTY POWER SYSTEM - SKETCH #002
Supply Power to Equipment Designated to Receive Casualty Power

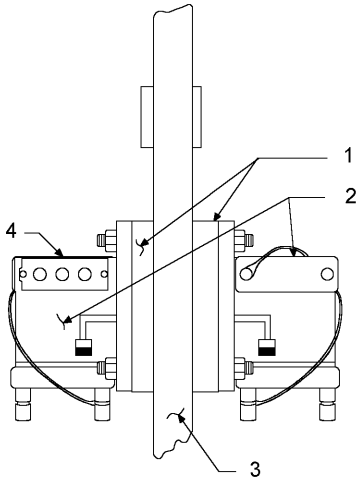


CASUALTY POWER SYSTEM - SKETCH #003
Casualty Power Run

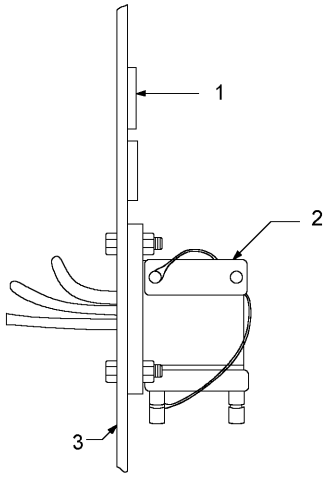


ITEM	DEFINITION
1	MIL-T-24552
2	CABLE RACK NUMBER
3	PLUG BOOT
4	KEY
5	PHASE A
6	PHASE B
7	PHASE C
8	PLUG HOUSING
9	CLAMP
10	CABLE LENGTH/LOCATION WHERE STOWED
11	TRANSPARENT HEAT SHRINKABLE TUBING

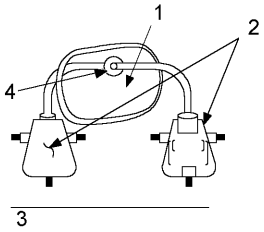
CASUALTY POWER SYSTEM - SKETCH #004
Casualty Power Cable Assembly



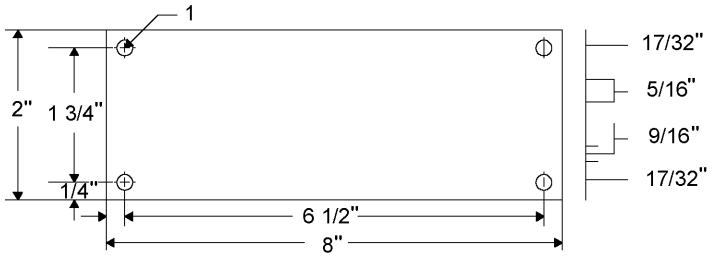
Typical Casualty Power
Bulkhead Terminal Assembly



Typical Casualty Power Terminal
Mounted on Equipment Enclosure



Alternate Bulkhead
Terminal Assembly



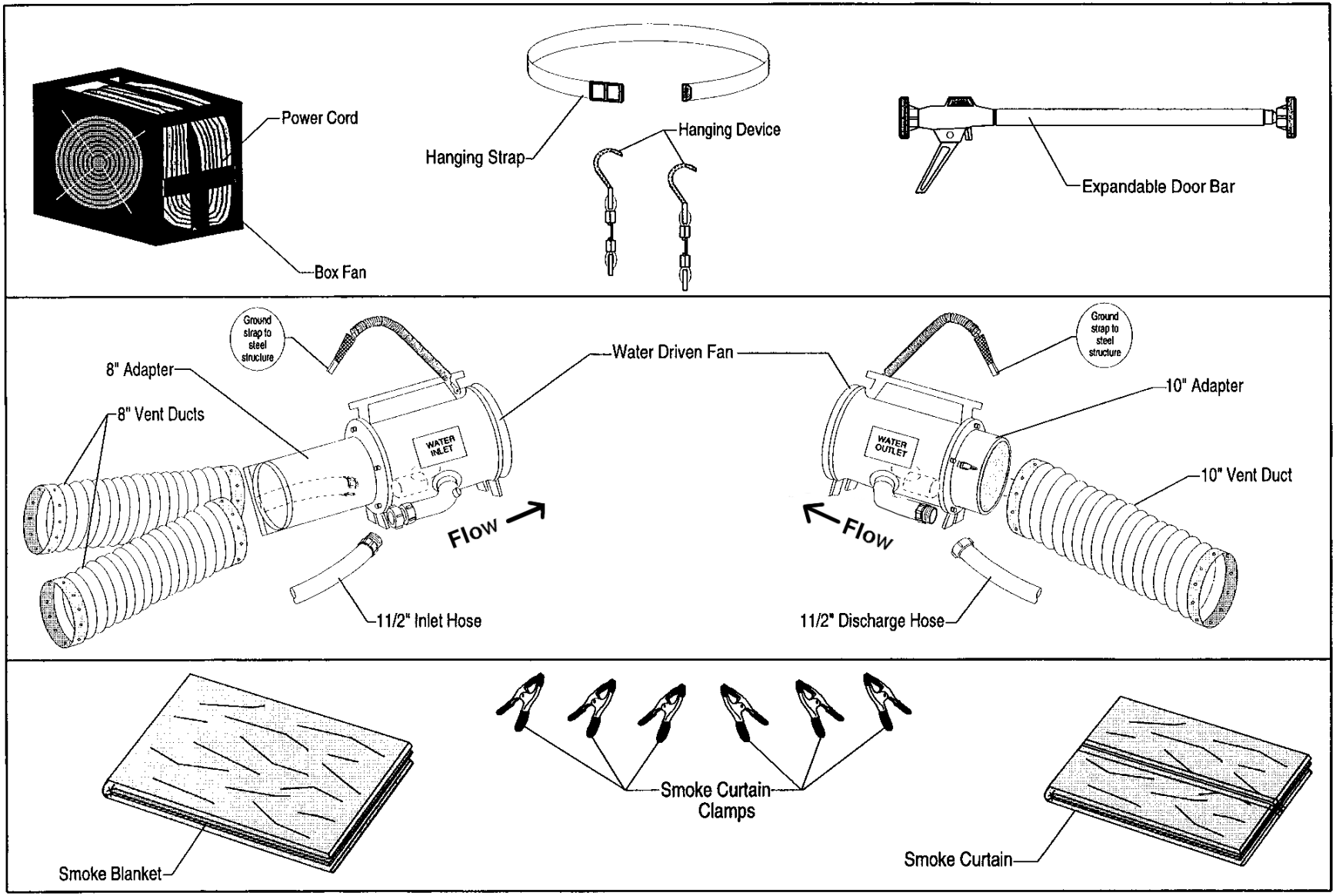
Warning Plate

TYPICAL CASUALTY POWER BULKHEAD TERMINAL ASSEMBLY	
ITEM	**DEFINITION**
1	SYM1048
2	SYM1046
3	BULKHEAD
4	PROTECTIVE COVER REMOVED
TYPICAL CASUALTY POWER TERMINAL MOUNTED ON EQUIPMENT ENCLOSURE	
ITEM	**DEFINITION**
1	WARNING PLATE
2	SYM1046
3	EQUIPMENT ENCLOSURE
ALTERNATE BULKHEAD TERMINAL ASSEMBLY	
ITEM	**DEFINITION**
1	BULKHEAD
2	SYM1047
3	DECK
4	STUFFING TUBE
WARNIING PLATE	
ITEM	**DEFINITION**
1	5/16 DRILL HOLES

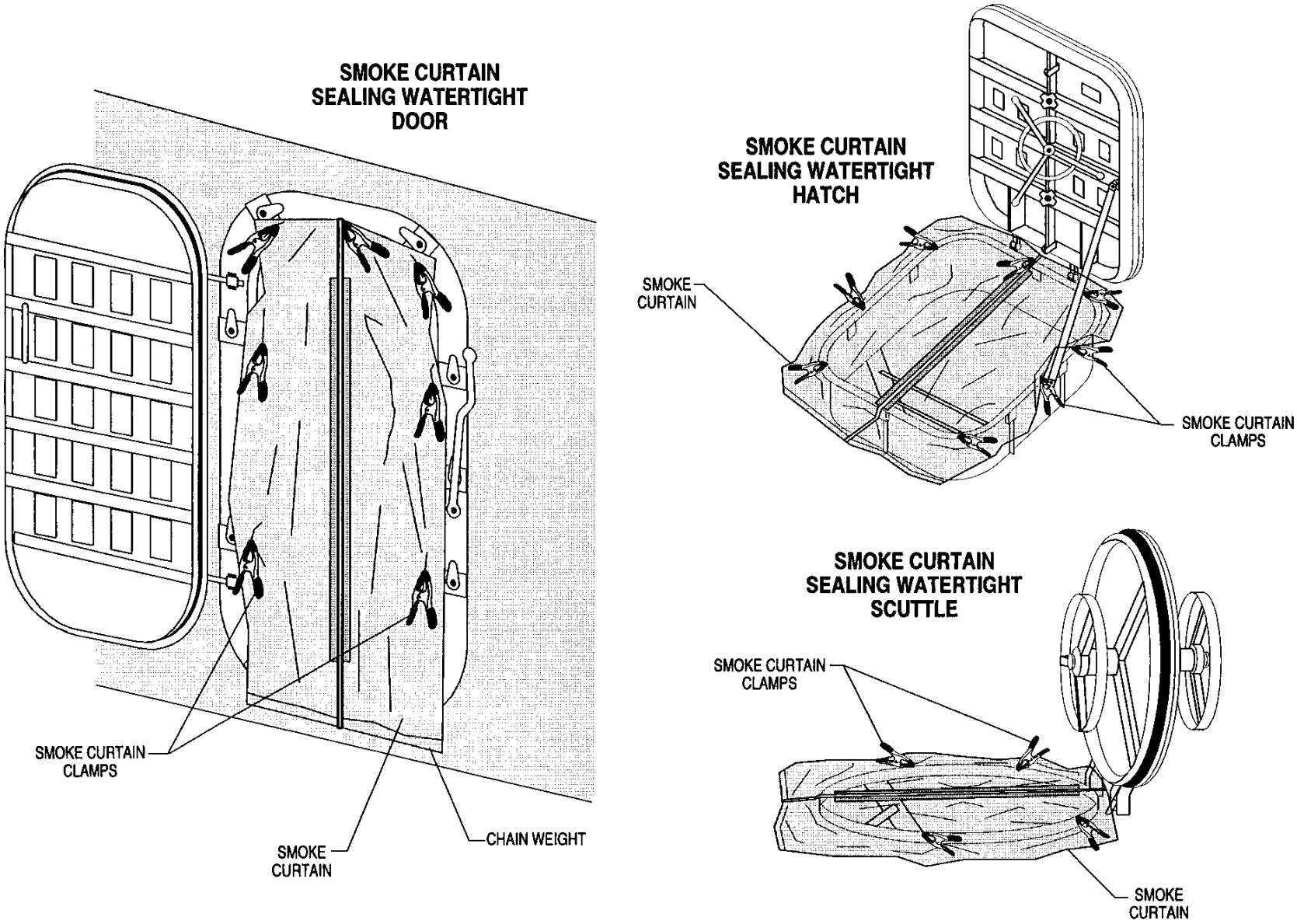
CASUALTY POWER SYSTEM - SKETCH #005
Installation of Casualty Power Equipment

DAMAGE CONTROL LAYOUT SKETCHES

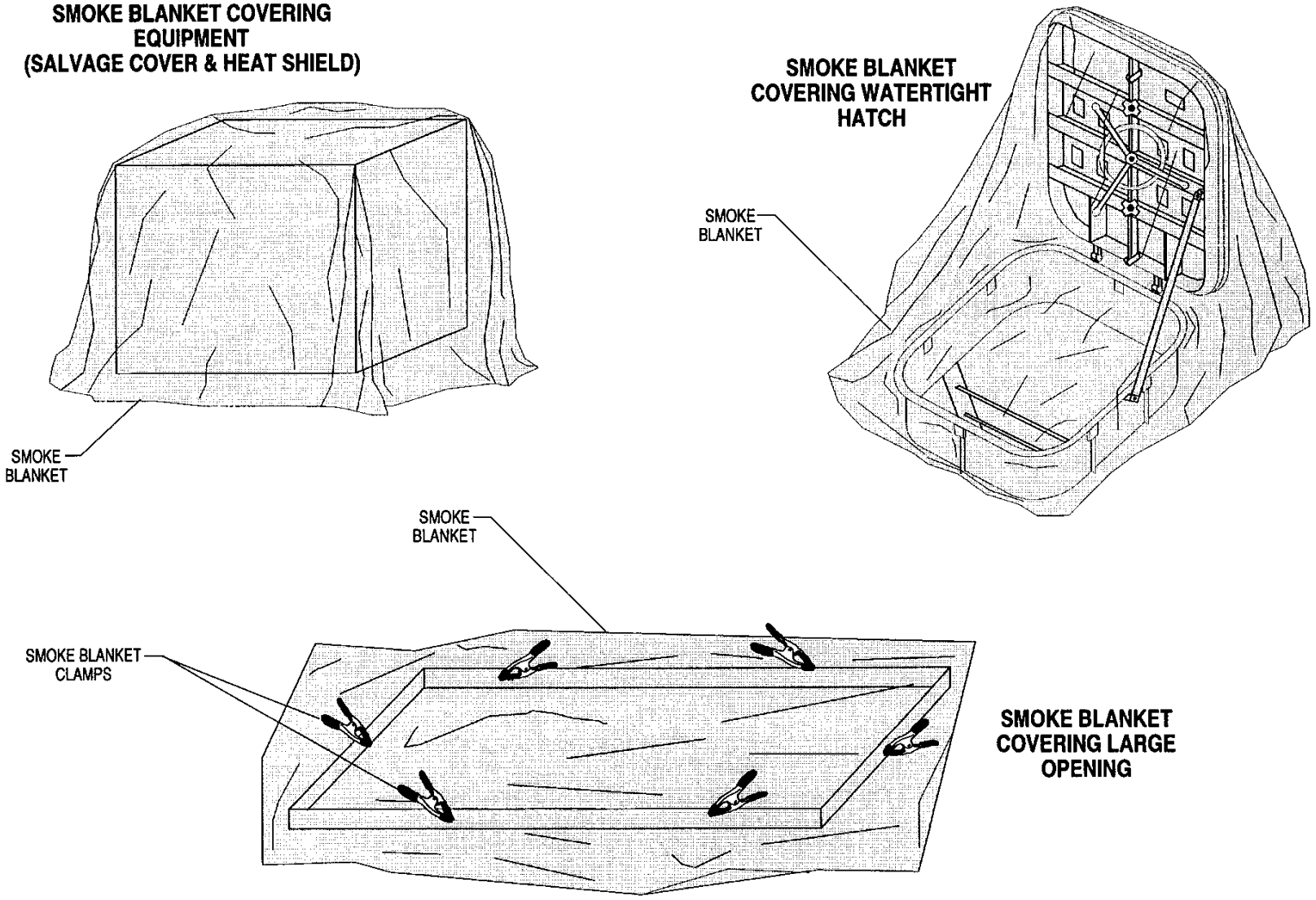
SECTION 3 - DESMOKING EVOLUTION



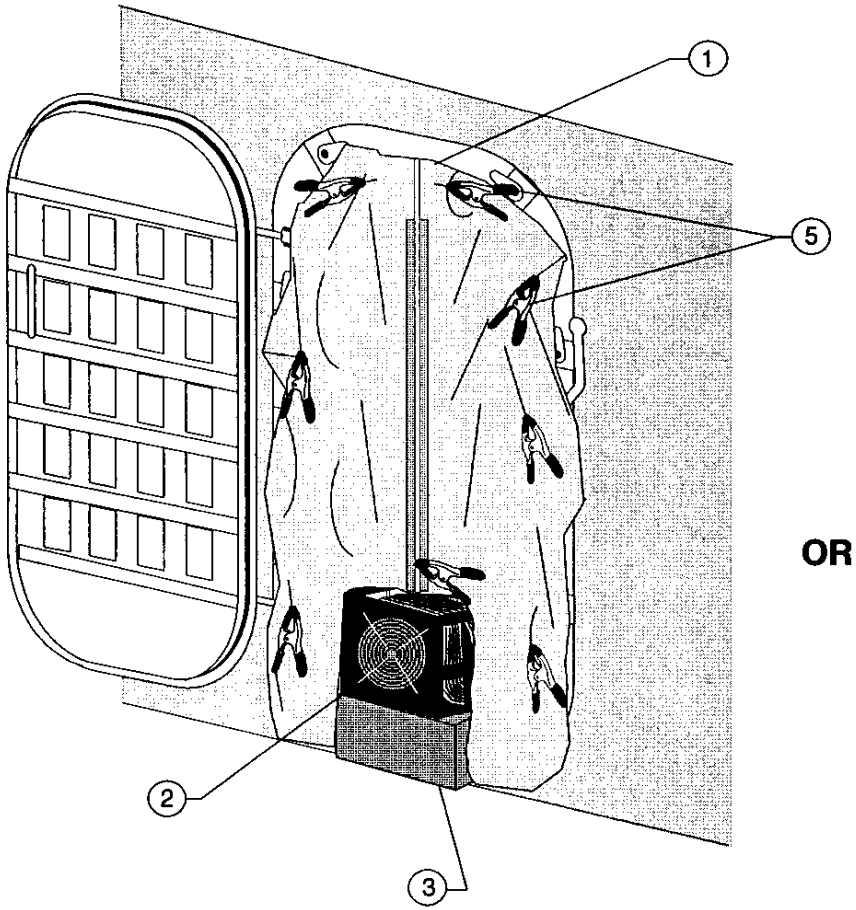
DESMOKING EVOLUTION - SKETCH #001
Desmoking Equipment



DESMOKING EVOLUTION - SKETCH #002
Smoke Curtain Set-Up

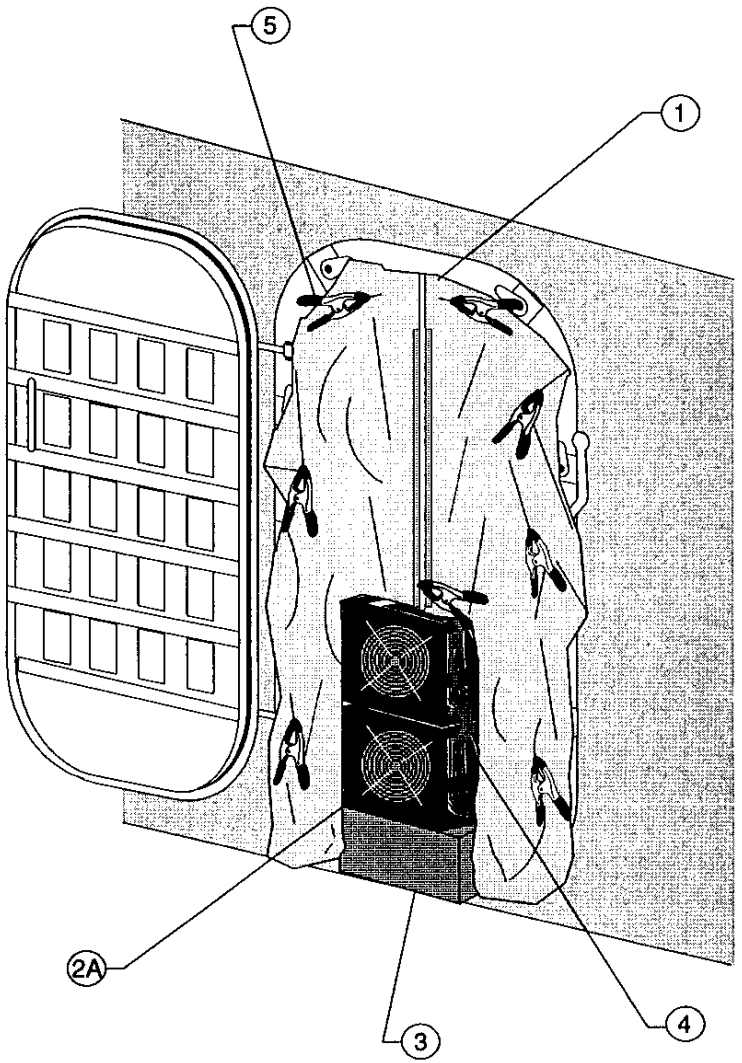


DESMOKING EVOLUTION - SKETCH #003
Smoke Blanket Set-Up



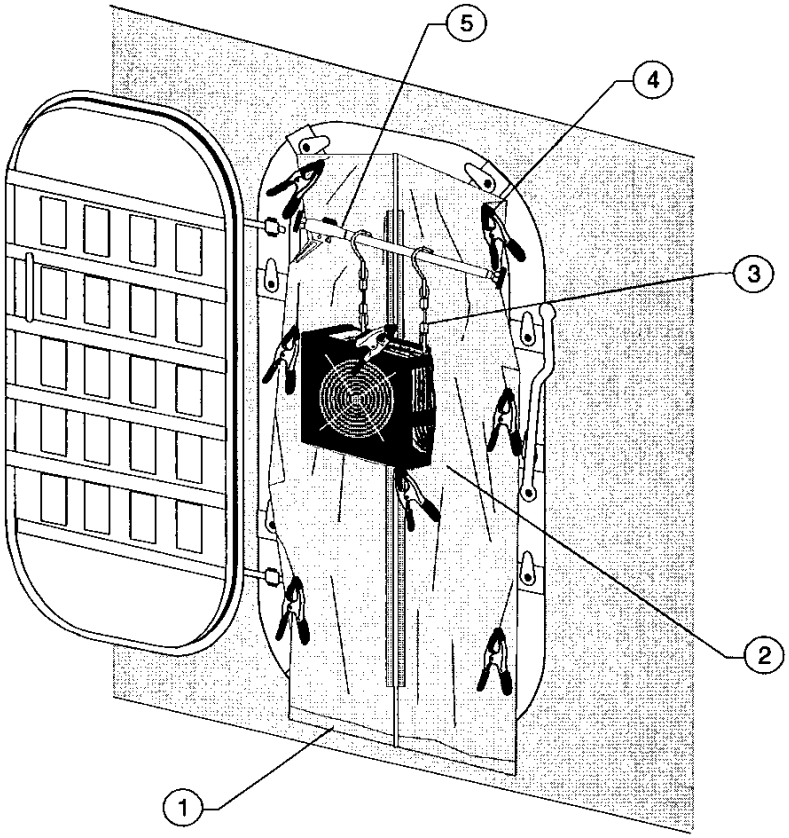
OR

NOTE: Balance fan(s) on door knife edge.

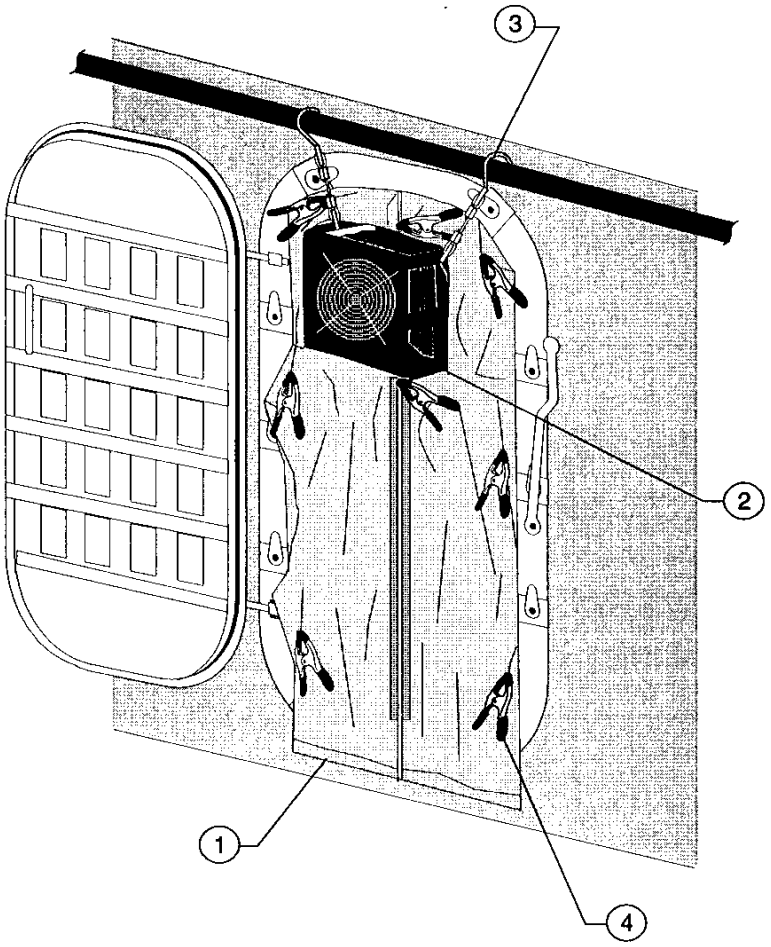


ITEM	QTY	EQUIPMENT
1	1	SMOKE CURTAIN
2	1	MEDIUM CAPACITY BOX FAN
2A	2	MEDIUM CAPACITY BOX FAN
3	1	LEVELING PIECE FOR DOOR KNIFE EDGE
4	AR	TIES FOR TYING BOX FANS TOGETHER
5	AR	SMOKE CURTAIN CLAMPS

DESMOKING EVOLUTION - SKETCH #004
Using Box Fan(s) Set in Watertight Door with Smoke Curtain

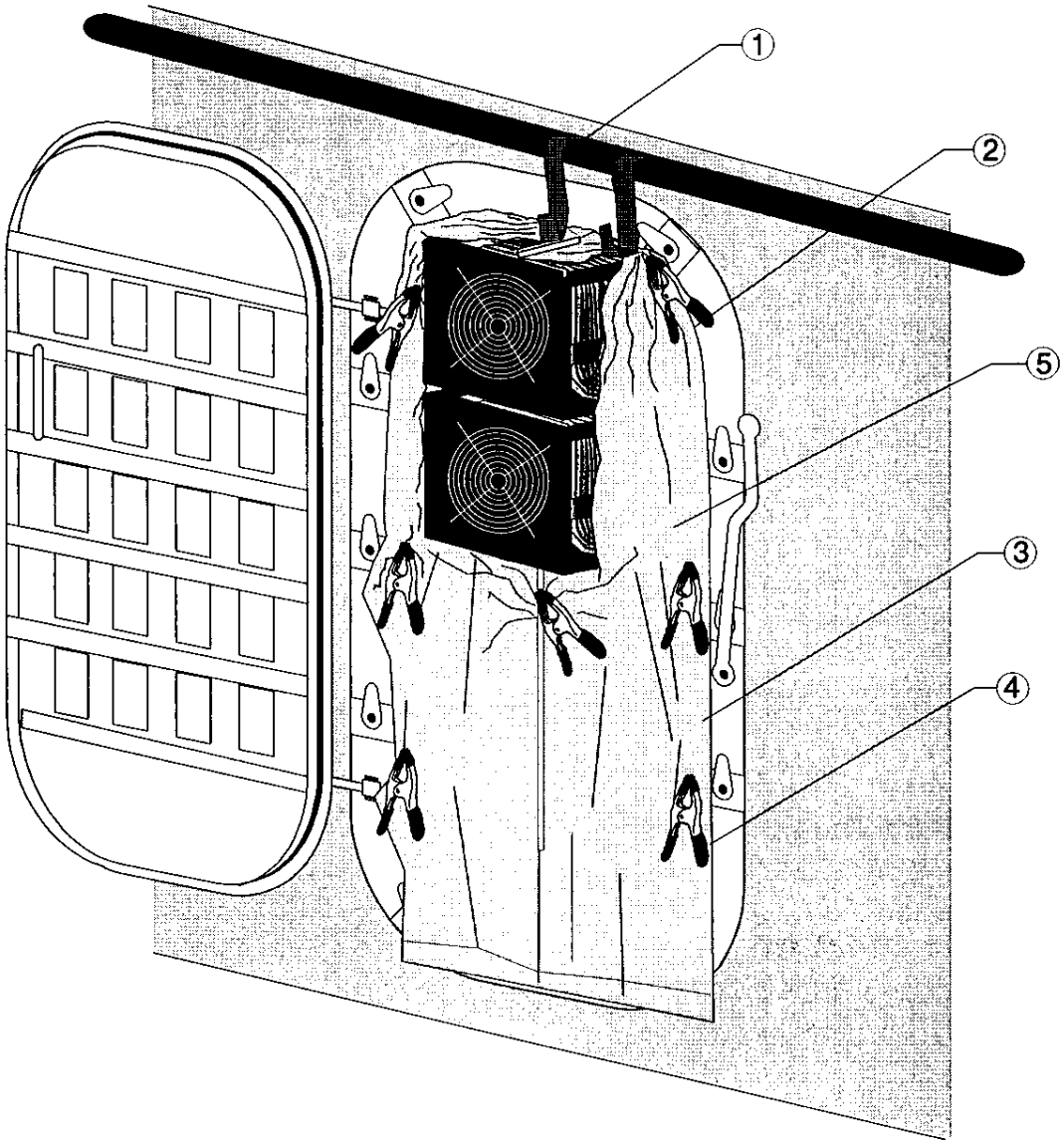


OR



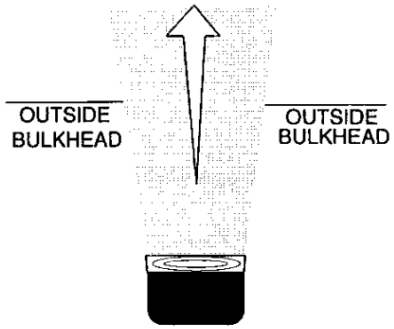
ITEM	QTY	EQUIPMENT
1	1	SMOKE CURTAIN
2	1	MEDIUM CAPACITY BOX FAN
3	2	HANGING DEVICE
4	AR	SMOKE CURTAIN CLAMPS
5	1	EXPANDABLE DOOR BAR

DESMOKING EVOLUTION - SKETCH #005
Using Box Fan Hung Across Watertight Door with Smoke Curtain

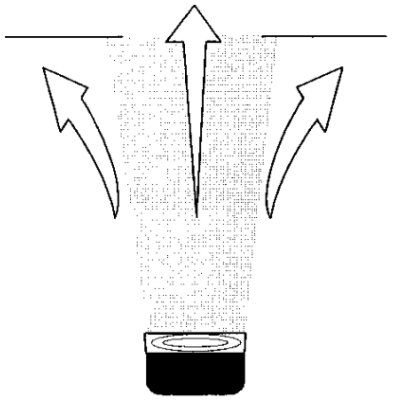


ITEM	QTY	EQUIPMENT
1	2	S-HOOKS OR BUNGI CORD
2	2	MEDIUM CAPACITY BOX FAN
3	1	SMOKE CURTAIN
4	AR	SMOKE CURTAIN CLAMPS
5	2	SADDLES FOR STACKING FANS

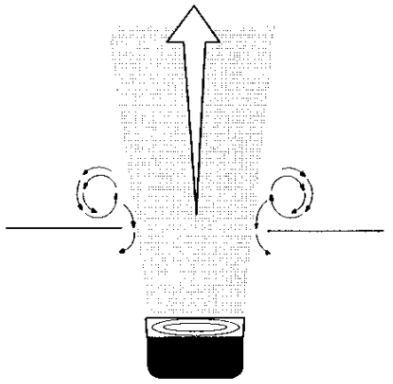
DESMOKING EVOLUTION - SKETCH #006
Using Two Fans Hung from Top of Watertight Door with Smoke Curtain



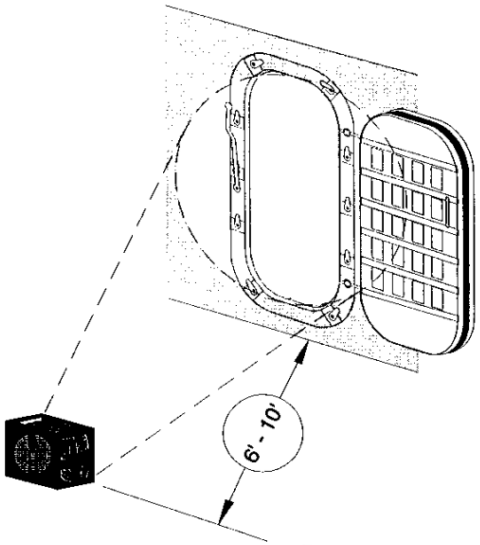
CORRECT:
Fan placed far enough away from door fills doorway with cone of air and increases fan effectiveness.

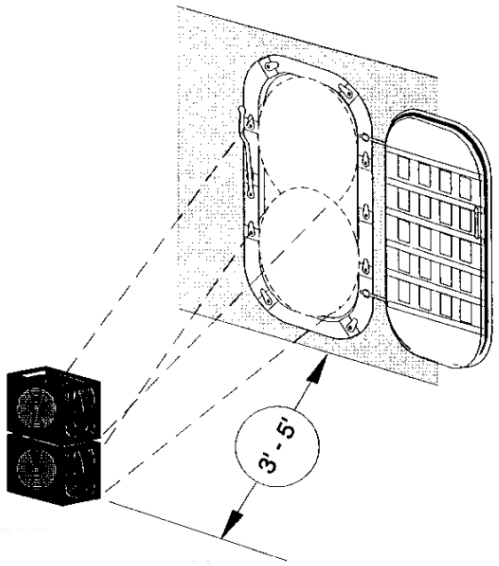


WRONG:
Fan placed too **FAR** from opening causes air supply to deflect.



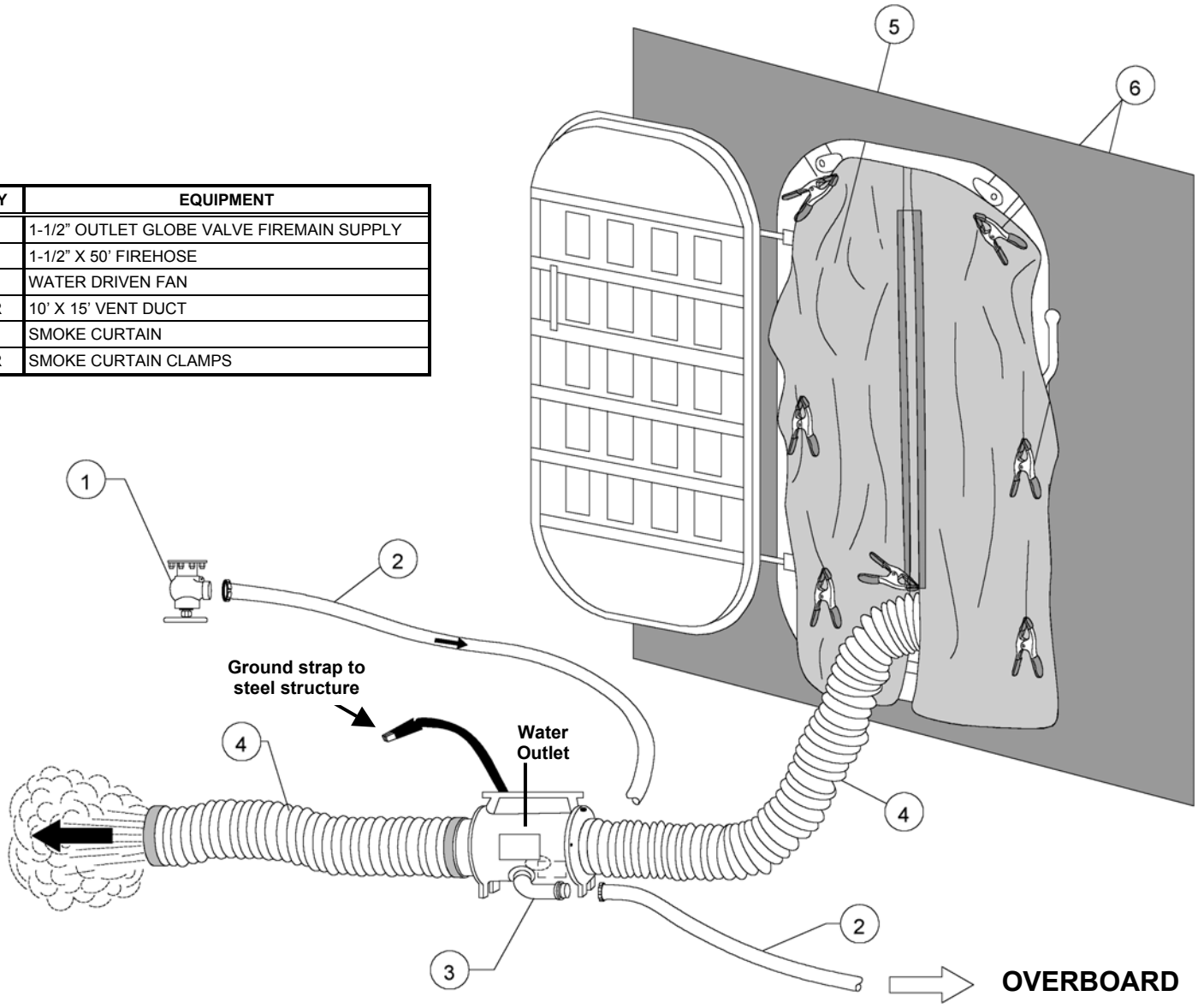
WRONG:
Fan placed too **CLOSE** to opening causes re-circulation possibilities to exist.



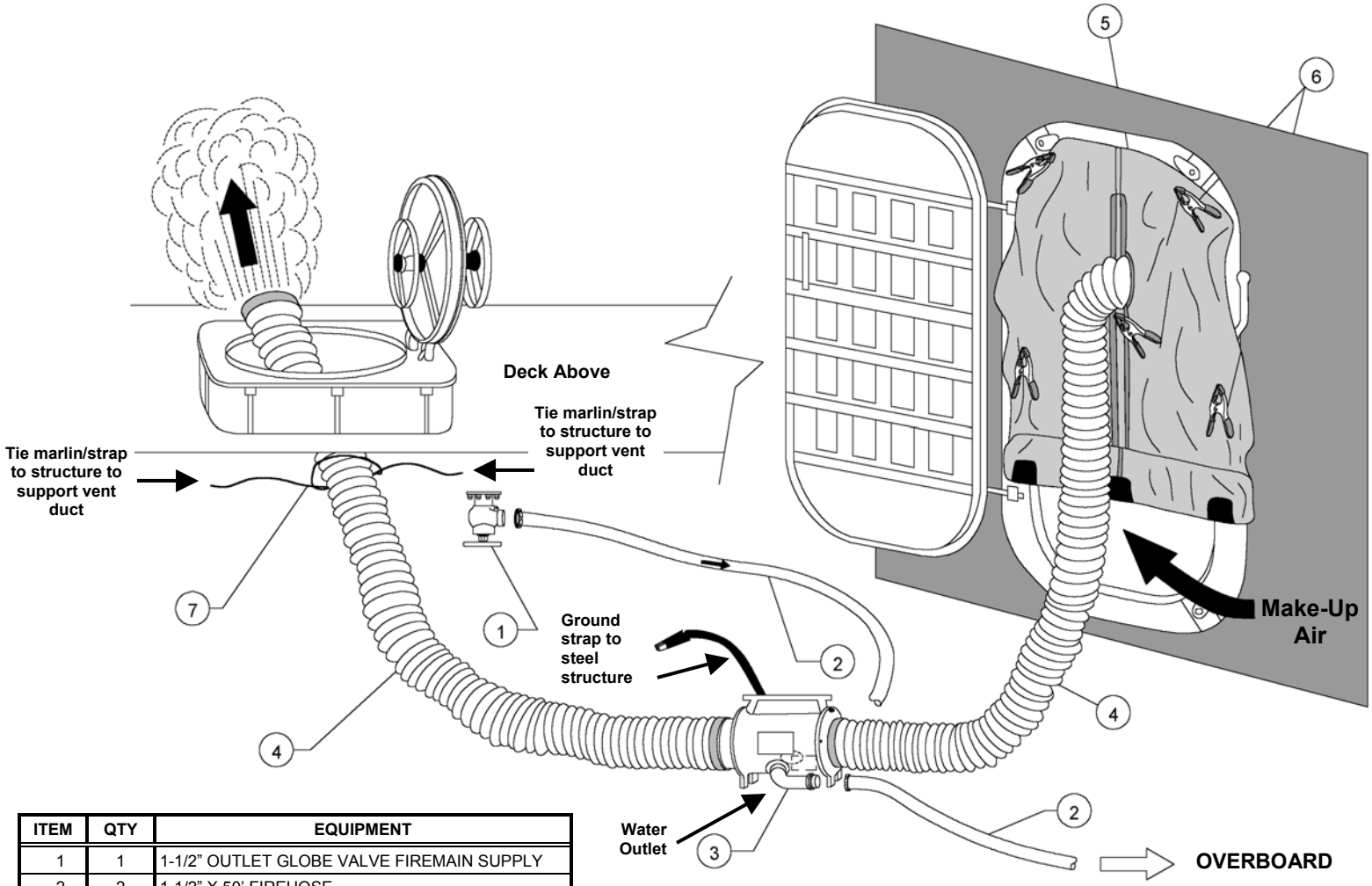


DESMOKING EVOLUTION - SKETCH #007
Optimum Placement of Desmoking Fans from Door (Seal Door Using Fan's Air)

ITEM	QTY	EQUIPMENT
1	1	1-1/2” OUTLET GLOBE VALVE FIREMAIN SUPPLY
2	2	1-1/2” X 50’ FIREHOSE
3	1	WATER DRIVEN FAN
4	AR	10’ X 15’ VENT DUCT
5	1	SMOKE CURTAIN
6	AR	SMOKE CURTAIN CLAMPS



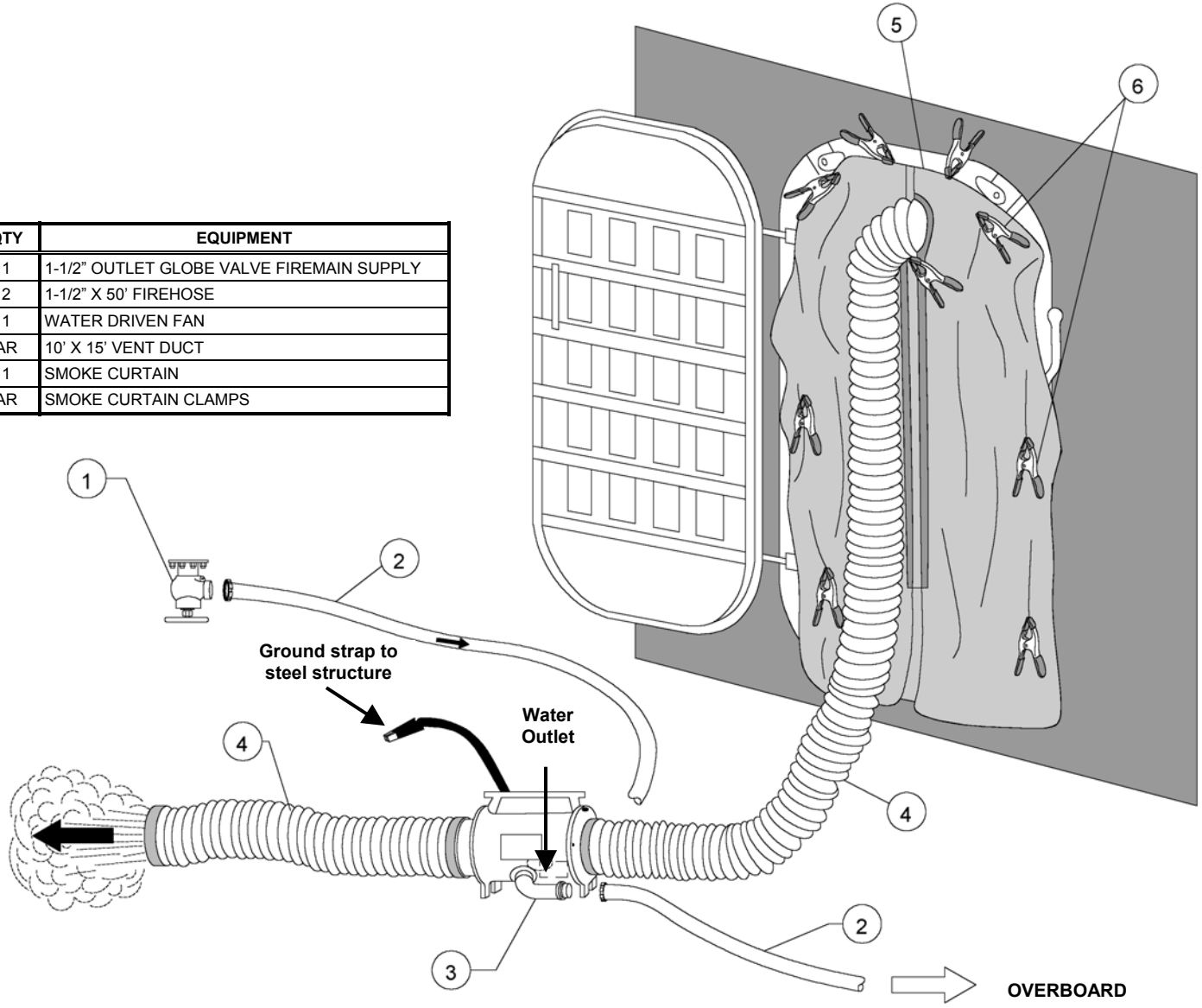
DESMOKING EVOLUTION - SKETCH #008
Desmoking with Water Driven Fan Placed Adjacent to Smoke-Filled Compartment



ITEM	QTY	EQUIPMENT
1	1	1-1/2" OUTLET GLOBE VALVE FIREMAIN SUPPLY
2	2	1-1/2" X 50' FIREHOSE
3	1	WATER DRIVEN FAN
4	AR	10' X 15' VENT DUCT
5	1	SMOKE CURTAIN
6	AR	SMOKE CURTAIN CLAMPS
7	AR	MARLIN STRAPS

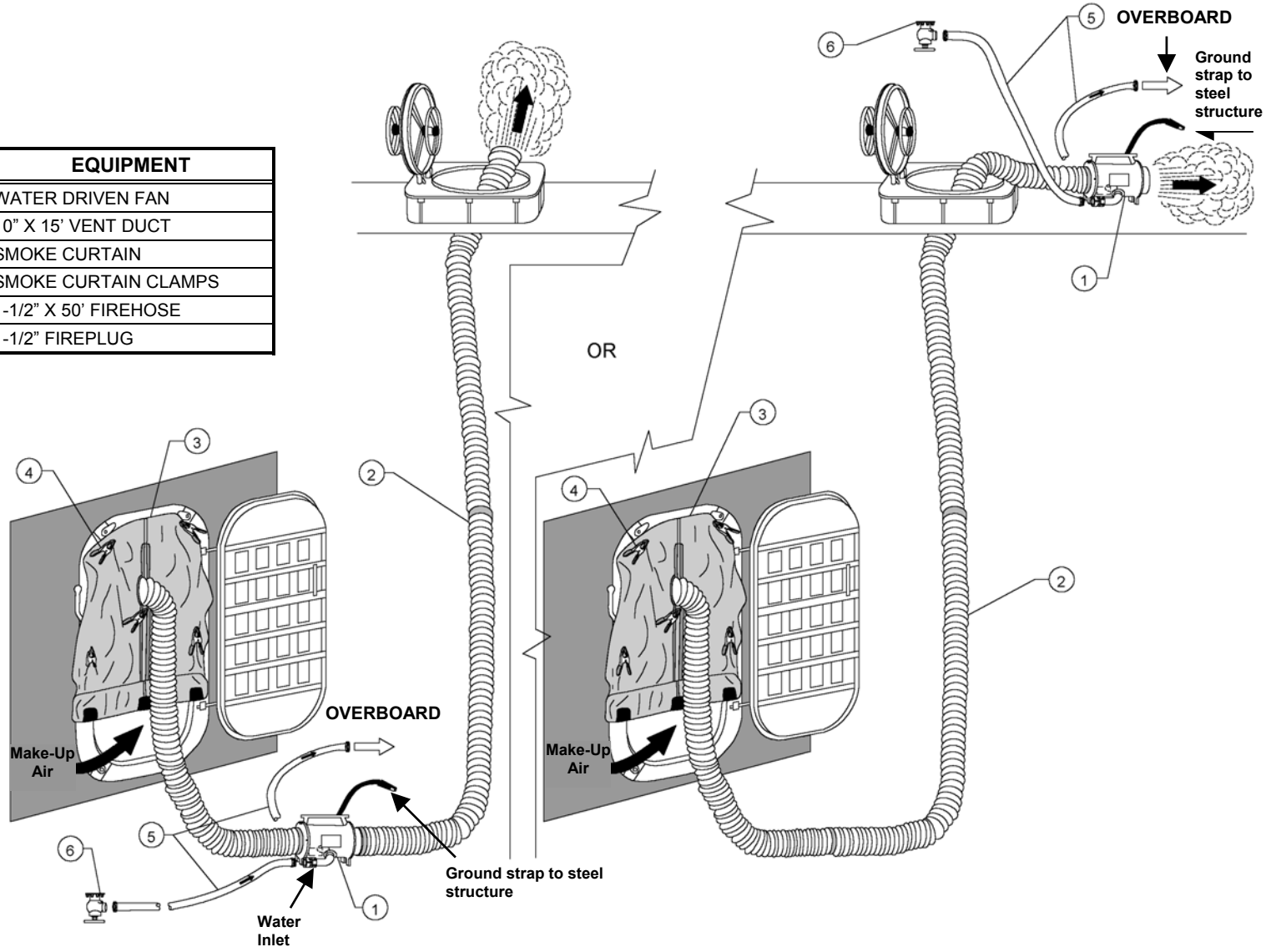
DESMOKING EVOLUTION - SKETCH #009
Using Water Driven Fan Placed Adjacent to Smoke-Filled Compartment and Vent Duct Exhausting Through Scuttle to Weather Deck

ITEM	QTY	EQUIPMENT
1	1	1-1/2" OUTLET GLOBE VALVE FIREMAIN SUPPLY
2	2	1-1/2" X 50' FIREHOSE
3	1	WATER DRIVEN FAN
4	AR	10' X 15' VENT DUCT
5	1	SMOKE CURTAIN
6	AR	SMOKE CURTAIN CLAMPS



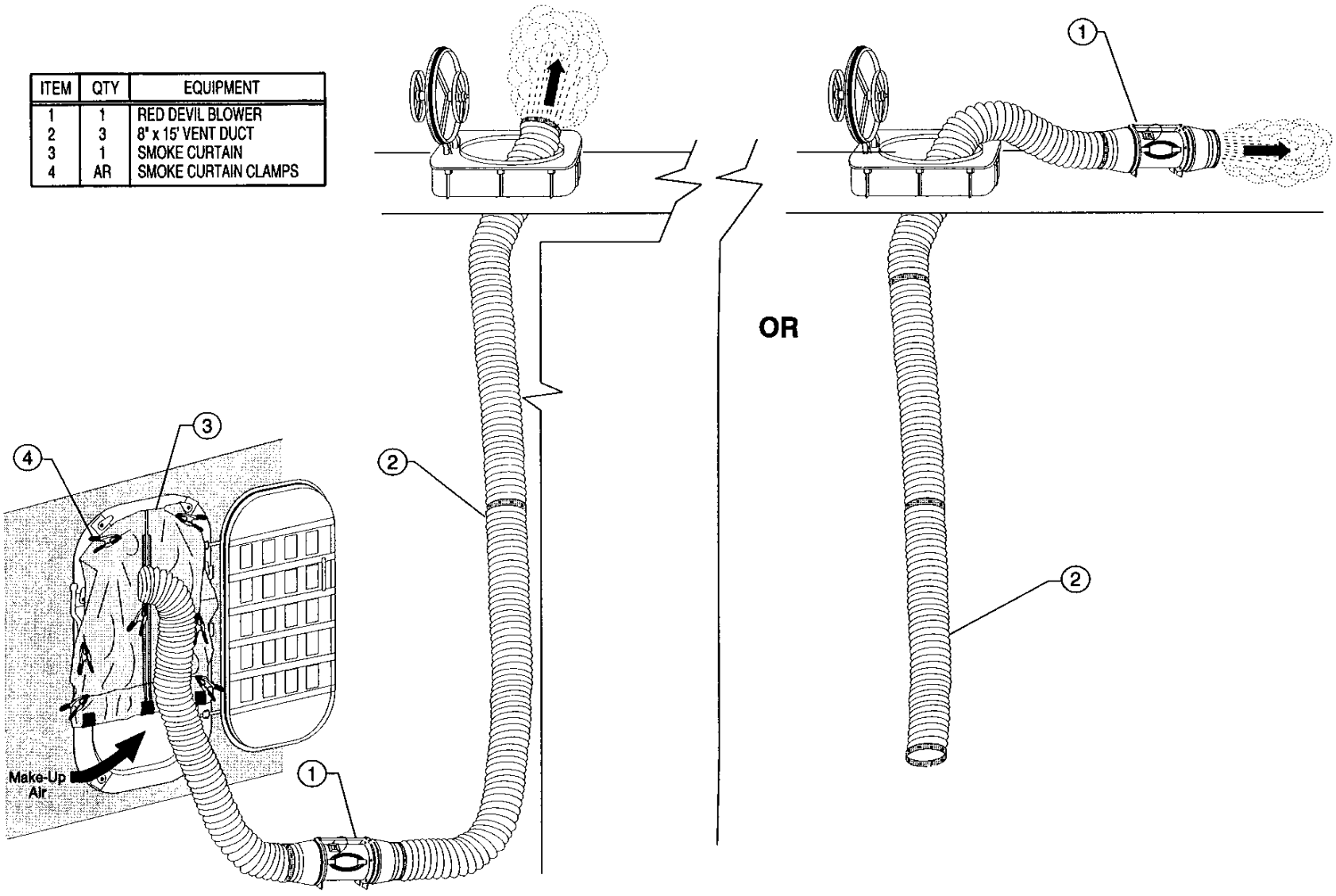
DESMOKING EVOLUTION - SKETCH #010
Desmoking with Water Driven Fan Placed Adjacent to Smoke-Filled Compartment

ITEM	QTY	EQUIPMENT
1	1	WATER DRIVEN FAN
2	3	10” X 15’ VENT DUCT
3	1	SMOKE CURTAIN
4	AR	SMOKE CURTAIN CLAMPS
5	2	1-1/2” X 50’ FIREHOSE
6	1	1-1/2” FIREPLUG



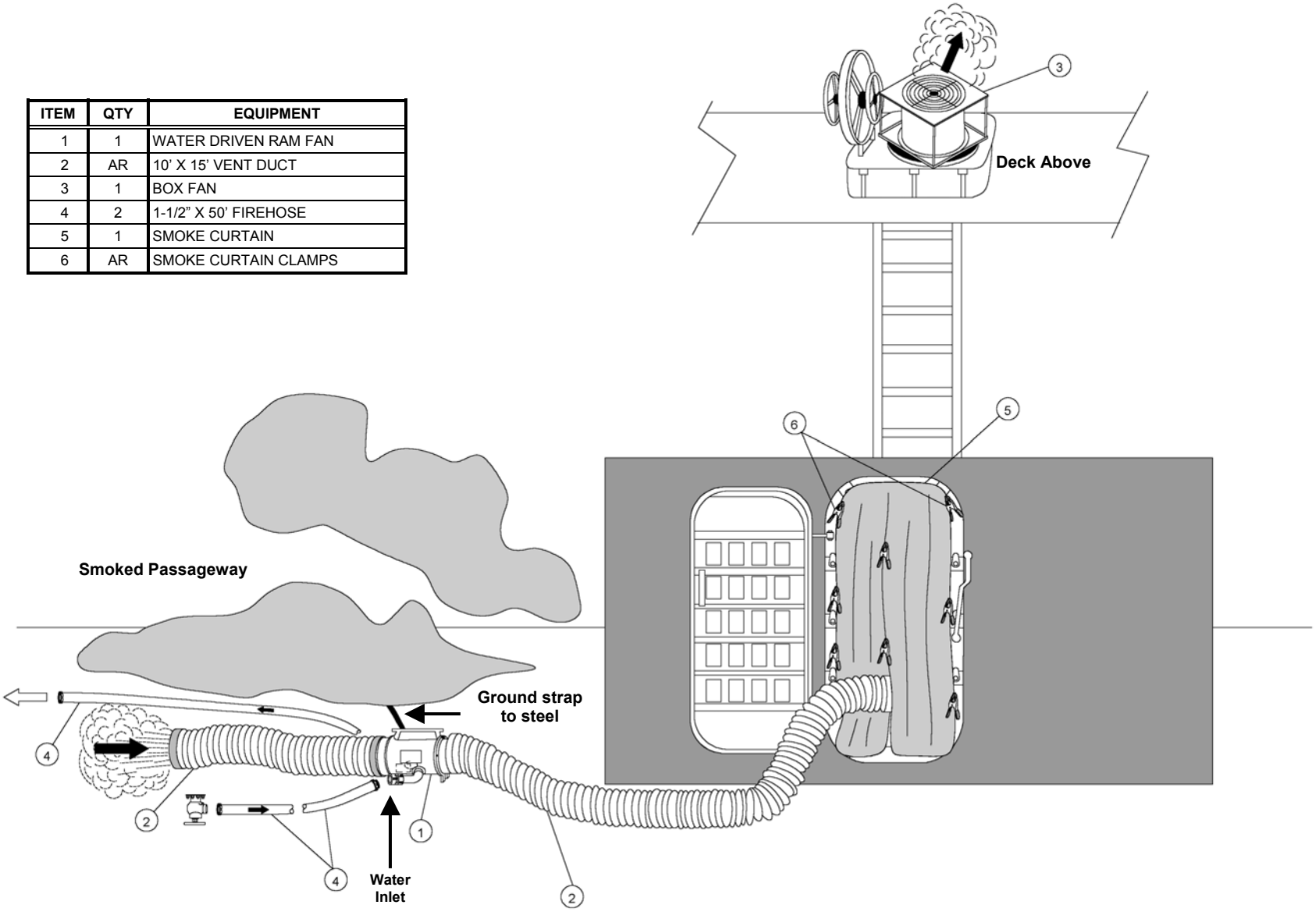
DESMOKING EVOLUTION - SKETCH #011
Using Water Driven Fan Placed on Weather Deck or Below Adjacent to Smoked Compartment

ITEM	QTY	EQUIPMENT
1	1	RED DEVIL BLOWER
2	3	8" x 15' VENT DUCT
3	1	SMOKE CURTAIN
4	AR	SMOKE CURTAIN CLAMPS



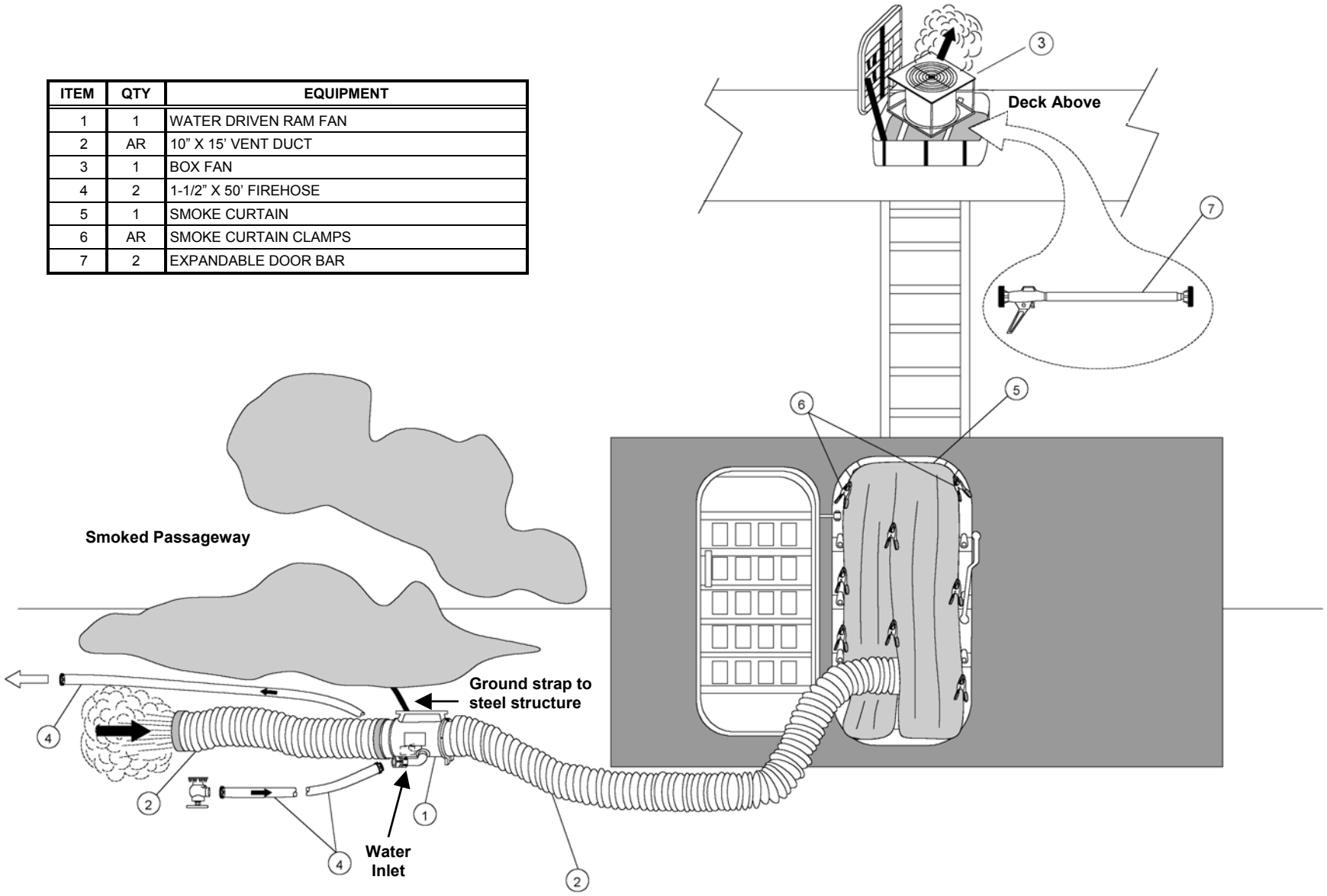
DESMOKING EVOLUTION - SKETCH #012
Using Red Devil Blower Placed on Weather Deck or Below Adjacent to Smoked Compartment

ITEM	QTY	EQUIPMENT
1	1	WATER DRIVEN RAM FAN
2	AR	10' X 15' VENT DUCT
3	1	BOX FAN
4	2	1-1/2" X 50' FIREHOSE
5	1	SMOKE CURTAIN
6	AR	SMOKE CURTAIN CLAMPS



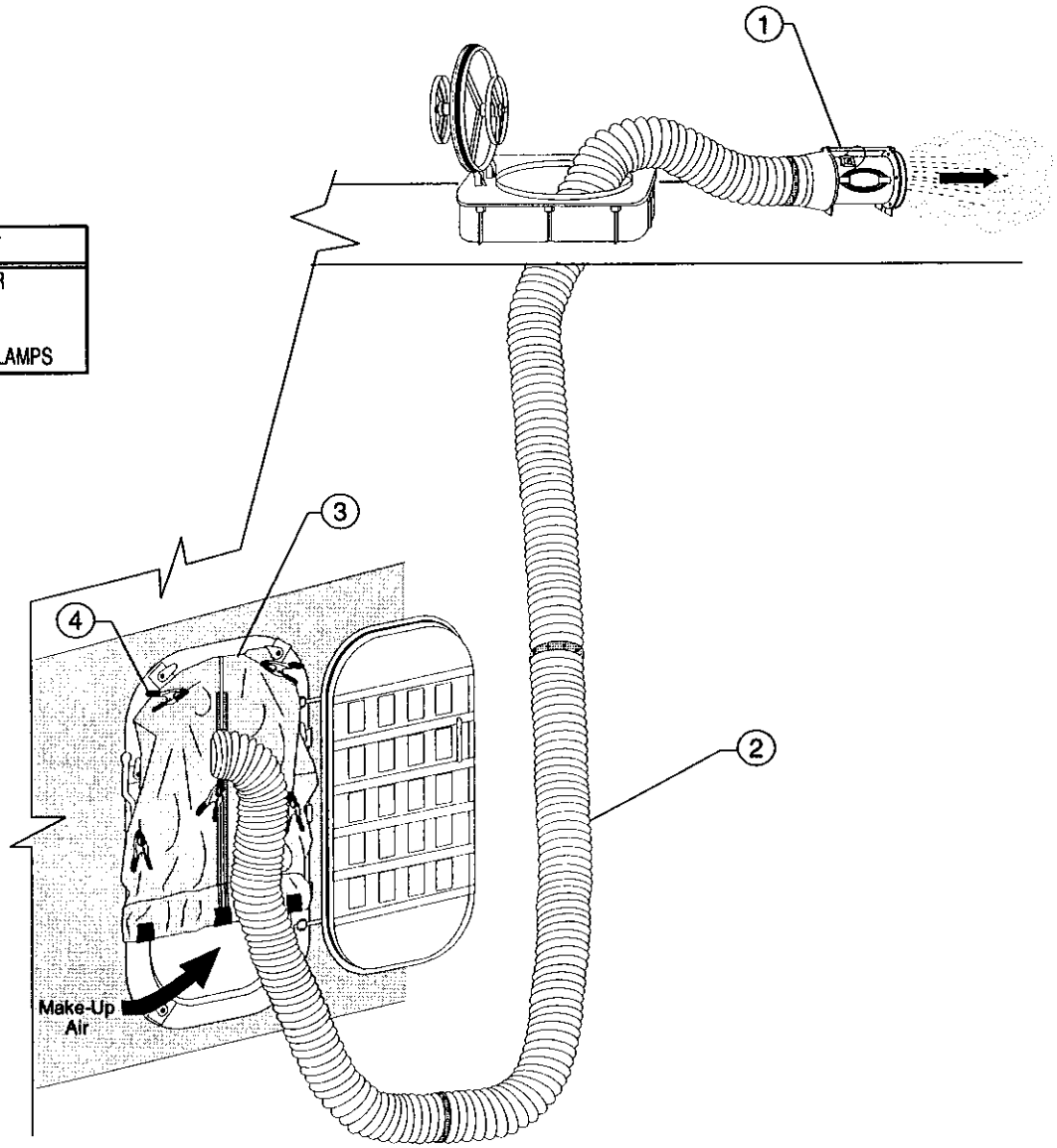
DESMOKING EVOLUTION - SKETCH #013
Using Water Driven Fan to Desmoke Compartment with Box Fan on Scuttle

ITEM	QTY	EQUIPMENT
1	1	WATER DRIVEN RAM FAN
2	AR	10” X 15’ VENT DUCT
3	1	BOX FAN
4	2	1-1/2” X 50’ FIREHOSE
5	1	SMOKE CURTAIN
6	AR	SMOKE CURTAIN CLAMPS
7	2	EXPANDABLE DOOR BAR

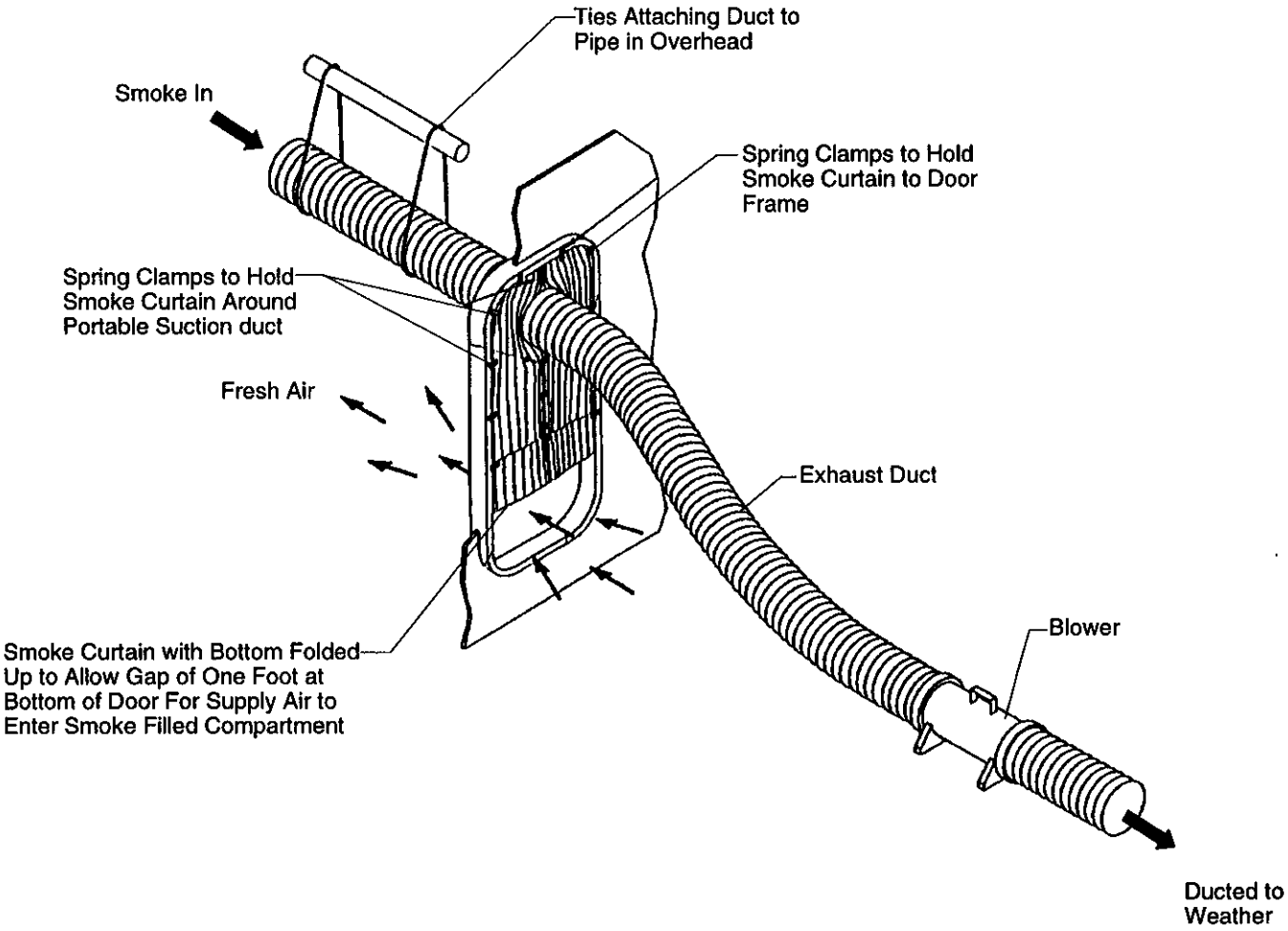


DESMOKING EVOLUTION - SKETCH #014
Using Water Driven Fan to Desmoke Compartment with Box Fan on Hatch

ITEM	QTY	EQUIPMENT
1	1	RED DEVIL BLOWER
2	3	8" x 15' VENT DUCT
3	1	SMOKE CURTAIN
4	AR	SMOKE CURTAIN CLAMPS

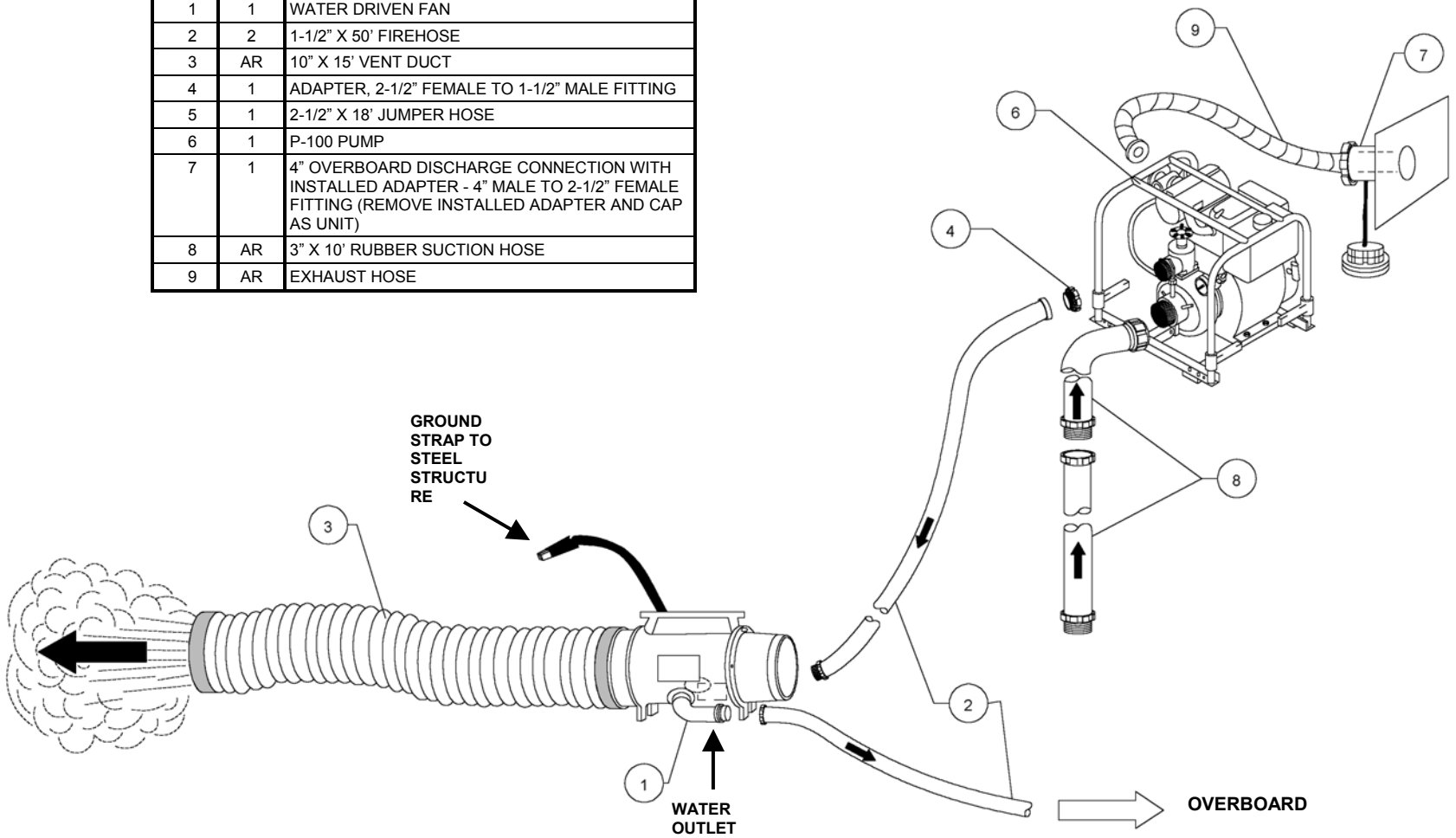


DESMOKING EVOLUTION - SKETCH #015
Using Red Devil Blower Placed on Weather Deck



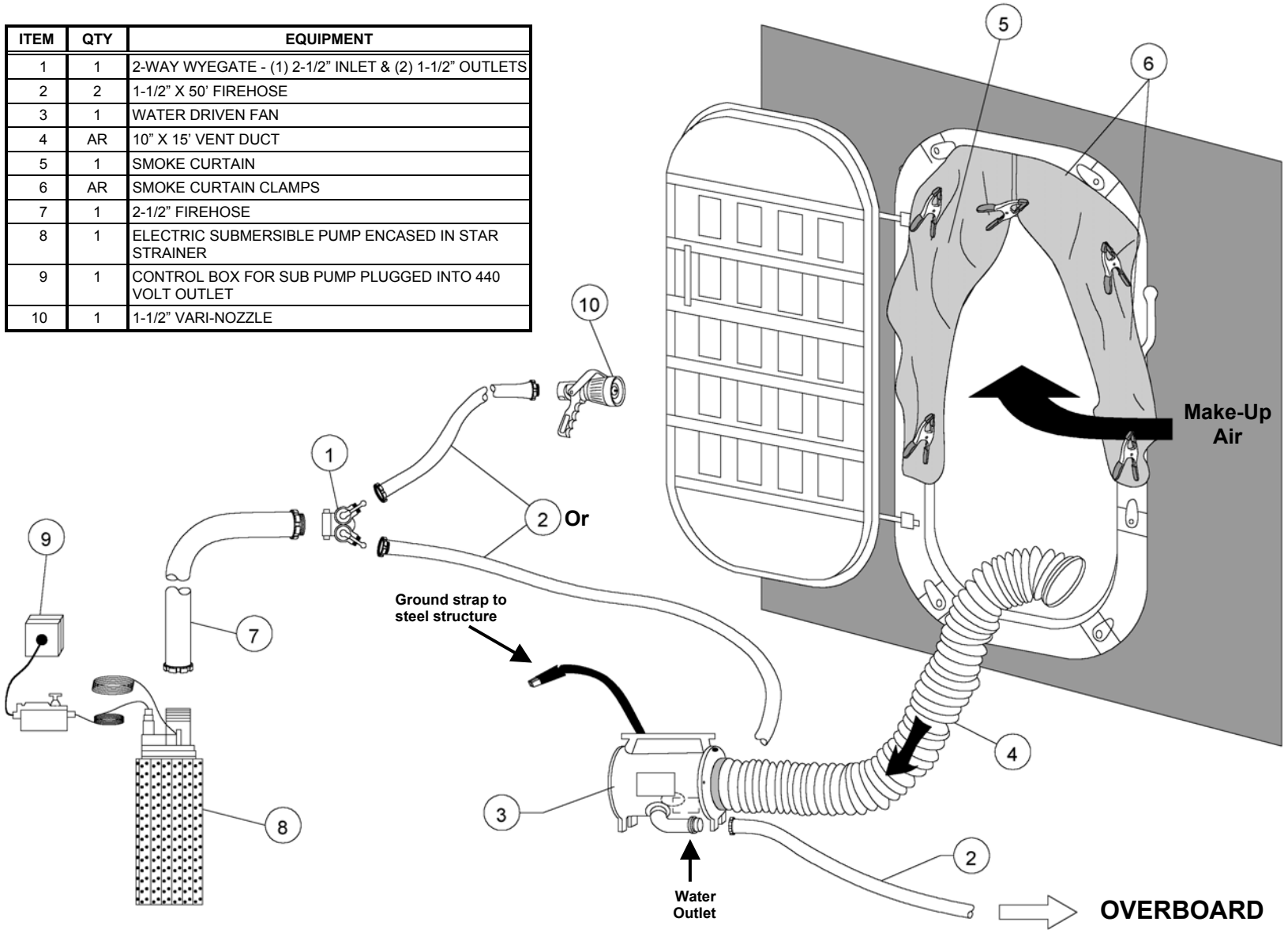
DESMOKING EVOLUTION - SKETCH #016
Showing Portable Suction Duct Through the Smoke Curtain Located in Door Frame

ITEM	QTY	EQUIPMENT
1	1	WATER DRIVEN FAN
2	2	1-1/2” X 50’ FIREHOSE
3	AR	10” X 15’ VENT DUCT
4	1	ADAPTER, 2-1/2” FEMALE TO 1-1/2” MALE FITTING
5	1	2-1/2” X 18’ JUMPER HOSE
6	1	P-100 PUMP
7	1	4” OVERBOARD DISCHARGE CONNECTION WITH INSTALLED ADAPTER - 4” MALE TO 2-1/2” FEMALE FITTING (REMOVE INSTALLED ADAPTER AND CAP AS UNIT)
8	AR	3” X 10’ RUBBER SUCTION HOSE
9	AR	EXHAUST HOSE

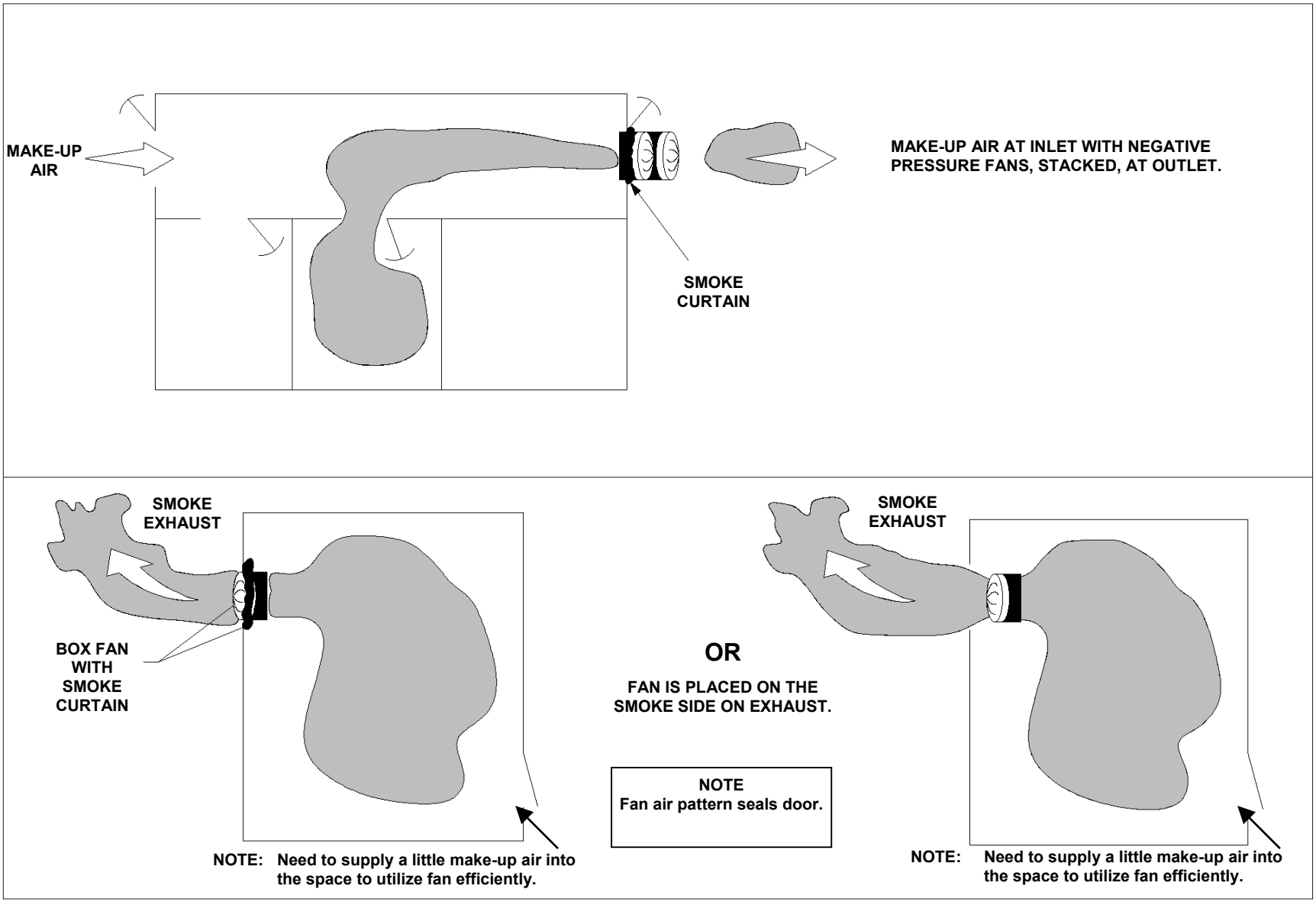


DESMOKING EVOLUTION - SKETCH #017
Desmoking from Weather Deck or Clear Space with Water Driven Fan Actuated by P-100 Pump

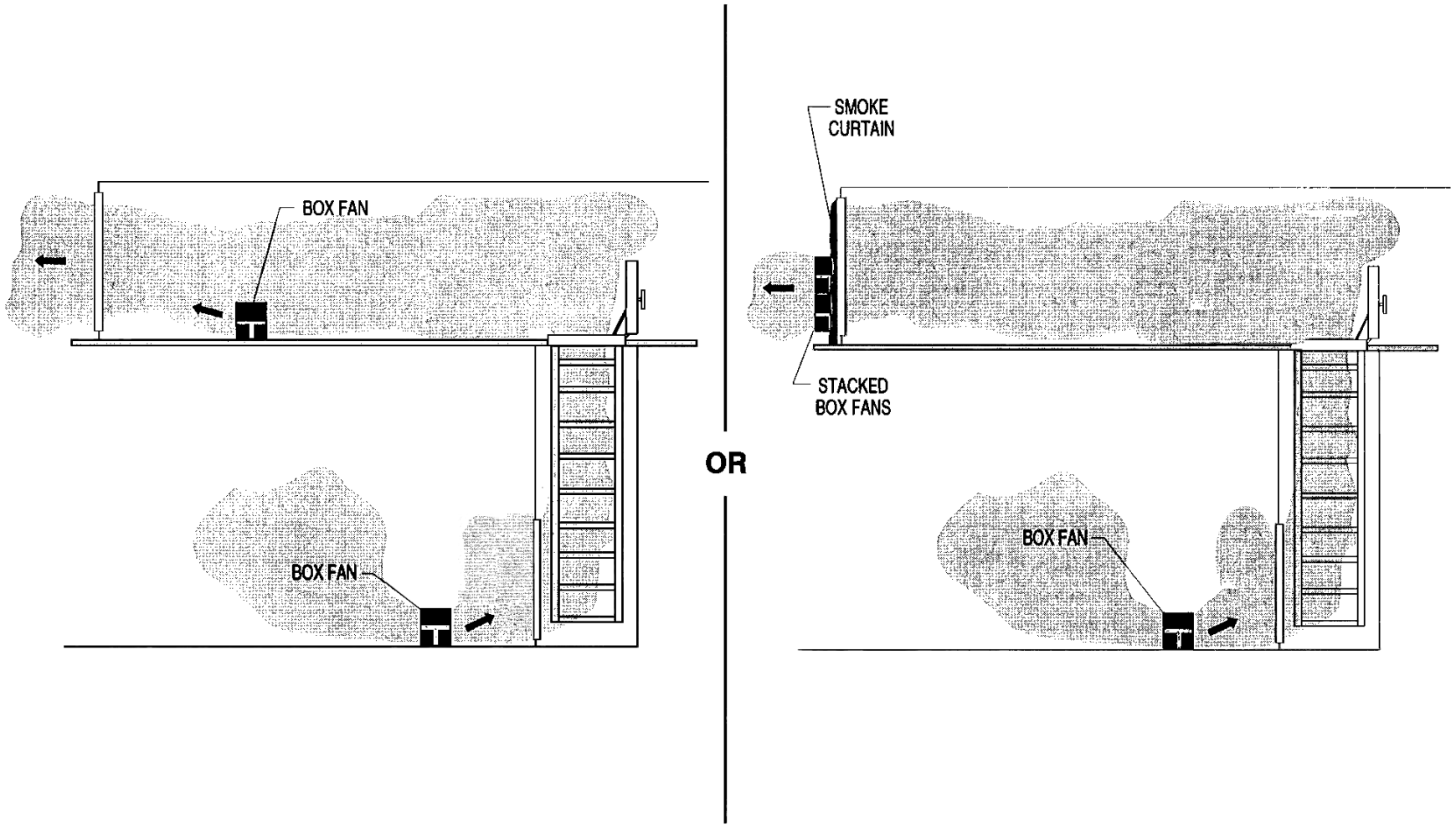
ITEM	QTY	EQUIPMENT
1	1	2-WAY WYEGATE - (1) 2-1/2” INLET & (2) 1-1/2” OUTLETS
2	2	1-1/2” X 50’ FIREHOSE
3	1	WATER DRIVEN FAN
4	AR	10” X 15’ VENT DUCT
5	1	SMOKE CURTAIN
6	AR	SMOKE CURTAIN CLAMPS
7	1	2-1/2” FIREHOSE
8	1	ELECTRIC SUBMERSIBLE PUMP ENCASED IN STAR STRAINER
9	1	CONTROL BOX FOR SUB PUMP PLUGGED INTO 440 VOLT OUTLET
10	1	1-1/2” VARI-NOZZLE



DESMOKING EVOLUTION - SKETCH #018
Using Electric Subpump Supplying Water Driven Fan or 1-1/2” Firehose



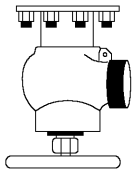
DESMOKING EVOLUTION - SKETCH #019
Using Box Fans - Stacked Negative Ventilation



DESMOKING EVOLUTION - SKETCH #020
Desmoking Passageway Through Escape Trunk Using Box Fans in Negative Pressure

DAMAGE CONTROL LAYOUT SKETCHES

SECTION 4 - DEWATERING EVOLUTION



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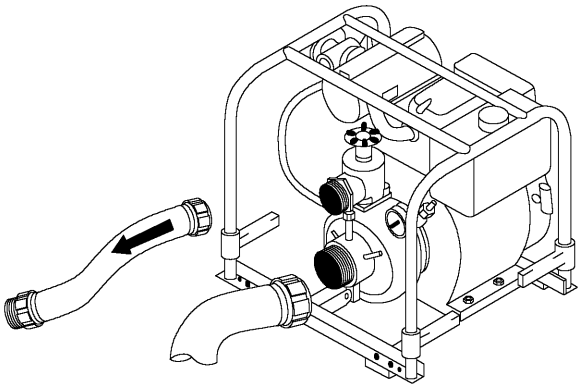

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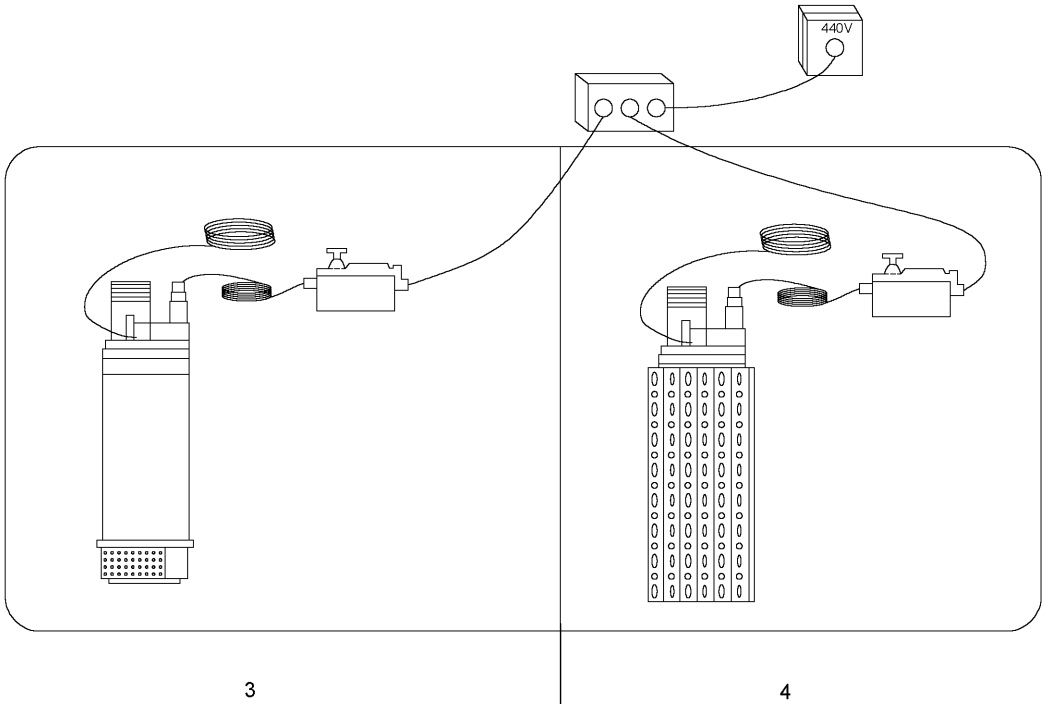
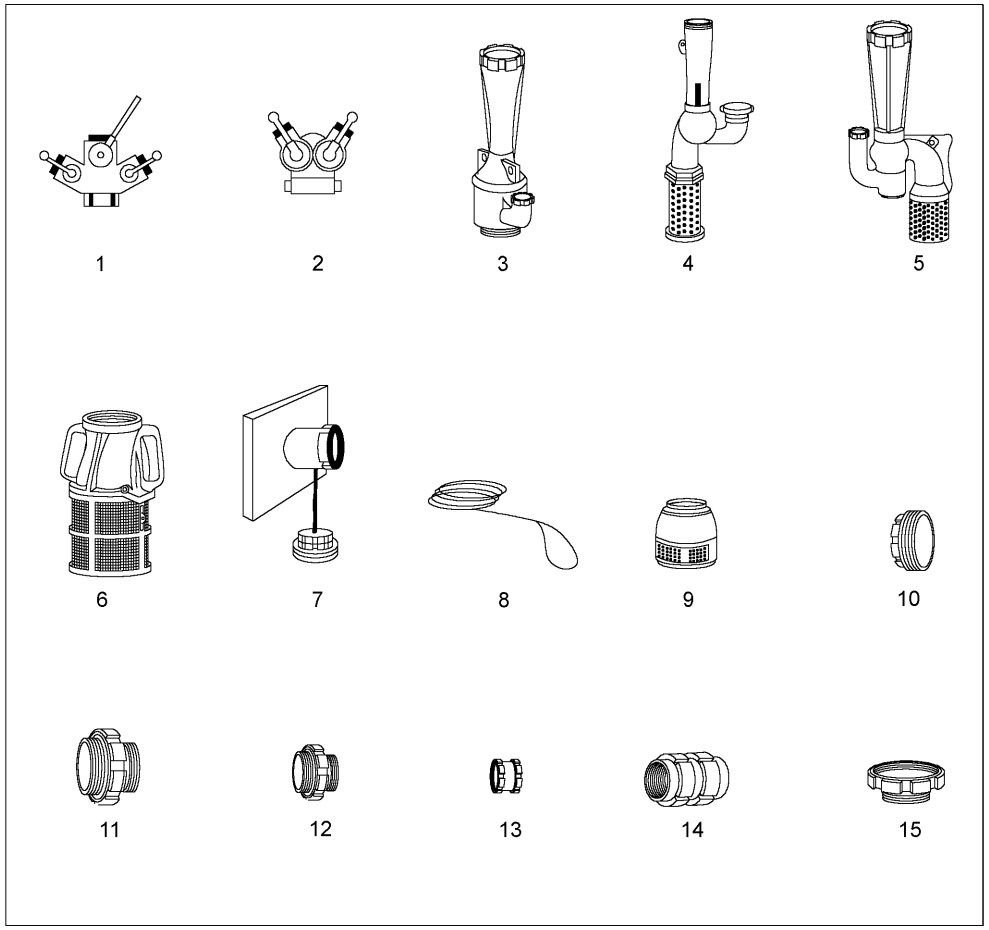


3 4

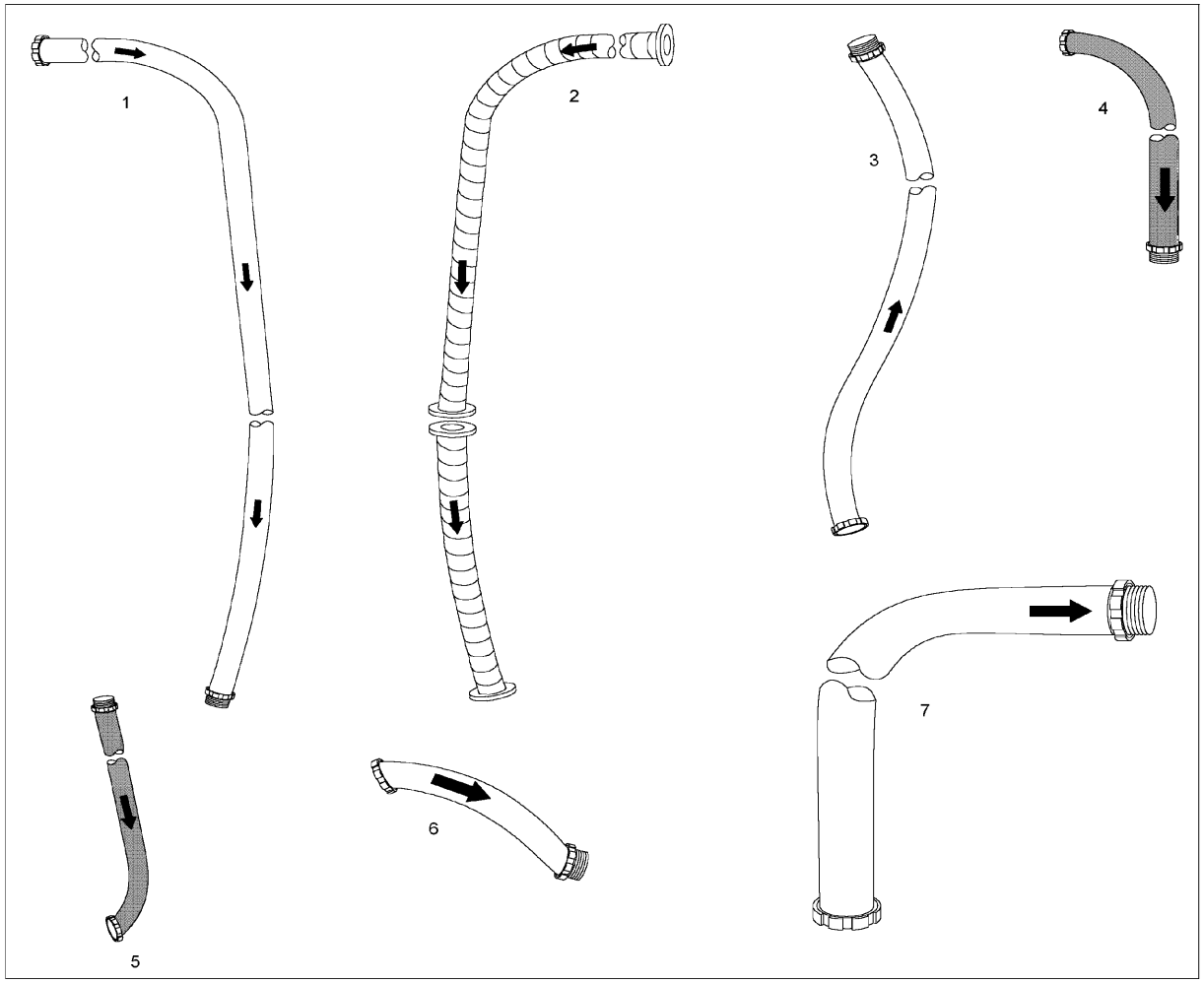
ITEM	EQUIPMENT
1	FIREPLUG
2	P-100 PUMP
3	SUBMERSIBLE PUMP W/O STRAINER
4	SUBMERSIBLE PUMP WITH STRAINER

DEWATERING EVOLUTION - SKETCH #001
Dewatering Equipment (Sheet 1 of 3)



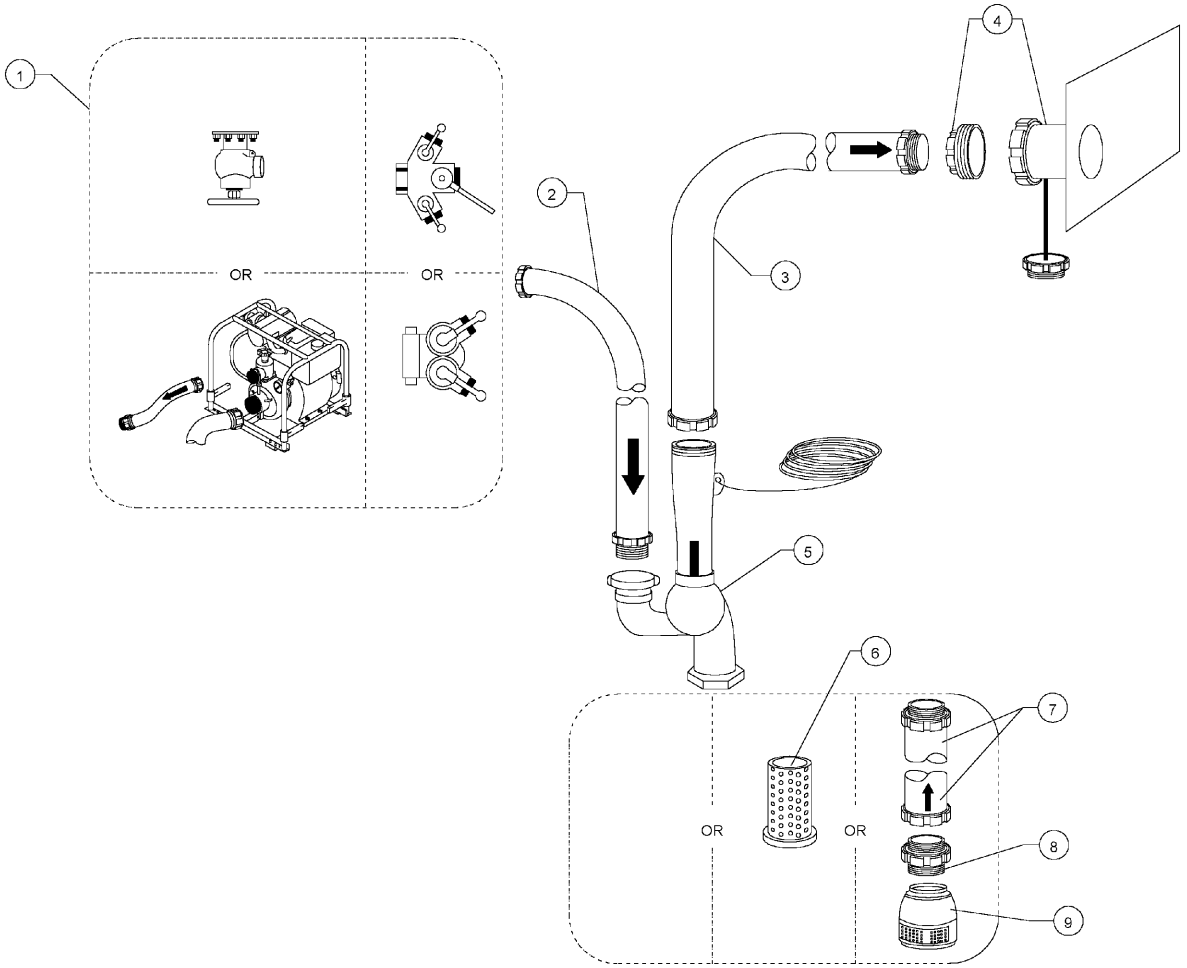
ITEM	EQUIPMENT
1	TRI GATE
2	WYE GATE
3	PERI JET EDUCTORT
4	1-1/2” EDUCTOR
5	S-TYPE EDUCTOR
6	FOOT VALVE WITH STRAINER
7	OVERBOARD DISCHARGE
8	TENDING LINE
9	FOOT VALVE STRAINER (SUB PUMP)
10	REDUCER 3” FEMALE – 4” MALE
11	ADAPTER 4” MALE – 3” MALE
12	ADAPTER 2-1/2” MALE – 1-1/2” MALE
13	ADAPTER 1-1/2” FEMALE – 1-1/2” FEMALE
14	ADAPTER 3” – 2-1/2” DOUBLE FEMALE
15	REDUCER 4” FEMALE – 3” MALE

DEWATERING EVOLUTION - SKETCH #001
Dewatering Equipment (Sheet 2 of 3)



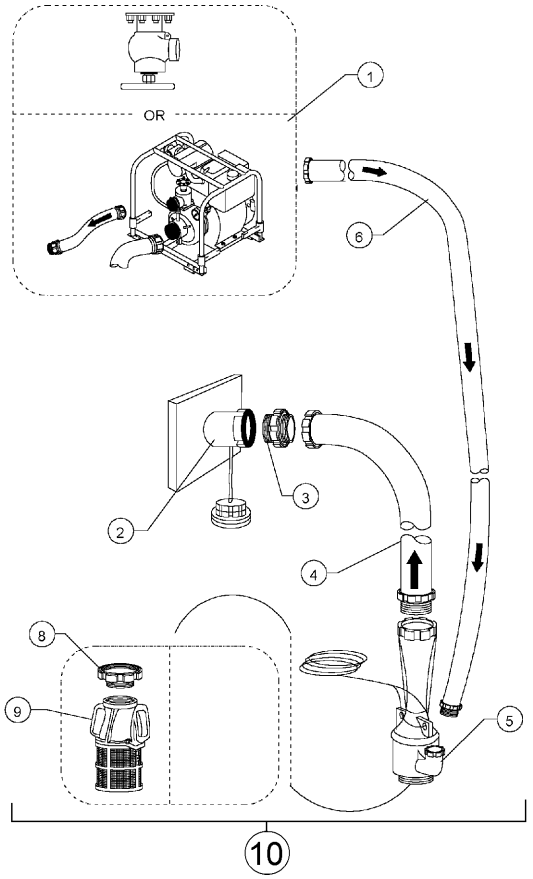
ITEM	EQUIPMENT
1	HOSE 2-1/2” X 50’
2	P-100 EXHAUST HOSE 2” X 10’ (2 EACH) WITH FLANGED ADAPTERS
3	HOSE 1-1/2” X 50’ OR 1-3/4” X 50’
4	HARD RUBBER HOSE 3” X 10’
5	HARD RUBBER HOSE 2-1/2” X 10’
6	HOSE JUMPER 2-1/2” X 18”
7	HOSE 4” X 50’

DEWATERING EVOLUTION - SKETCH #001
Dewatering Equipment (Sheet 3 of 3)



ITEM	QTY	EQUIPMENT
1	1	WATER SOURCE (P-100 OR FIRE PLUG CONNECTED TO TRI GATE OR WYE GATE)
2	1	1-1/2" X 50' FIREHOSE
3	1	2-1/2" X 50' FIREHOSE
4	1	4" OVERBOARD DISCHARGE CONNECTION WITH INSTALLED ADAPTER - 4" MALE TO 2-1/2" FEMALE FITTING AND CAP (REMOVE CAP)
5	1	1-1/2" EDUCTOR WITH STRAINER AND HANDLING LINE
		OPTIONAL
6	1	2-1/2" STRAINER
		OR
7	1	2-1/2" X 10' HARD RUBBER SUCTION HOSE
8	1	ADAPTER (2-1/2" DOUBLE MALE FITTING)
9	1	2-1/2" STRAINER WITH FOOT VALVE

DEWATERING EVOLUTION - SKETCH #002
Using 1-1/2" Eductor with or without Strainer



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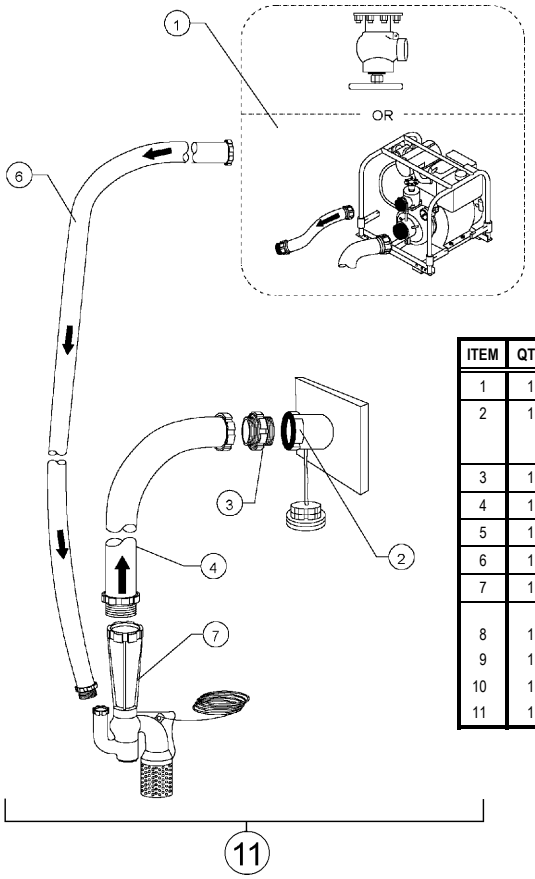
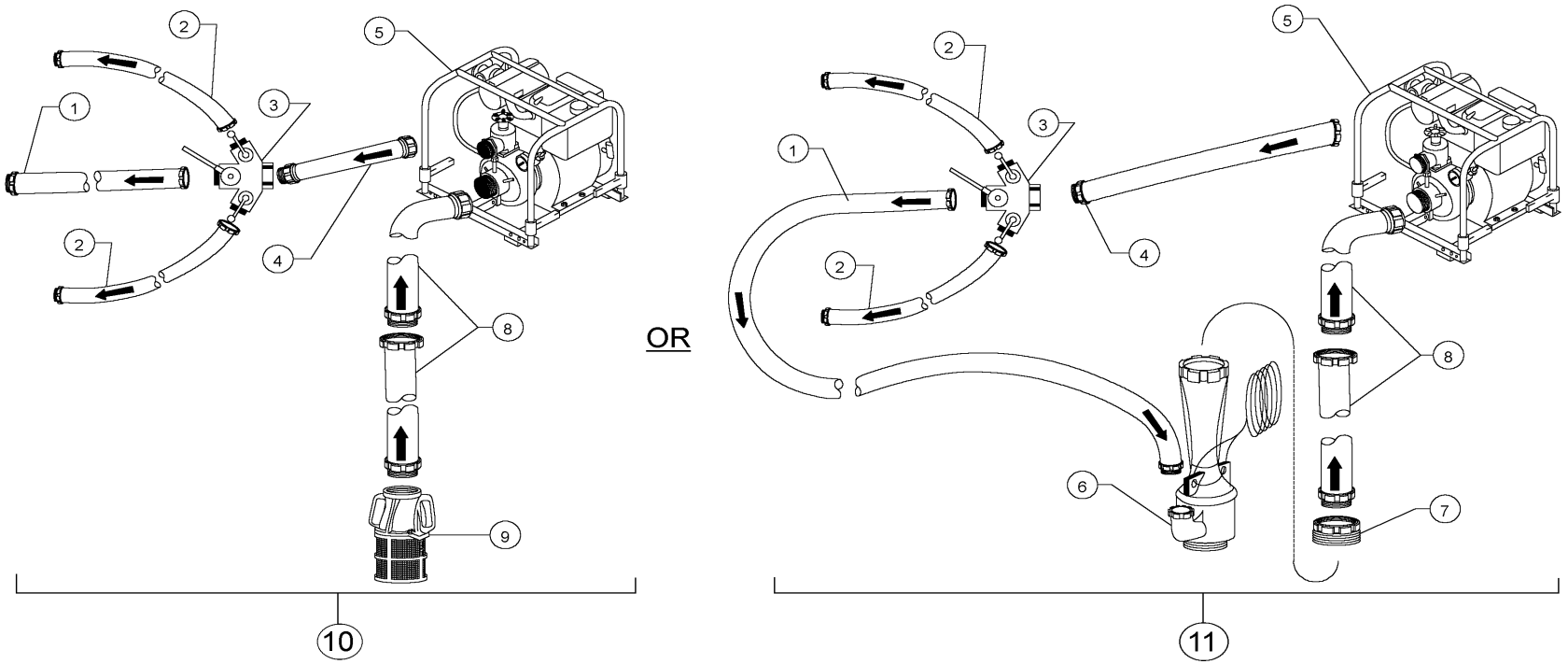


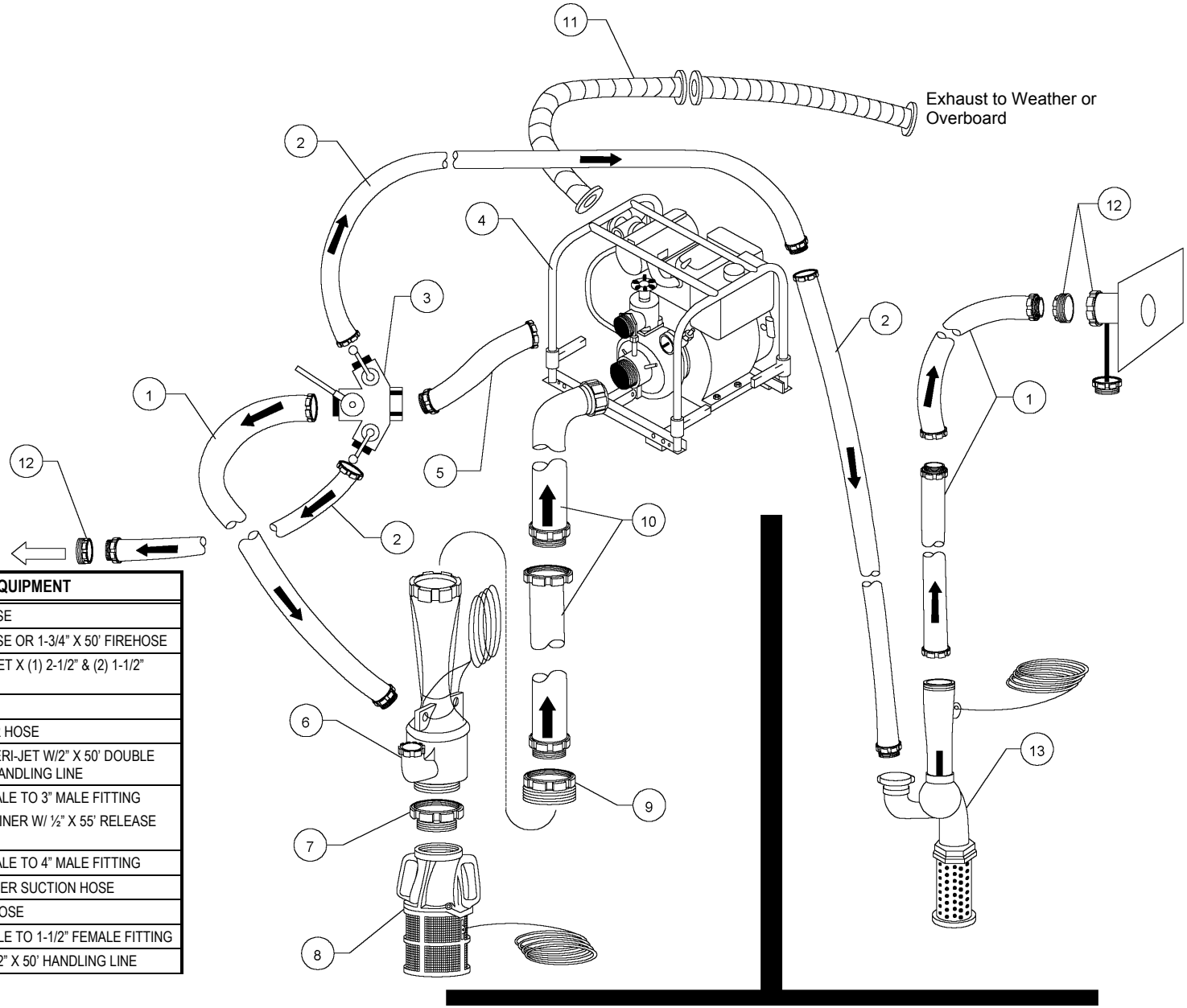
ITEM	QTY	EQUIPMENT
1	1	2-1/2" WATER OUTLET (P-100 PUMP OR FIREPLUG)
2	1	4" OVERBOARD DISCHARGE CONNECTION WITH INSTALLED ADAPTER - 4" MALE TO 2-1/2" FEMALE FITTING AND CAP (REMOVE AS UNIT)
3	1	ADAPTER - 4" DOUBLE MALE FITTING
4	1	4" X 50' FIREHOSE
5	1	2-1/2" PERI JET EDUCTOR WITH HANDLING LINE
6	1	2-1/2" FIREHOSE
7	1	2-1/2" S-TYPE EDUCTOR WITH HANDLING LINE
		OPTIONAL
8	1	ADAPTER - 4" FEMALE TO 3" MALE FITTING
9	1	VALVE, FOOT STRAINER WITH 1/2" X 56' RELEASE LINE
10	1	DEWATERING WITH PERI JET EDUCTOR
11	1	DEWATERING WITH 2-1/2" S-TYPE EDUCTOR

DEWATERING EVOLUTION - SKETCH #003
Using 2-1/2" Eductor or Peri Jet with or without Foot Valve Actuating from 2-1/2" Fireplug or P-100 Pump



ITEM	QTY	EQUIPMENT
1	1	2-1/2" X 50' FIREHOSE
2	2	1-1/2" X 50' FIREHOSE OR 1-3/4" X 50' FIREHOSE
3	1	TRIGATE, 2-1/2" INLET X (1) 2-1/2" & (2) 1-1/2" OUTLETS
4	1	2-1/2" X 18" JUMPER HOSE
5	1	P-100 PUMP
6	1	2-1/2" EDUCTOR, PERI JET WITH 2" X 50' HANDLING LINE
7	1	ADAPTER - 3" FEMALE TO 4" MALE FITTING
8	NOTE 1	3" X 10' HARD RUBBER SUCTION HOSE
9	1	FOOT VALVE/STRAINER
10	1	DEWATERING WITH P-100 PUMP
11	1	DEWATERING WITH COMBINATION OF EDUCTOR AND P-100 PUMP
NOTE 1:		THREE OR MORE LENGTHS OF SUCTION HOSE REQUIRED FOR LIFTS OVER 20'

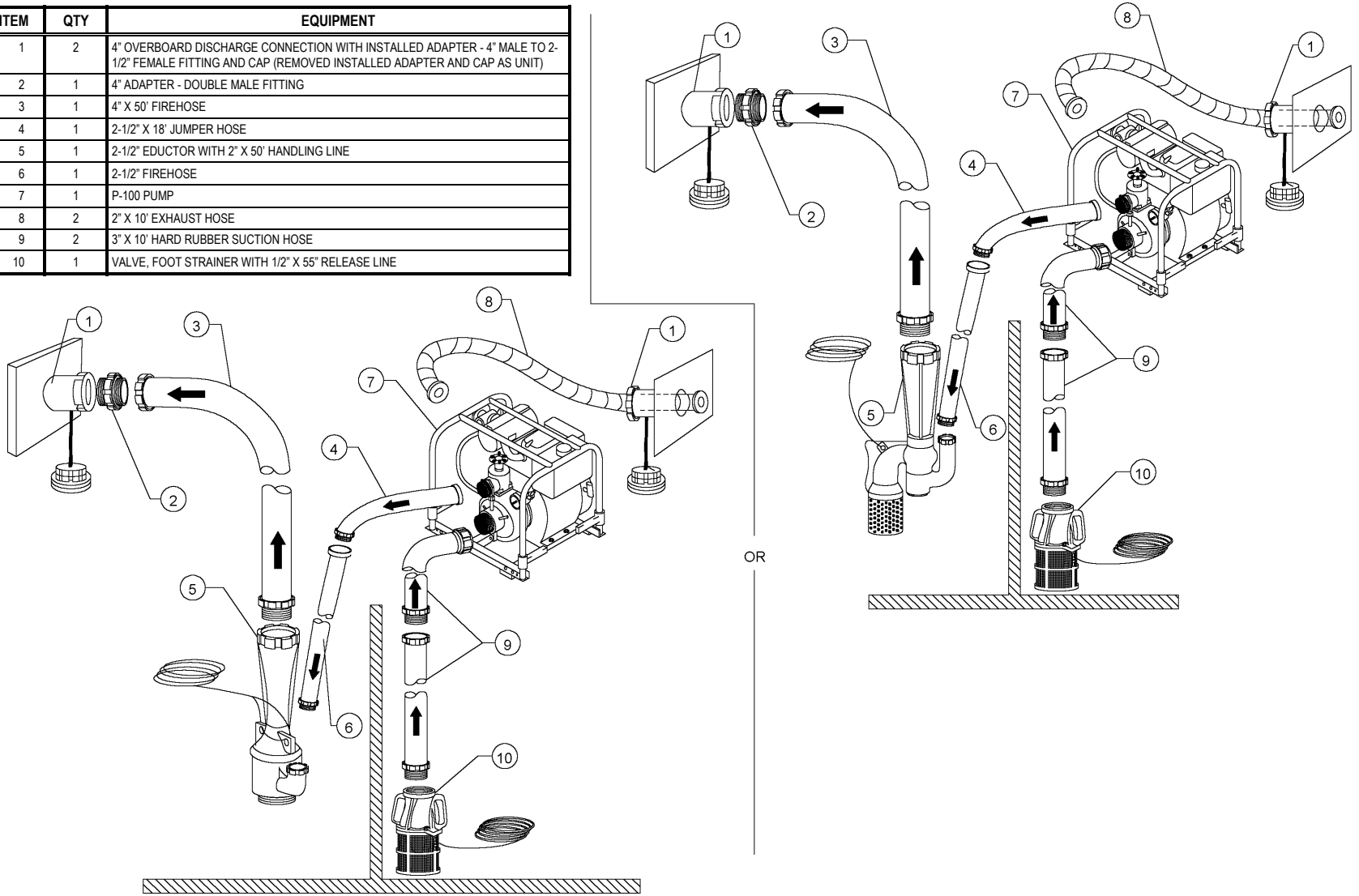
DEWATERING EVOLUTION - SKETCH #004
Suction Lifts Under 20 Feet



ITEM	QTY	EQUIPMENT
1	1	2-1/2" X 50' FIREHOSE
2	1	1-1/2" X 50' FIREHOSE OR 1-3/4" X 50' FIREHOSE
3	1	TRIGATE, 2-1/2" INLET X (1) 2-1/2" & (2) 1-1/2" OUTLETS
4	1	P-100 PUMP
5	1	2-1/2" X 18" JUMPER HOSE
6	1	2-1/2" EDUCTOR, PERI-JET W/2" X 50' DOUBLE BRAIDED ROPE – HANDLING LINE
7	1	ADAPTER – 4" FEMALE TO 3" MALE FITTING
8	1	VALVE, FOOT STRAINER W/ ½" X 55' RELEASE LINE
9	1	ADAPTER – 3" FEMALE TO 4" MALE FITTING
10	1	3" X 10' HARD RUBBER SUCTION HOSE
11	2	2" X 10' EXHAUST HOSE
12	1	ADAPTER 2-1/2" MALE TO 1-1/2" FEMALE FITTING
13	1	1-1/2" EDUCTOR W/2" X 50' HANDLING LINE

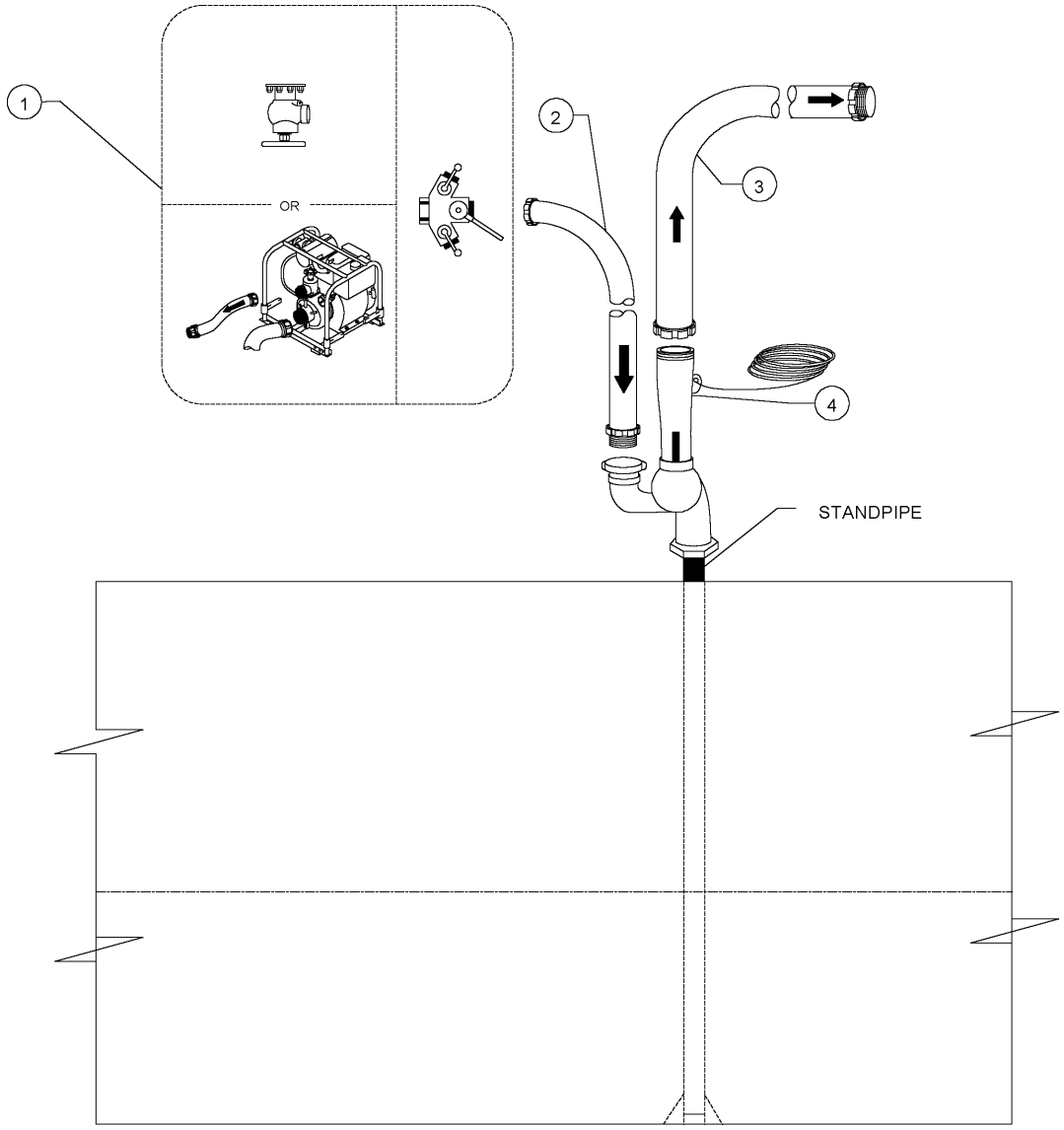
DEWATERING EVOLUTION - SKETCH #005
Using 1-1/2" Eductor and Peri Jet Eductor for Lifts Over 20 Feet

ITEM	QTY	EQUIPMENT
1	2	4" OVERBOARD DISCHARGE CONNECTION WITH INSTALLED ADAPTER - 4" MALE TO 2-1/2" FEMALE FITTING AND CAP (REMOVED INSTALLED ADAPTER AND CAP AS UNIT)
2	1	4" ADAPTER - DOUBLE MALE FITTING
3	1	4" X 50' FIREHOSE
4	1	2-1/2" X 18' JUMPER HOSE
5	1	2-1/2" EDUCTOR WITH 2" X 50' HANDLING LINE
6	1	2-1/2" FIREHOSE
7	1	P-100 PUMP
8	2	2" X 10' EXHAUST HOSE
9	2	3" X 10' HARD RUBBER SUCTION HOSE
10	1	VALVE, FOOT STRAINER WITH 1/2" X 55" RELEASE LINE

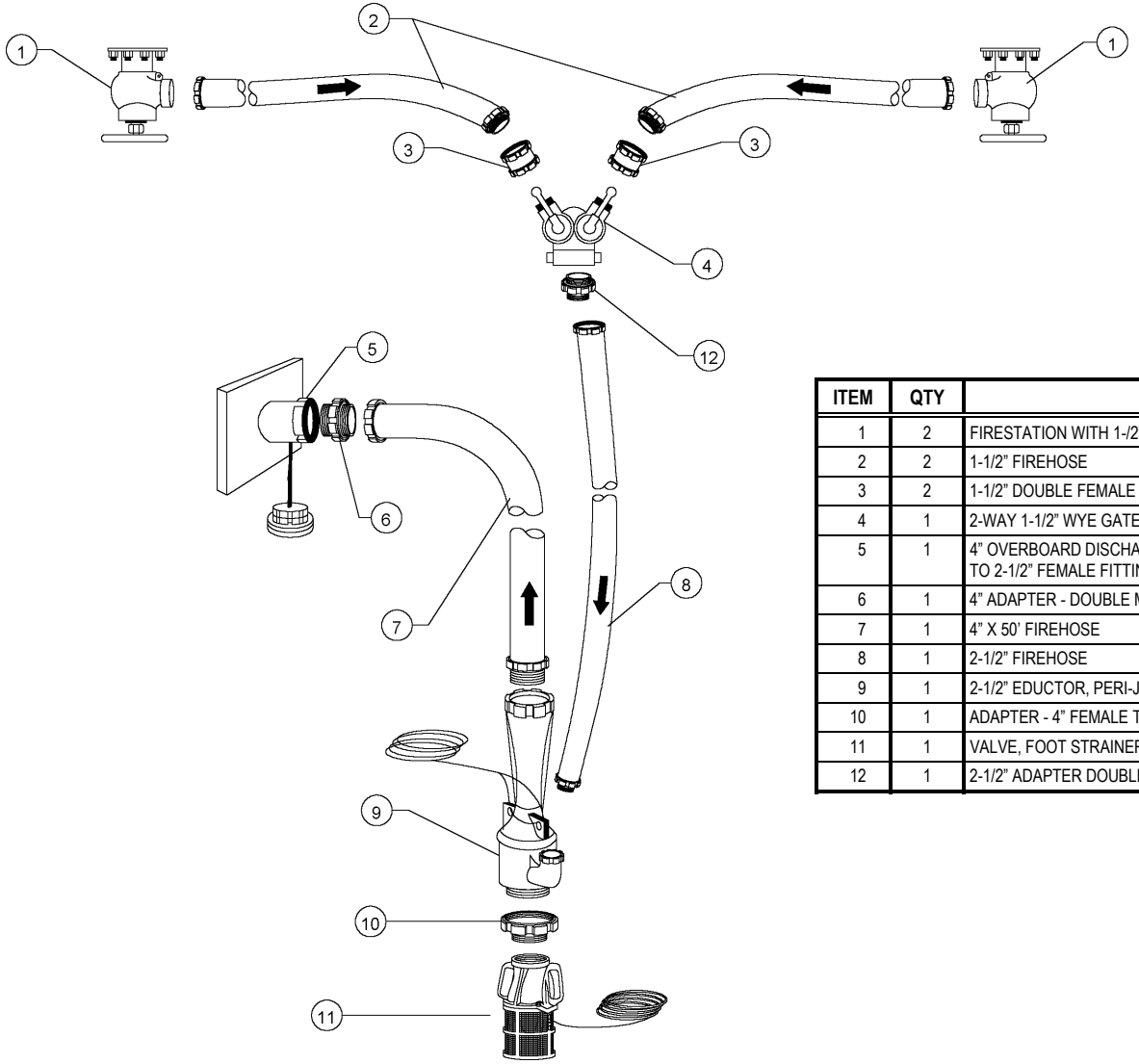


DEWATERING EVOLUTION - SKETCH #006
Using P-100 Pump and Eductor Pumping Contaminated Space

ITEM	QTY	EQUIPMENT
1	1	WATER SOURCE (FIREPLUG, P-100 CONNECT TO TRIGATE
2	1	1-1/2” X 50’ FIREHOSE
3	1	2-1/2” X 50’ FIREHOSE
4	1	1-1/2” EDUCTOR WITH HANDLING LINE (REMOVE STRAINER FROM 1-1/2” EDUCTOR)

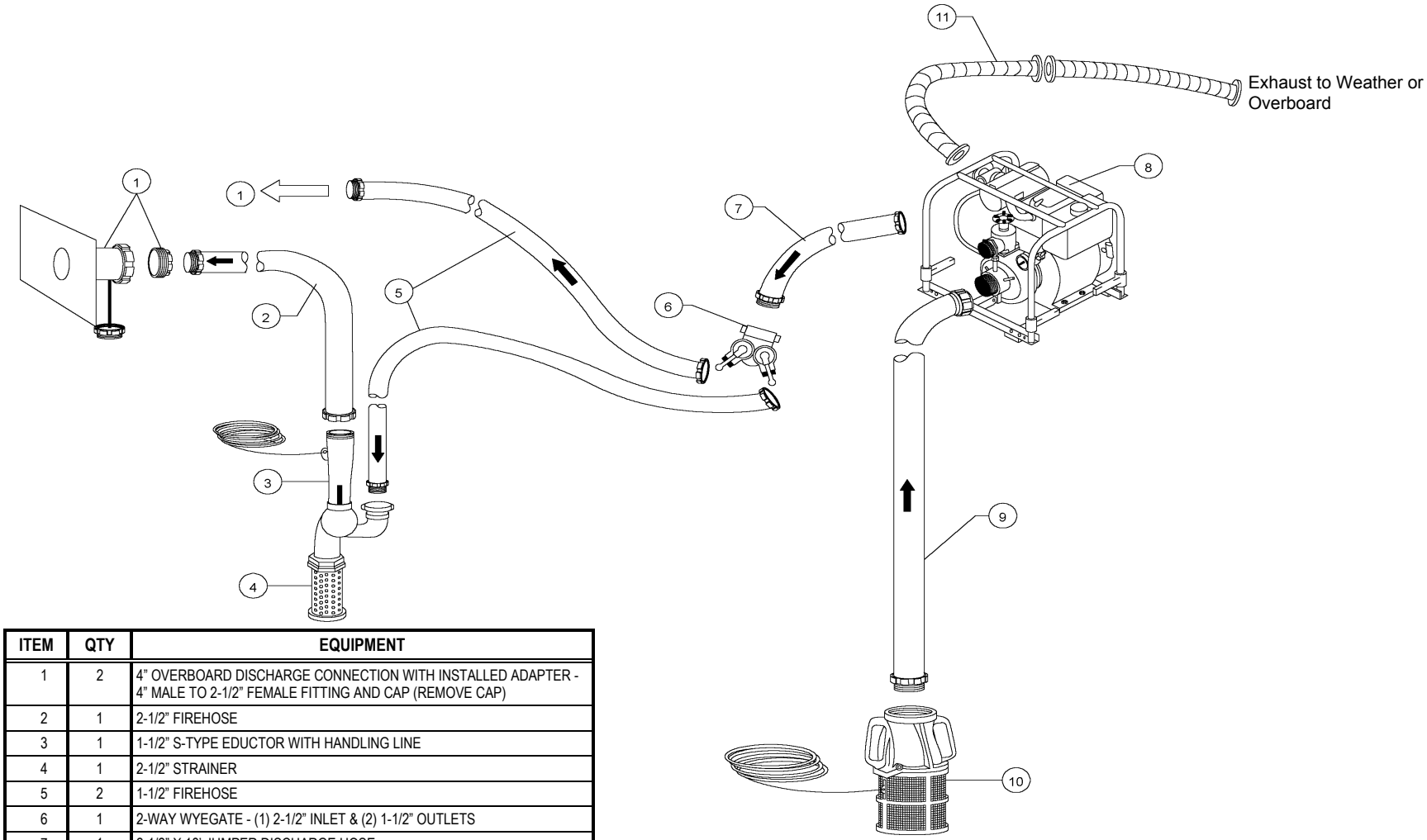


DEWATERING EVOLUTION - SKETCH #007
Using 1-1/2” Eductor Connected to a Standpipe



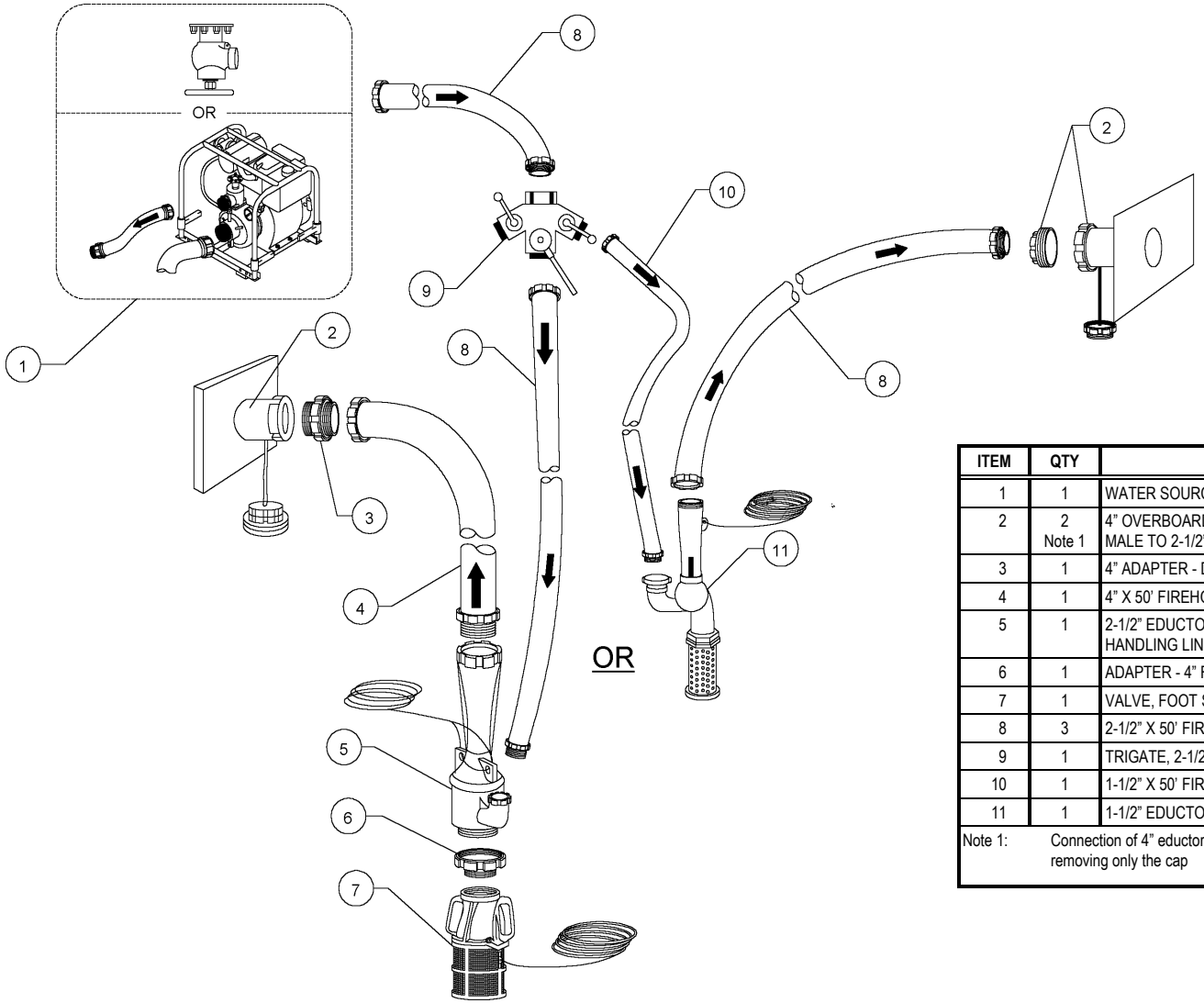
ITEM	QTY	EQUIPMENT
1	2	FIRESTATION WITH 1-/2" FIREPLUG, (2) 1-1/2" FIREHOSES AND SPANNER WRENCH
2	2	1-1/2" FIREHOSE
3	2	1-1/2" DOUBLE FEMALE FITTING
4	1	2-WAY 1-1/2" WYE GATE
5	1	4" OVERBOARD DISCHARGE CONNECTION WITH INSTALLED ADAPTER - 4" MALE TO 2-1/2" FEMALE FITTING AND CAP (REMOVE AS UNIT)
6	1	4" ADAPTER - DOUBLE MALE FITTING
7	1	4" X 50' FIREHOSE
8	1	2-1/2" FIREHOSE
9	1	2-1/2" EDUCTOR, PERI-JET WITH 2" X 50' DOUBLE-BRAIDED ROPE - HANDLING LINE
10	1	ADAPTER - 4" FEMALE TO 3" MALE FITTING
11	1	VALVE, FOOT STRAINER WITH 1/2" X 55' RELEASE LINE
12	1	2-1/2" ADAPTER DOUBLE MALE FITTING

DEWATERING EVOLUTION - SKETCH #008
Using Peri Jet Eductor and 1-1/2" Fireplug



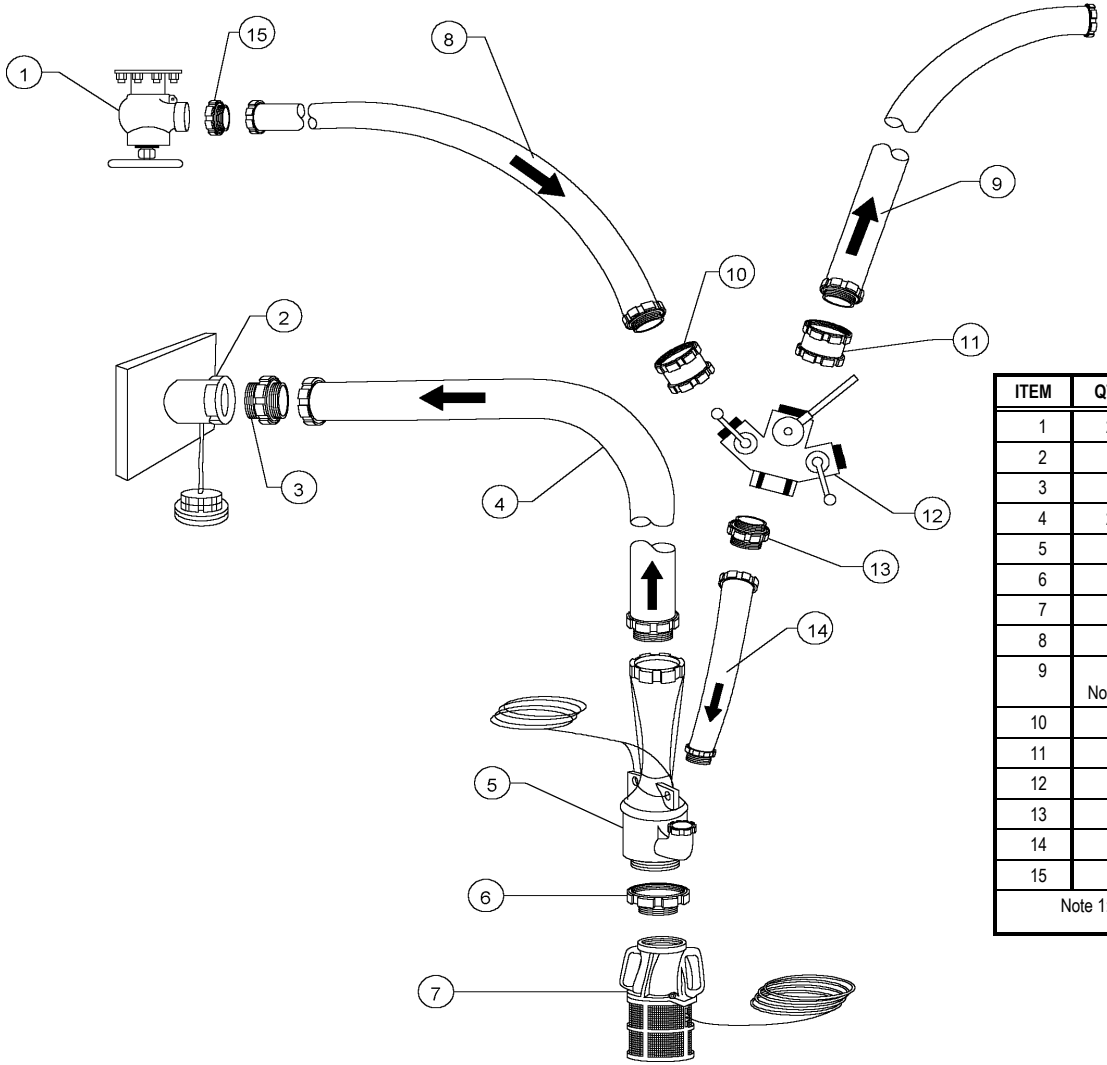
ITEM	QTY	EQUIPMENT
1	2	4" OVERBOARD DISCHARGE CONNECTION WITH INSTALLED ADAPTER - 4" MALE TO 2-1/2" FEMALE FITTING AND CAP (REMOVE CAP)
2	1	2-1/2" FIREHOSE
3	1	1-1/2" S-TYPE EDUCTOR WITH HANDLING LINE
4	1	2-1/2" STRAINER
5	2	1-1/2" FIREHOSE
6	1	2-WAY WYEGATE - (1) 2-1/2" INLET & (2) 1-1/2" OUTLETS
7	1	2-1/2" X 18' JUMPER DISCHARGE HOSE
8	1	P-100 PUMP
9	1	3" X 10' HARD RUBBER SUCTION HOSE
10	1	3" FOOT VALVE STRAINER WITH 1/2" X 55' RELEASE LINE
11	2	2" X 10' EXHAUST HOSE

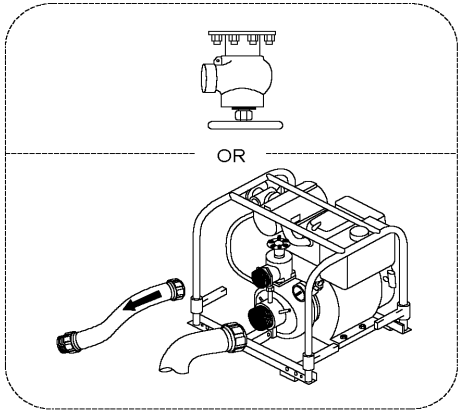
DEWATERING EVOLUTION - SKETCH #009
Using P-100 to Actuate Both the 1-1/2" Eductor and the Foot Valve Strainer for 10 Ft. Suction Lift



ITEM	QTY	EQUIPMENT
1	1	WATER SOURCE (FIRE PLUG CONNECTION, P100 PUMP)
2	2 Note 1	4" OVERBOARD DISCHARGE CONNECTION WITH INSTALLED ADAPTER - 4" MALE TO 2-1/2" FEMALE FITTING AND CAP
3	1	4" ADAPTER - DOUBLE MALE FITTING
4	1	4" X 50' FIREHOSE
5	1	2-1/2" EDUCTOR, PERI-JET WITH 2" X 50' DOUBLE-BRAIDED ROPE - HANDLING LINE
6	1	ADAPTER - 4" FEMALE TO 3" MALE FITTING
7	1	VALVE, FOOT STRAINER WITH 1/2" X 55' RELEASE LINE
8	3	2-1/2" X 50' FIREHOSE
9	1	TRIGATE, 2-1/2" INLET X (1) 2-1/2" & (2) 1-1/2" OUTLETS
10	1	1-1/2" X 50' FIREHOSE
11	1	1-1/2" EDUCTOR WITH 2-1/2" STRAINER (ATTACHED) AND HANDLING LINE
Note 1:		Connection of 4" eductor requires removing installed reducer; 2-1/2" eductor requires removing only the cap

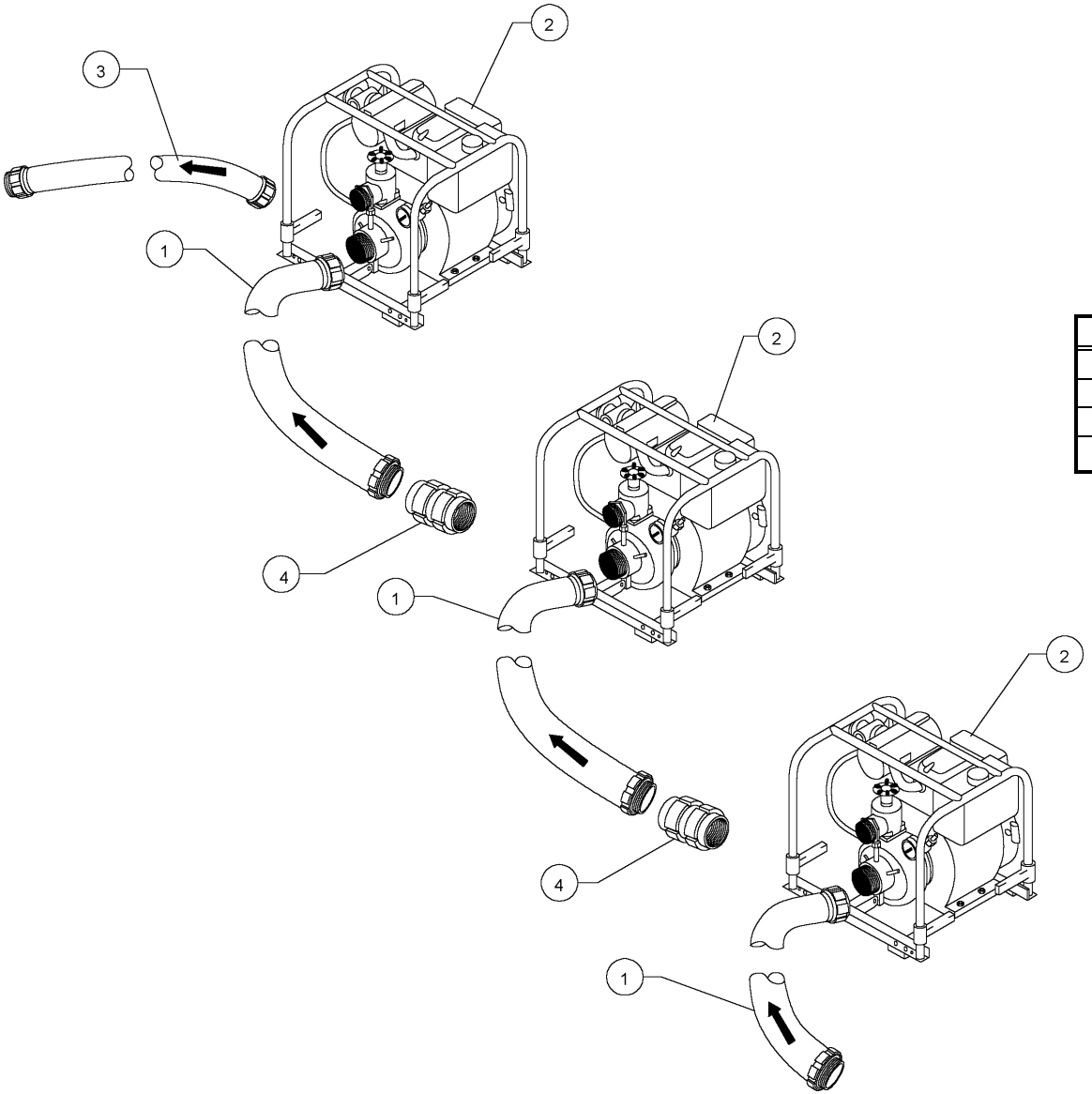
DEWATERING EVOLUTION - SKETCH #010
Using Peri Jet Eductor or 1-1/2" Eductor





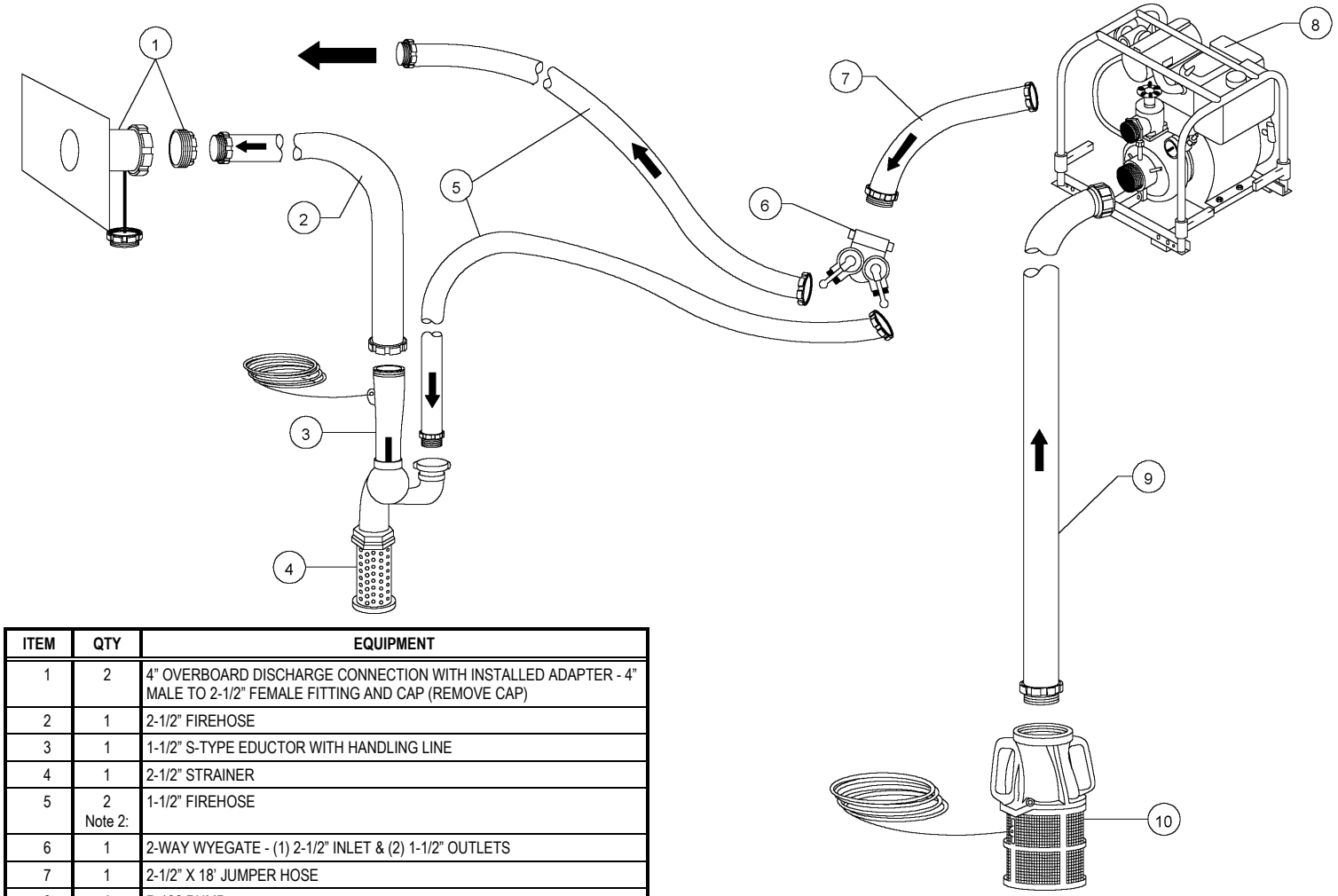
ITEM	QTY	EQUIPMENT
1	2	1-1/2" OR 2-1/2" FIREPLUG, (2) 1-1/2" OR 1-3/4" FIREHOSES
2	1	4" OVERBOARD DISCHARGE CONNECTION WITH INSTALLED CAP
3	1	ADAPTER - 3" MALE TO 4" MALE FITTING
4	2	3" X 10' HARD RUBBER SUCTION HOSE
5	1	2-1/2" EDUCTOR, PERI-JET WITH 2" X 50' DOUBLE-BRAIDED ROPE-HANDLING LINE
6	1	ADAPTER - 4" FEMALE TO 3" MALE FITTING
7	1	VALVE, FOOT STRAINER WITH 1/2" X 55' RELEASE LINE
8	1	1-1/2" OR 1-3/4" FIREHOSE
9	1 Note 1	2-1/2" FIREHOSE
10	1	ADAPTER - 1-1/2" DOUBLE FEMALE FITTING
11	1	ADAPTER - 2-1/2" DOUBLE FEMALE FITTING
12	1	TRIGATE, 2-1/2" INLET X (1) 2-1/2" & (2) 1-1/2" OUTLETS
13	1	ADAPTER - 2-1/2" DOUBLE MALE FITTING
14	1	2-1/2" X 50' FIREHOSE
15	1	ADAPTER 2-1/2" FEMALE TO 1-1/2" MALE
Note 1:		Firehose can be connected directly to 2-1/2" male discharge fitting on P-100 pump

DEWATERING EVOLUTION - SKETCH #011
Using Peri Jet Eductor Supplied by 2-1/2" and 1-1/2"or 1-3/4" Hoses (Increased Capacity 20% or More)



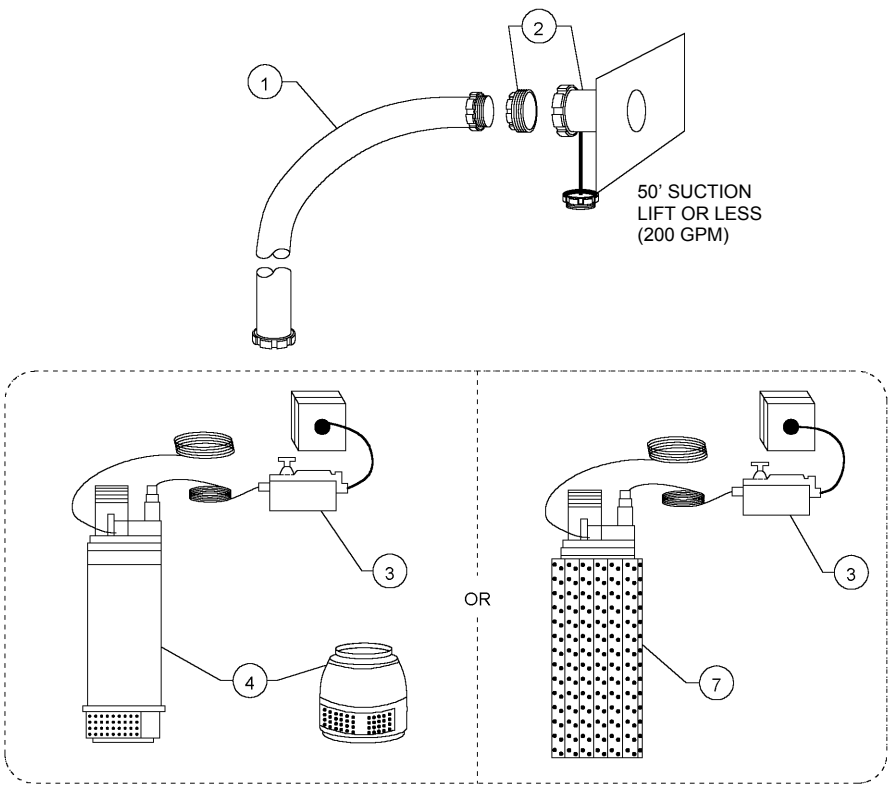
ITEM	QTY	EQUIPMENT
1	3	3" X 10' SUCTION HOSE
2	3	P-100 PUMP
3	1	2-1/2" X 50' FIREHOSE
4	2	ADAPTER - 3" TO 2-1/2" DOUBLE FEMALE

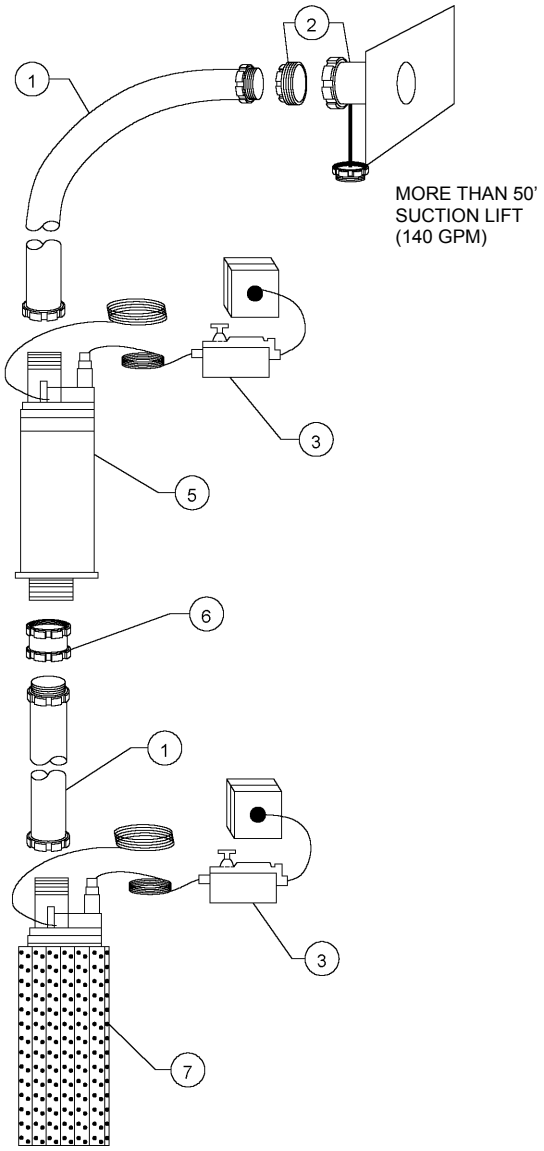
DEWATERING EVOLUTION - SKETCH #012
20 Foot-Plus Suction Lift Using Three P-100 Pumps in Tandem



ITEM	QTY	EQUIPMENT
1	2	4" OVERBOARD DISCHARGE CONNECTION WITH INSTALLED ADAPTER - 4" MALE TO 2-1/2" FEMALE FITTING AND CAP (REMOVE CAP)
2	1	2-1/2" FIREHOSE
3	1	1-1/2" S-TYPE EDUCTOR WITH HANDLING LINE
4	1	2-1/2" STRAINER
5	2 Note 2:	1-1/2" FIREHOSE
6	1	2-WAY WYEGATE - (1) 2-1/2" INLET & (2) 1-1/2" OUTLETS
7	1	2-1/2" X 18' JUMPER HOSE
8	1	P-100 PUMP
9	1 Note 1	3" X 10' HARD RUBBER SUCTION HOSE
10	1	3" FOOT VALVE STRAINER WITH 1/2" X 55' RELEASE LINE
Note 1:	A second hose may be used if required up to 20 feet	
Note 2:	Second hose to Alternate Overboard Discharge connection	

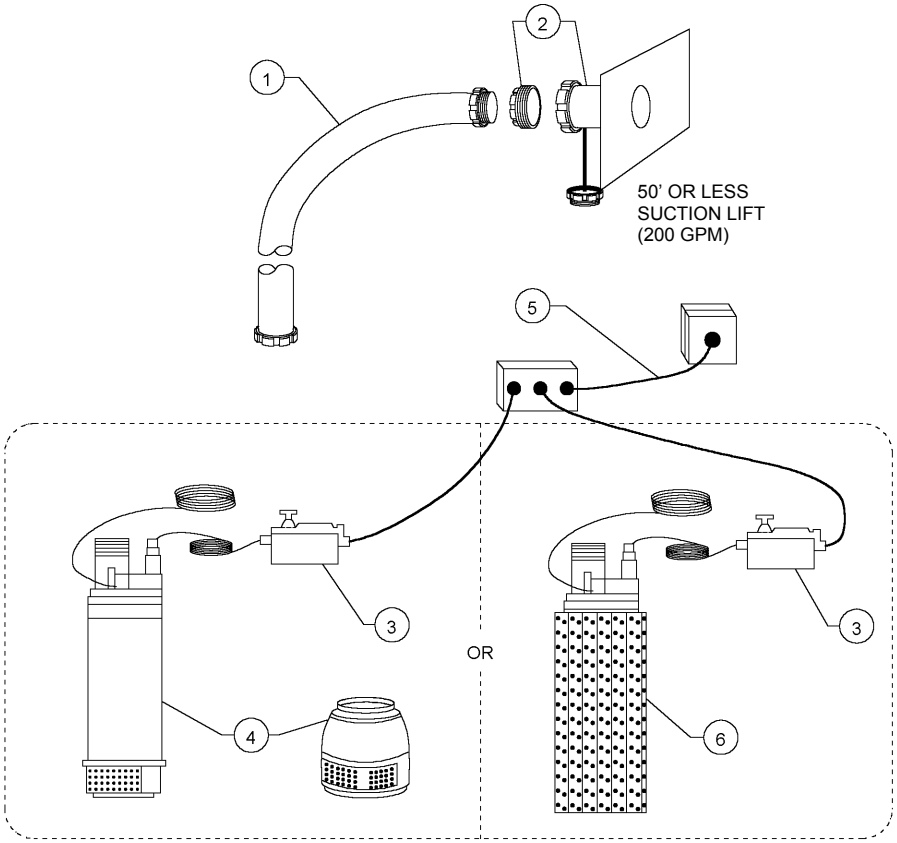
DEWATERING EVOLUTION - SKETCH #013
Using P-100 Pump and 1-1/2" Eductor

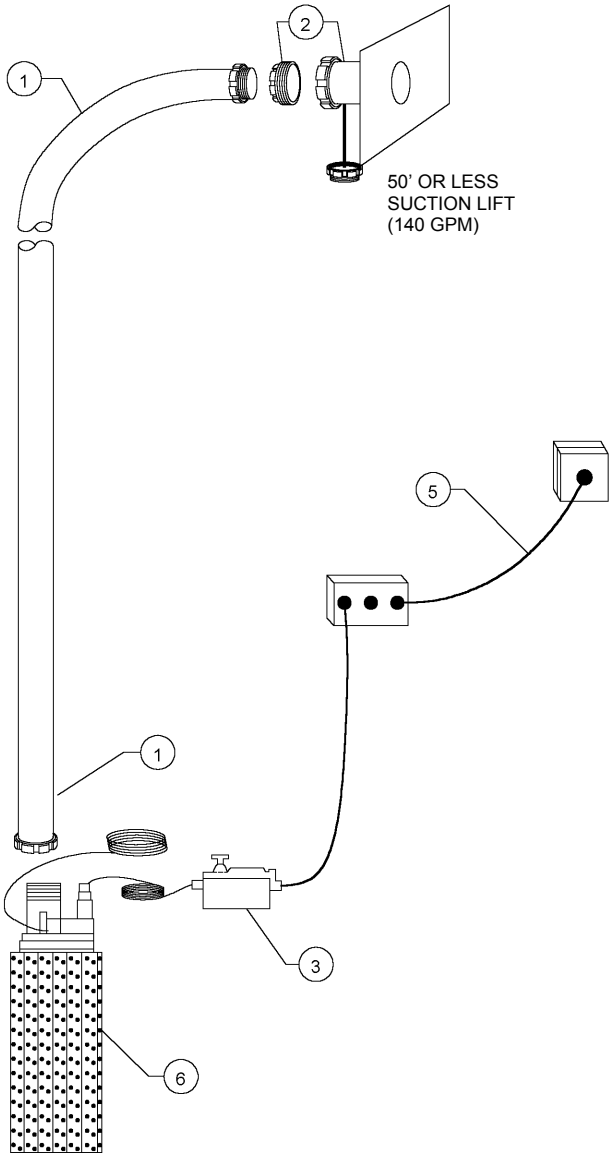




ITEM	QTY	EQUIPMENT
1	1 (2)	2-1/2" FIREHOSE
2	1	4" OVERBOARD DISCHARGE CONNECTION WITH INSTALLED ADAPTER - 4" MALE TO 2-1/2" FEMALE FITTING AND CAP (REMOVE CAP ONLY)
3	1 (2)	CONTROL BOX FOR SUB PUMP PLUGGED INTO 440V OUTLET
4	1	ELECTRIC SUB PUMP WITH 2-1/2" FOOT VALVE, STRAINER AND HANDLING LINE
5	1	ELECTRIC SUB PUMP WITH HANDLING LINE
6	1	ADAPTER - 2-1/2" DOUBLE FEMALE FITTING
7	1	ELECTRIC SUB PUMP ENCASED IN STAR STRAINER WITH HANDLING LINE

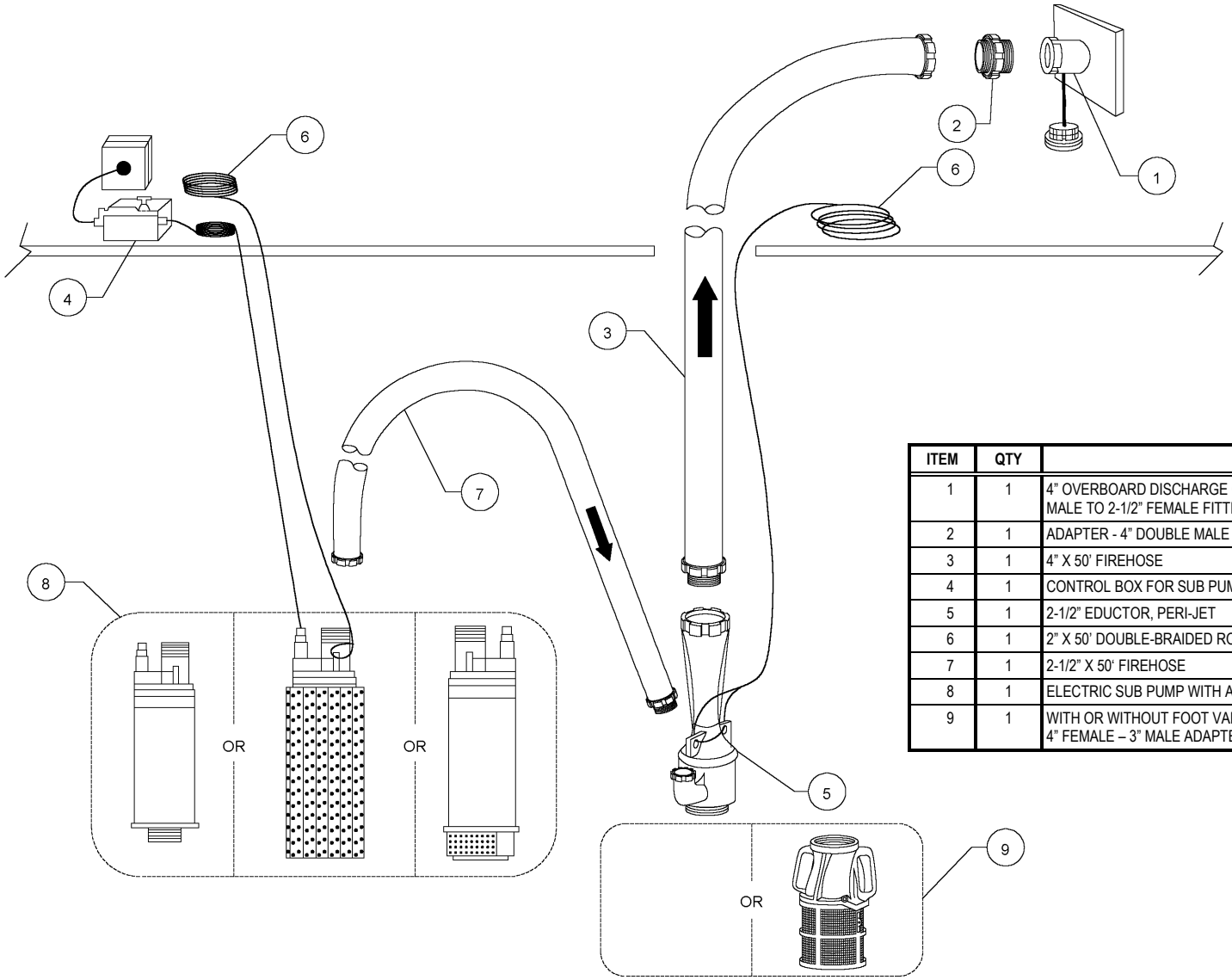
DEWATERING EVOLUTION - SKETCH #014
Using Submersible Pumps Single or in Tandem- More than 50 Ft. Suction Lift





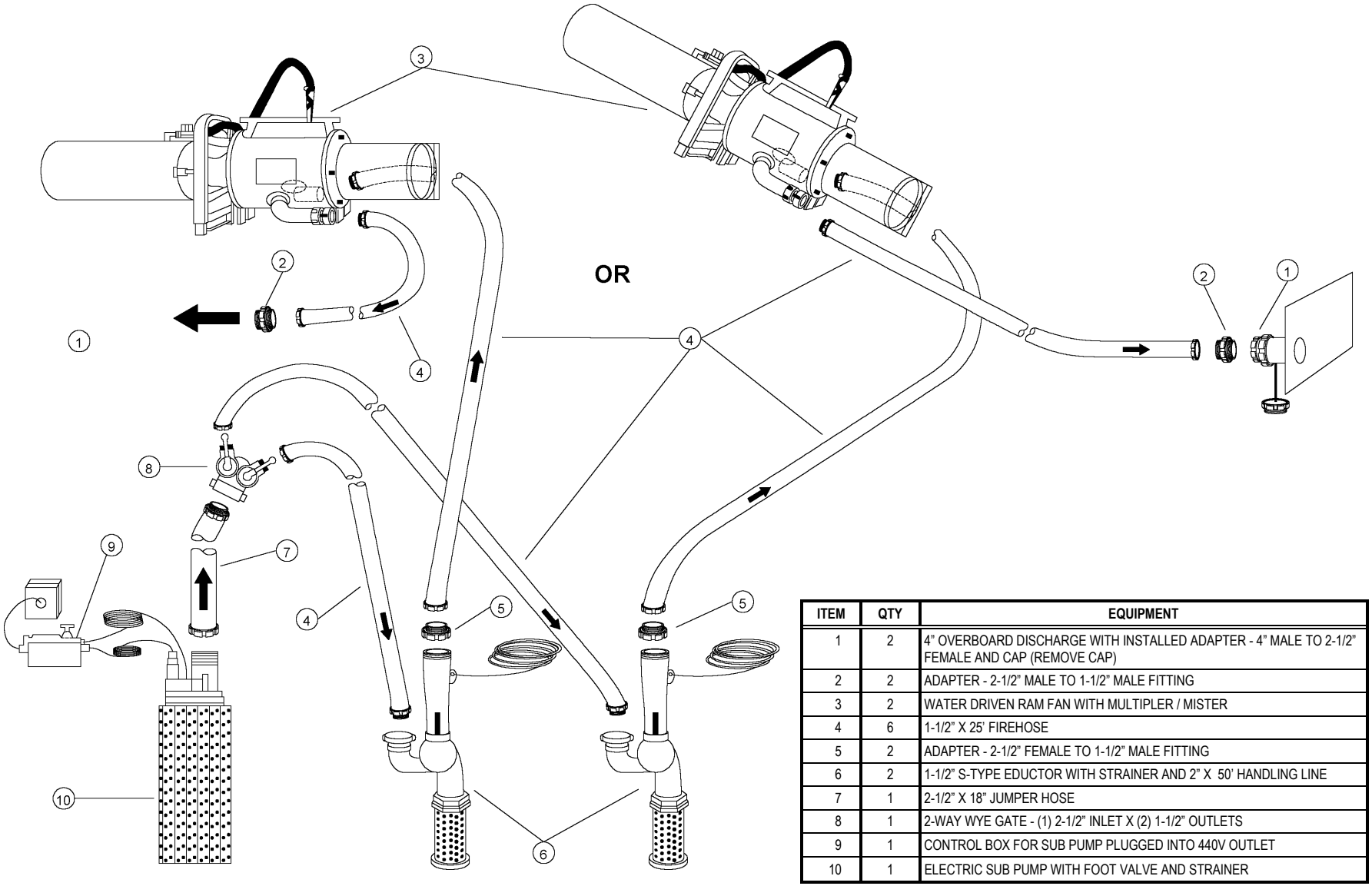
ITEM	QTY	EQUIPMENT
1	1(2)	2-1/2" FIREHOSE
2	1	4" OVERBOARD DISCHARGE CONNECTION WITH INSTALLED ADAPTER - 4" MALE TO 2-1/2" FEMALE FITTING AND CAP (REMOVE CAP ONLY)
3	1(2)	CONTROL BOX FOR SUB PUMP PLUGGED INTO AN OUTLET BOW AND 440V OUTLET
4	1	ELECTRIC SUB PUMP WITH 2-1/2" FOOT VALVE STRAINER AND HANDLING LINE
5	1	440V EXTENSION CABLE
6	1	ELECTRIC SUB PUMP WITH HANDLING LINE

DEWATERING EVOLUTION - SKETCH #015
Using Submersible Pump - Up to 50 Ft. Suction Lift



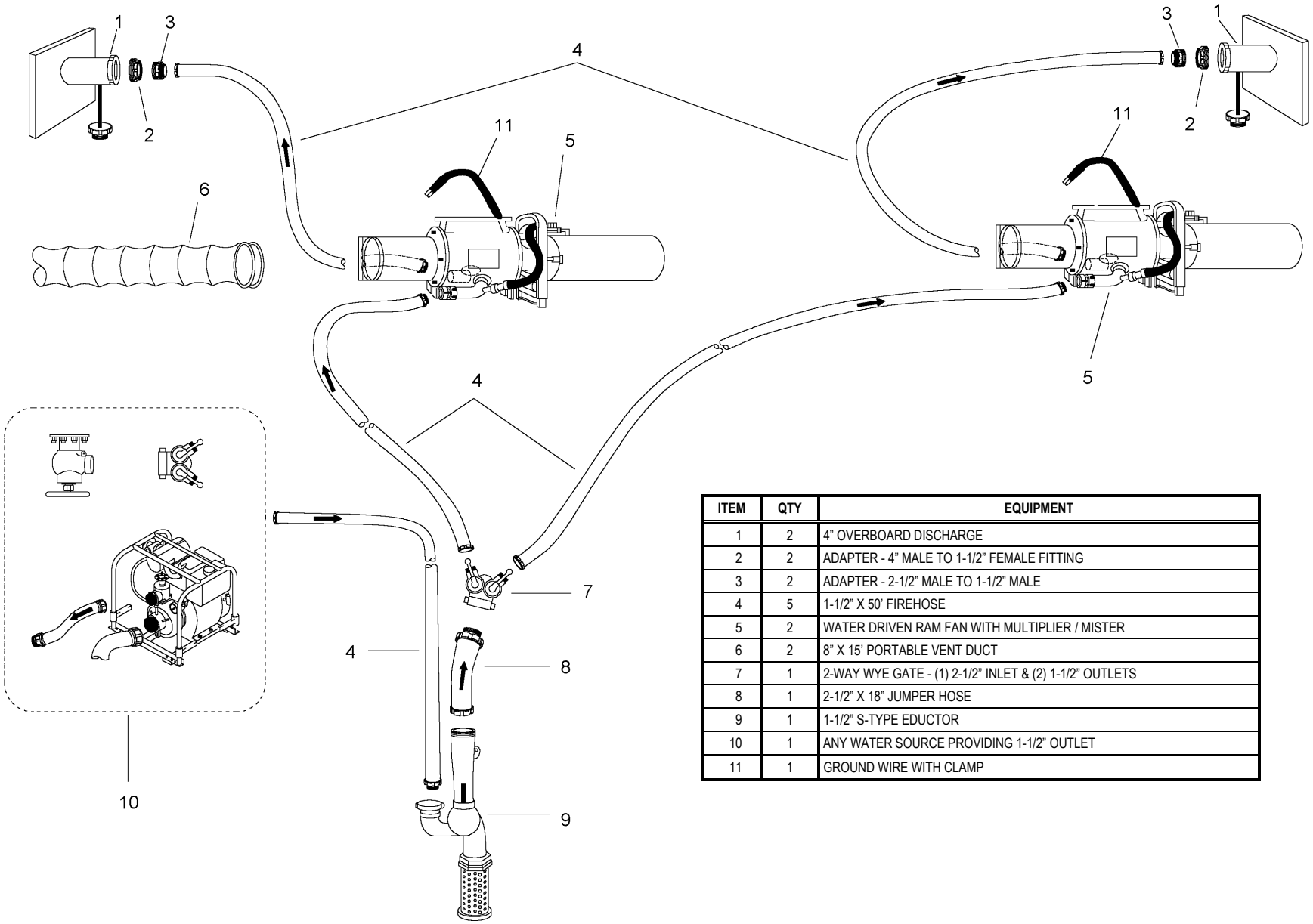
ITEM	QTY	EQUIPMENT
1	1	4" OVERBOARD DISCHARGE CONNECTION WITH INSTALLED ADAPTER - 4" MALE TO 2-1/2" FEMALE FITTING AND CAP (REMOVE AS UNIT)
2	1	ADAPTER - 4" DOUBLE MALE
3	1	4" X 50' FIREHOSE
4	1	CONTROL BOX FOR SUB PUMP PLUGGED INTO 440 VOLT OUTLET
5	1	2-1/2" EDUCTOR, PERI-JET
6	1	2" X 50' DOUBLE-BRAIDED ROPE-HANDLING LINE
7	1	2-1/2" X 50' FIREHOSE
8	1	ELECTRIC SUB PUMP WITH AND WITHOUT FOOT VALVE AND STRAINER
9	1	WITH OR WITHOUT FOOT VALVE STRAINER **(OPTIONAL)** INSTALLED, USE 4" FEMALE – 3" MALE ADAPTER

DEWATERING EVOLUTION - SKETCH #016
Using Submersible Pump to Provide Actuating Water to Peri Jet Eductor



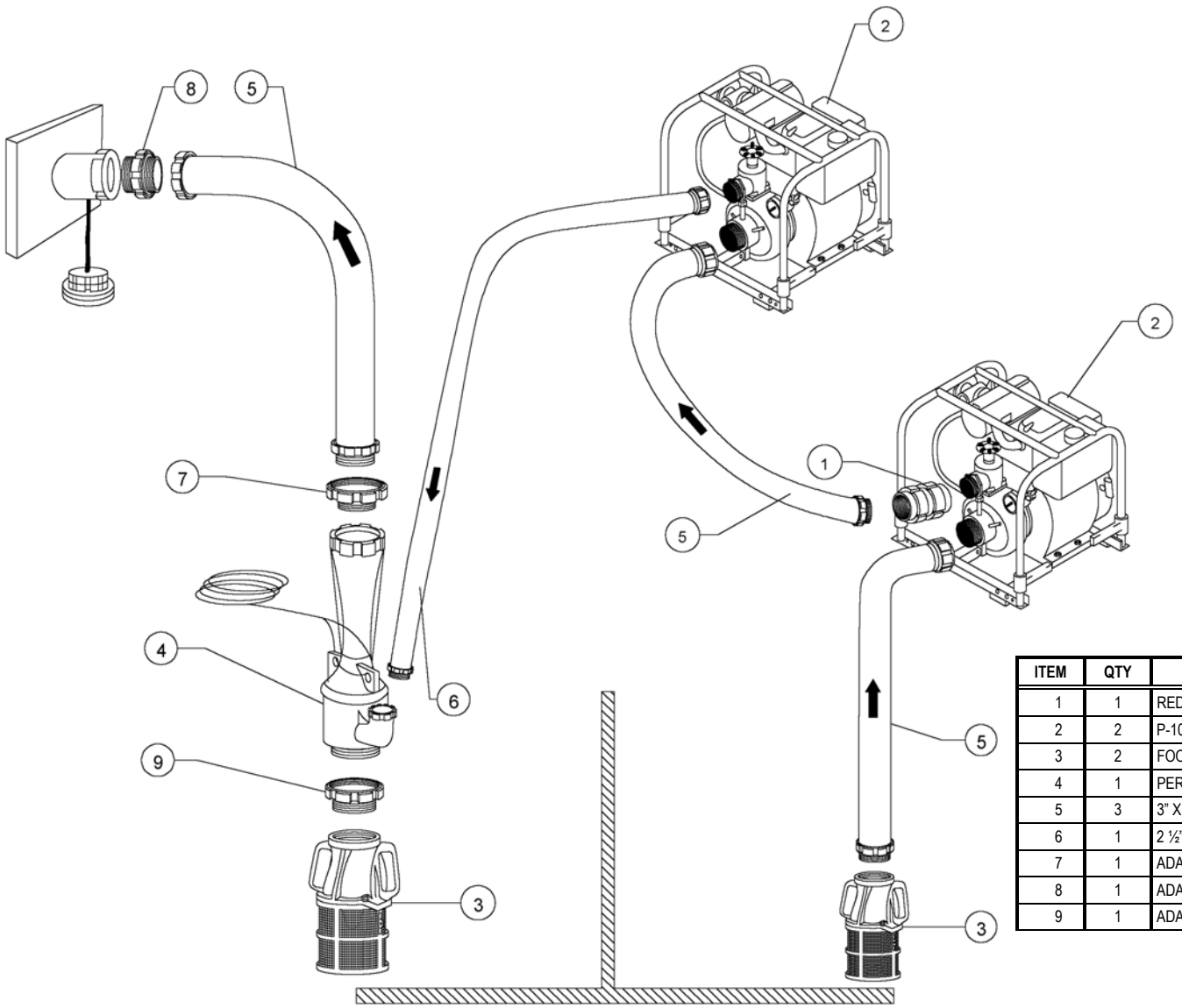
ITEM	QTY	EQUIPMENT
1	2	4" OVERBOARD DISCHARGE WITH INSTALLED ADAPTER - 4" MALE TO 2-1/2" FEMALE AND CAP (REMOVE CAP)
2	2	ADAPTER - 2-1/2" MALE TO 1-1/2" MALE FITTING
3	2	WATER DRIVEN RAM FAN WITH MULTIPLER / MISTER
4	6	1-1/2" X 25' FIREHOSE
5	2	ADAPTER - 2-1/2" FEMALE TO 1-1/2" MALE FITTING
6	2	1-1/2" S-TYPE EDUCTOR WITH STRAINER AND 2" X 50' HANDLING LINE
7	1	2-1/2" X 18" JUMPER HOSE
8	1	2-WAY WYE GATE - (1) 2-1/2" INLET X (2) 1-1/2" OUTLETS
9	1	CONTROL BOX FOR SUB PUMP PLUGGED INTO 440V OUTLET
10	1	ELECTRIC SUB PUMP WITH FOOT VALVE AND STRAINER

DEWATERING EVOLUTION - SKETCH #017
Electric Submersible Pump Discharge Actuating One or Two 1-1/2" S-Type Eductors and Corresponding Ram Fans



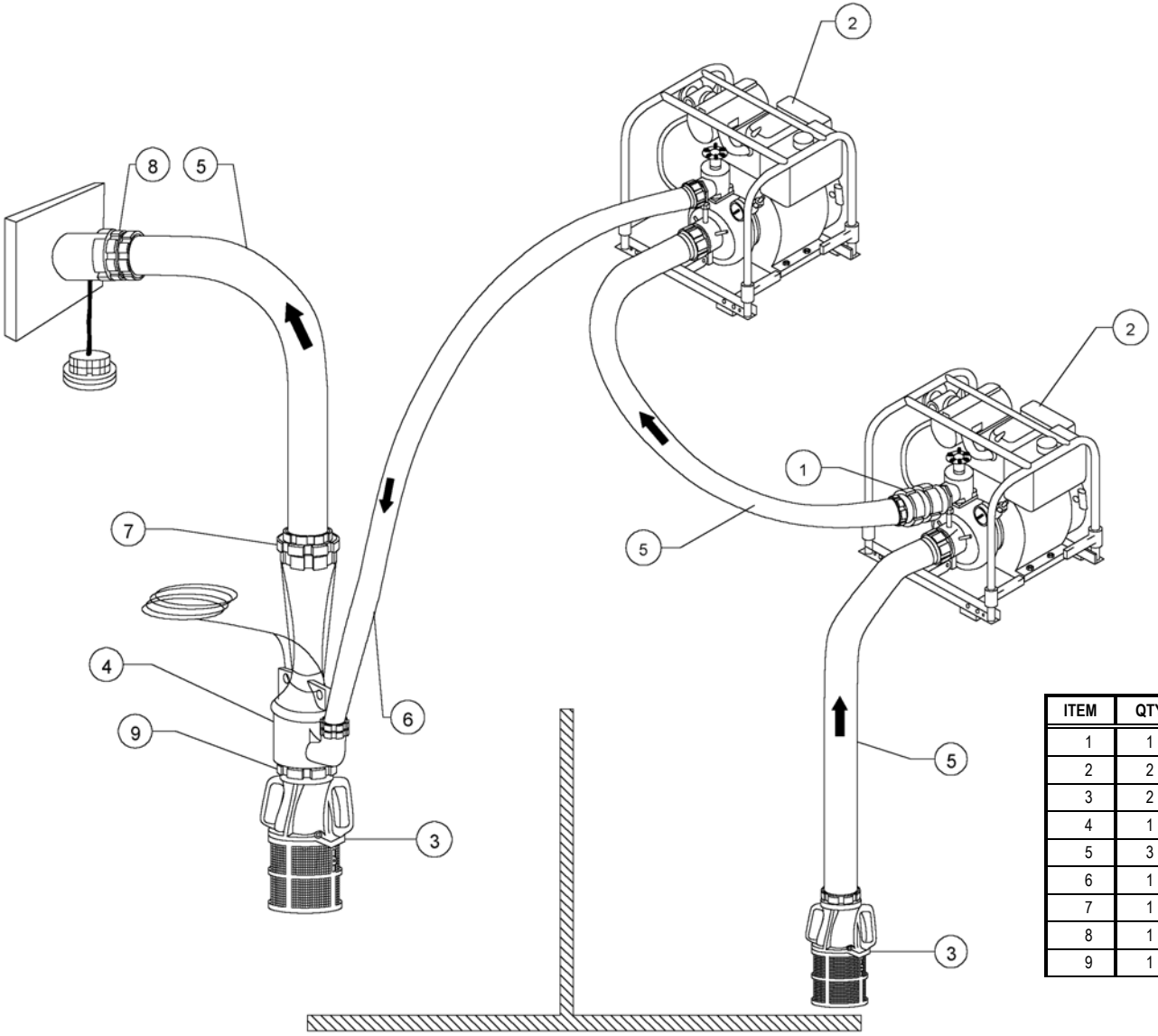
ITEM	QTY	EQUIPMENT
1	2	4" OVERBOARD DISCHARGE
2	2	ADAPTER - 4" MALE TO 1-1/2" FEMALE FITTING
3	2	ADAPTER - 2-1/2" MALE TO 1-1/2" MALE
4	5	1-1/2" X 50' FIREHOSE
5	2	WATER DRIVEN RAM FAN WITH MULTIPLIER / MISTER
6	2	8" X 15' PORTABLE VENT DUCT
7	1	2-WAY WYE GATE - (1) 2-1/2" INLET & (2) 1-1/2" OUTLETS
8	1	2-1/2" X 18" JUMPER HOSE
9	1	1-1/2" S-TYPE EDUCTOR
10	1	ANY WATER SOURCE PROVIDING 1-1/2" OUTLET
11	1	GROUND WIRE WITH CLAMP

DEWATERING EVOLUTION - SKETCH #018
1-1/2" S-Type Eductor Providing Actuating Water to Two Water Driven Ram Fans for Cooling/Desmoking



ITEM	QTY	EQUIPMENT
1	1	REDUCER 2 ½ " FEMALE X 3" FEMALE
2	2	P-100 PUMP
3	2	FOOT VALVE STRAINER
4	1	PERI-JET EDUCTOR
5	3	3" X 10' HARD RUBBER SUCTION HOSE
6	1	2 ½" X 50' FIRE HOSE
7	1	ADAPTER 4" MALE - 3" FEMALE
8	1	ADAPTER 4" MALE – 3" MALE
9	1	ADAPTER 4" FEMALE – 3" MALE

DEWATERING EVOLUTION - SKETCH #019 (SHEET 1 OF 2)
Dewatering Compartments Using Two P-100 Pumps in Tandem Actuating Eductor in Adjacent Space

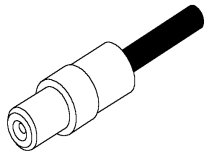


ITEM	QTY	EQUIPMENT
1	1	REDUCER 2 ½ " FEMALE X 3" FEMALE
2	2	P-100 PUMP
3	2	FOOT VALVE STRAINER
4	1	PERI-JET EDUCTOR
5	3	3" X 10' HARD RUBBER SUCTION HOSE
6	1	2 ½" X 50' FIRE HOSE
7	1	ADAPTER 4" MALE - 3" FEMALE
8	1	ADAPTER 4" MALE – 3" MALE
9	1	ADAPTER 4" FEMALE – 3" MALE

DEWATERING EVOLUTION - SKETCH #019 (SHEET 2 OF 2)
Dewatering Compartments Using Two P-100 Pumps with Connections made in Tandem Actuating Eductor in Adjacent Space

DAMAGE CONTROL LAYOUT SKETCHES

SECTION 5 - EMERGENCY COMMUNICATIONS EVOLUTION



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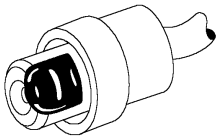

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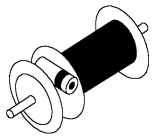

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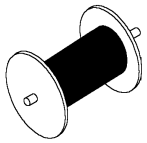

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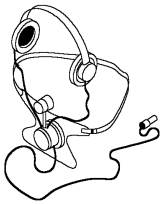

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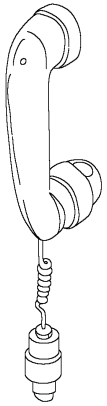

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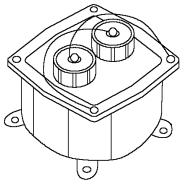

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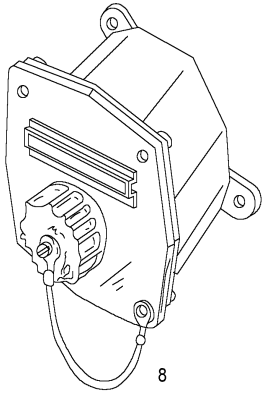
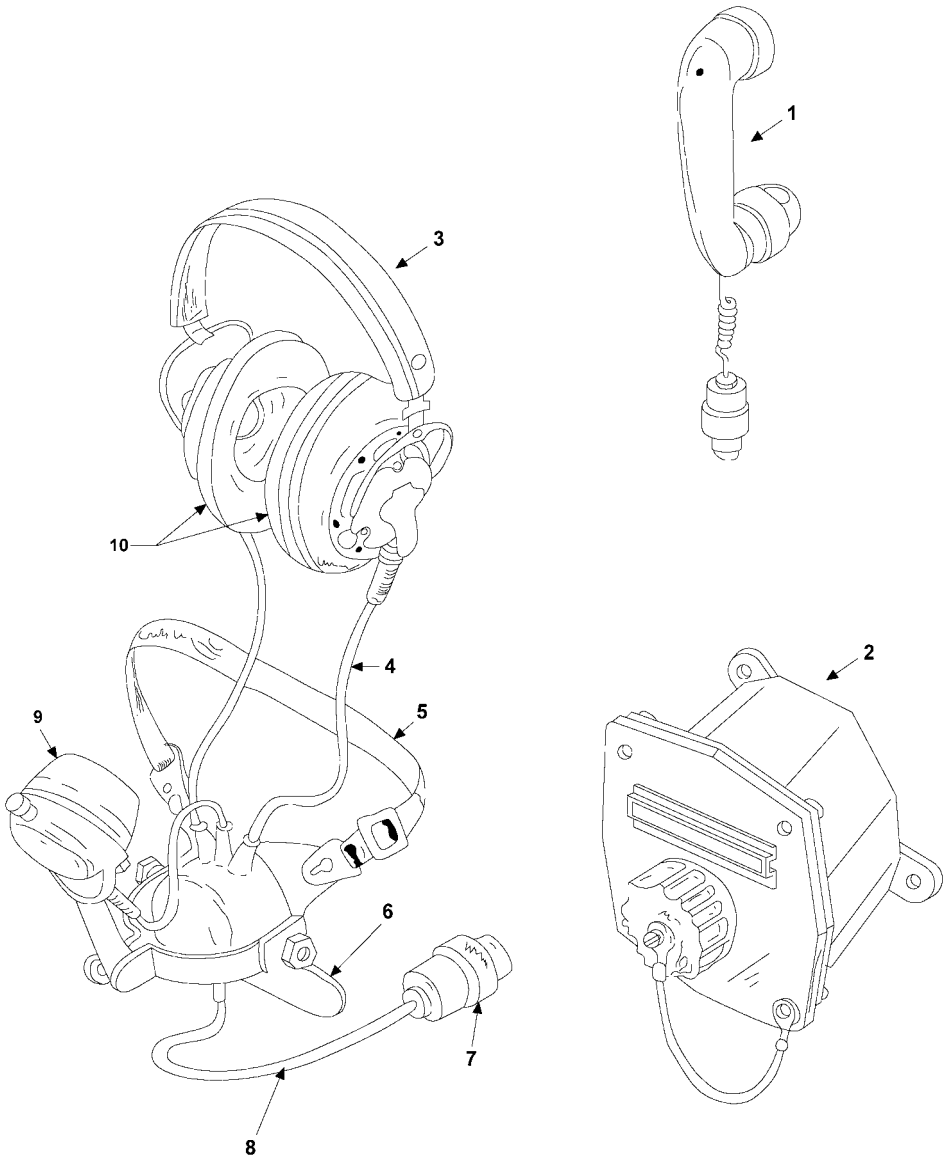


8

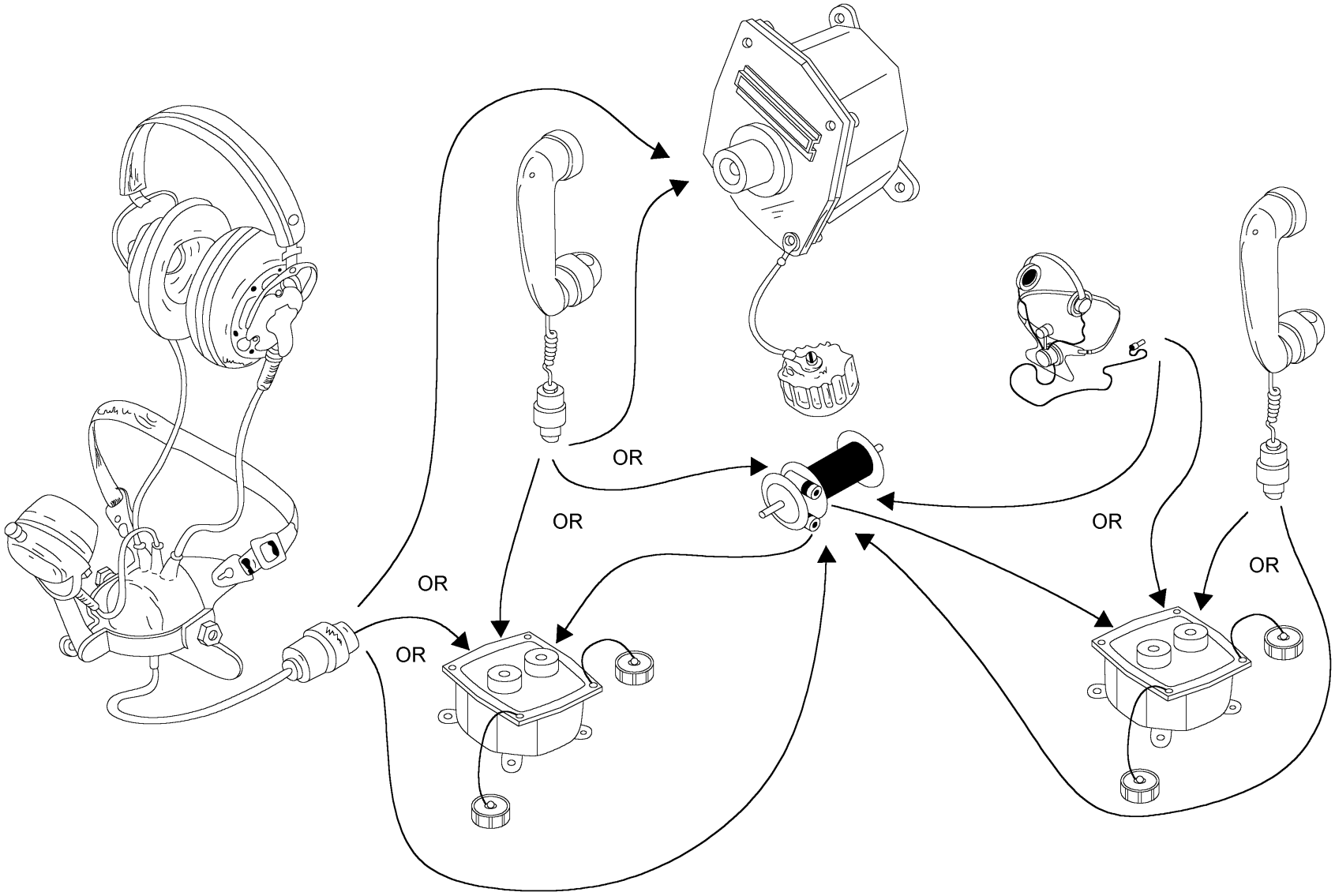
ITEM	QTY	EQUIPMENT
1	1	PLUG - TELEPHONE
2	1	JACK – TELEPHONE
3	1	REEL – CABLE – ORNAGE (X 40J) 200 FT.
4	1	CABLE – 200 FT. TEL TY MR-1D-1
5	2	HEADSET – CHEST – S.P. PHONES W/20' CABLE
6	1	HANDSET – SOUND POWERED PHONES
7	1	JACK BOX – DOUBLE GANG
8	1	JACK BOX – SINGLE OUTLET

EMERGENCY COMMUNICATIONS EVOLUTION – SKETCH #001
Sound Powered Phone Communications Equipment

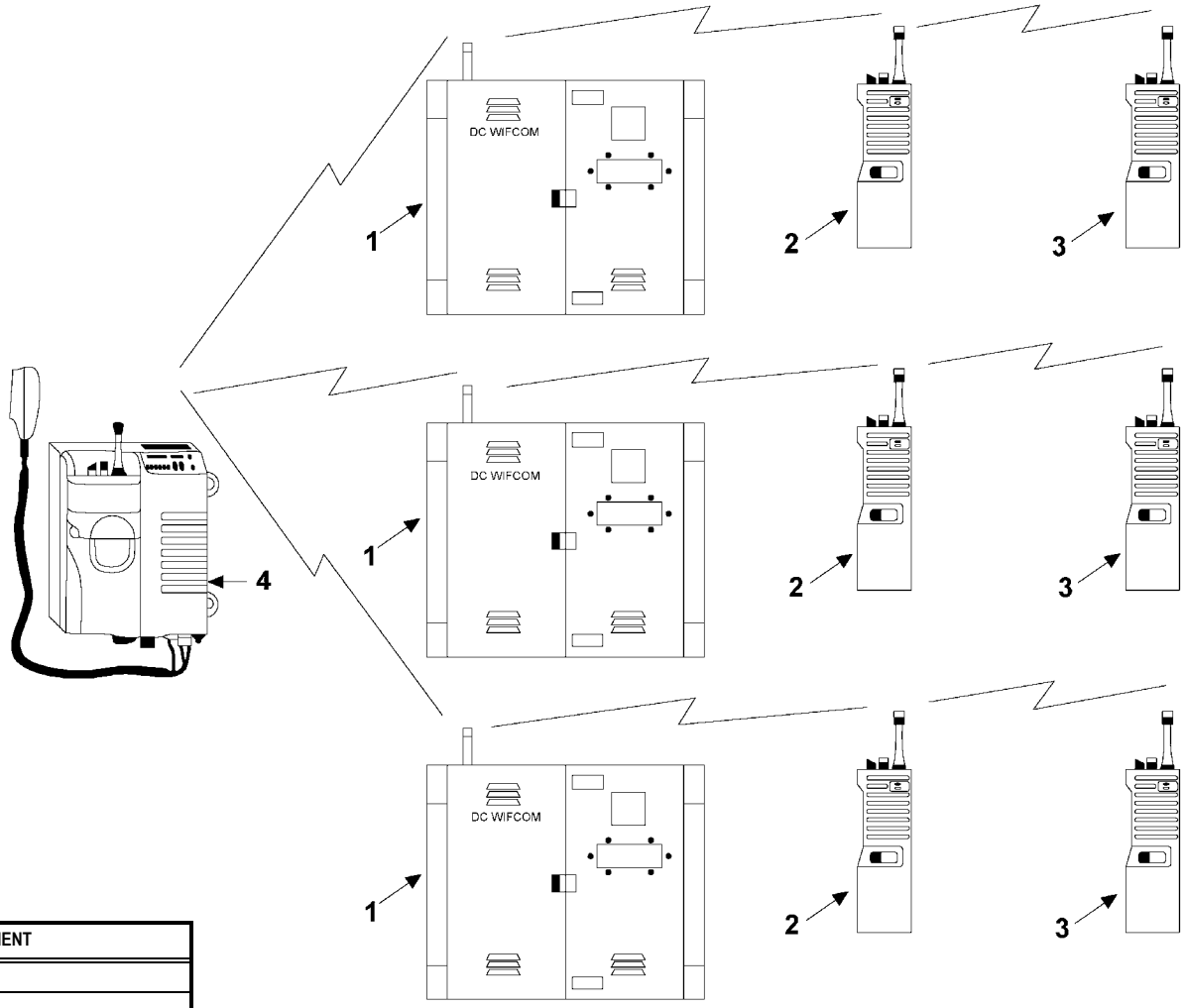


ITEM	QTY	EQUIPMENT
1	1	HANDSET
2	1	JACKBOX
3	1	HEADBAND
4	1	TINSEL CORD
5	2	NECKSTRAP
6	1	CHEST PLATE
7	1	JACK PLUG
8	1	CABLE
9	1	SOUND POWERED TRANSMITTER
10	1	SOUND POWERED RECEIVER

EMERGENCY COMMUNICATIONS EVOLUTION – SKETCH #002
Emergency V.S.P. Phones



EMERGENCY COMMUNICATIONS EVOLUTION - SKETCH #003
Emergency V.S.P. Phone Cable Reel



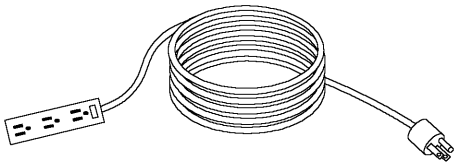
ITEM	EQUIPMENT
1	REPAIR LOCKER
2	SCENE LEADER
3	INVESTIGATOR
4	DCC

EMERGENCY COMMUNICATIONS EVOLUTION - SKETCH #004
DC Portable Radio Evolution

DAMAGE CONTROL LAYOUT SKETCHES

SECTION 6 - EMERGENCY LIGHTING EVOLUTION

1



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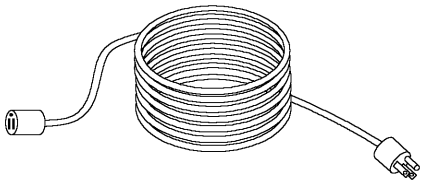

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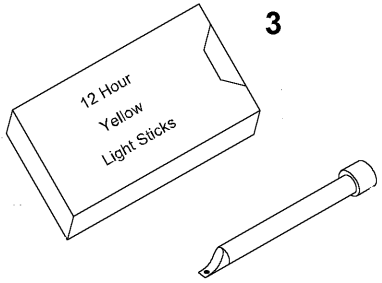

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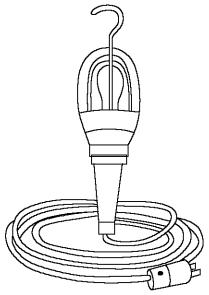

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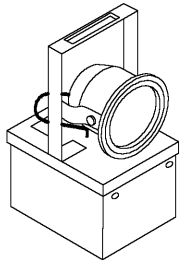
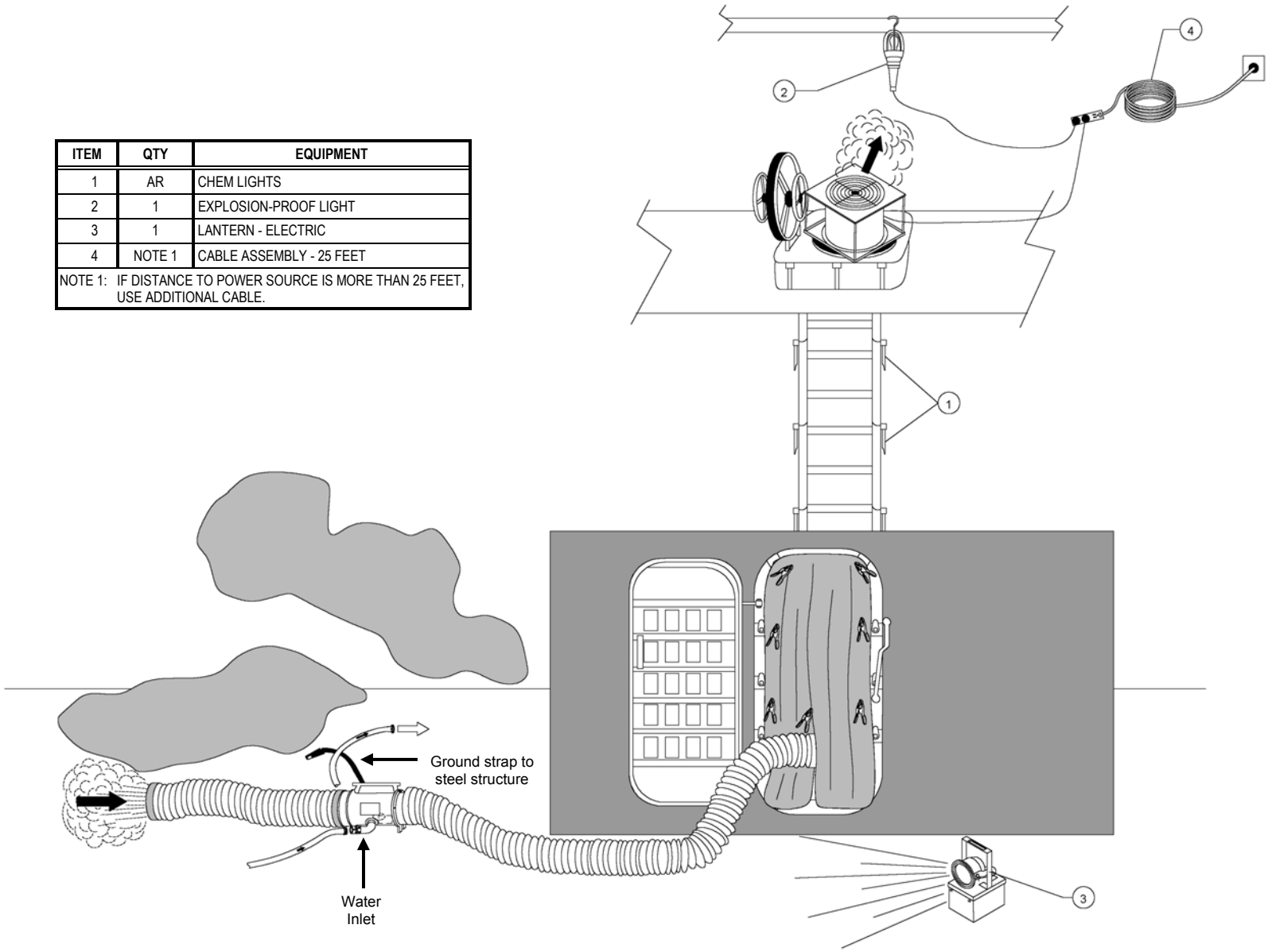


ITEM	QTY	EQUIPMENT
1	1	1 CABLE ASSEMBLY - 25 FEET TRIPLE OUTLET
2	1	CABLE ASSEMBLY - 50 FEET
3	1 BOX	1 WAND LIGHT, CHEMICAL - YELLOW (BOX OF 10)
4	1	LIGHT - EXTENSION 50 FT - EXPLOSION-PROOF
5	1	LANTERN - ELECTRIC BATTERY - RECHARGEABLE

EMERGENCY LIGHTING EVOLUTION - SKETCH #001
Emergency Lighting Equipment

ITEM	QTY	EQUIPMENT
1	AR	CHEM LIGHTS
2	1	EXPLOSION-PROOF LIGHT
3	1	LANTERN - ELECTRIC
4	NOTE 1	CABLE ASSEMBLY - 25 FEET
NOTE 1: IF DISTANCE TO POWER SOURCE IS MORE THAN 25 FEET, USE ADDITIONAL CABLE.		

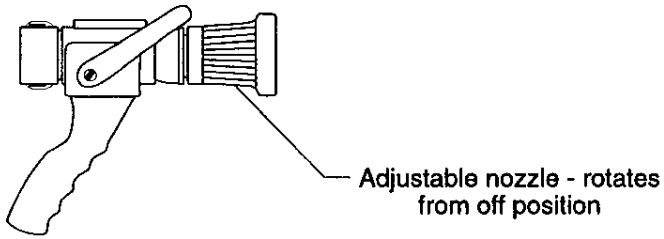


EMERGENCY LIGHTING EVOLUTION - SKETCH #002
Cables, Emergency Lights, Chem Lights and Portable Lantern in Use

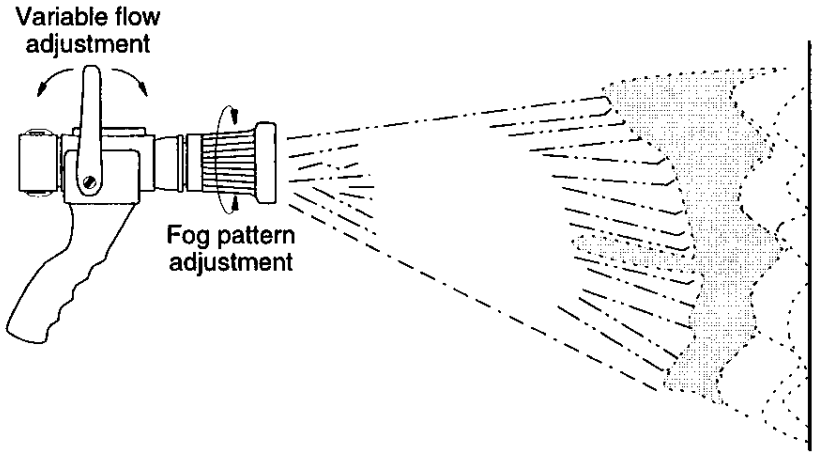
DAMAGE CONTROL LAYOUT SKETCHES

SECTION 7 - FIREHOSES/FITTINGS EVOLUTION

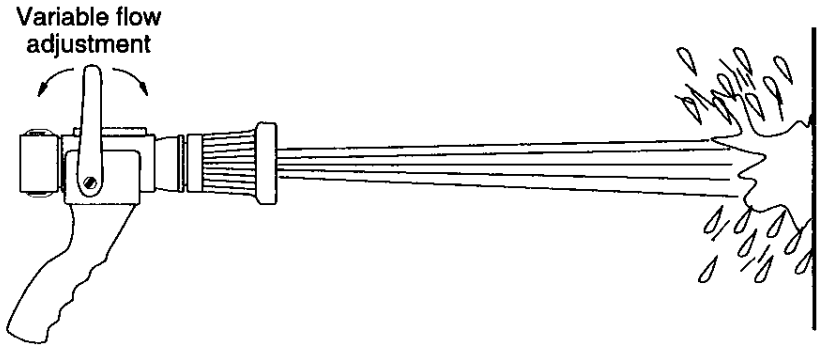
SHUT POSITION



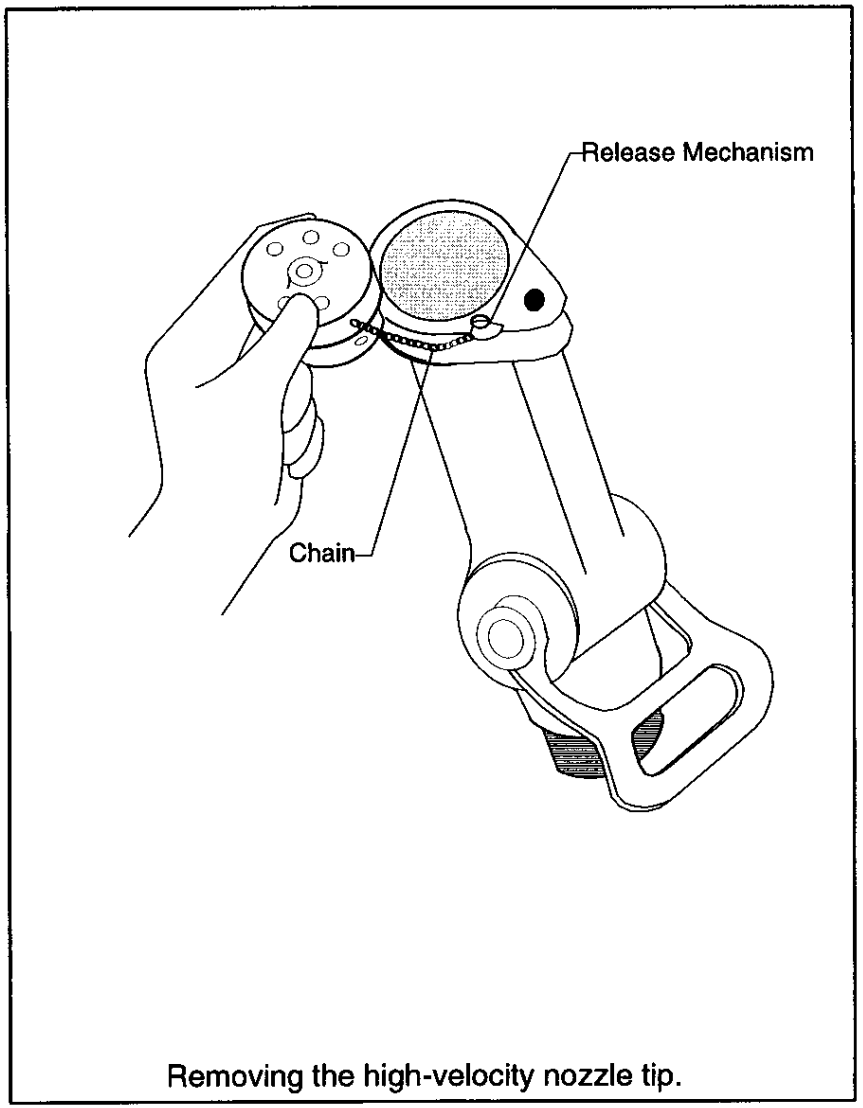
FOG PATTERN = 0-90 DEGREES



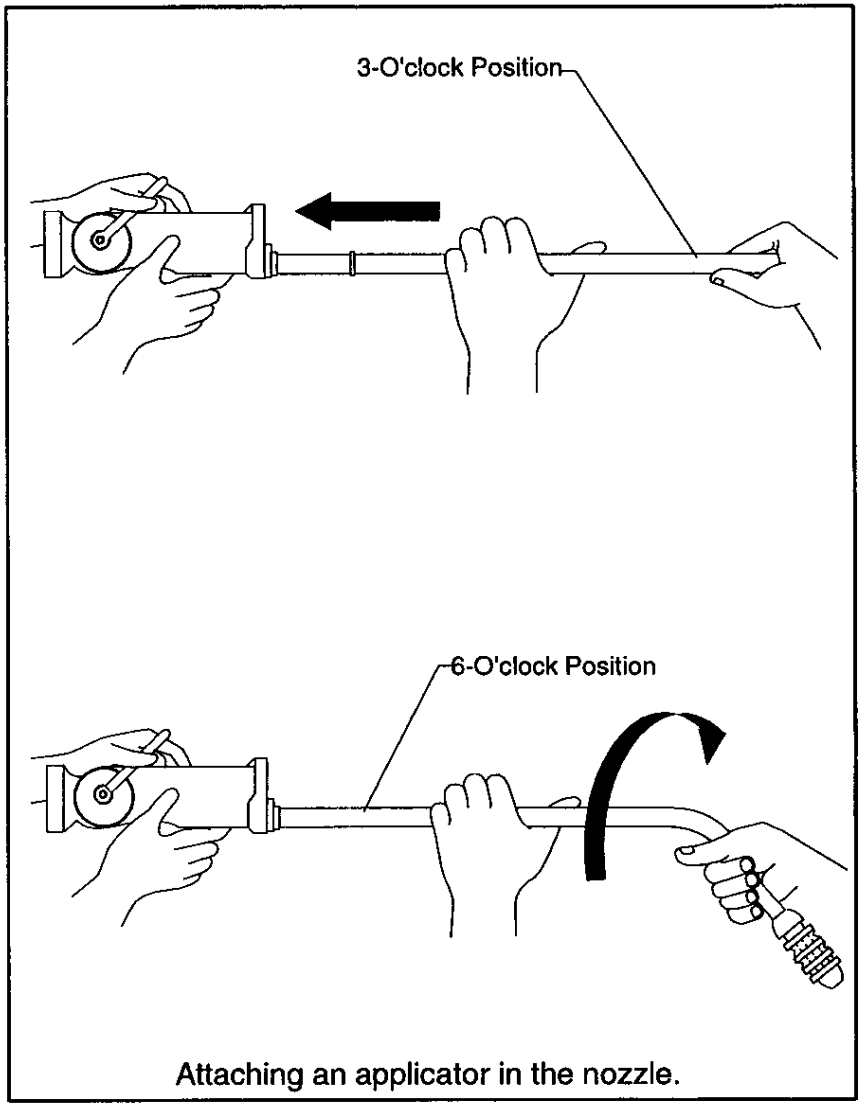
STRAIGHT STREAM PATTERN



FIREHOSES/FITTINGS EVOLUTION - SKETCH #001
Operating Positions for Navy 1-1/2" Vari-Nozzles



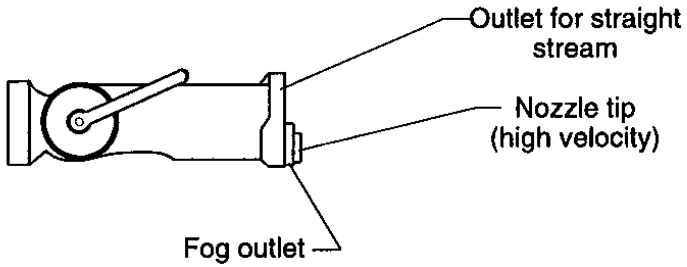
Removing the high-velocity nozzle tip.



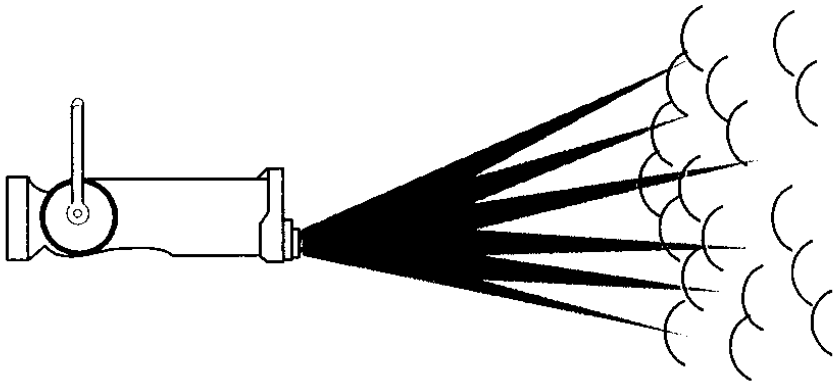
Attaching an applicator in the nozzle.

FIREHOSES/FITTINGS EVOLUTION - SKETCH #002
Using Nozzle Tip and Applicator

SHUT POSITION

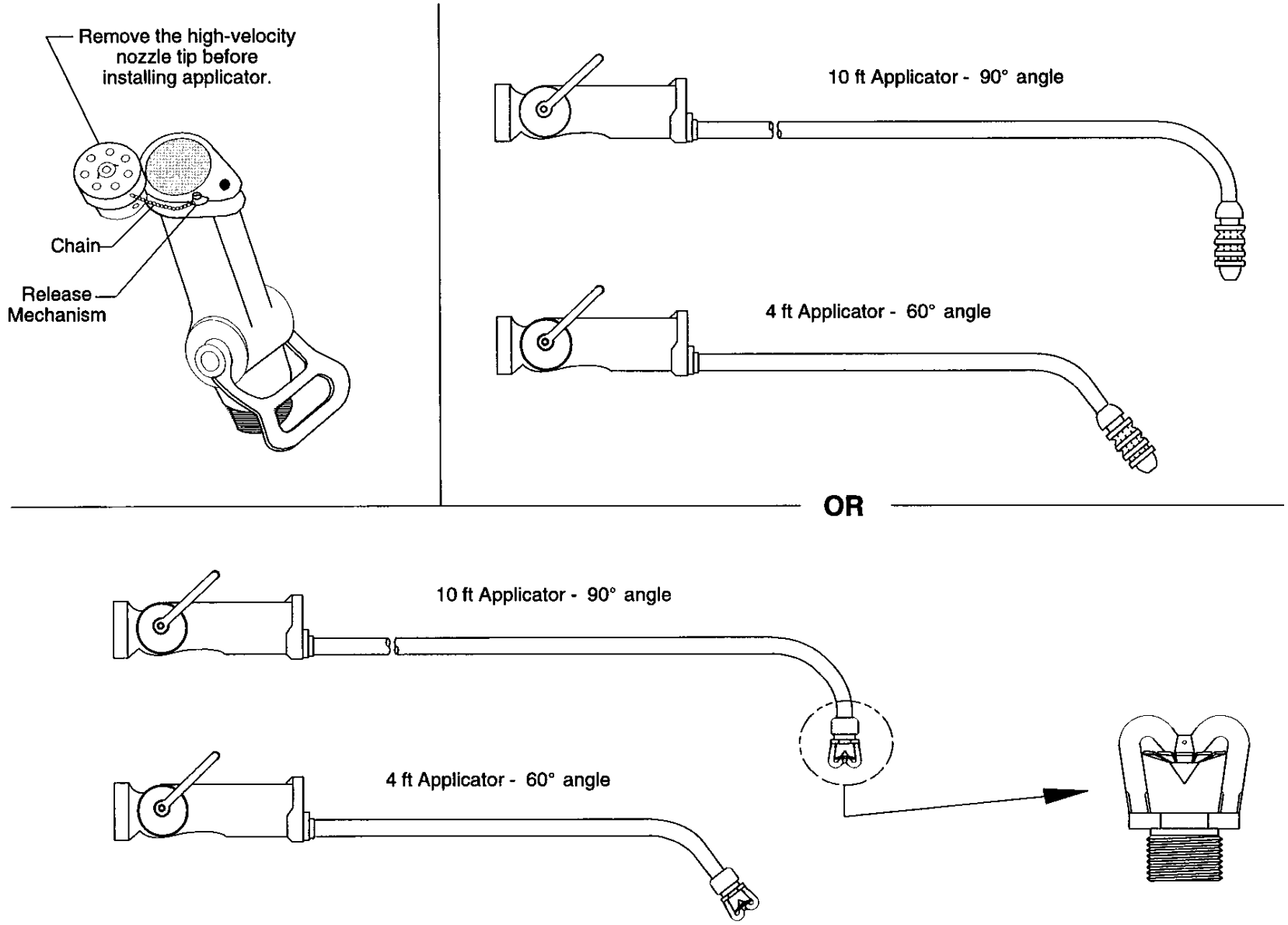


FOG POSITION



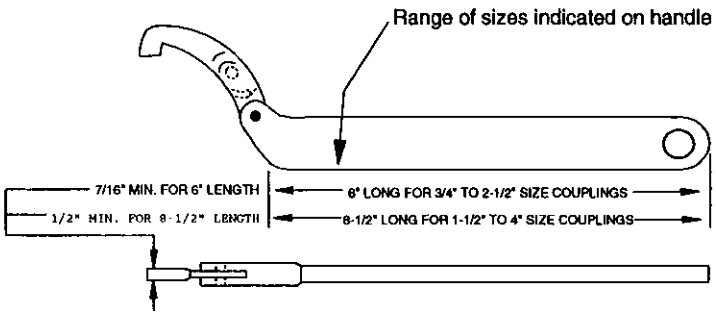
SOLID-STREAM POSITION

FIREHOSES/FITTINGS EVOLUTION - SKETCH #003
Operating Positions for Navy All-Purpose 1-1/2" Nozzles Used at High Velocity

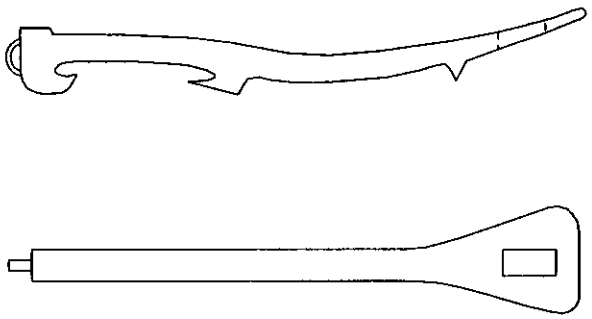


FIREHOSES/FITTINGS EVOLUTION - SKETCH #004
Navy All-Purpose 1-1/2" Nozzles With Fog Applicators

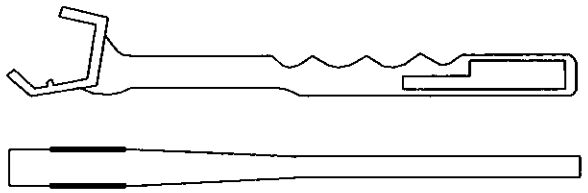
ADJUSTABLE SPANNER WRENCH



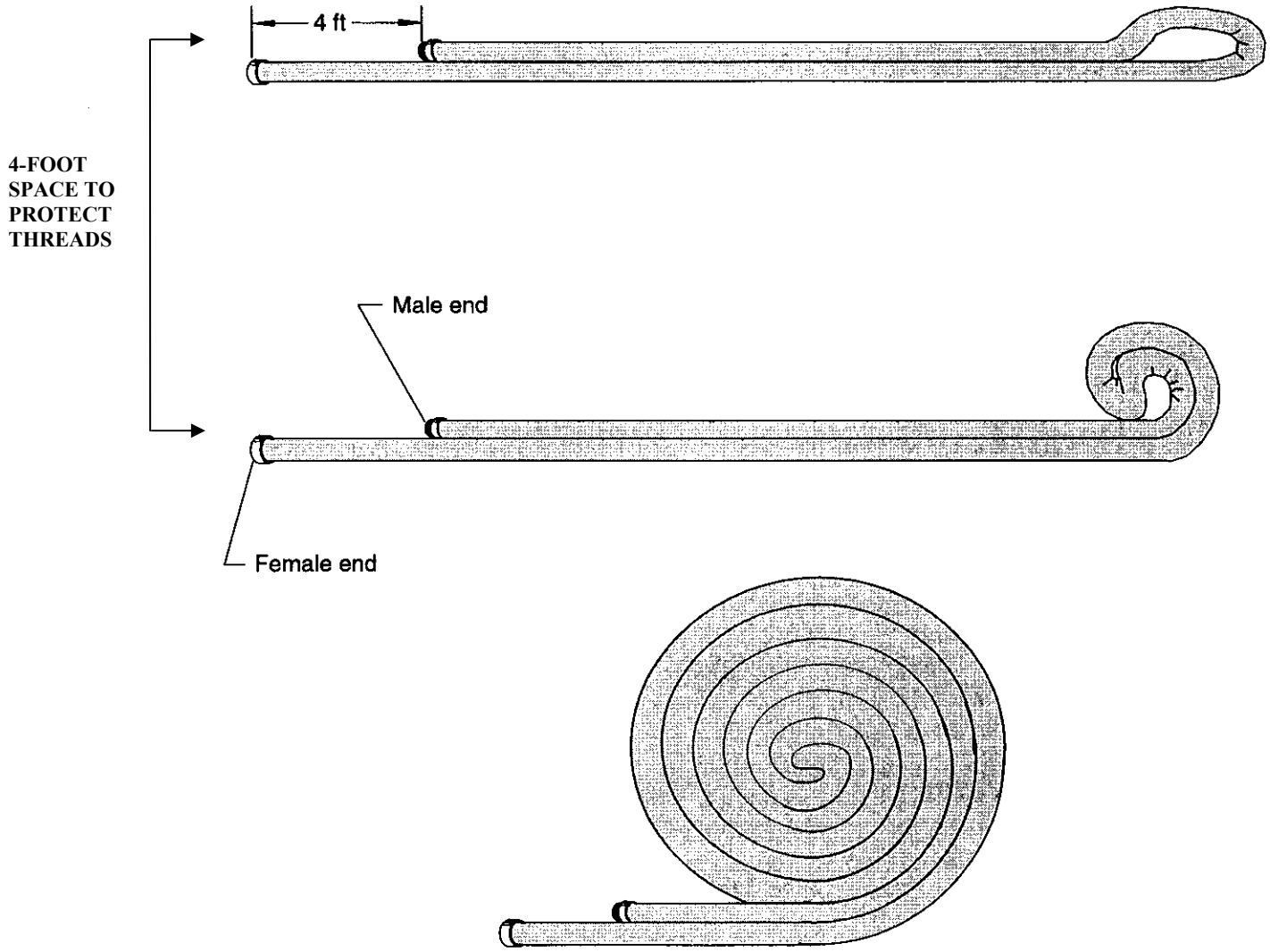
NAVY MULTI-PURPOSE SPANNER WRENCH



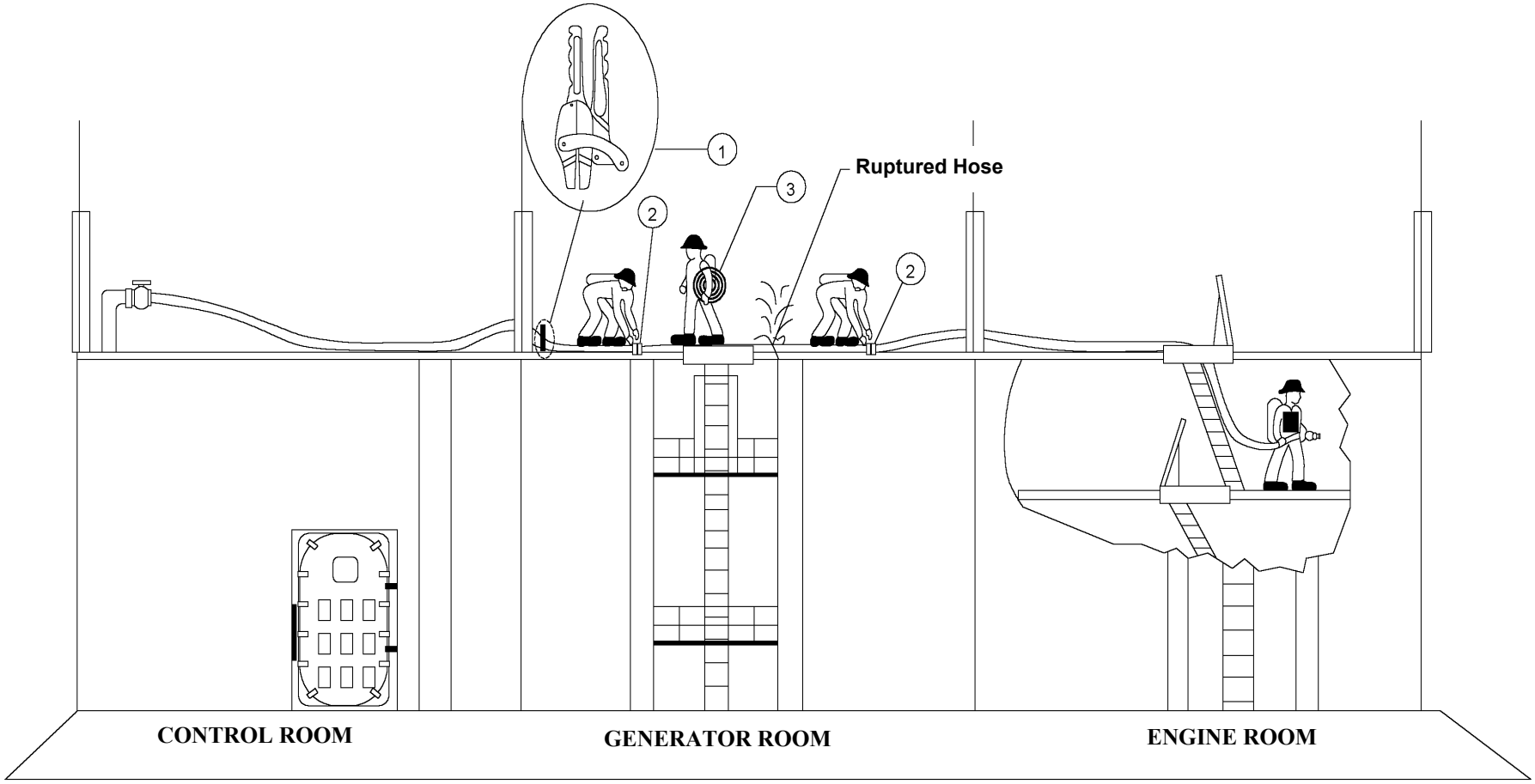
NAVY STANDARD SPANNER WRENCH



FIREHOSES/FITTINGS EVOLUTION - SKETCH #005
Spanner Wrenches



FIREHOSES/FITTINGS EVOLUTION - SKETCH #006
Preparing Firehose for Storage

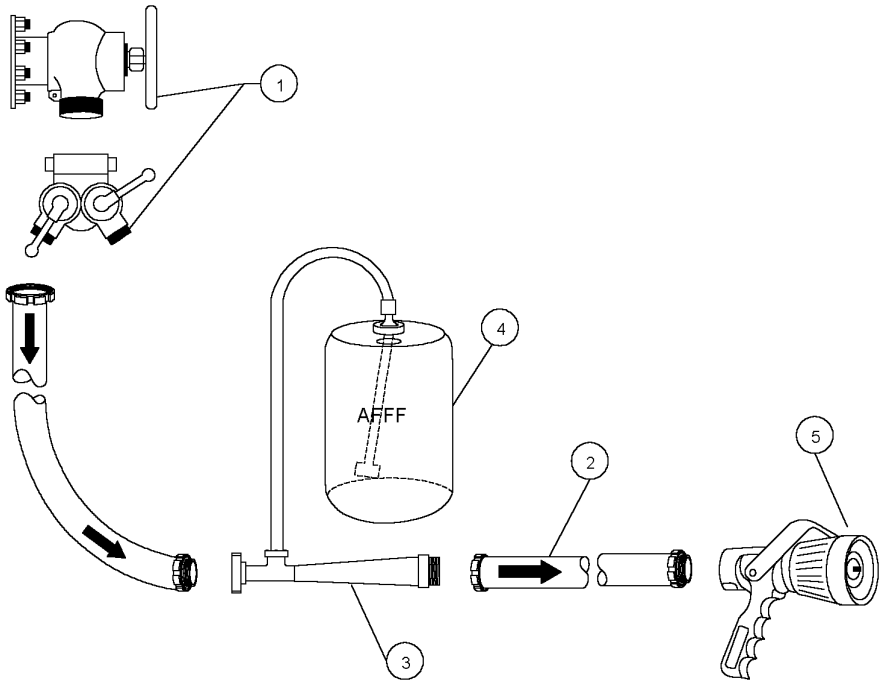


ITEM	QTY	EQUIPMENT
1	1	2-1/2" HOSE CLAMP
2	2	SPANNER WRENCH
3	1	1-1/2" X 50' FIREHOSE (REPLACEMENT ONLY)

FIREHOSES/FITTINGS EVOLUTION - SKETCH #007
Replacing Ruptured Fire Hose Using 2-1/2" Hose Clamp

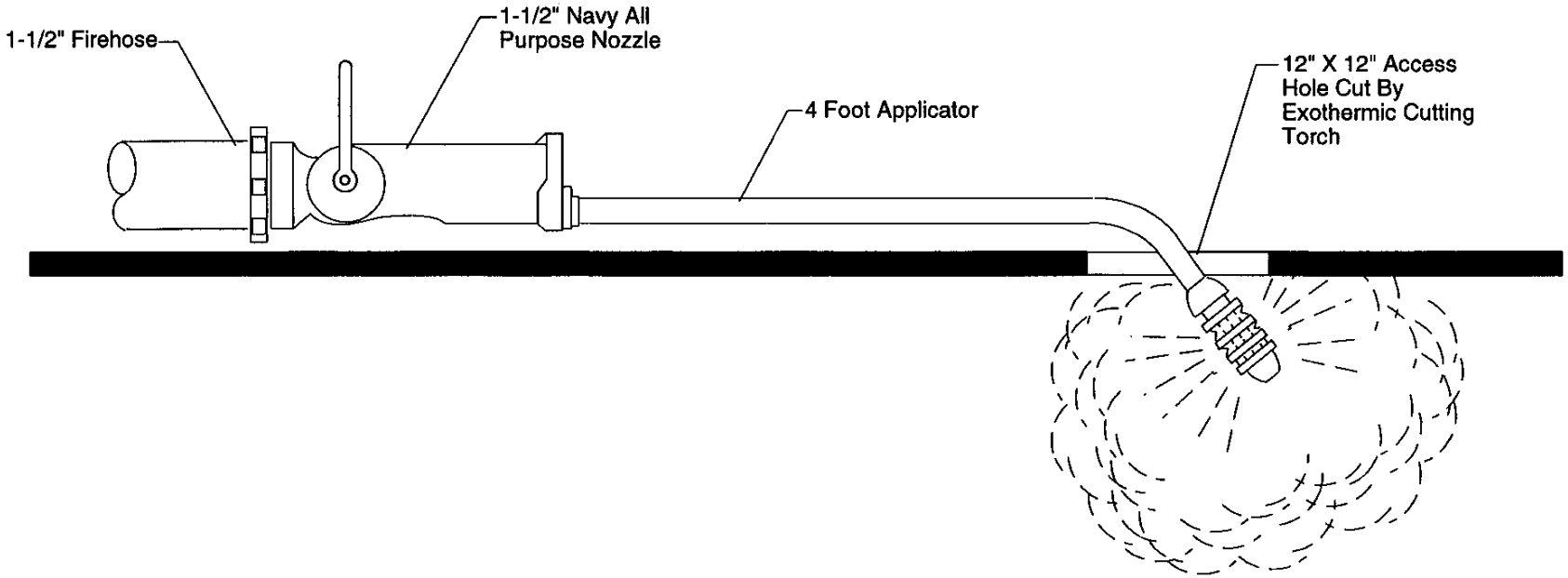
DAMAGE CONTROL LAYOUT SKETCHES

SECTION 8 - FIREFIGHTING EVOLUTION

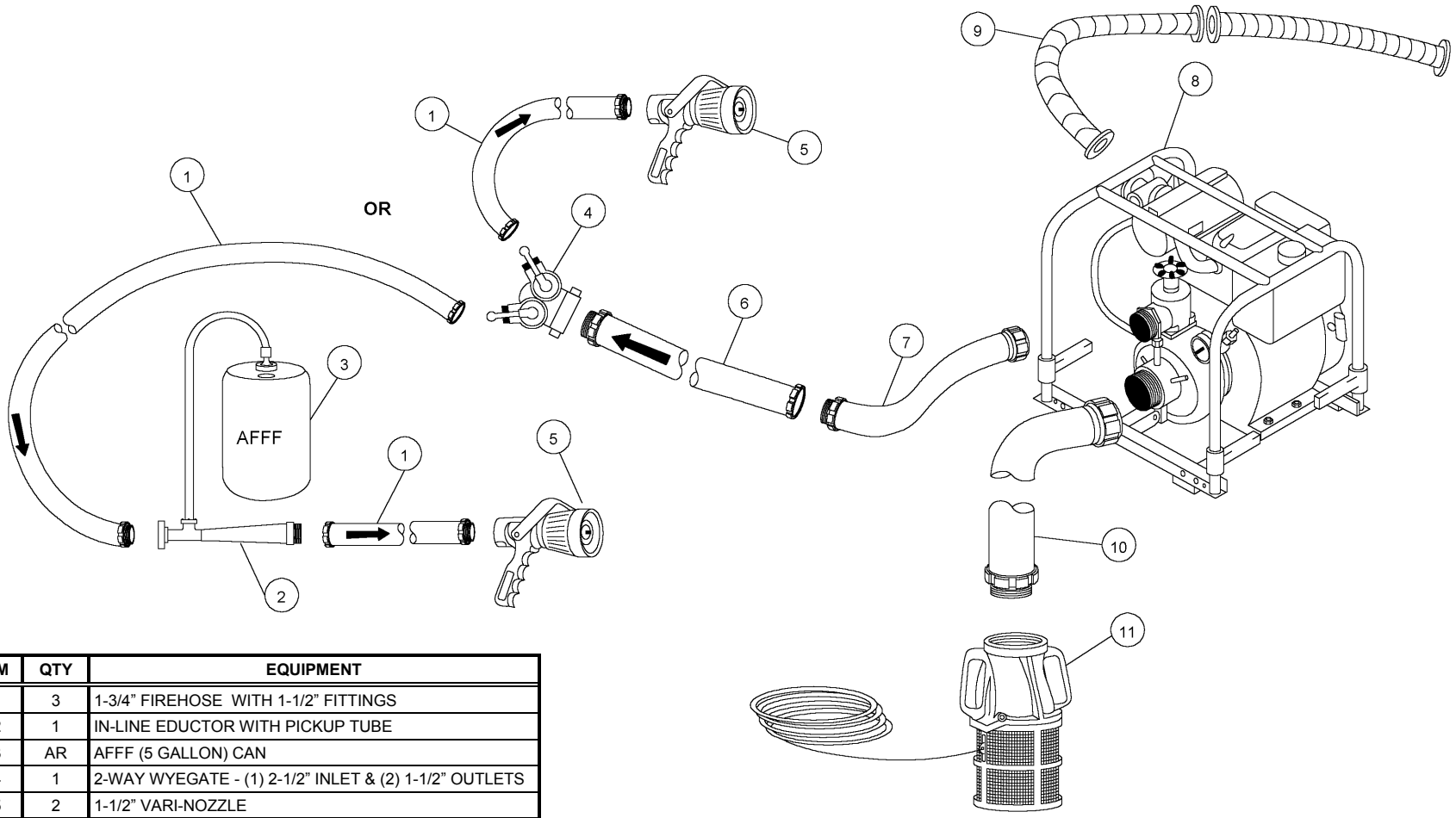


ITEM	QTY	EQUIPMENT
1	1	FIREPLUG WITH WYEGATE PROVIDING 2-1/2” OUTLET
2	2 OR 3	1-1/2” FIREHOUSE (MAXIMUM 150 FEET)
3	1	IN-LINE EDUCTOR WITH PICKUP TUBE
4	AR	AFFF (5 GAL) CAN
5	1	1-1/2” VARI-NOZZLE

FIREFIGHTING EVOLUTION - SKETCH #001
Using Portable AFFF (In-Line) Eductor/Firemain

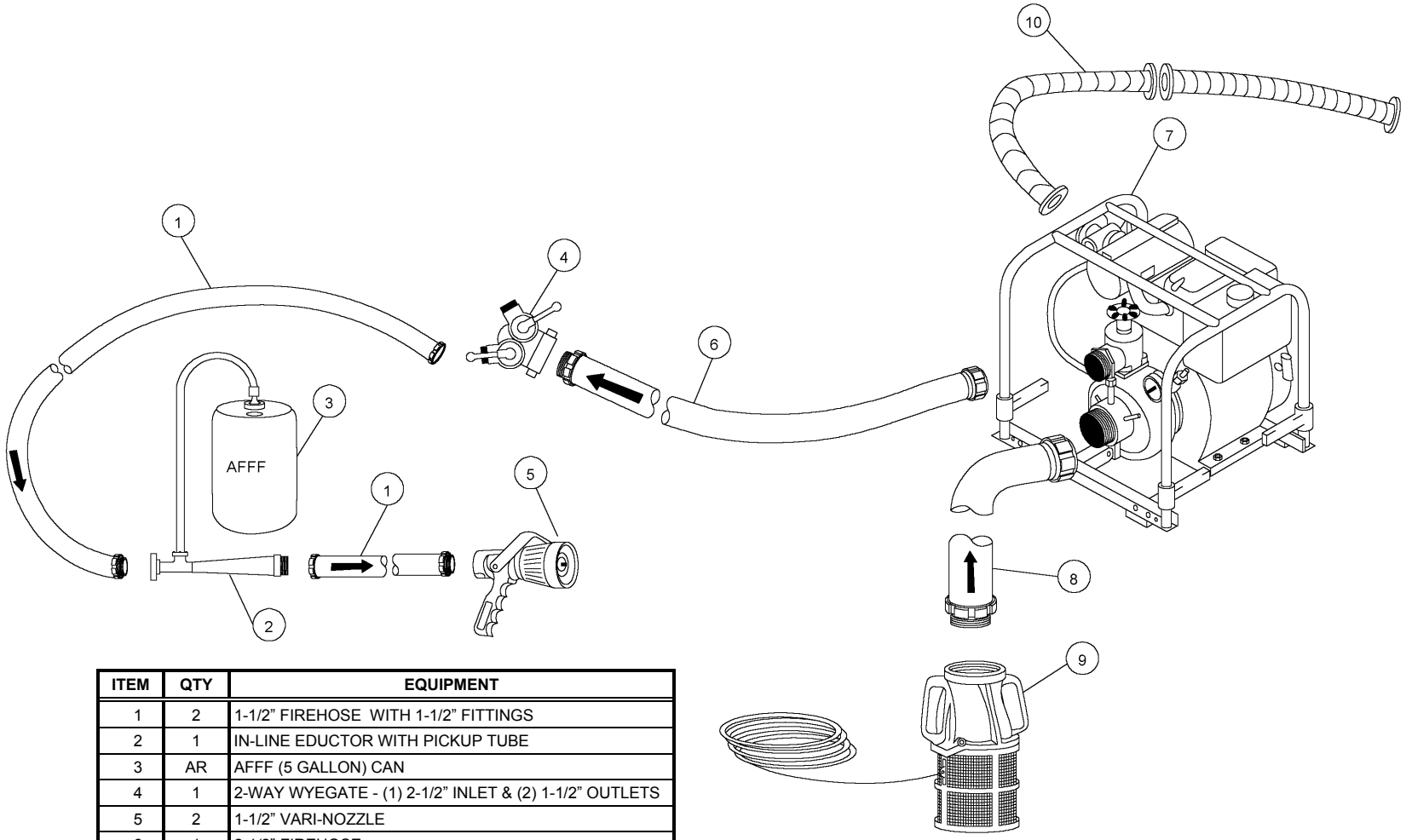


FIREFIGHTING EVOLUTION - SKETCH #002
Using NAP Nozzle and 4 Foot Applicator



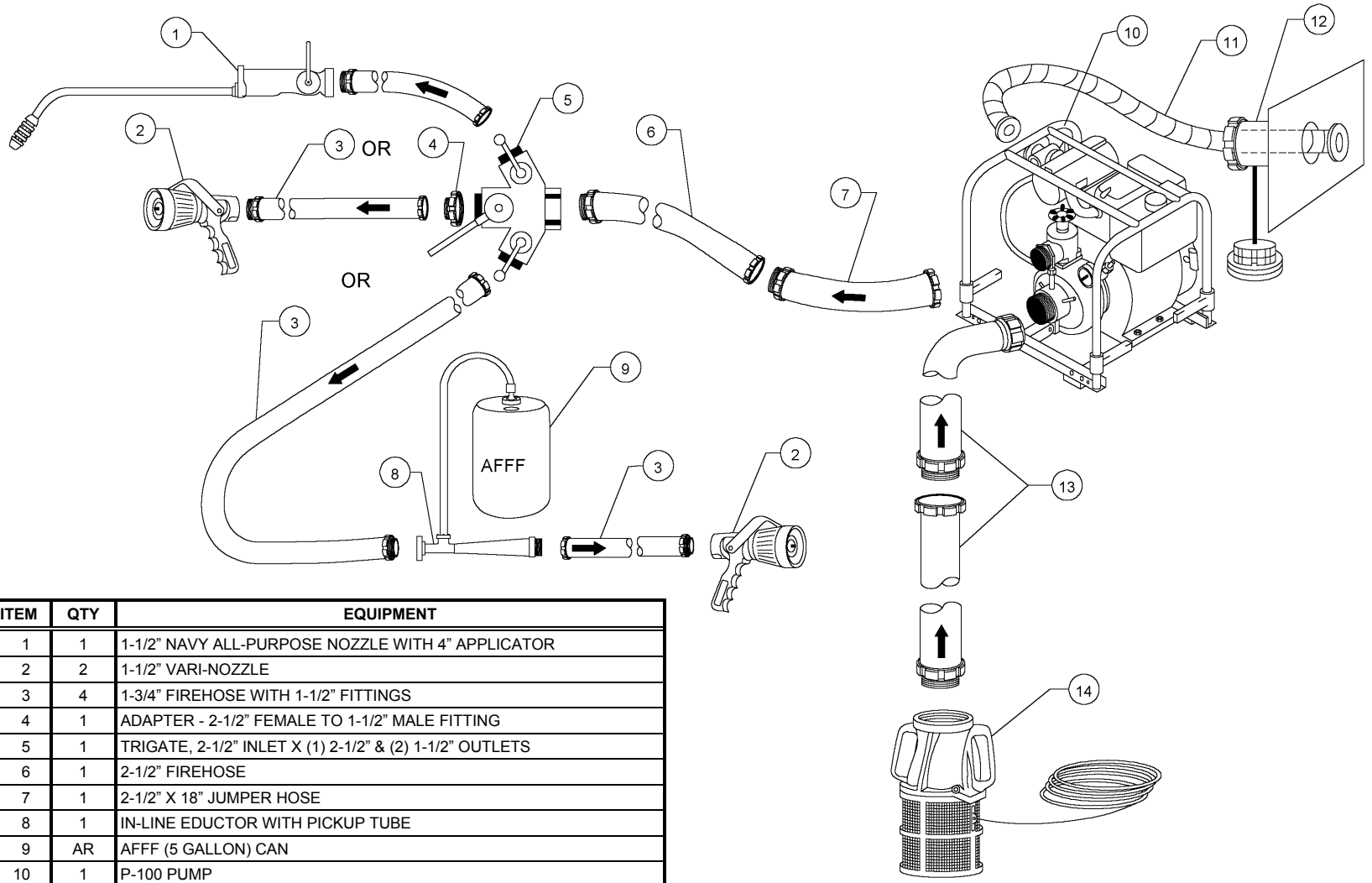
ITEM	QTY	EQUIPMENT
1	3	1-3/4” FIREHOSE WITH 1-1/2” FITTINGS
2	1	IN-LINE EDUCTOR WITH PICKUP TUBE
3	AR	AFFF (5 GALLON) CAN
4	1	2-WAY WYEGATE - (1) 2-1/2” INLET & (2) 1-1/2” OUTLETS
5	2	1-1/2” VARI-NOZZLE
6	1	2-1/2” FIREHOSE
7	1	2-1/2” X 18” JUMPER HOSE
8	1	P-100 PUMP
9	2	2” X 10’ EXHAUST HOSE
10	Note 1	3” X 10’ HARD RUBBER SUCTION HOSE
11	1	VALVE, FOOT STRAINER WITH 1/2” X 55’ RELEASE LINE
Note 1: Maximum of two, but if two sections of hose are used, a 2” x 50’ handling line is required		

FIREFIGHTING EVOLUTION - SKETCH #003
Using P-100 Pump and In-Line Eductor Using 1-3/4” Firehose



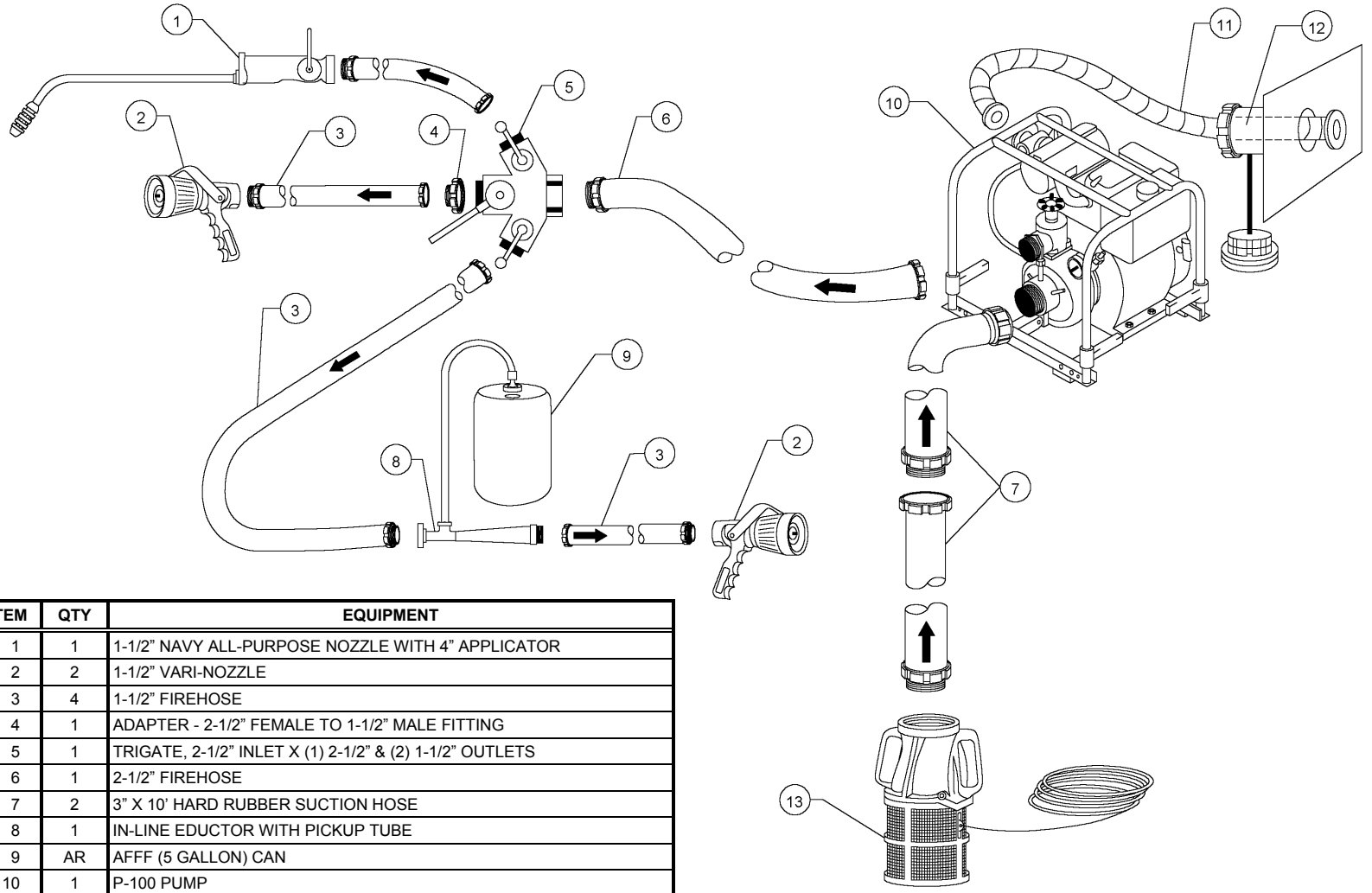
ITEM	QTY	EQUIPMENT
1	2	1-1/2" FIREHOSE WITH 1-1/2" FITTINGS
2	1	IN-LINE EDUCTOR WITH PICKUP TUBE
3	AR	AFFF (5 GALLON) CAN
4	1	2-WAY WYEGATE - (1) 2-1/2" INLET & (2) 1-1/2" OUTLETS
5	2	1-1/2" VARI-NOZZLE
6	1	2-1/2" FIREHOSE
7	1	P-100 PUMP
8	Note 1	3" X 10" HARD SUCTION HOSE
9	1	VALVE, FOOT STRAINER WITH 1/2" X 55' RELEASE LINE
10	2	2" X 10' EXHAUST HOSE
Note 1:		Maximum of two, but if two sections of hose are used, a 2" x 50' handling line is required

FIREFIGHTING EVOLUTION - SKETCH #004
Using P-100 Pump and In-Line Eductor



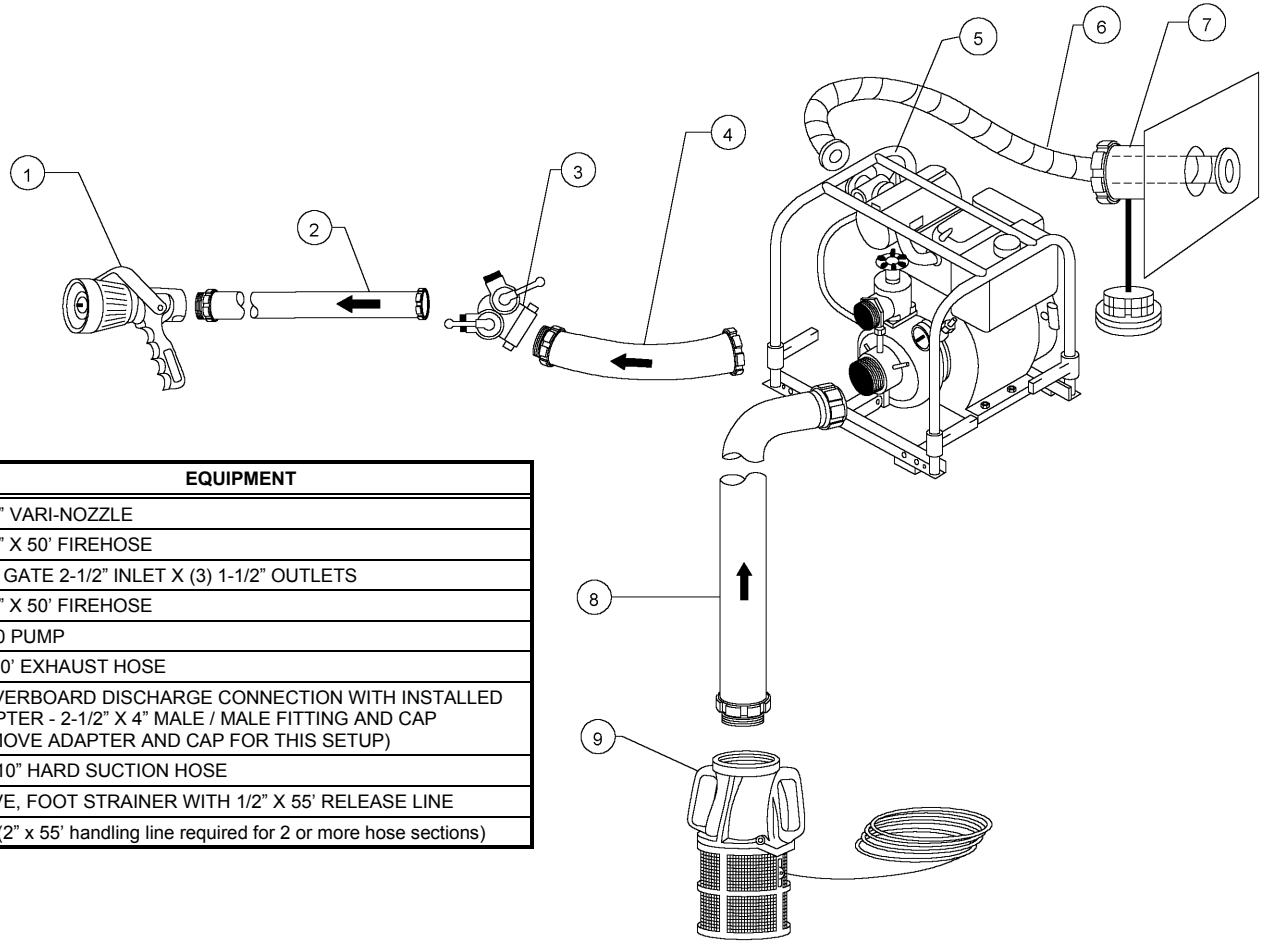
ITEM	QTY	EQUIPMENT
1	1	1-1/2” NAVY ALL-PURPOSE NOZZLE WITH 4” APPLICATOR
2	2	1-1/2” VARI-NOZZLE
3	4	1-3/4” FIREHOSE WITH 1-1/2” FITTINGS
4	1	ADAPTER - 2-1/2” FEMALE TO 1-1/2” MALE FITTING
5	1	TRIGATE, 2-1/2” INLET X (1) 2-1/2” & (2) 1-1/2” OUTLETS
6	1	2-1/2” FIREHOSE
7	1	2-1/2” X 18” JUMPER HOSE
8	1	IN-LINE EDUCTOR WITH PICKUP TUBE
9	AR	AFFF (5 GALLON) CAN
10	1	P-100 PUMP
11	2	2” X 10’ EXHAUST HOSE
12	1	4” OVERBOARD DISCHARGE CONNECTION WITH INSTALLED ADAPTER - 4” MALE TO 2-1/2” FEMALE FITTING AND CAP (REMOVE AS UNIT)
13	2	3” X 10’ HARD RUBBER SUCTION HOSE
14	1	VALVE, FOOT STRAINER WITH 1/2” X 55’ RELEASE LINE

FIREFIGHTING EVOLUTION - SKETCH #005
Using P-100 Pump Using 1-3/4” Firehose



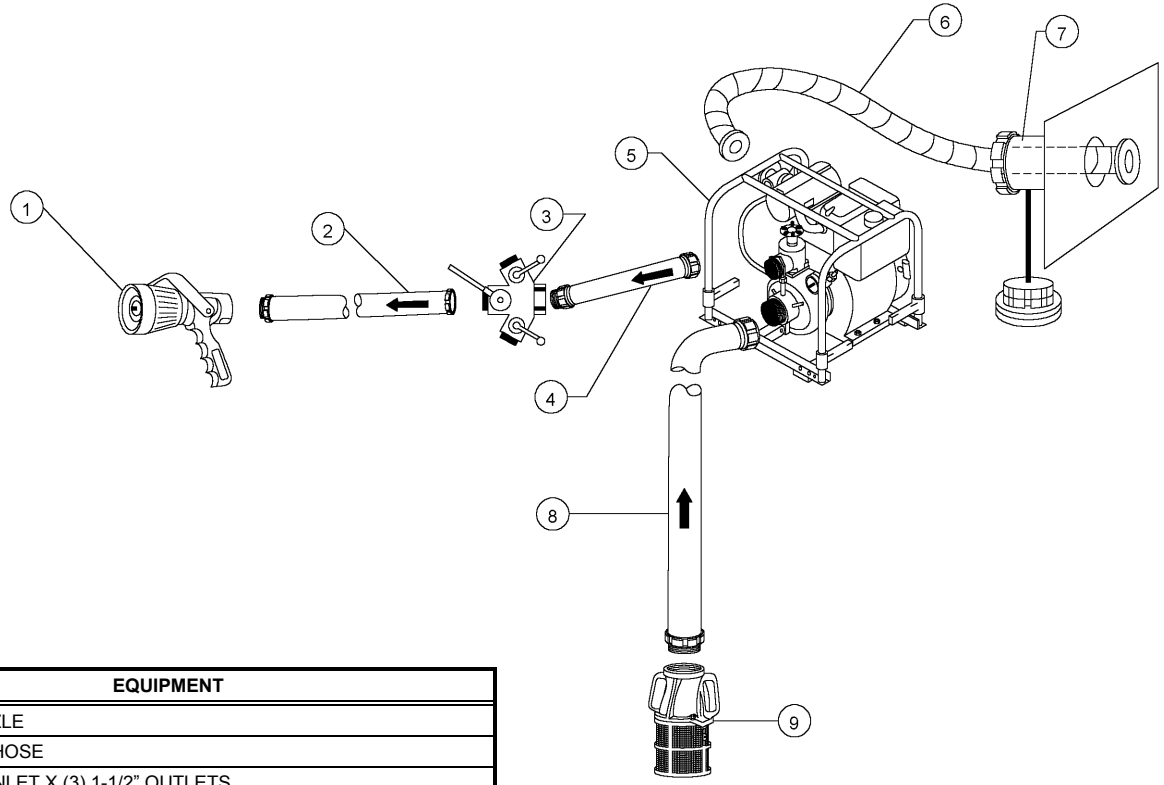
ITEM	QTY	EQUIPMENT
1	1	1-1/2” NAVY ALL-PURPOSE NOZZLE WITH 4” APPLICATOR
2	2	1-1/2” VARI-NOZZLE
3	4	1-1/2” FIREHOSE
4	1	ADAPTER - 2-1/2” FEMALE TO 1-1/2” MALE FITTING
5	1	TRIGATE, 2-1/2” INLET X (1) 2-1/2” & (2) 1-1/2” OUTLETS
6	1	2-1/2” FIREHOSE
7	2	3” X 10’ HARD RUBBER SUCTION HOSE
8	1	IN-LINE EDUCTOR WITH PICKUP TUBE
9	AR	AFFF (5 GALLON) CAN
10	1	P-100 PUMP
11	2	2” X 10’ EXHAUST HOSE
12	1	4” OVERBOARD DISCHARGE CONNECTION WITH INSTALLED ADAPTER - 4” MALE TO 2-1/2” FEMALE FITTING AND CAP (REMOVE AS UNIT)
13	1	VALVE, FOOT STRAINER WITH 1/2” X 55’ RELEASE LINE

FIREFIGHTING EVOLUTION - SKETCH #006
Using P-100 Pump and Various Applicators



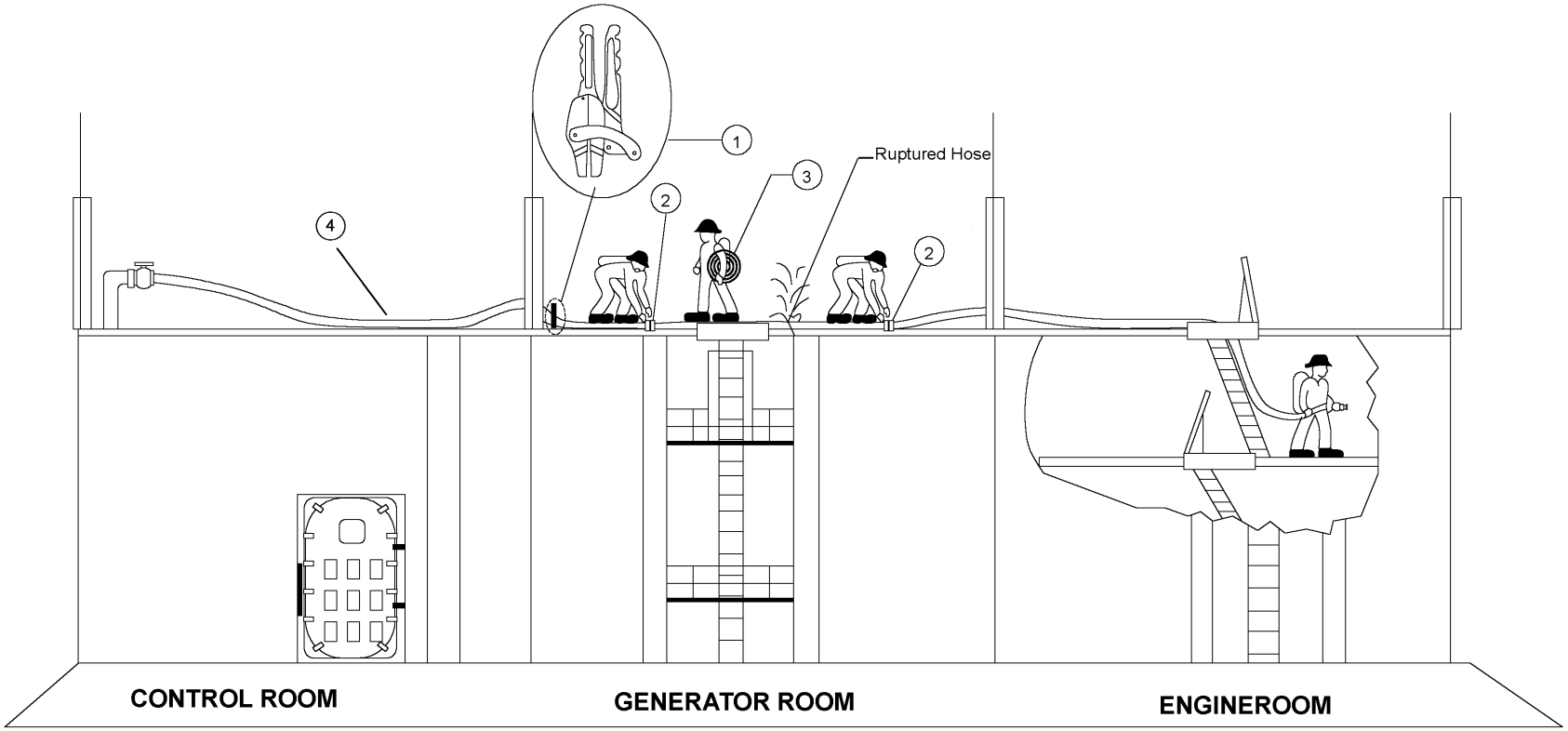
ITEM	QTY	EQUIPMENT
1	3	1-1/2” VARI-NOZZLE
2	3	1-3/4” X 50’ FIREHOSE
3	1	WYE GATE 2-1/2” INLET X (3) 1-1/2” OUTLETS
4	1	2-1/2” X 50’ FIREHOSE
5	1	P-100 PUMP
6	2	2”X 10’ EXHAUST HOSE
7	1	4” OVERBOARD DISCHARGE CONNECTION WITH INSTALLED ADAPTER - 2-1/2” X 4” MALE / MALE FITTING AND CAP (REMOVE ADAPTER AND CAP FOR THIS SETUP)
8	Note 1	3” X 10” HARD SUCTION HOSE
9	1	VALVE, FOOT STRAINER WITH 1/2” X 55’ RELEASE LINE
Note 1: As required (2” x 55’ handling line required for 2 or more hose sections)		

FIREFIGHTING EVOLUTION - SKETCH #007
Using P-100 Pump Taking Suction from Overboard or Flooded Compartment Using 1-3/4” Firehose



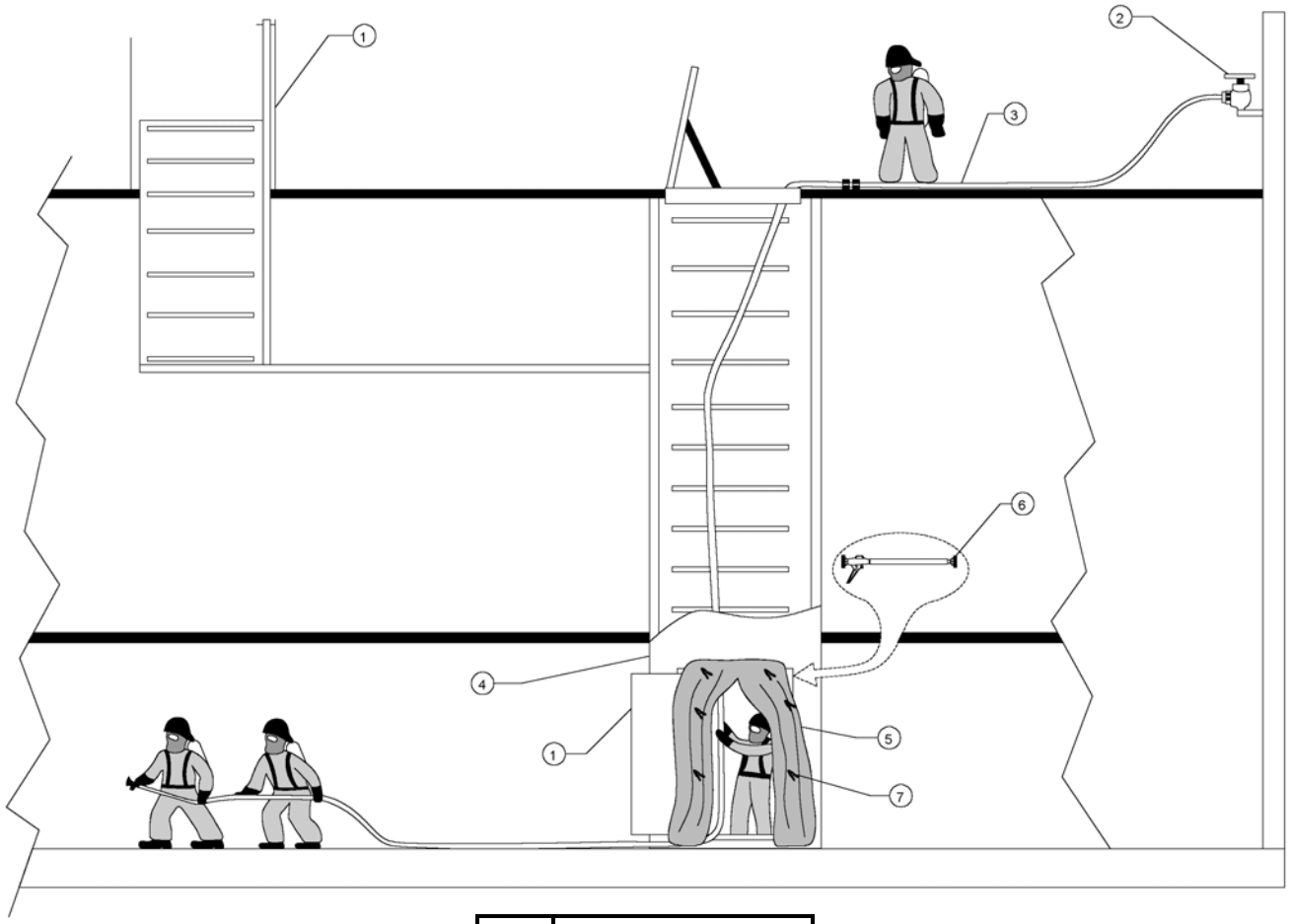
ITEM	QTY	EQUIPMENT
1	1	1-1/2” VARI-NOZZLE
2	1	1-1/2” X 50’ FIREHOSE
3	1	TRIGATE 2-1/2” INLET X (3) 1-1/2” OUTLETS
4	1	2-1/2” X 50’ FIREHOSE
5	1	P-100 PUMP
6	2	2” X 10’ EXHAUST HOSE
7	1	4” OVERBOARD DISCHARGE CONNECTION WITH INSTALLED ADAPTER - 2-1/2” X 4” MALE / MALE FITTING AND CAP (REMOVE ADAPTER AND CAP FOR THIS SETUP)
8	Note 1	3” X 10’ HARD RUBBER SUCTION HOSE
9	1	VALVE, FOOT STRAINER WITH 1/2” X 50’ RELEASE LINE
Note 1: As required (2” x 55’ handling line required for two or more hose sections)		

FIREFIGHTING EVOLUTION - SKETCH #008
Using P-100 Pump Taking Suction from Overboard or Flooded Compartment



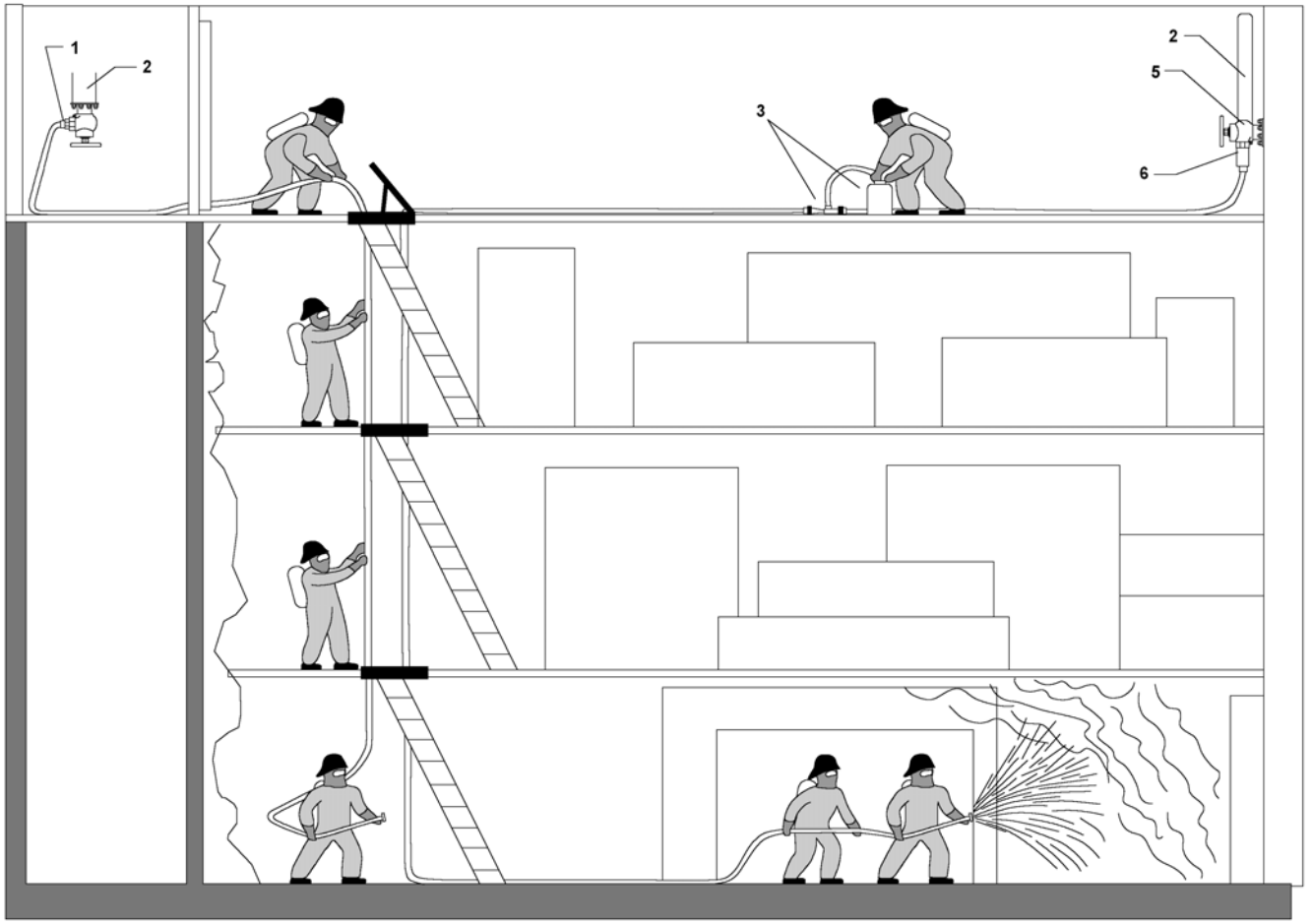
ITEM	QTY	EQUIPMENT
1	1	2-1/2” HOSE CLAMP
2	2	SPANNER WRENCH
3	1	2-1/2” X 50’ FIREHOSE (REPLACEMENT ONLY)
4	1	2-1/2” FIREHOSE

FIREFIGHTING EVOLUTION - SKETCH #009
Replacing Ruptured Firehose Using 2-1/2” Hose Clamp to Control Wild Firehose



ITEM	EQUIPMENT
1	ELLISON DOOR
2	1-1/2” FIRE PLUG
3	1-1/2” FIREHOSE
4	ESCAPE TRUNK
5	SMOKE CURTAIN
6	EXPANDABLE DOOR BAR
AR	SMOKE CLAMPS

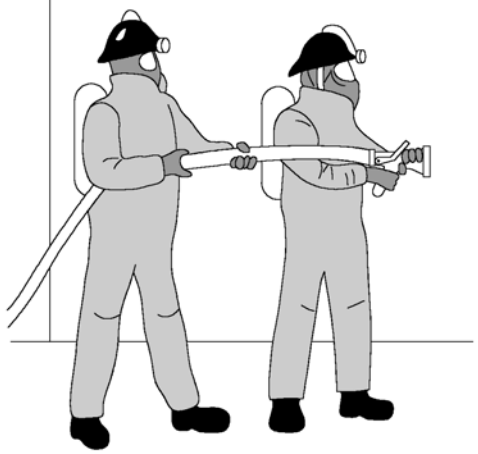
FIREFIGHTING EVOLUTION - SKETCH #010
Passing Through Escape Trunk



ITEM	EQUIPMENT
1	REDUCER 2-1/2" TO 1-1/2"
2	FIREMAIN SUPPLY PIPE
3	5 GALLON CAN AFFF AND PORTABLE AFF (IN-LINE) EDUCTOR
5	FIRE PLUG
6	WYE GATE

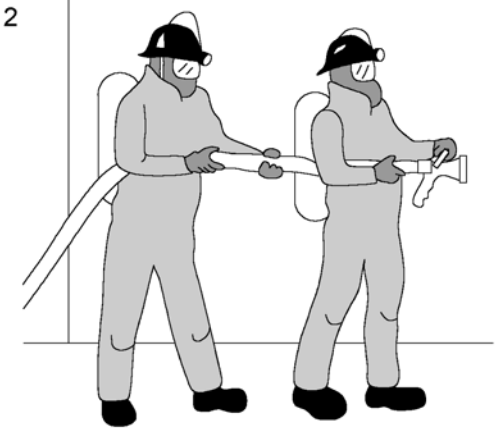
FIREFIGHTING EVOLUTION - SKETCH #011
Using Portable AFFF (In-Line) Eductor

1



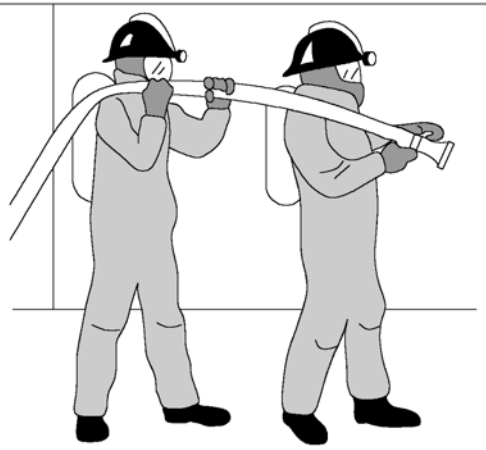
Over the arm, using pistol grip, grasping pattern shroud.

2



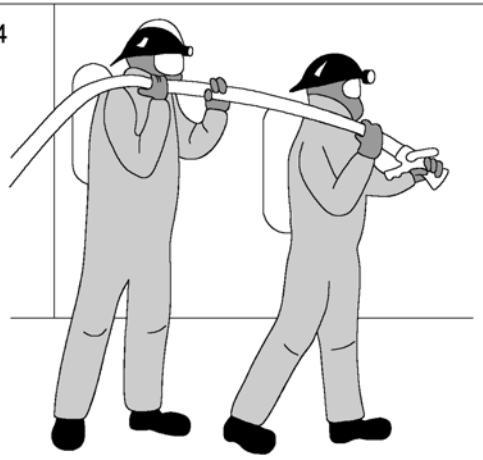
Under the arm, not using pistol grip, grasping shut off bail handle.

3



Over the shoulder, using pistol grip, grasping shut off bail handle.

4



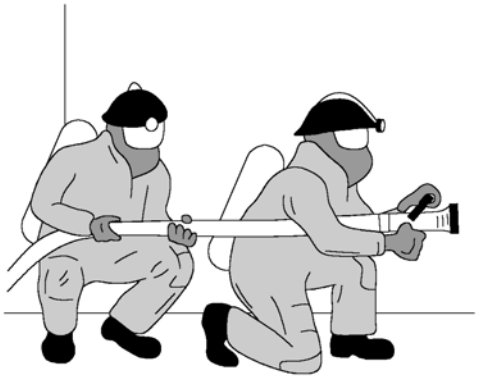
Over the shoulder, not using pistol grip, grasping pattern shroud.

FIREFIGHTING EVOLUTION - SKETCH #012
Hose Line and Nozzle Handling Methods (Sheet 1 of 2)

5

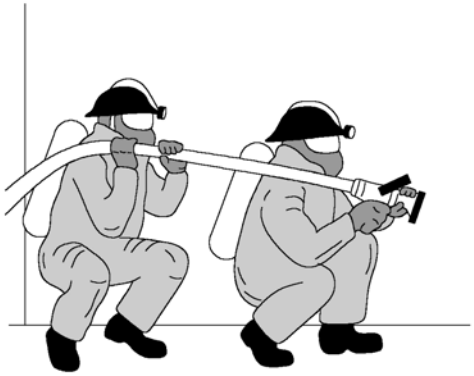
Under the arm, not using pistol grip, grasping the pattern shroud.

6



Under the arm, using pistol grip, grasping the shut off bail handle.

7

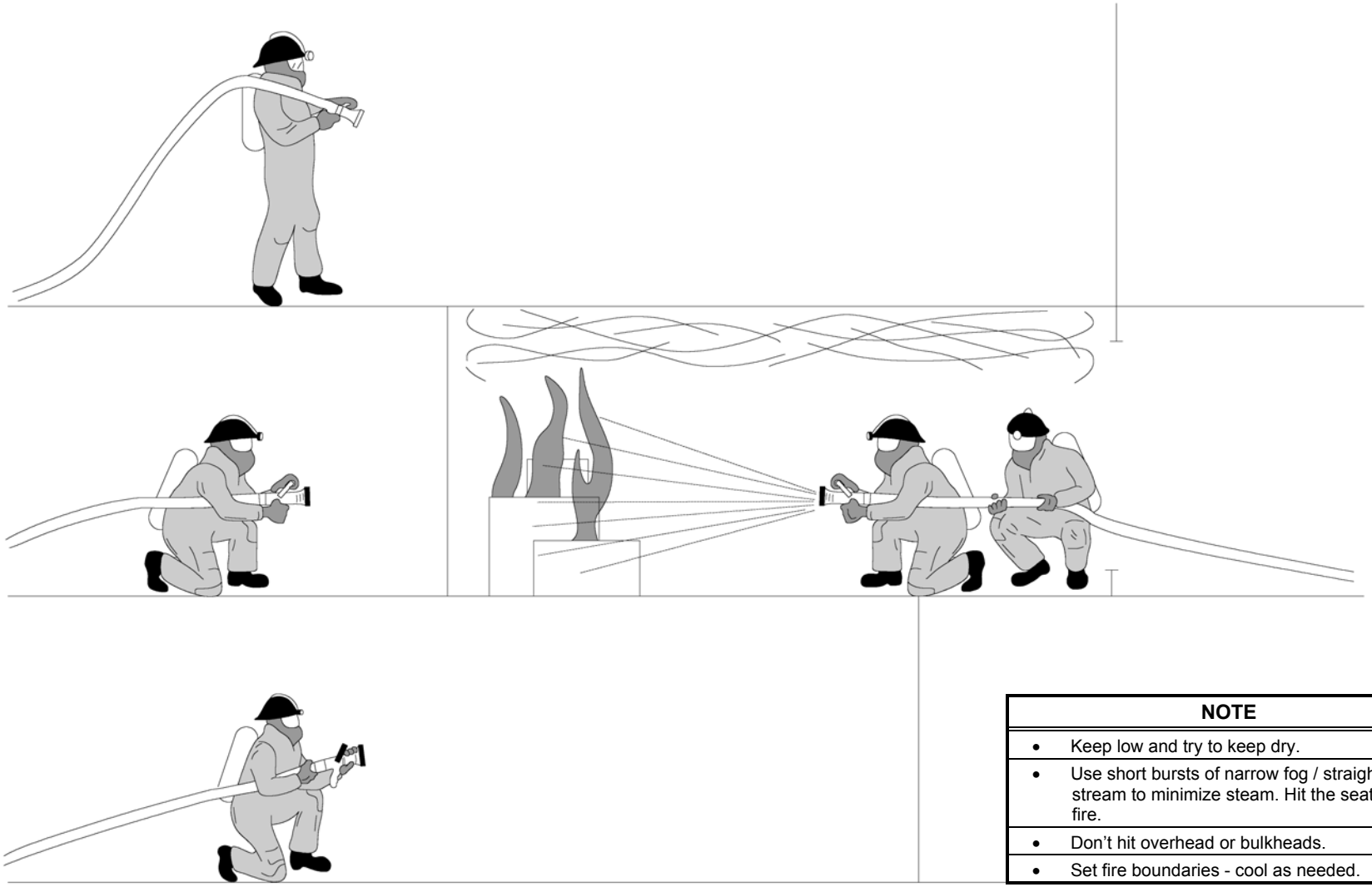


Over the shoulder, using the pistol grip, hand on pattern shroud, directing stream down.

8

Nozzleman over the shoulder, backup man under the arm, using pistol grip, hand on pattern shroud, directing stream upward.

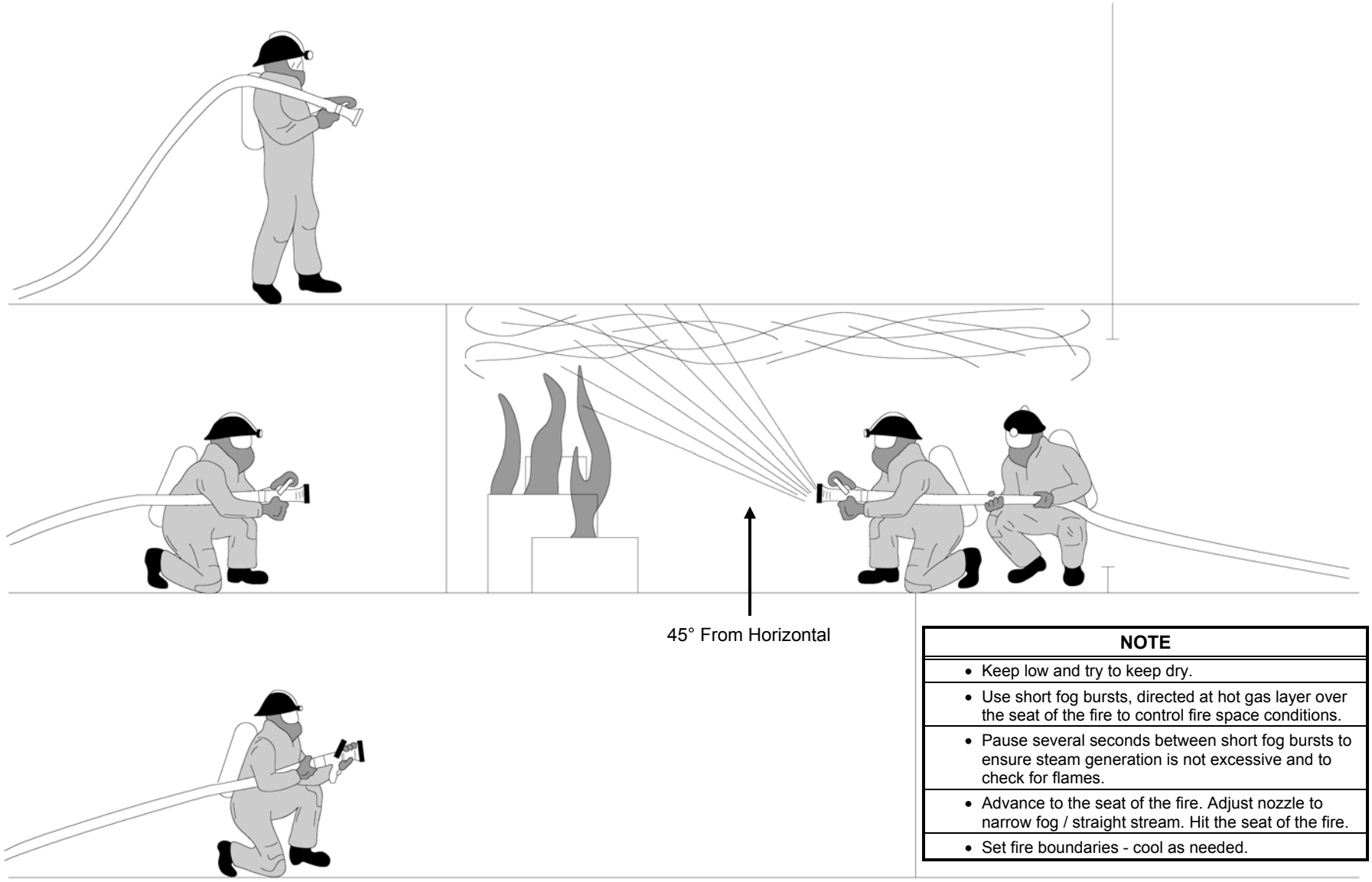
FIREFIGHTING EVOLUTION - SKETCH #012
Hose Line and Nozzle Handling Methods (Sheet 2 of 2)



NOTE
• Keep low and try to keep dry.
• Use short bursts of narrow fog / straight stream to minimize steam. Hit the seat of the fire.
• Don't hit overhead or bulkheads.
• Set fire boundaries - cool as needed.

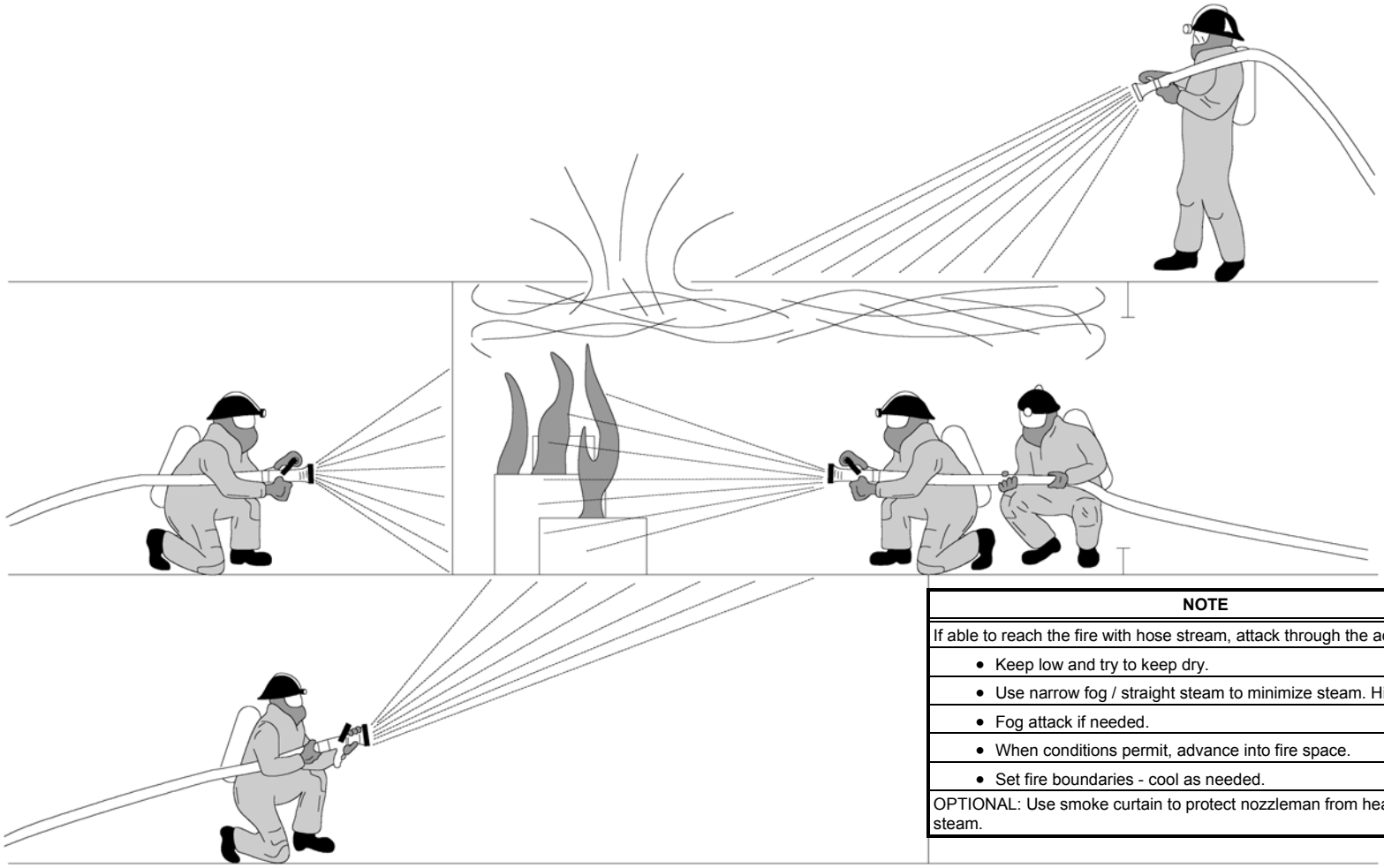
Preferred Method: Enter Space and Attack Fire Directly.

FIREFIGHTING EVOLUTION - SKETCH #013
Fire Attack - Direct Attack



NOTE
• Keep low and try to keep dry.
• Use short fog bursts, directed at hot gas layer over the seat of the fire to control fire space conditions.
• Pause several seconds between short fog bursts to ensure steam generation is not excessive and to check for flames.
• Advance to the seat of the fire. Adjust nozzle to narrow fog / straight stream. Hit the seat of the fire.
• Set fire boundaries - cool as needed.

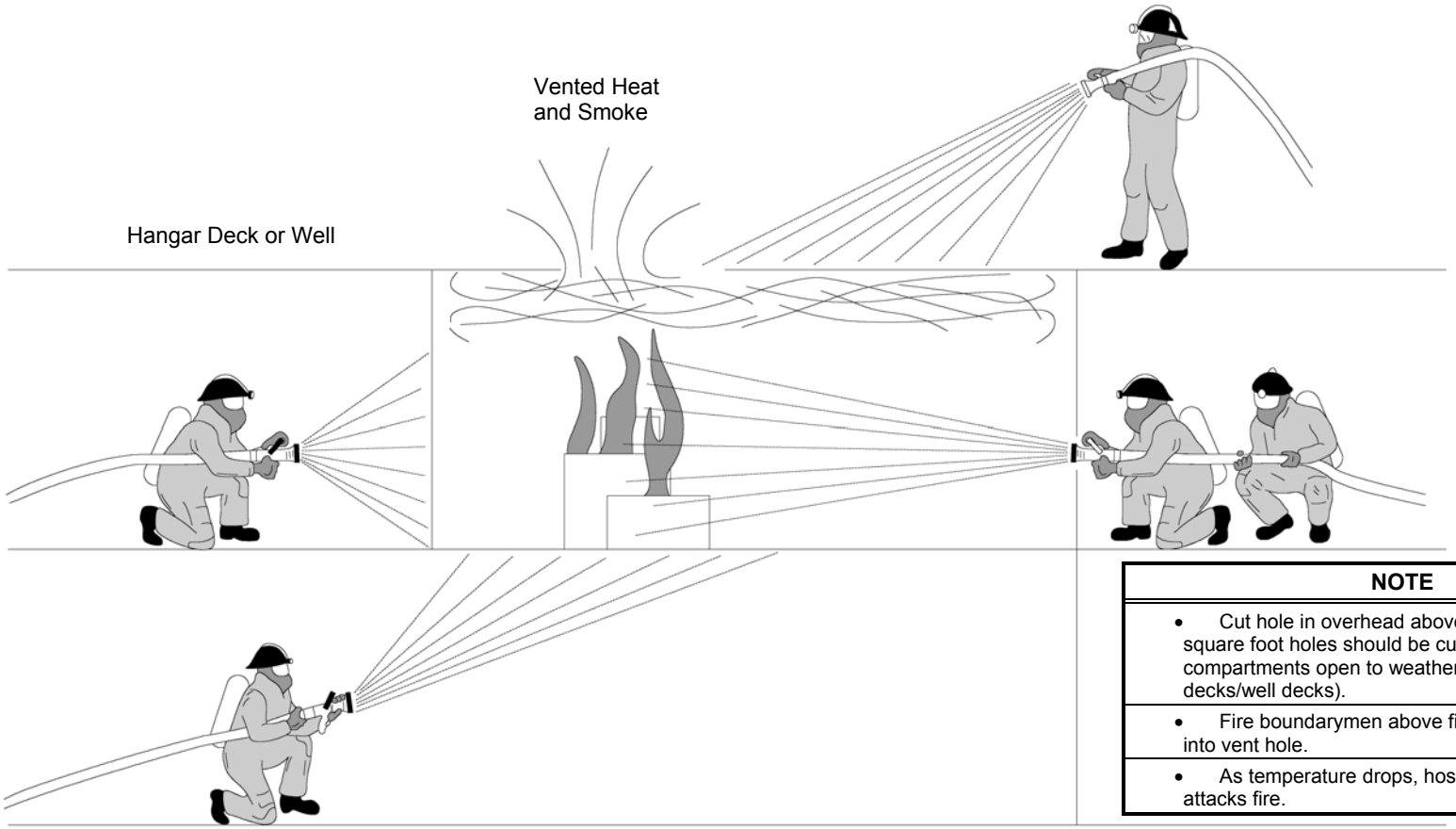
FIREFIGHTING EVOLUTION - SKETCH #014
Fire Attack - Fog Attack to Control Fire



NOTE
If able to reach the fire with hose stream, attack through the access:
• Keep low and try to keep dry.
• Use narrow fog / straight steam to minimize steam. Hit seat of fire.
• Fog attack if needed.
• When conditions permit, advance into fire space.
• Set fire boundaries - cool as needed.
OPTIONAL: Use smoke curtain to protect nozzleman from heat and steam.

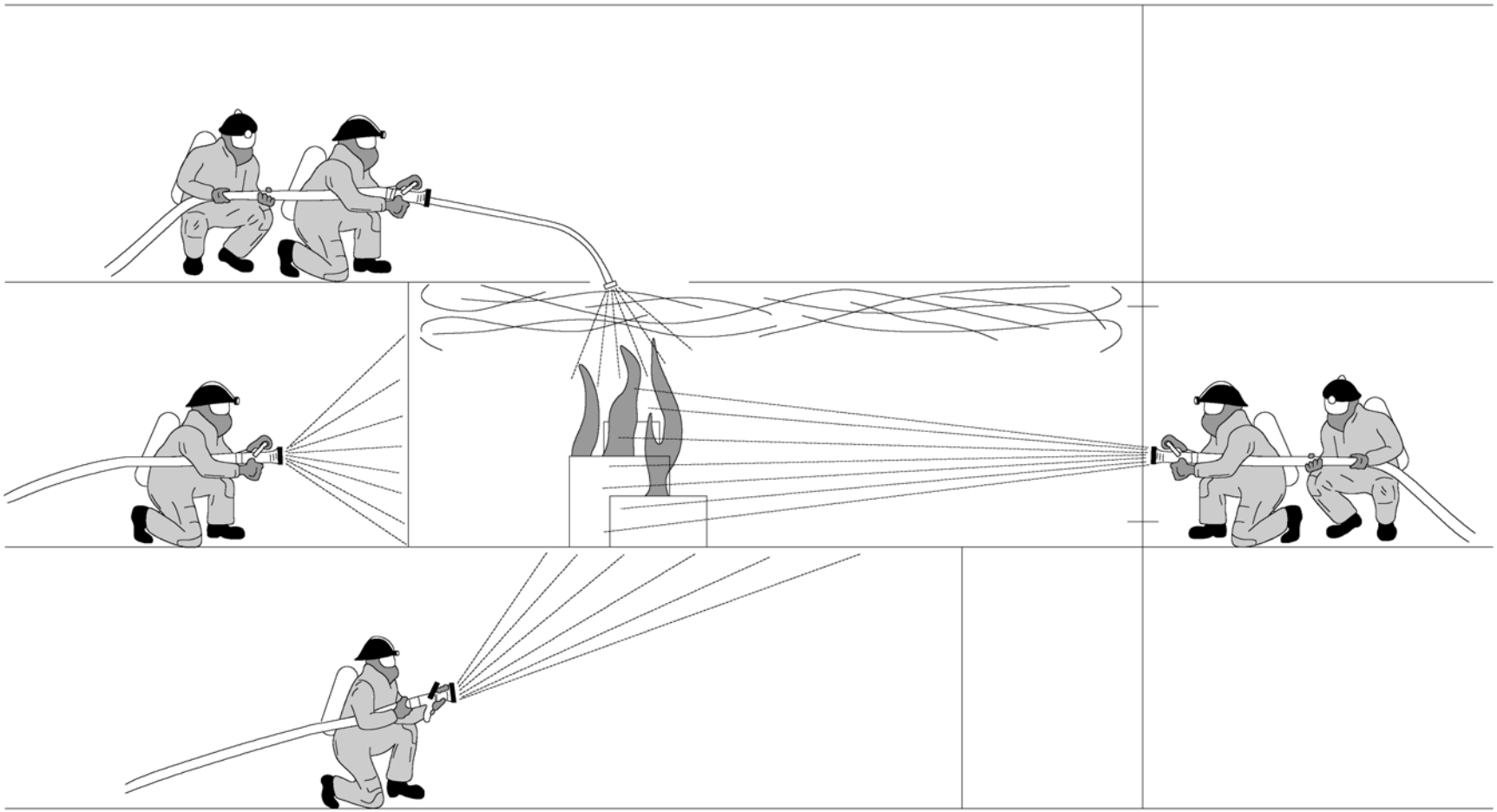
If high temperature attack from an access when fire can be reached with hose stream.

FIREFIGHTING EVOLUTION - SKETCH #015
Fire Attack - Attack from an Access



NOTE
• Cut hole in overhead above fire. Minimum one square foot holes should be cut from weather deck or compartments open to weather (can include hangar decks/well decks).
• Fire boundarymen above fire avoids directing water into vent hole.
• As temperature drops, hose team enters and attacks fire.

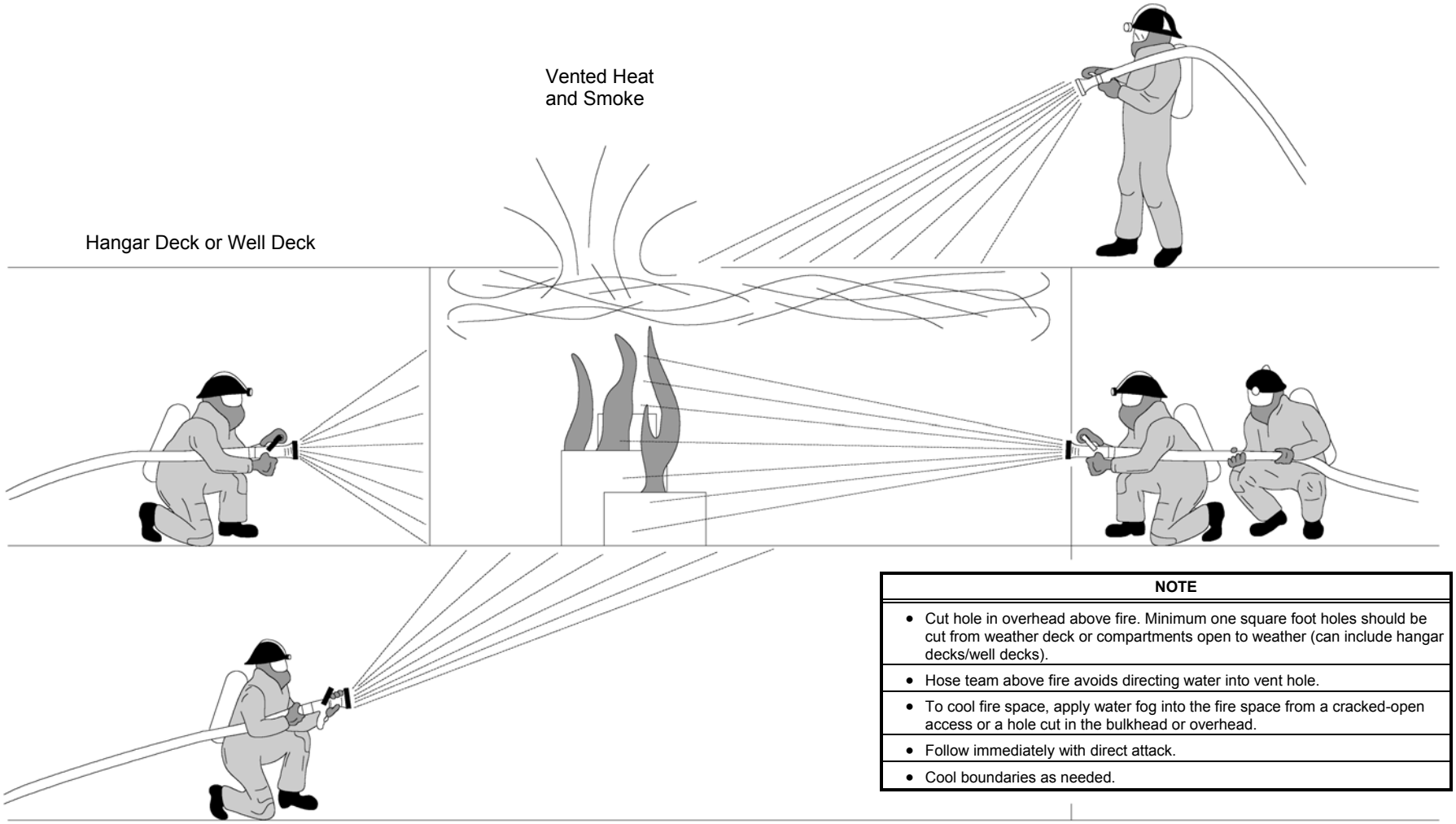
FIREFIGHTING EVOLUTION - SKETCH #016
Fire Attack - Direct Attack with Vent to Weather



If high temperature denies access, conduct indirect attack.

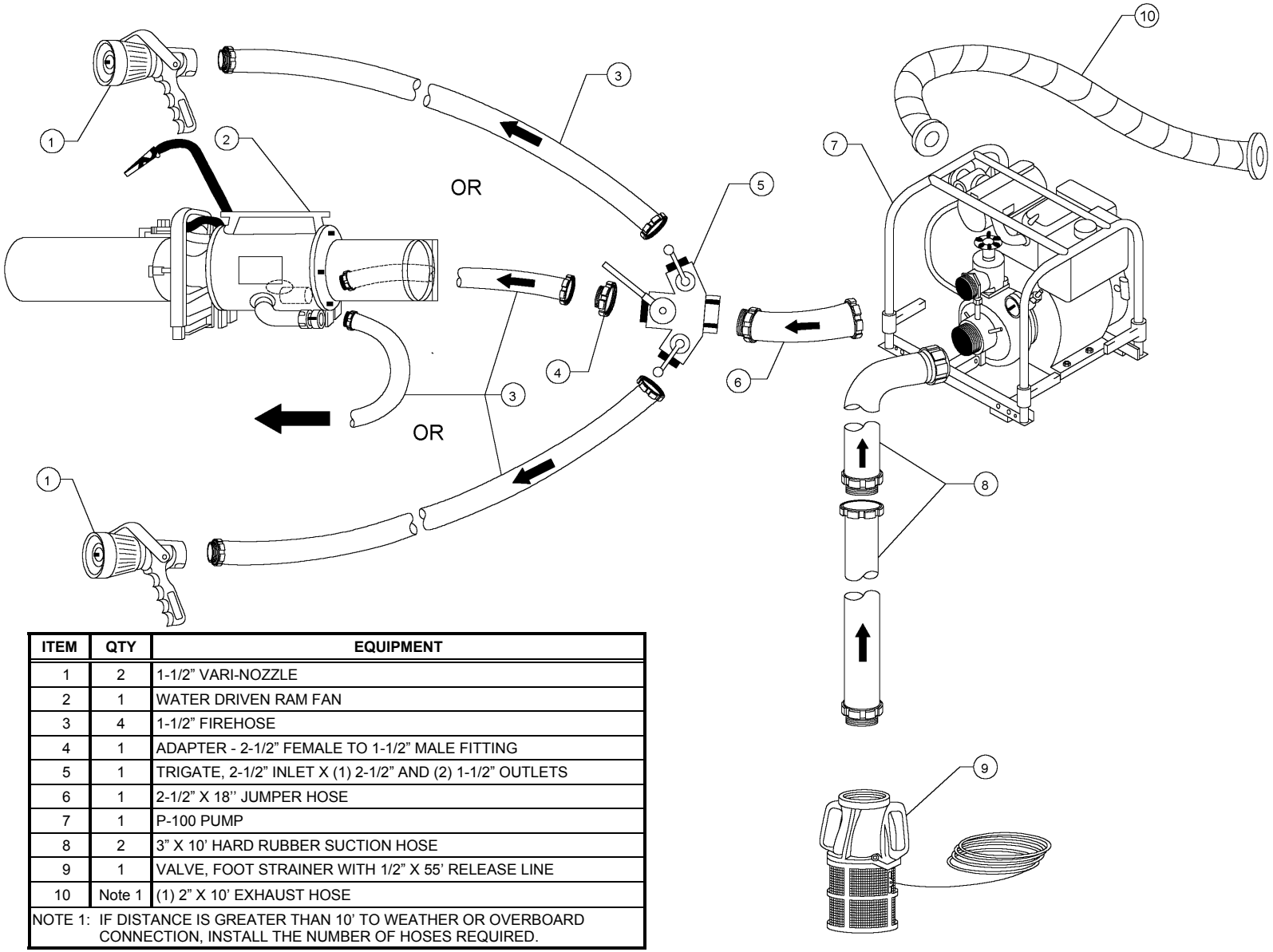
NOTE
• To cool fire space, apply water fog into the fire space from a cracked-open access or a hole cut in the bulkhead or overhead.
• Follow immediately with direct attack.
• Cool boundaries as needed.

FIREFIGHTING EVOLUTION - SKETCH #017
Indirect Attack



NOTE
• Cut hole in overhead above fire. Minimum one square foot holes should be cut from weather deck or compartments open to weather (can include hangar decks/well decks).
• Hose team above fire avoids directing water into vent hole.
• To cool fire space, apply water fog into the fire space from a cracked-open access or a hole cut in the bulkhead or overhead.
• Follow immediately with direct attack.
• Cool boundaries as needed.

FIREFIGHTING EVOLUTION - SKETCH #018
Indirect Attack with Venting



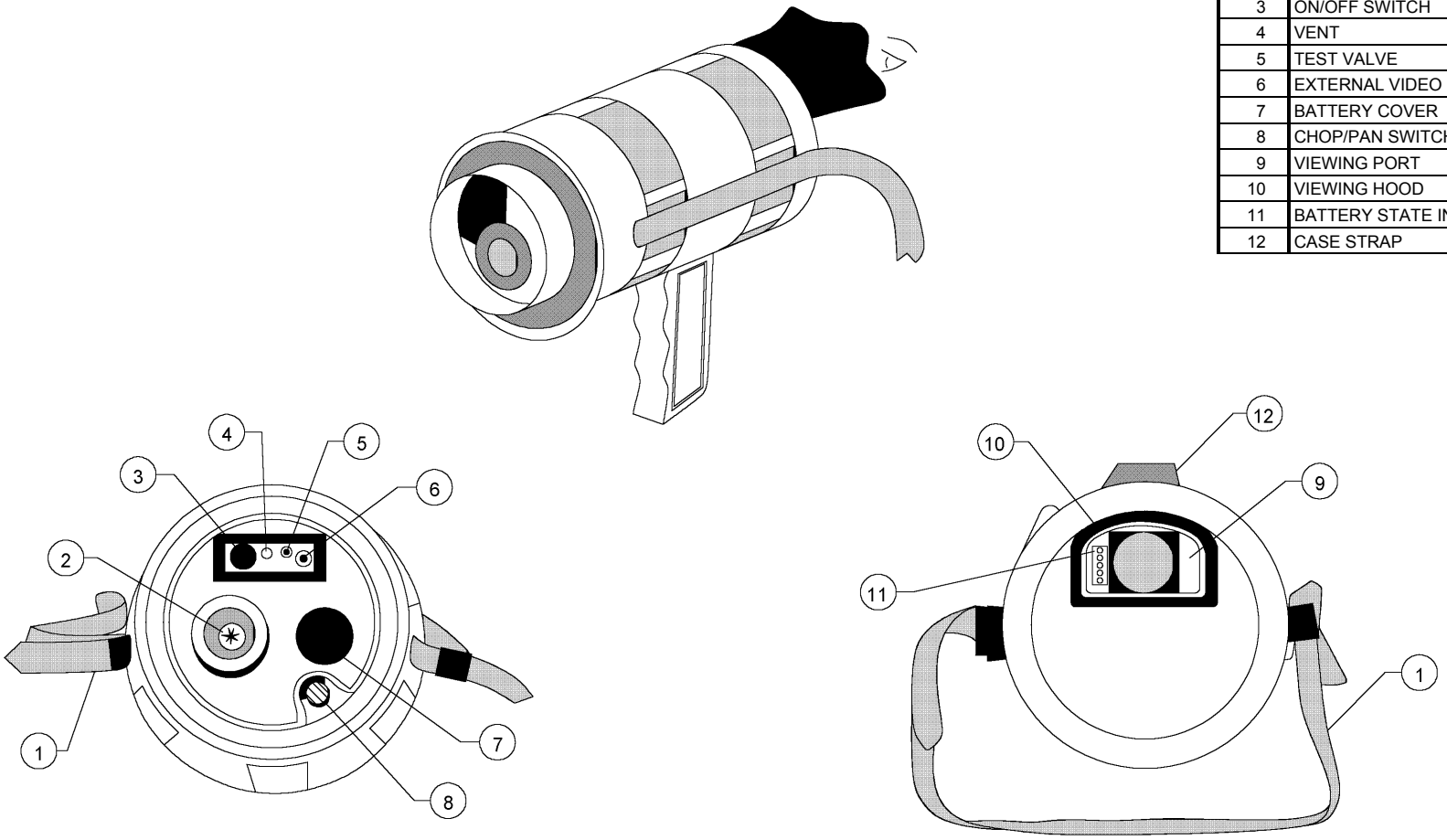
ITEM	QTY	EQUIPMENT
1	2	1-1/2" VARI-NOZZLE
2	1	WATER DRIVEN RAM FAN
3	4	1-1/2" FIREHOSE
4	1	ADAPTER - 2-1/2" FEMALE TO 1-1/2" MALE FITTING
5	1	TRIGATE, 2-1/2" INLET X (1) 2-1/2" AND (2) 1-1/2" OUTLETS
6	1	2-1/2" X 18'' JUMPER HOSE
7	1	P-100 PUMP
8	2	3" X 10' HARD RUBBER SUCTION HOSE
9	1	VALVE, FOOT STRAINER WITH 1/2" X 55' RELEASE LINE
10	Note 1	(1) 2" X 10' EXHAUST HOSE
NOTE 1: IF DISTANCE IS GREATER THAN 10' TO WEATHER OR OVERBOARD CONNECTION, INSTALL THE NUMBER OF HOSES REQUIRED.		

FIREFIGHTING EVOLUTION - SKETCH #019
Using P-100 Pump Taking Suction from Overboard or Flooded Compartment Suction Lift Less than 20 Feet

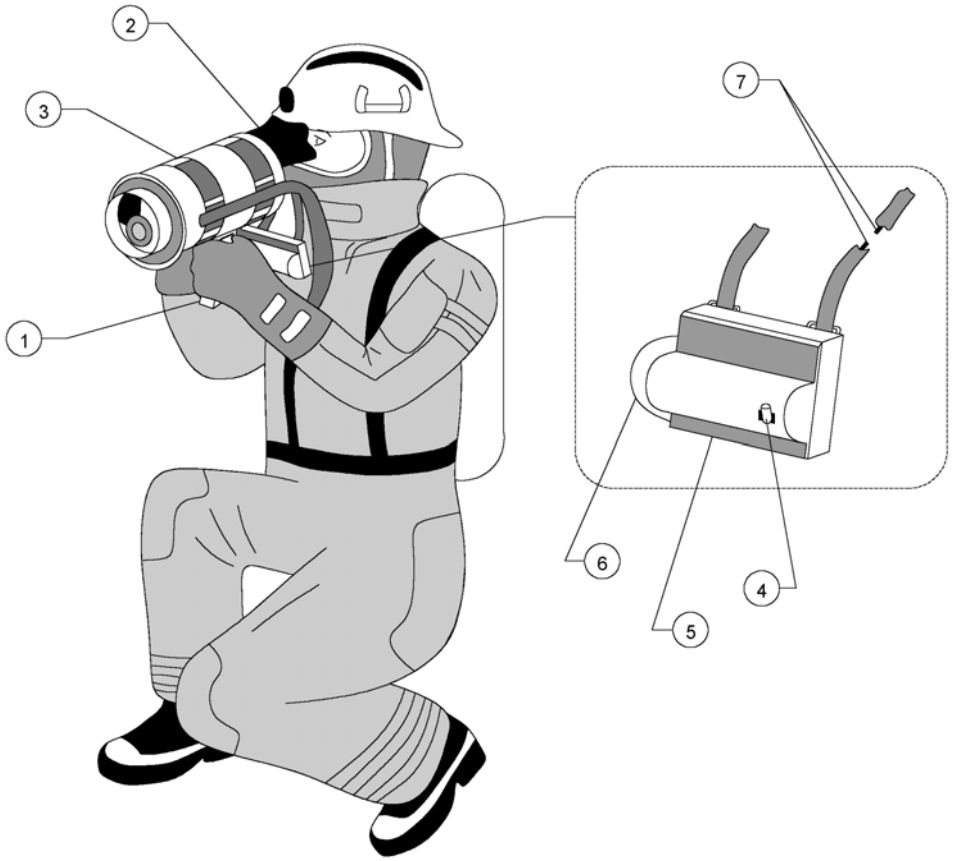
DAMAGE CONTROL LAYOUT SKETCHES

SECTION 9 - NAVAL FIREFIGHTERS' THERMAL IMAGER

ITEM	EQUIPMENT
1	CARRYING STRAP
2	GERMANIUM LENS
3	ON/OFF SWITCH
4	VENT
5	TEST VALVE
6	EXTERNAL VIDEO SOCKET
7	BATTERY COVER
8	CHOP/PAN SWITCH
9	VIEWING PORT
10	VIEWING HOOD
11	BATTERY STATE INDICATOR
12	CASE STRAP



NAVAL FIREFIGHTER'S THERMAL IMAGER - SKETCH #001
Allowing Sight through Dense Smoke and Light Steam to Locate Seat of Fire, in Overhaul Operations and for Search and Rescue of Personnel

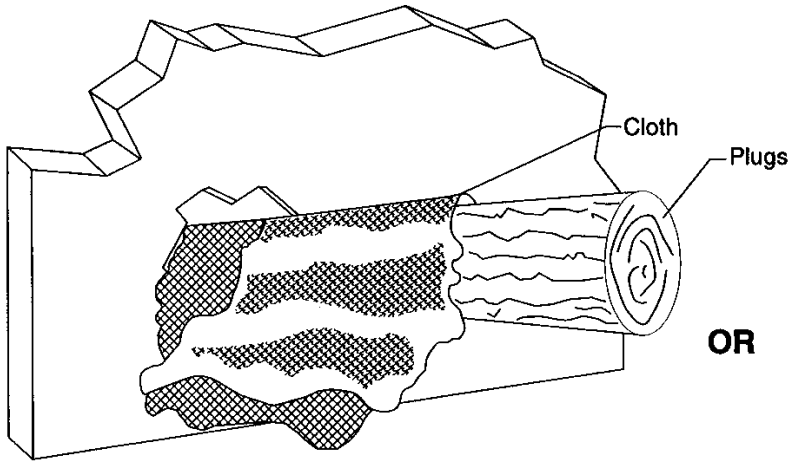


ITEM	EQUIPMENT
1	REMOVABLE HANDLE
2	VIEWING HOOD
3	HARNESS
4	ON/OFF SWITCH (RED)
5	VOLTAGE STABILIZER UNIT
6	BATTERY CAP
7	CABLE CONCEALED IN HARNESS

NAVAL FIREFIGHTER'S THERMAL IMAGER - SKETCH #003
Typical Operating Scenario (SCBA)

DAMAGE CONTROL LAYOUT SKETCHES

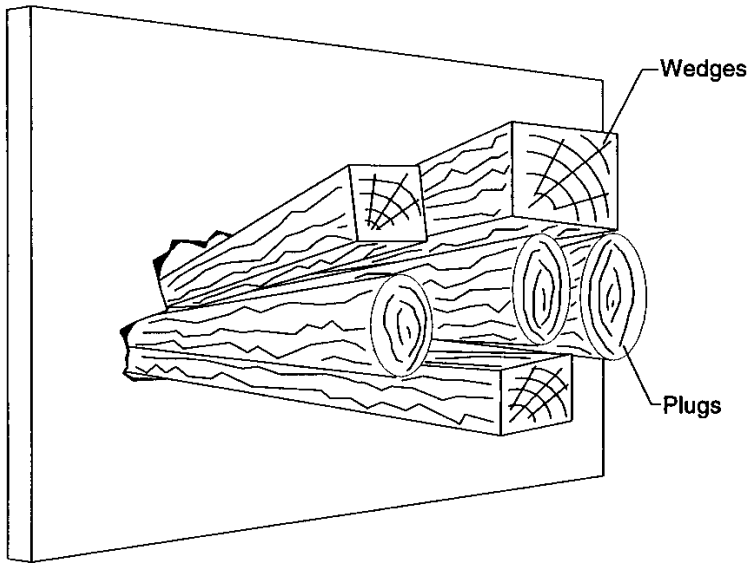
SECTION 10 - PATCHING/PLUGGING EVOLUTION



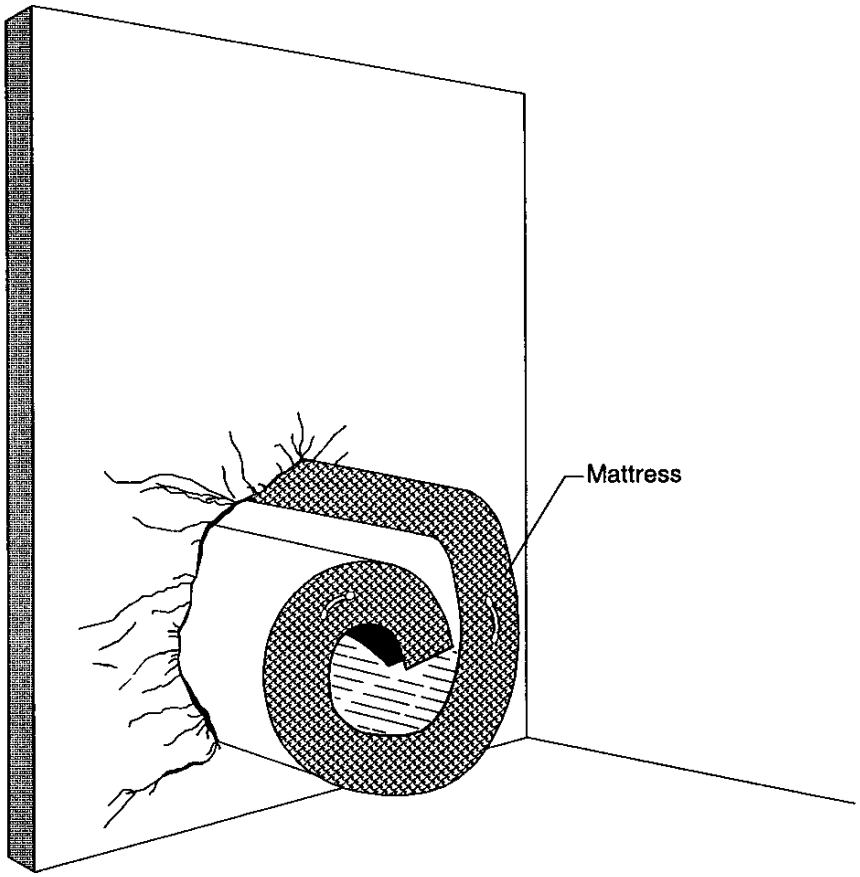
Stop jagged leaks by inserting plug camel wrapped with cloth.

OR

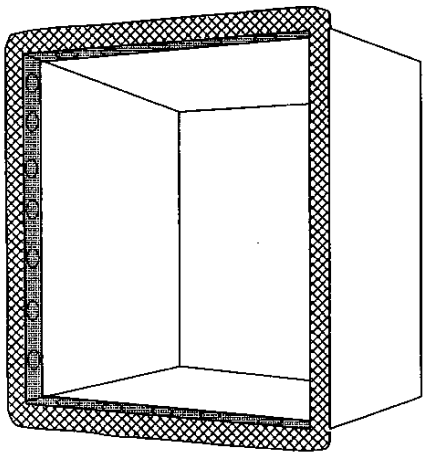
Stop jagged leaks using combinations of conical plugs and wedges.



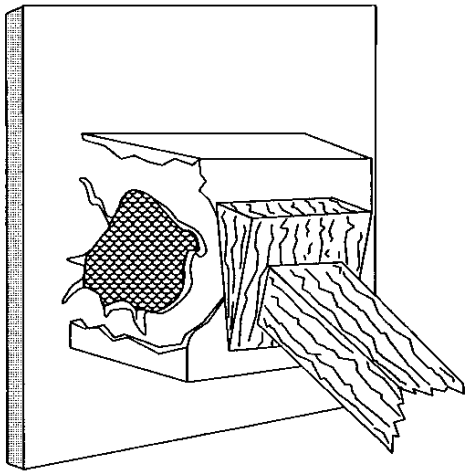
PATCHING/PLUGGING EVOLUTION - SKETCH #001
Use of Wooden Plugs and Wedges in Filling Holes



PATCHING/PLUGGING EVOLUTION - SKETCH #002
Plugging with Mattresses

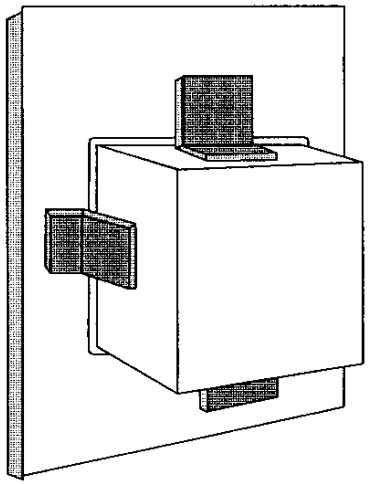


Steel box leak stopper of 1/4" plate with rubber, canvas or oakum gasket around edges.



Cut-away section showing box stopper held in place with shoring.

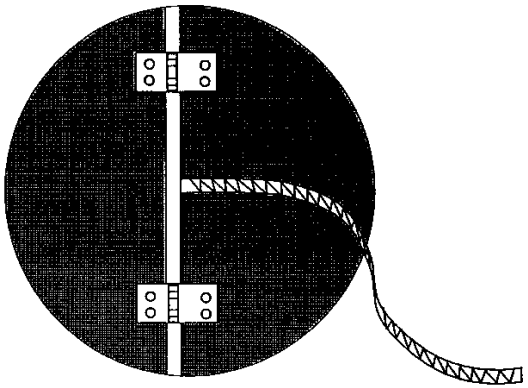
OR



Steel box welded and placed with angle chips.

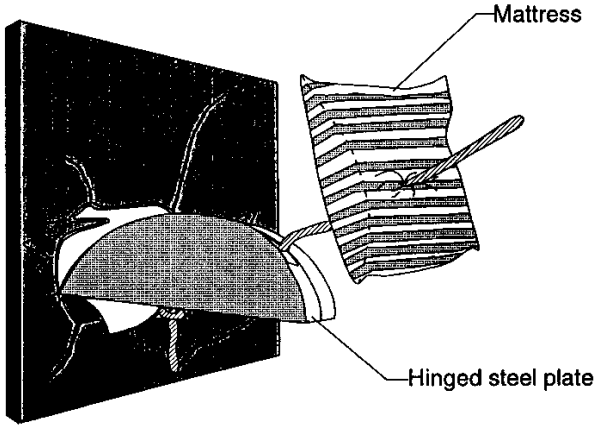
PATCHING/PLUGGING EVOLUTION - SKETCH #003
Box Patch

1



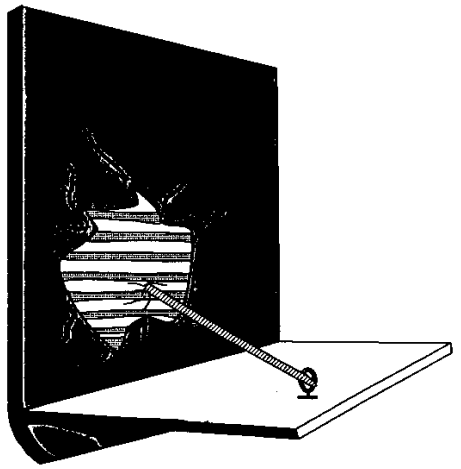
Prefabricated hinged steel plate which can be folded to go through a hole. Use with a pillow or other gasket. Recommended size up to 18" diameter. Use for patching relatively small hole.

2



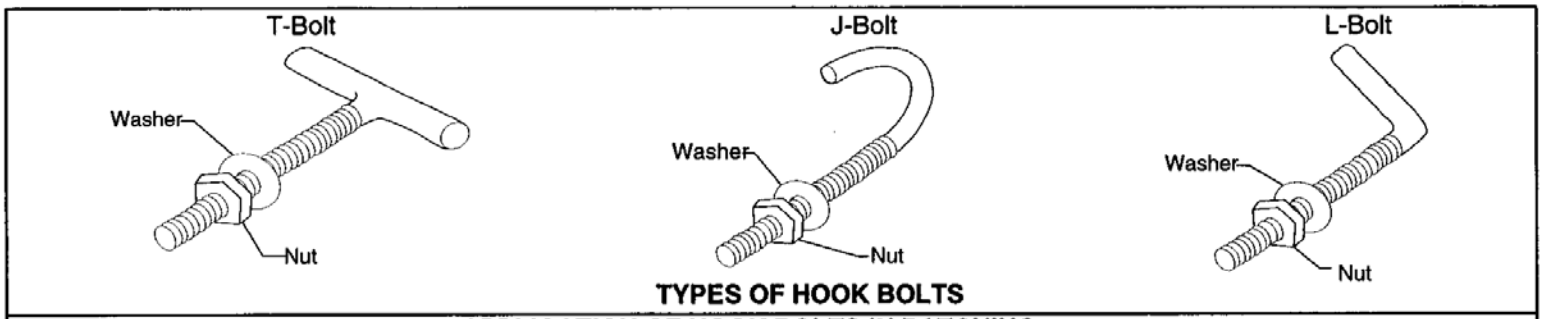
Fit line of plate through a mattress/gasket. Fold plate and push through the hole from inside of ship.

3



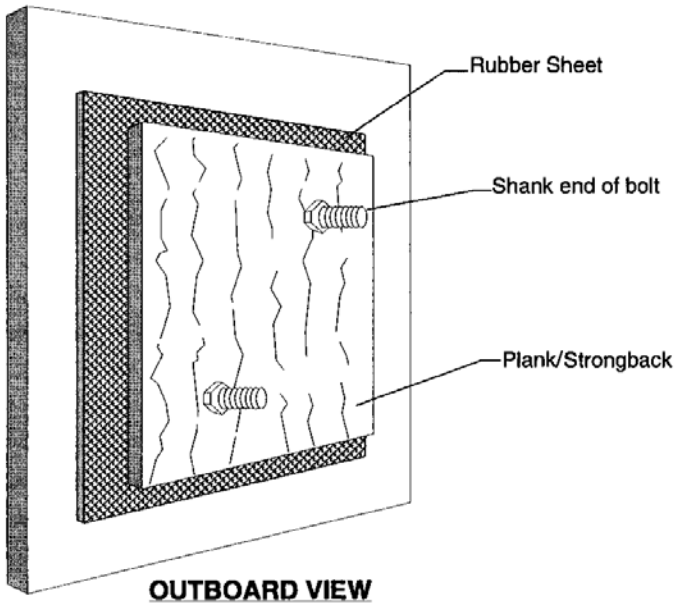
Secure line to the ship.

PATCHING/PLUGGING EVOLUTION - SKETCH #004
Hinged Plate Patch

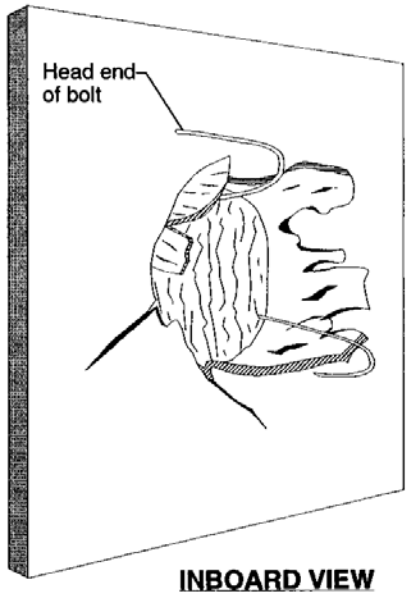


TYPES OF HOOK BOLTS

APPLICATION OF HOOK BOLTS IN PATCHING



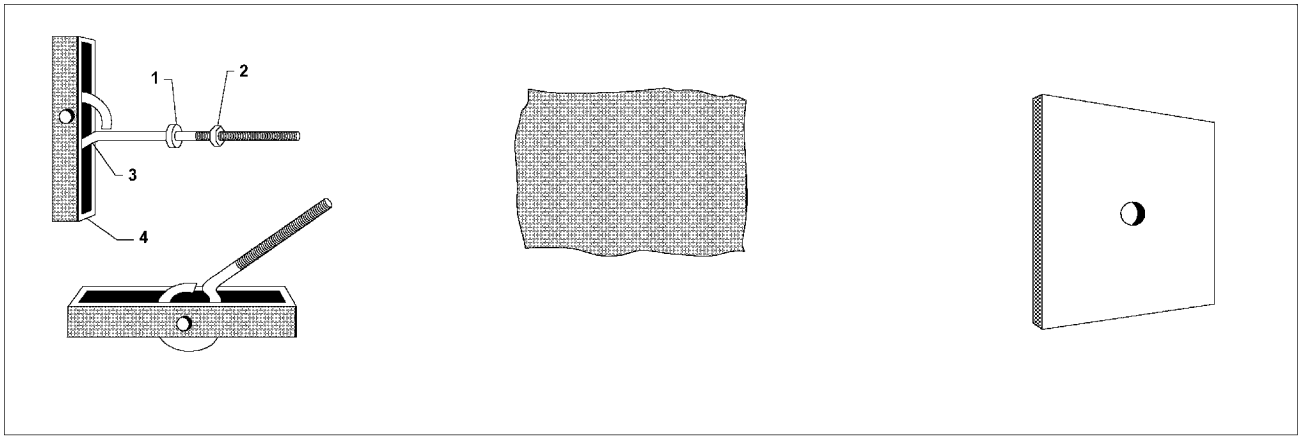
OUTBOARD VIEW

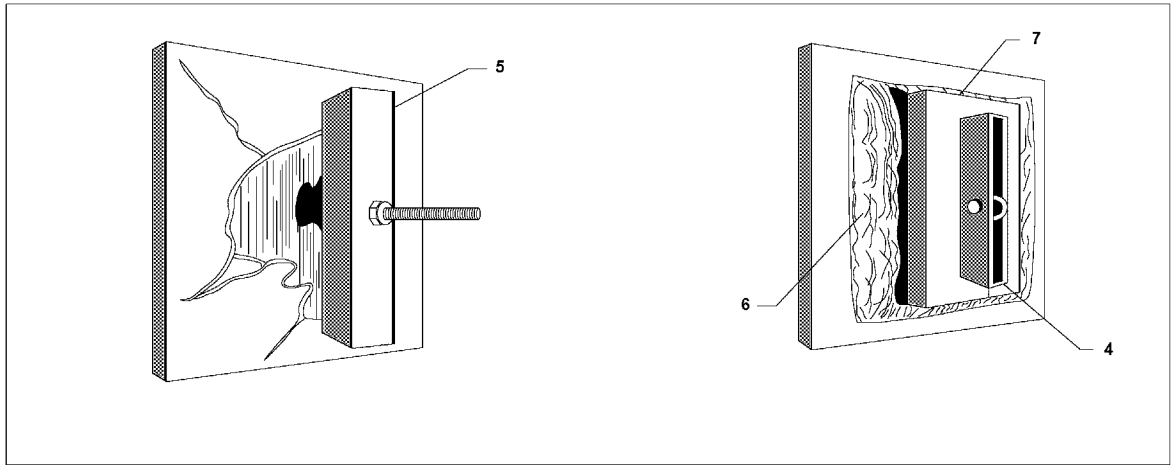


INBOARD VIEW

Insert head end of the bolt through hole and rotate or adjust bolt until bolt cannot be pulled back through hole. Slide a pad or gasket, backed by a plank or strongback over the bolt. Secure patch by taking up on the nut.

PATCHING/PLUGGING EVOLUTION - SKETCH #005
Securing Patch with Hook Bolts

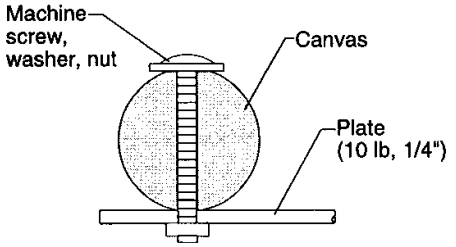




ITEM	qty	EQUIPMENT
1	1	Washer
2	1	Nut
3	1	Hinged Joint
4	1	The T
5	1	4" x 4" Strongback
6	1	Mattress, Blanket or stuffed canvas
7	1	Backing Plate

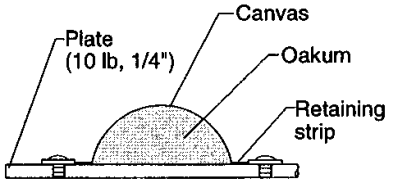
PATCHING/PLUGGING EVOLUTION - SKETCH #006
Folding T-Patch

1



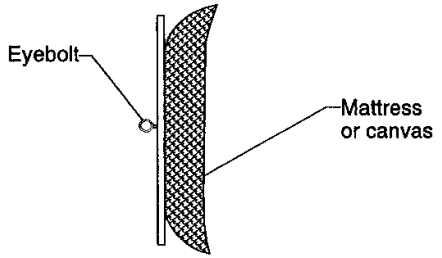
Fabricating gasket by securing canvas, stuffed with oakum or cloth to plate with machine screws.

OR



Fabricating gasket by securing canvas with retaining strip.

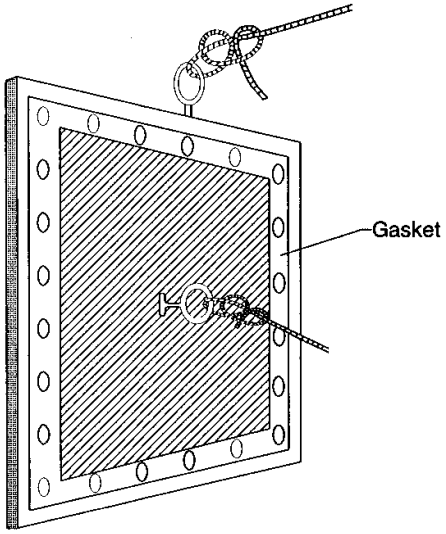
2



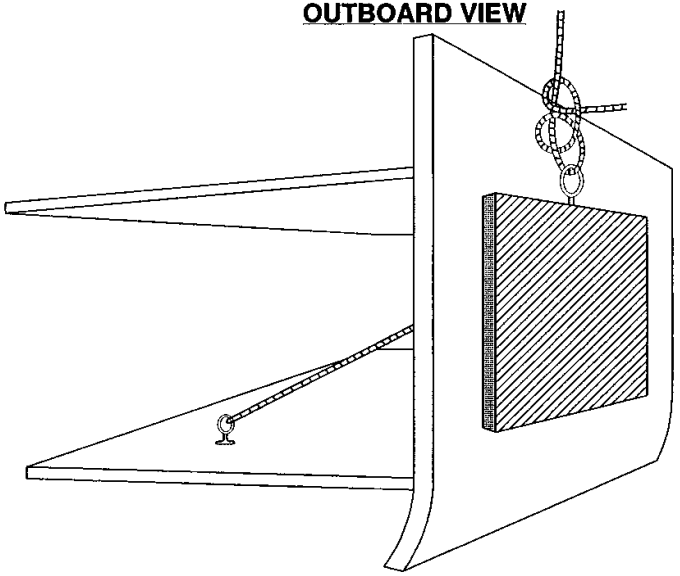
At the center of the inner side and at the top of the plate, weld a ring or eyebolt to secure holding tine.

FABRICATING PLATE PATCH

INBOARD VIEW

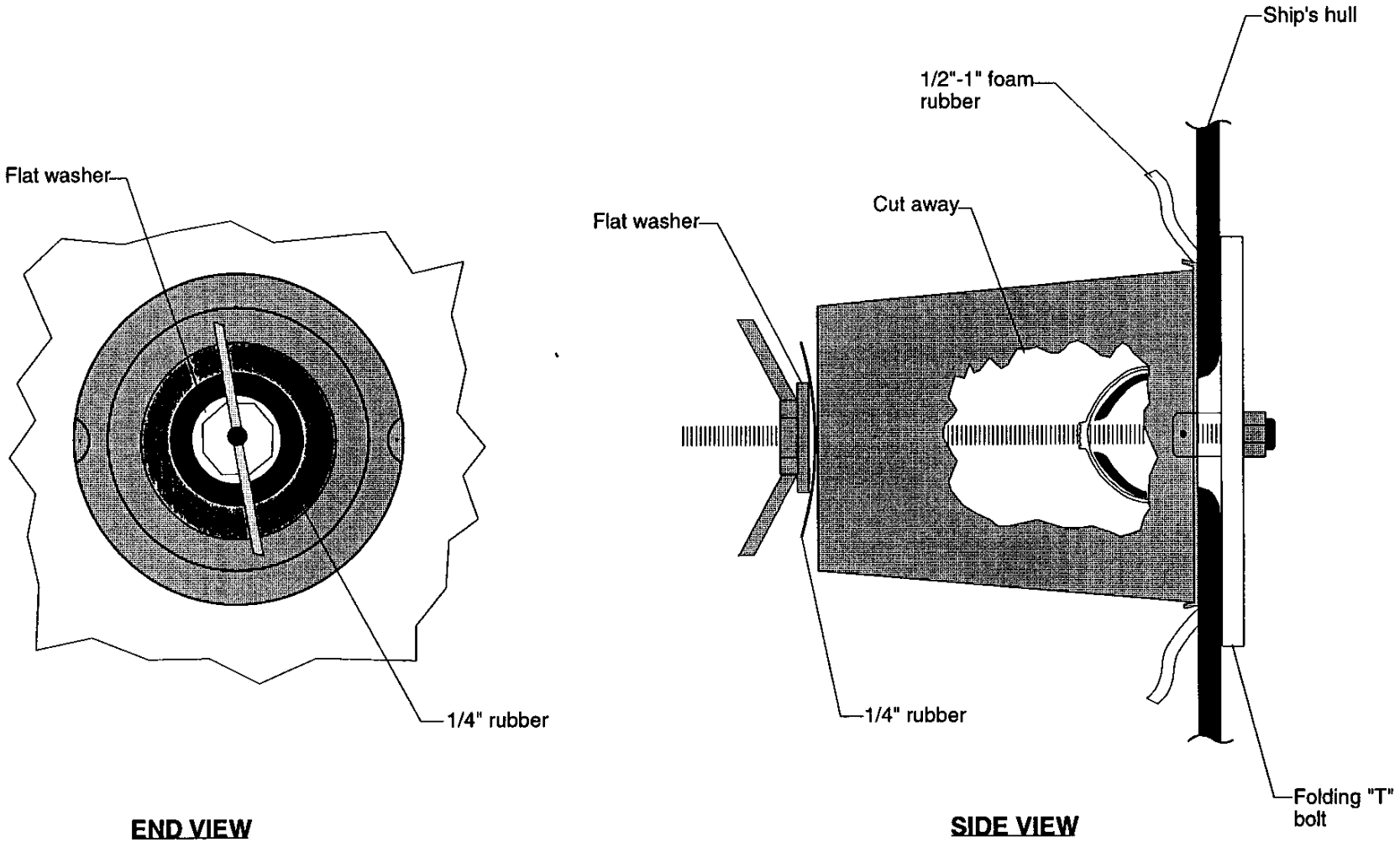


OUTBOARD VIEW

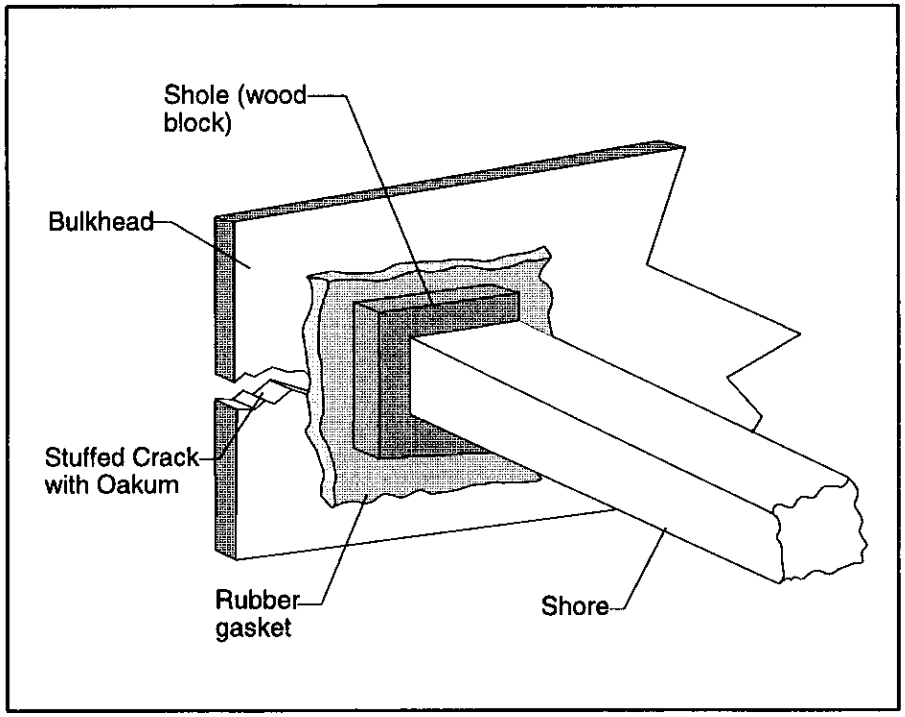


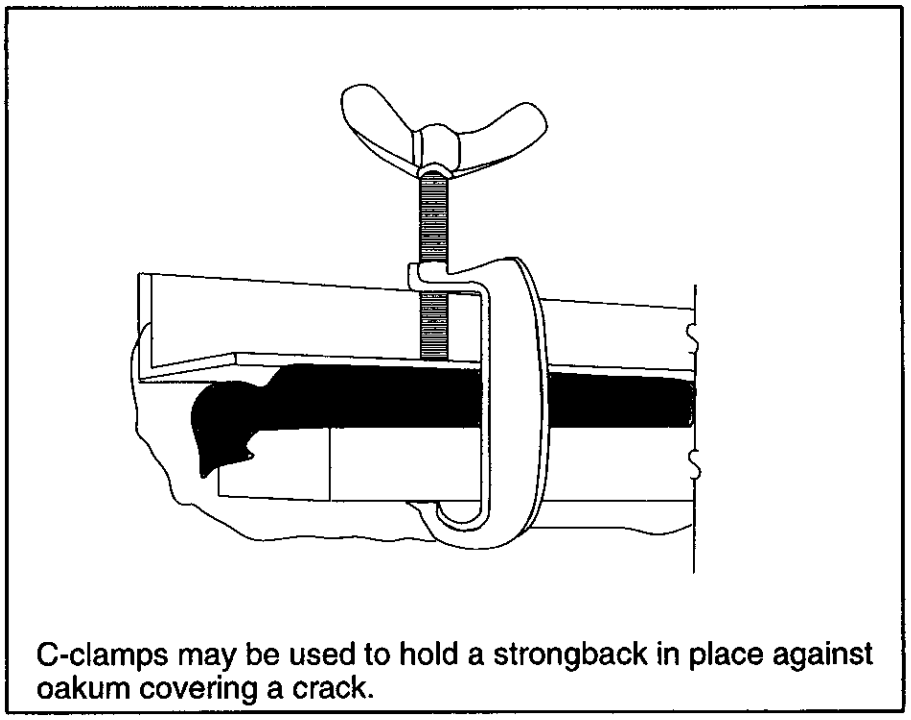
Lower the plate over the side of the ship by the handling and supporting line. From the inside of the ship, reach out through the shell hole and grab the center line. Pull the patch tightly against the ship side and secure center line to structure.

PATCHING/PLUGGING EVOLUTION - SKETCH #007
Plate Patch



PATCHING/PLUGGING EVOLUTION - SKETCH #008
Bucket Patch

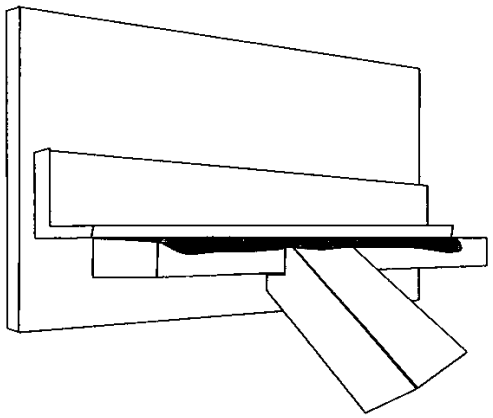




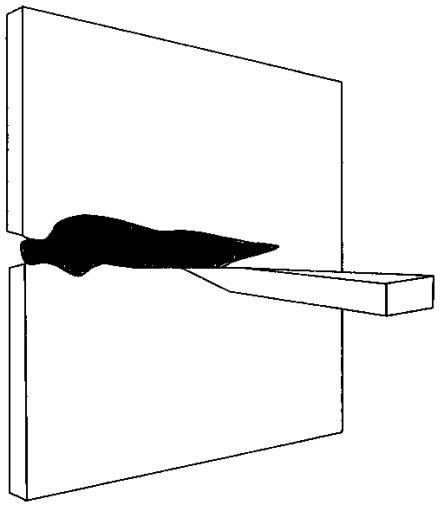
C-clamps may be used to hold a strongback in place against oakum covering a crack.

PATCHING/PLUGGING EVOLUTION - SKETCH #009
Patching and Sealing Crack

CAULKING THIN PLATING

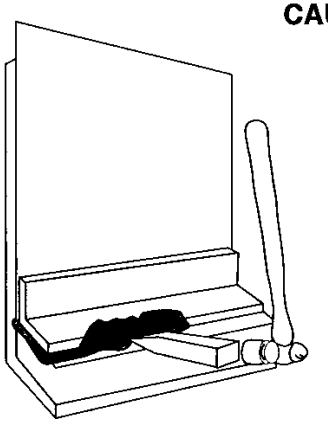


Stop leak under welded frames by bracing oakum or cloth against cracks.

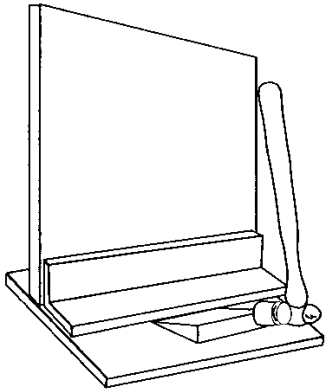


Partially stop leak by driving oakum, marline, or rags into small cracks.

CAULKING TORN SEAMS

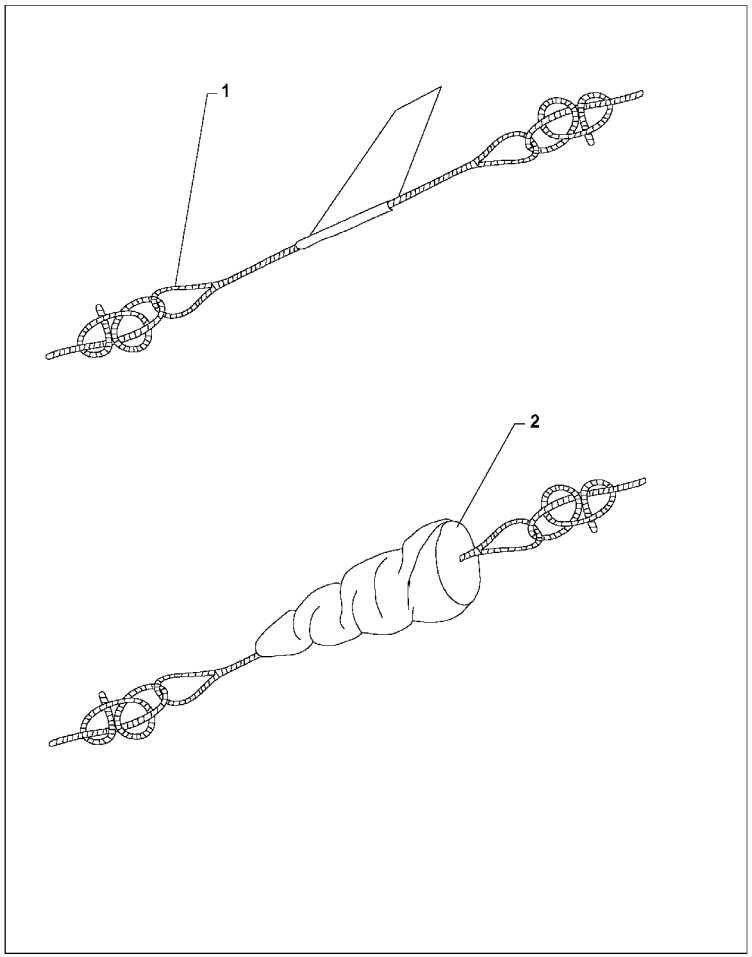


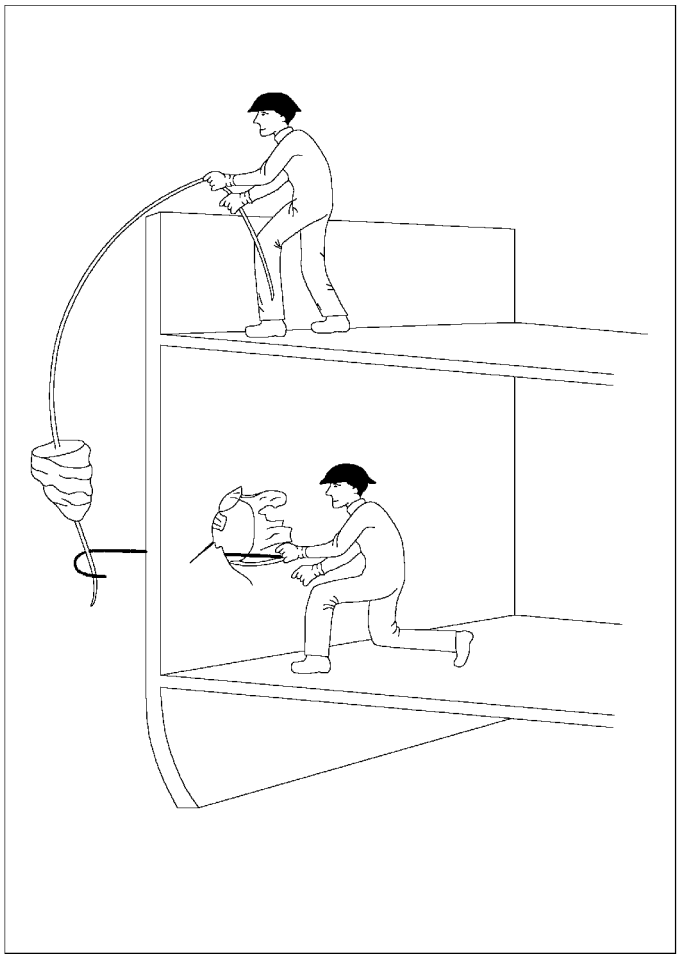
Pack oakum under angle iron to stop leak.



A wedge to be driven home must be of soft wood in order not to open the seam.

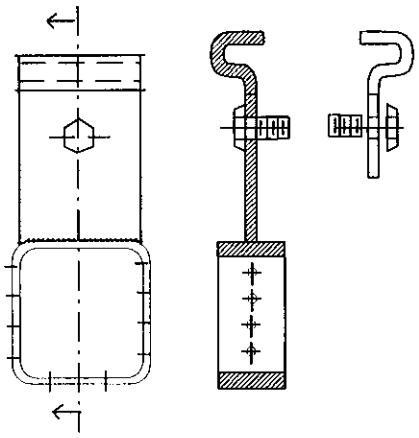
PATCHING/PLUGGING EVOLUTION - SKETCH #010
Caulking Thin Plating and Torn Seams



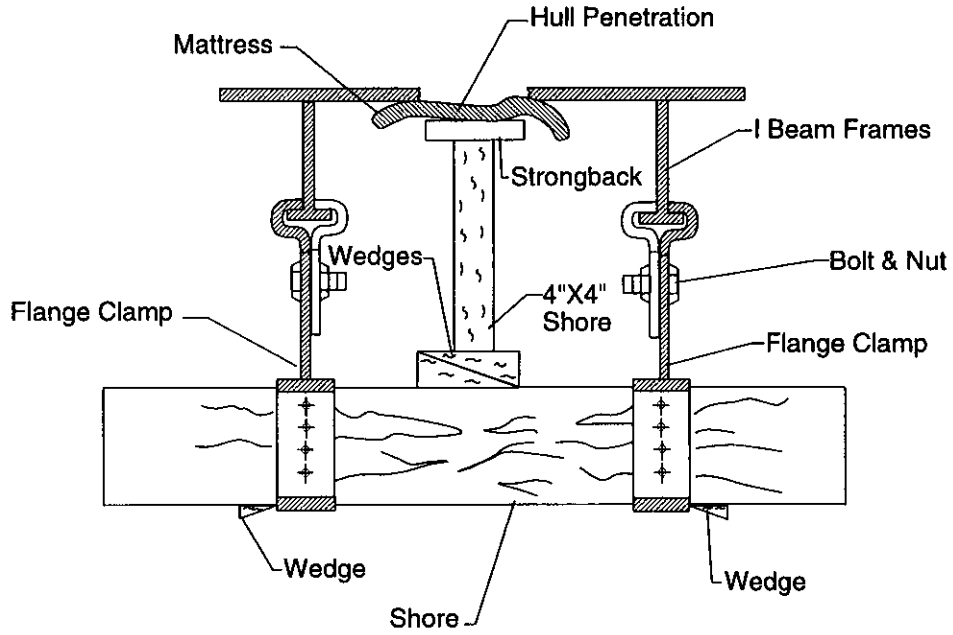


ITEM	qty	EQUIPMENT
1	1	Heavy line with eye at each end
2	1	Cloth/blanket

PATCHING/PLUGGING EVOLUTION - SKETCH #011
Cloth Patch



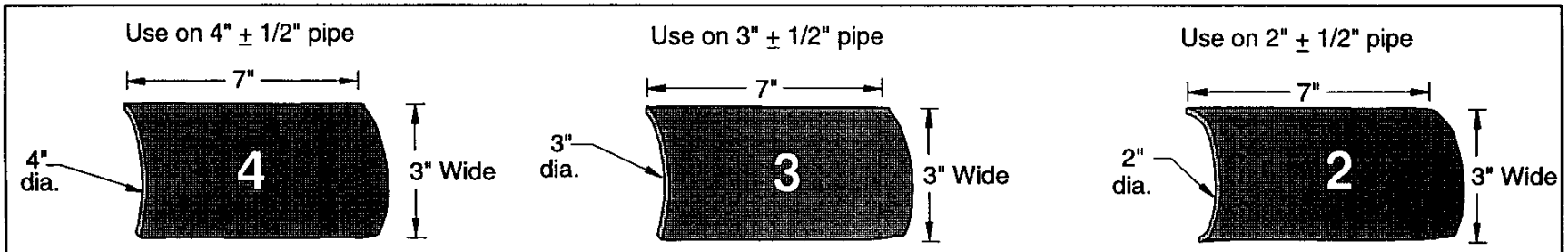
FLANGE CLAMP



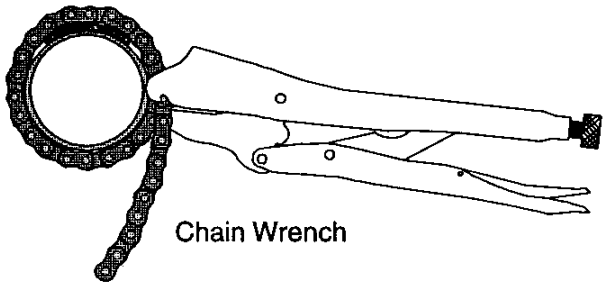
PATCHING/PLUGGING EVOLUTION - SKETCH #012
Emergency Leak Plugging Using Flange Clamp

DAMAGE CONTROL LAYOUT SKETCHES

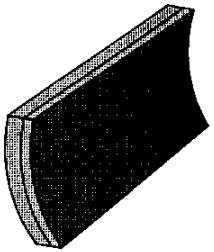
SECTION 11 - PIPE PATCHING EVOLUTION



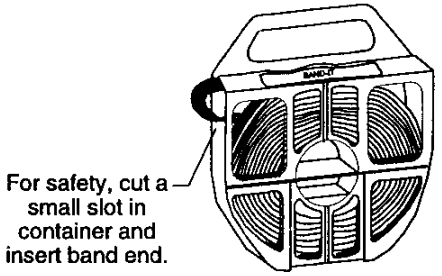
PRE-FABRICATED 1/4" THICK STRONGBACK WITH 1/8" RUBBER GASKET GLUED TO BACK SIDE
(Recommend marking each strongback with size)



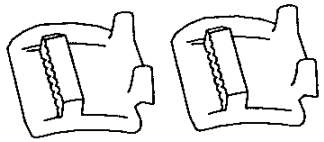
Chain Wrench



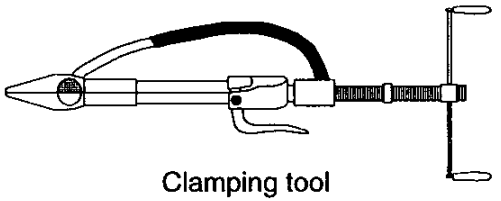
1/8" Rubber Gasket
(Attached to back side of each strongback)



Metal bands and holder



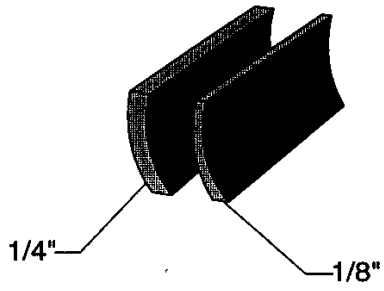
Band-It Buckle



Clamping tool

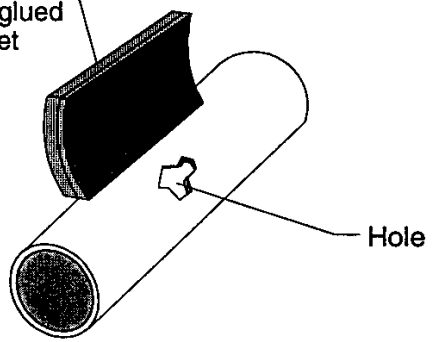
PIPE PATCHING EVOLUTION - SKETCH #001
Pipe Patching Equipment

1



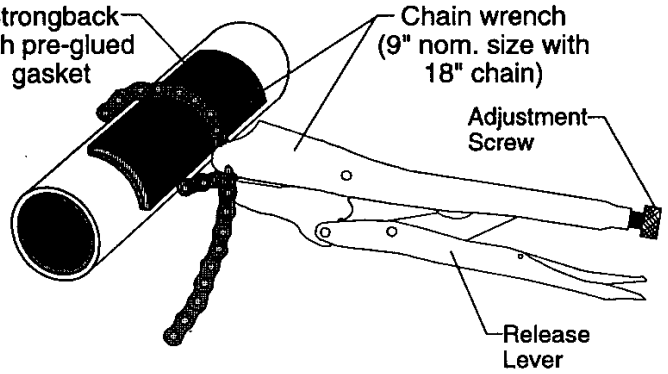
Pre-cut gasket to size and glue gasket and strongback together.

2



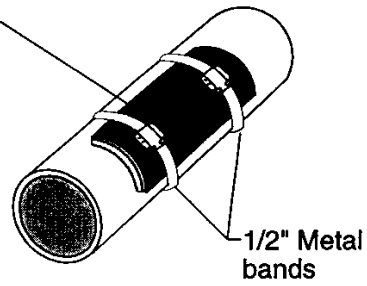
Select correct size strongback to match pipe that is being patched. Strongback should fit snugly on pipe.

3



Use chain wrench to secure strongback tightly onto pipe before applying bands.

4

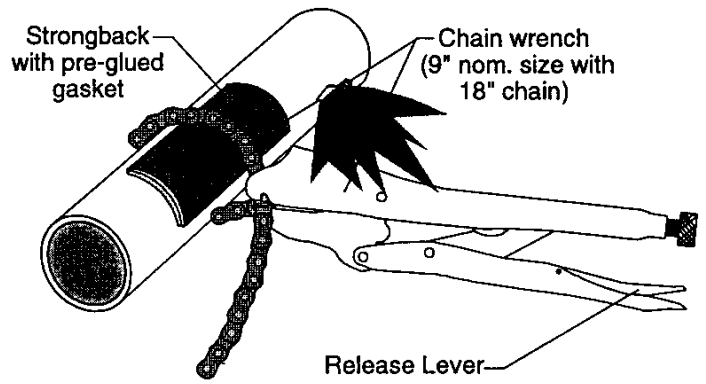


Apply metal bands. Use minimum of two bands to secure strongback tightly onto pipe. (Follow Metal Banding Procedures for applying metal bands.

PIPE PATCHING EVOLUTION - SKETCH #002
Band-it Isolated Pipe

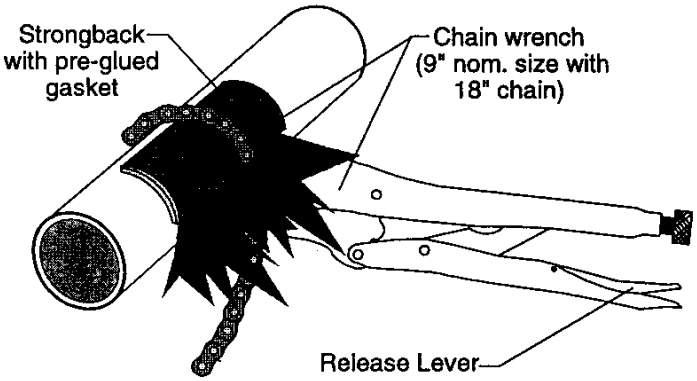
THIS IS A TWO-MAN OPERATION:

1



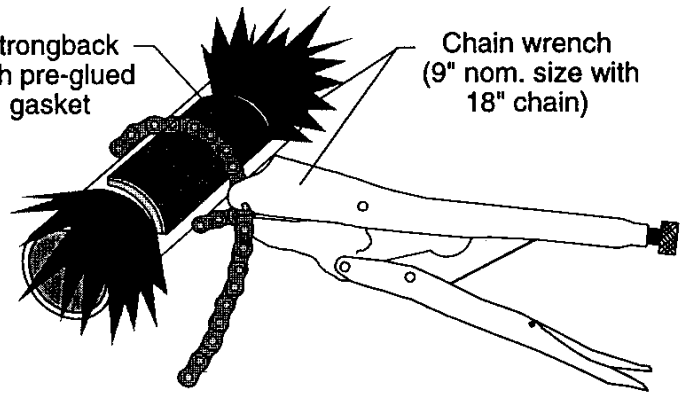
1st man: Trial fit strongback, place offset and above the rupture.
2nd man: Use chain wrench to tighten strongback. Without adjusting chain wrench, loosen chain with release

2



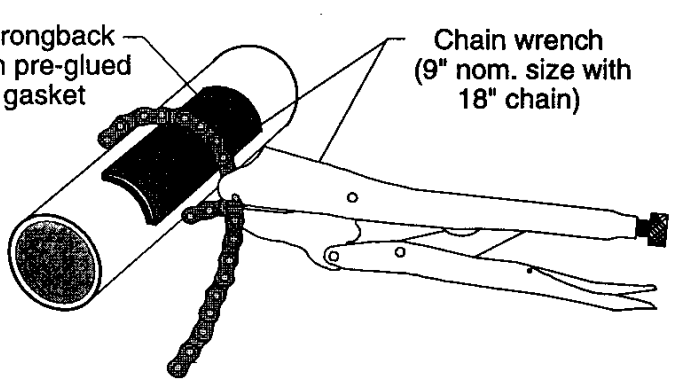
1st man: Use two hands slide strongback over and above the rupture.
2nd man: Hold chain wrench, centering strongback above the rupture. The chain will split the stream.

3



1st man: Slide strongback down, centering over rupture.
2nd man: Slide chain wrench down over strongback. Keep one hand with tight grip on wrench handle.

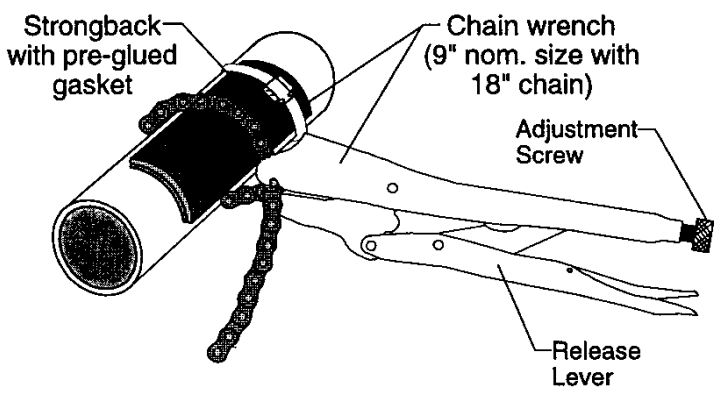
4



2nd man: Clamp chain wrench to secure strongback tightly onto pipe to stop leak for final time.

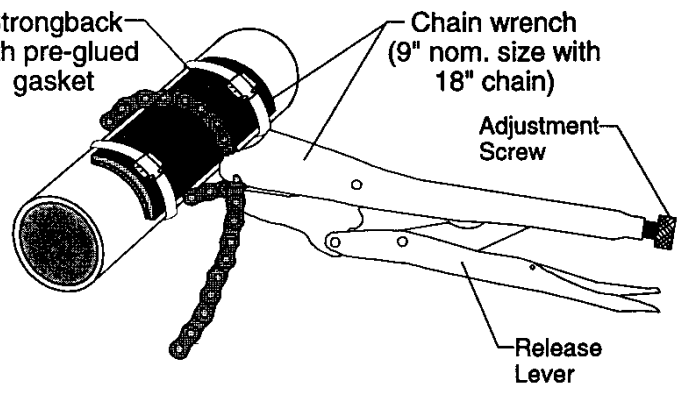
PIPE PATCHING EVOLUTION - SKETCH #003
Band-it Patch on Pressurized Pipe (Sheet 1 of 2)

5



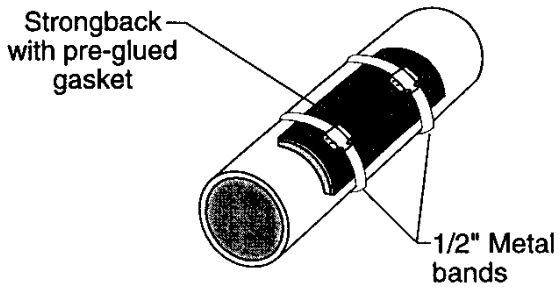
Apply first metal band. (Follow Metal Banding Procedures for applying metal bands.)

6



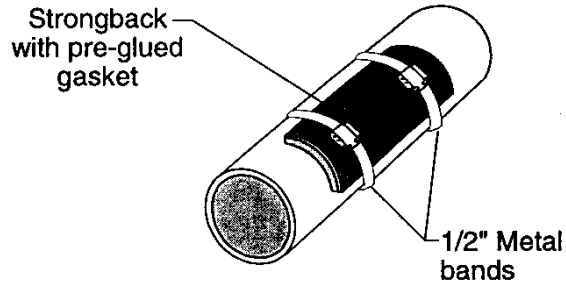
Apply second metal band to secure strongback tightly onto pipe to stop leak for final time.

7



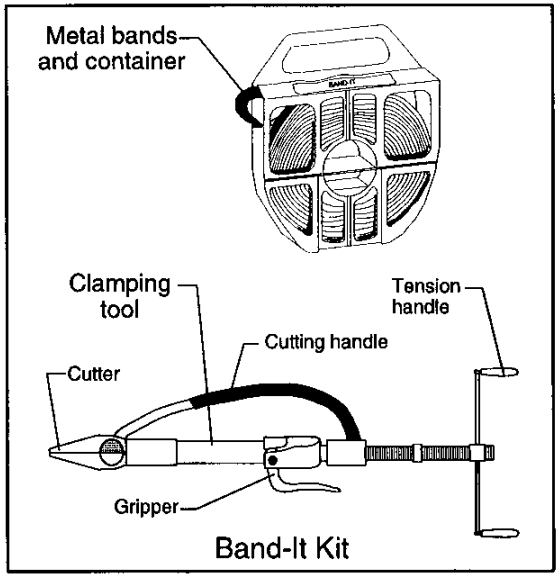
Remove chain wrench. Use minimum of two bands to secure strongback tightly onto pipe.

8

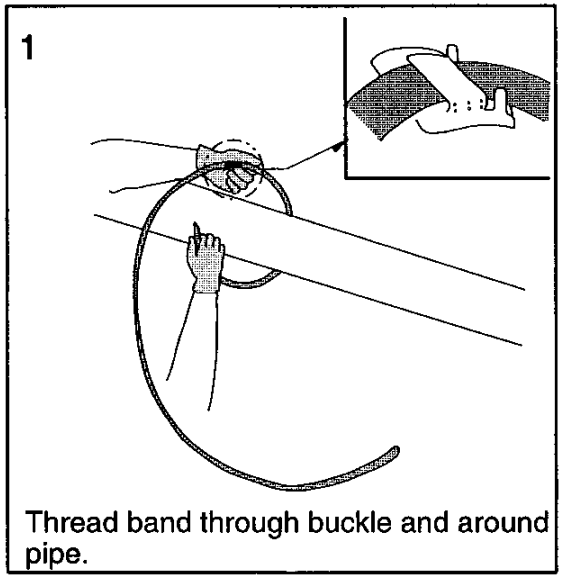


If strongback is not tight enough, a 3rd band may be applied after removal of chain wrench.

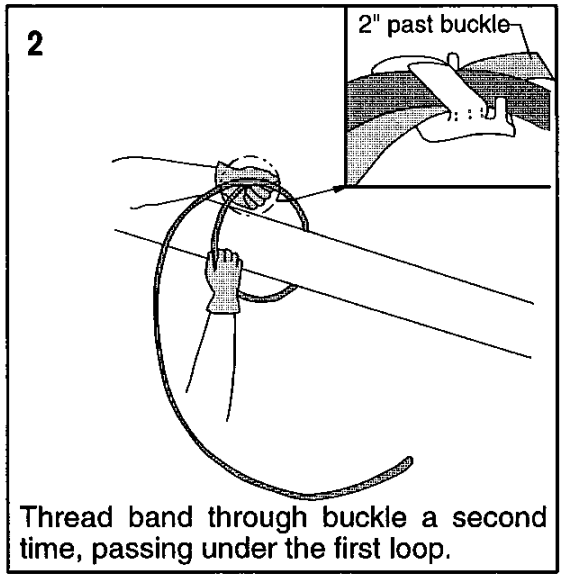
PIPE PATCHING EVOLUTION - SKETCH #003
Band-it Patch on Pressurized Pipe (Sheet 2 of 2)



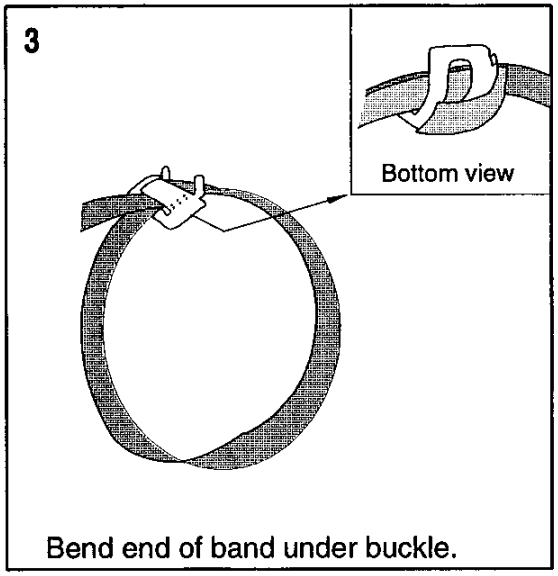
Band-It Kit



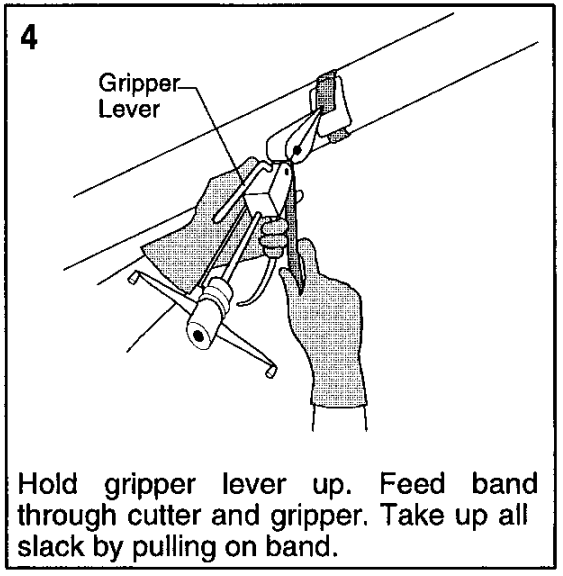
Thread band through buckle and around pipe.



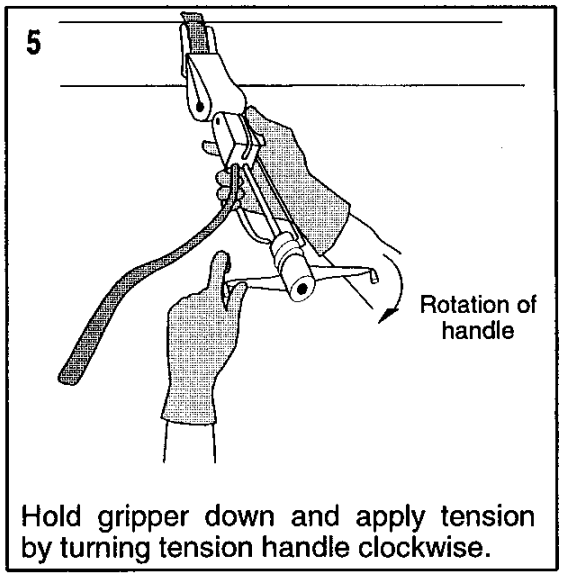
Thread band through buckle a second time, passing under the first loop.



Bend end of band under buckle.

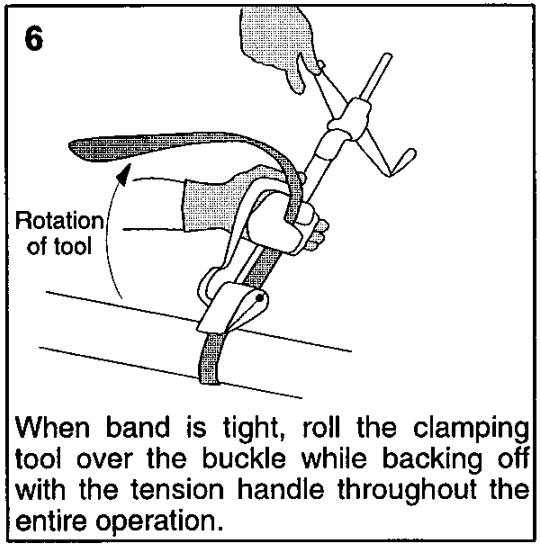


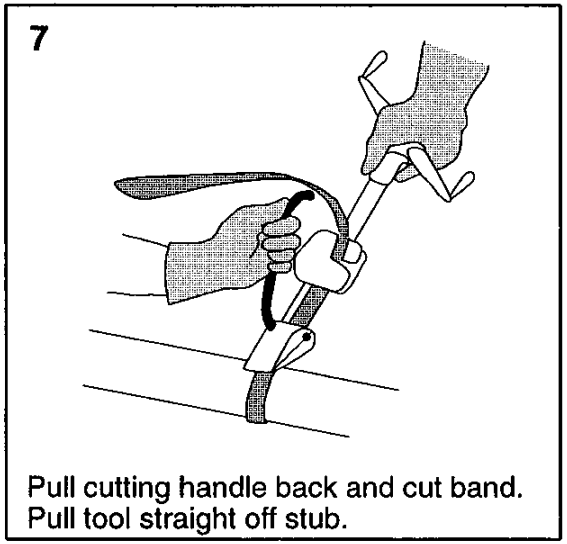
Hold gripper lever up. Feed band through cutter and gripper. Take up all slack by pulling on band.

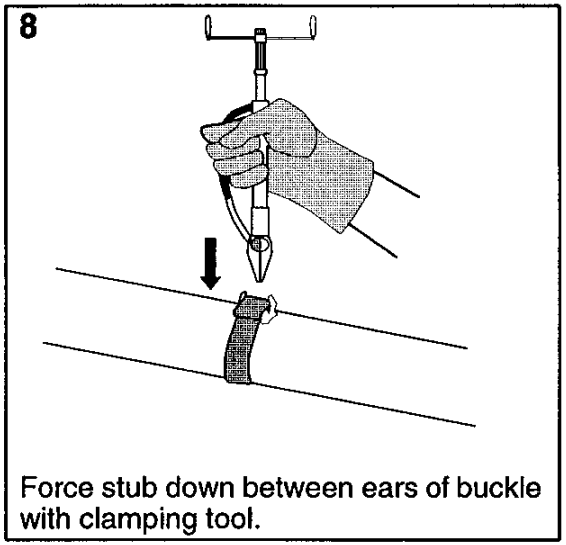


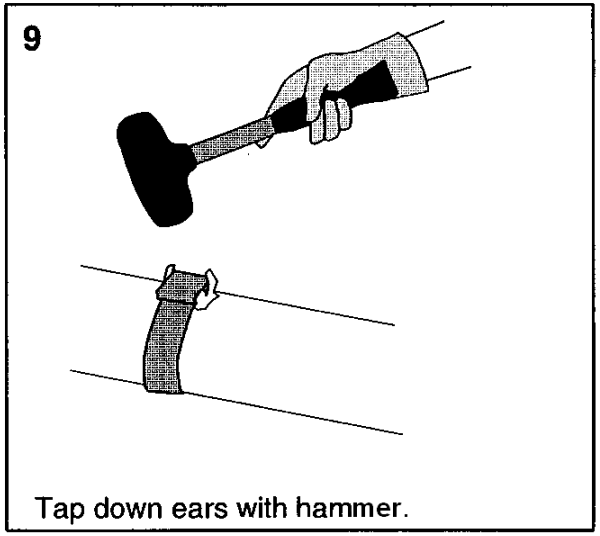
Hold gripper down and apply tension by turning tension handle clockwise.

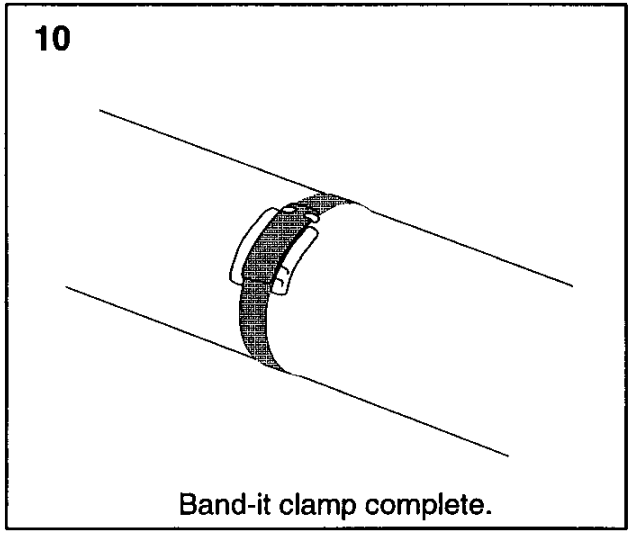
PIPE PATCHING EVOLUTION - SKETCH #004
Metal Bending Procedures for Band-it Patch (Sheet 1 of 2)











PIPE PATCHING EVOLUTION - SKETCH #004
Metal Bending Procedures for Band-it Patch (Sheet 2 of 2)

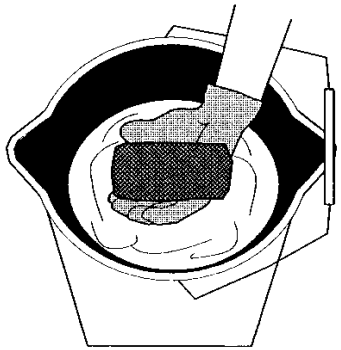
1

Remove all pressure from pipe being repaired.

2

With file, rough score around pipe at leak site and 2" on either side of leak. Remove file shavings with clean rag.

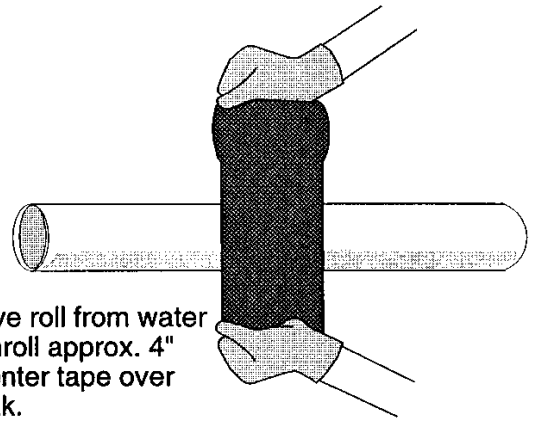
3



NOTE:
EYE PROTECTION AND LATEX GLOVES SHALL BE WORN WHEN WORKING WITH EWARP!

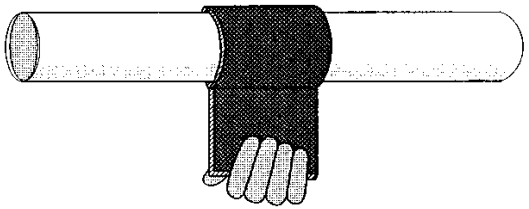
Remove roll of EWARP from pouch (work rapidly to avoid EWARP from solidifying) and immerse roll in water for 20 seconds.

4



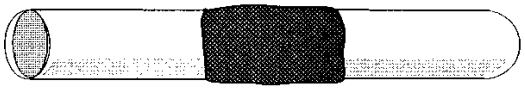
Remove roll from water and unroll approx. 4" and center tape over the leak.

5



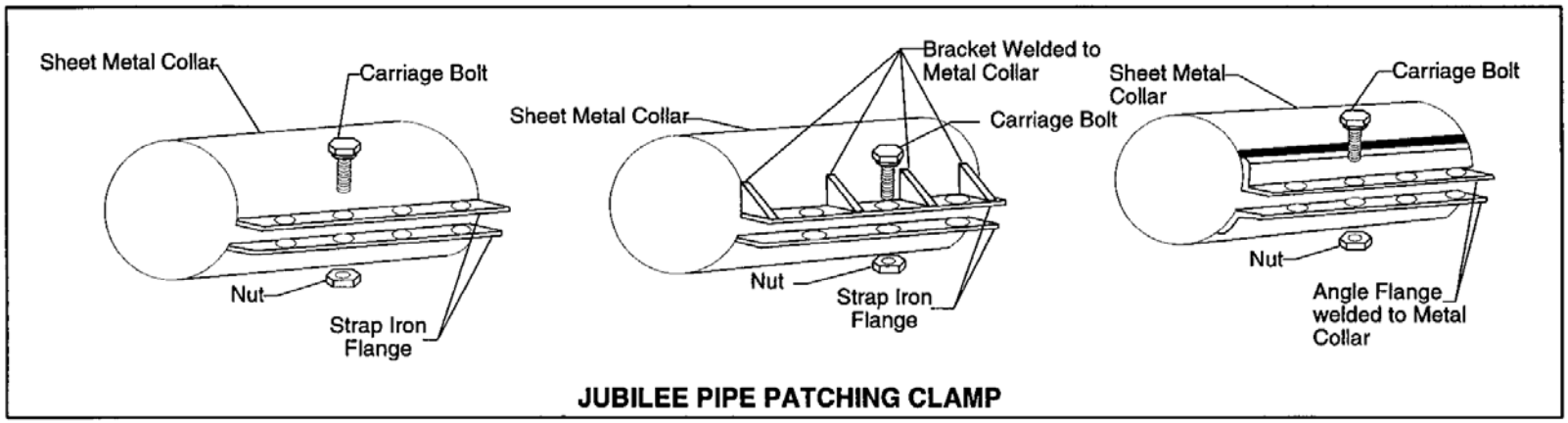
Wrap tape around pipe and pull firmly as wrap.

6

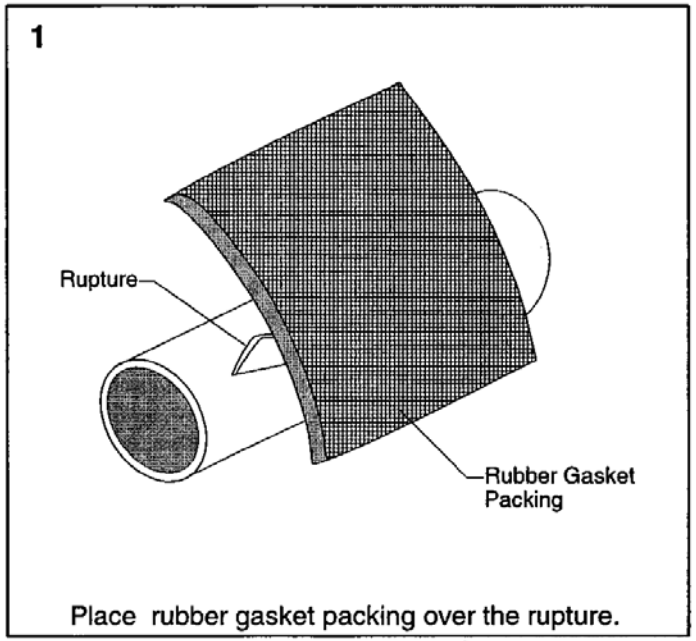


Application complete.

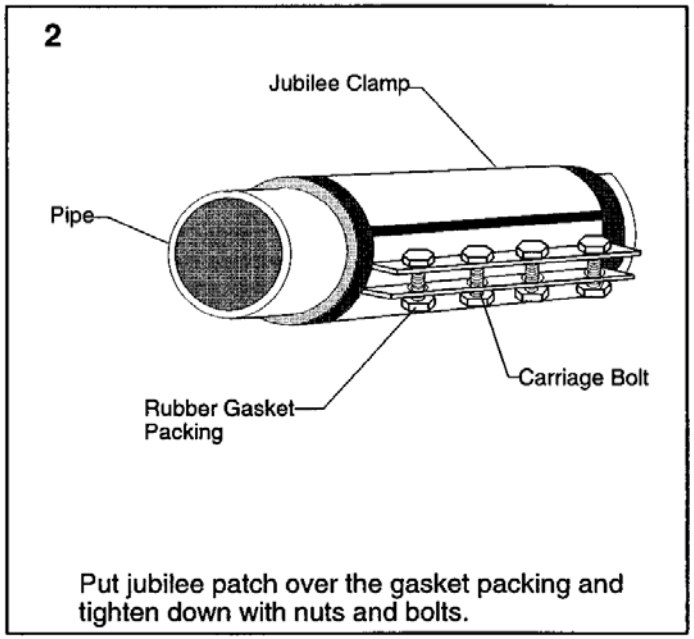
PIPE PATCHING EVOLUTION - SKETCH #005
Emergency Water Activated Repair Patch (EWARP)



JUBILEE PIPE PATCHING CLAMP

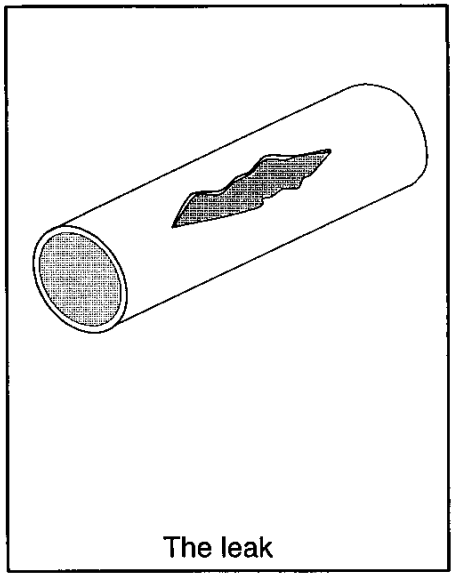


Place rubber gasket packing over the rupture.



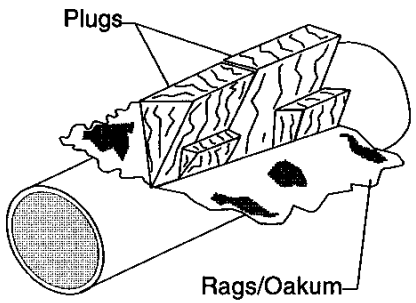
Put jubilee patch over the gasket packing and tighten down with nuts and bolts.

PIPE PATCHING EVOLUTION - SKETCH #006
Jubilee Pipe Patch



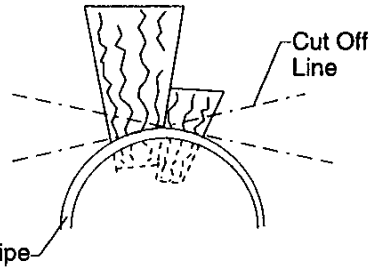
The leak

1



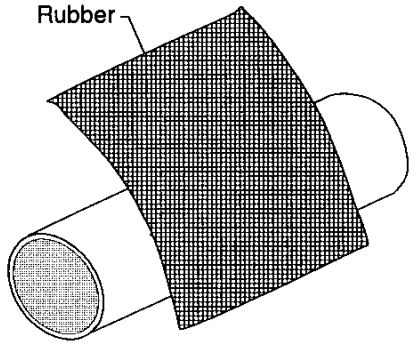
Insert soft wood plugs covered with cloth or gasket snuggly into leak.

2



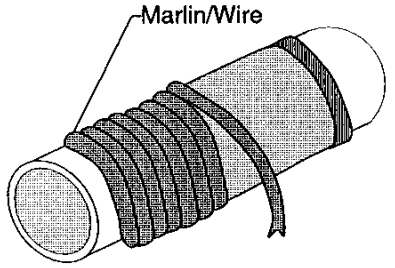
Cut off plugs flush with pipe. Do not set the plugs too far into pipe.

3



Wrap with rubber sheet packing. Overlap ends of crack 2".

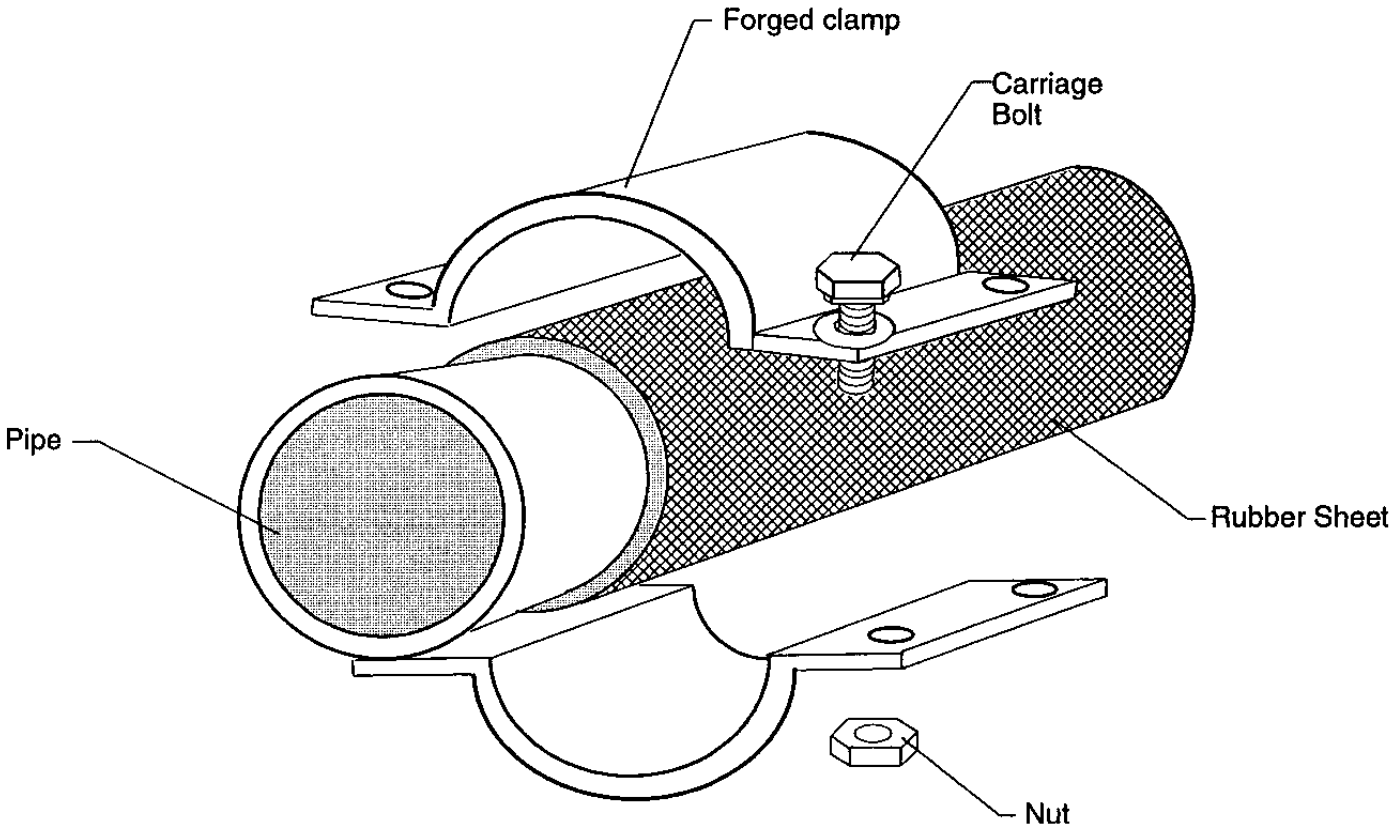
4



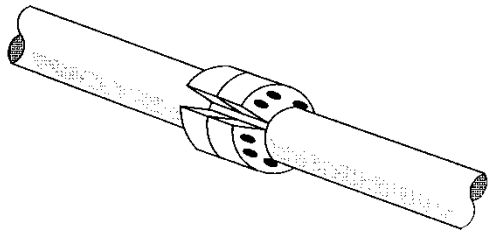
Bind with marlin or wire. Binding should overlap patch by about 1/2" on each end.

PIPE PATCHING EVOLUTION - SKETCH #007
Soft Patch on Low-Pressure Pipe Line

Note: Make clamps to allow for thickness of gasket.



PIPE PATCHING EVOLUTION - SKETCH #008
Clamp Patch



Flange rupture

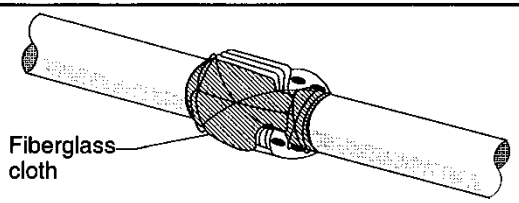
2 **HARDENER AND RESIN APPLICATION**

1. Put on eye shields and gloves. Then open liquid resin can and liquid hardener can.

2. Add hardener to resin can and mix for 2 minutes or until it is a uniform gray color.

3. Cut void cover into "H" shape and coat both sides of void cover with resin-hardener mixture.

4



Cut 4 pieces of fiberglass cloth, each of them long enough to make one complete turn around pipe and overlap 1". Cut these 4 pieces in an "H" shape and fold center pieces over edges of flange. Impregnate separate plies of fiberglass cloth over rupture.

1 **PREPARATION**

1. Secure pipe area.

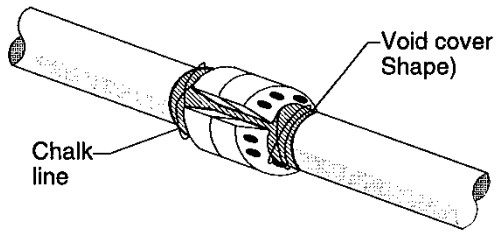
2. Remove lagging and clean damaged section.

3. Make sure pipe surface is clean.

4. Where practical, simplify rupture by bending or removing irregular projections.

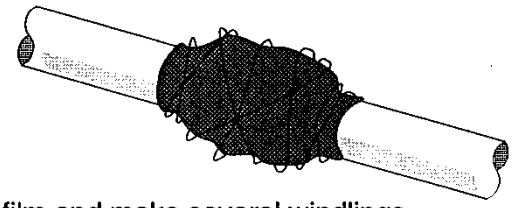
5. Determine amount of materials needed. Allow patch to extend at least 4-5" on either side of rupture.

3



Insert impregnate void cover with resin-hardener mixture into void and tie it securely with chalk line.

5



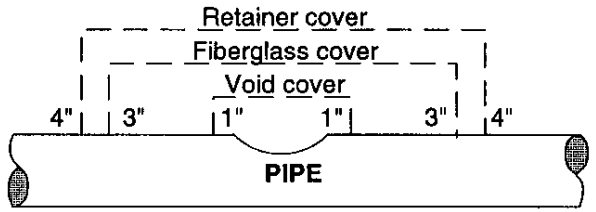
Apply PVC film and make several windlings of chalk line through gap in a figure "X" in order to have fiberglass cloth conform to center of rupture and flange edges.

PIPE PATCHING EVOLUTION - SKETCH #009
Flange Pipe Patch

1 PREPARATION

1. Secure pipe area.
2. Remove lagging and clean damaged section.
3. Make sure pipe surface is clean.
4. Where practical, simplify rupture by bending or removing irregular projections.

2 RELATIVE POSITIONS OF PATCH MATERIALS

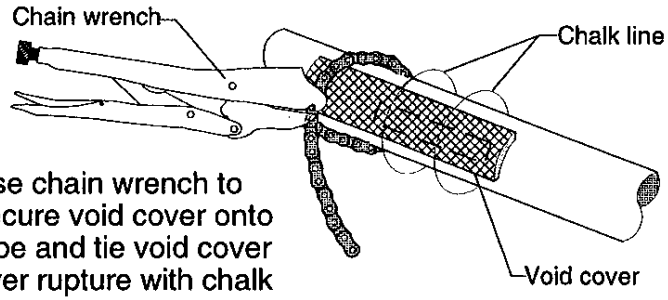


Determine amount of materials needed.

3 HARDENER AND RESIN APPLICATION

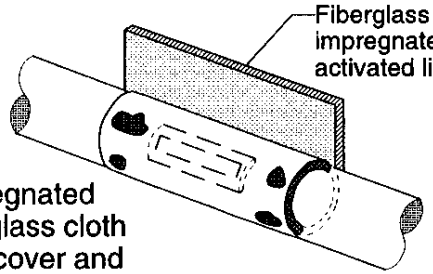
1. Put on eye shields and gloves. Then open liquid resin can and liquid hardener can.
2. Add hardener to resin can and mix for 2 minutes or until it is a uniform gray color.
3. Coat both sides of void cover with resin-hardener mixture.

4



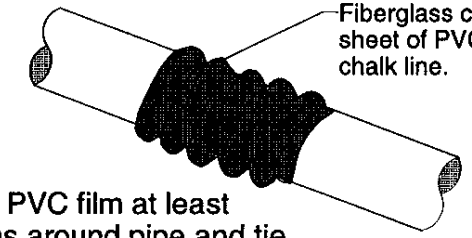
Use chain wrench to secure void cover onto pipe and tie void cover over rupture with chalk line.

5



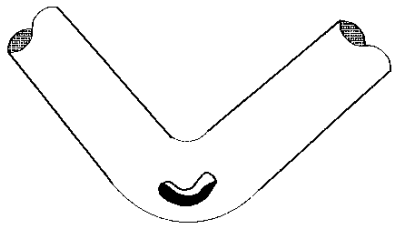
Center impregnated side of fiberglass cloth toward void cover and wrap around pipe 3 or 4 turns.

6



Wrap PVC film at least 2 turns around pipe and tie with chalk line starting from center of patch. Make 1/2" spacings between spirals.

PIPE PATCHING EVOLUTION - SKETCH #010
Simple Pipe Patch



Elbow rupture

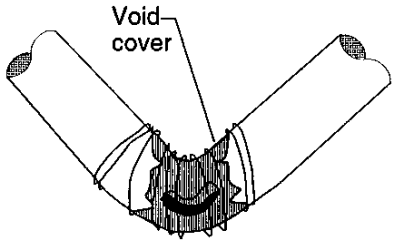
1 **PREPARATION**

1. Secure pipe area.
2. Remove lagging and clean damaged section.
3. Make sure pipe surface is clean.
4. Where practical, simplify rupture by bending or removing irregular projections.
5. Determine amount of materials needed. Allow patch to extend at least 4-5" on either side of rupture.

2 **HARDENER AND RESIN APPLICATION**

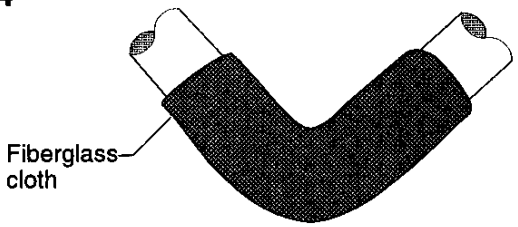
1. Put on eye shields and gloves. Then open liquid resin can and liquid hardener can.
2. Add hardener to resin can and mix for 2 minutes or until it is a uniform gray color.
3. Coat both sides of void cover with resin-hardener mixture.

3



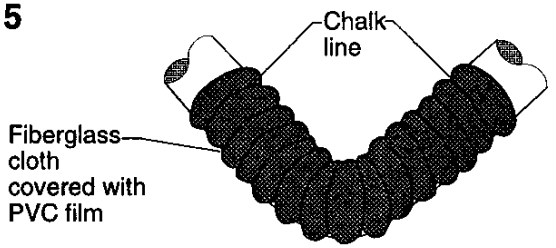
Slit edges of void cover 2" to 3" at each end to conform to contour of pipe and secure with chalk line.

4



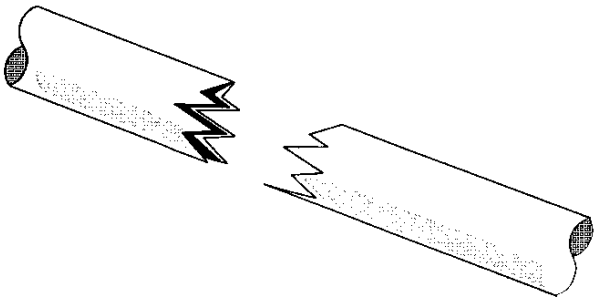
Wrap impregnated fiberglass cloth around pipe and shape cloth to contour of pipe.

5



Apply PVC film at least 2 turns around pipe and tie with chalk line starting from center.

PIPE PATCHING EVOLUTION - SKETCH #011
Elbow Pipe Patch Using Plastic Pipe Patching Kit



Severed rupture

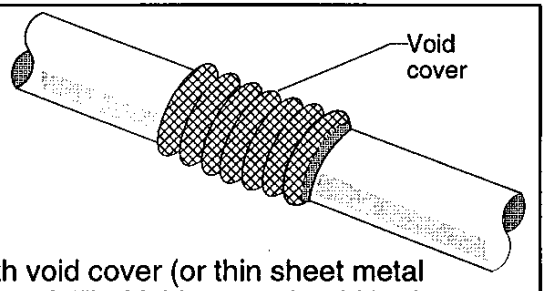
1 **PREPARATION**

1. Secure pipe area.
2. Remove lagging and clean damaged section.
3. Make sure pipe surface is clean.
4. Where practical, simplify rupture by bending or removing irregular projections.
5. Determine amount of materials needed. Allow patch to extend at least 4-5" on either side of rupture.

2 **HARDENER AND RESIN APPLICATION**

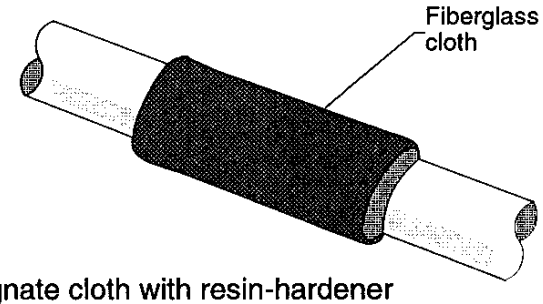
1. Put on eye shields and gloves. Then open liquid resin can and liquid hardener can.
2. Add hardener to resin can and mix for 2 minutes or until it is a uniform gray color.
3. Coat both sides of void cover with resin-hardener mixture.

3



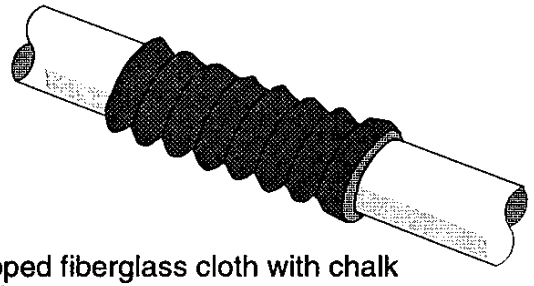
Bridge gap with void cover (or thin sheet metal where gap exceed 4"). Void cover should be long enough to provide one complete turn around pipe with possible overlap of about 2". Secure void

4



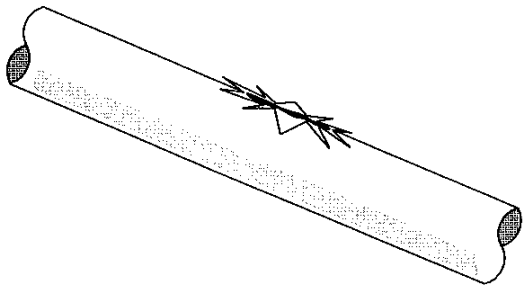
Impregnate cloth with resin-hardener mixture and wrap cloth around bridge material.

5



Secure wrapped fiberglass cloth with chalk line starting from center.

PIPE PATCHING EVOLUTION - SKETCH #012
Severed Pipe Patch



Compound rupture

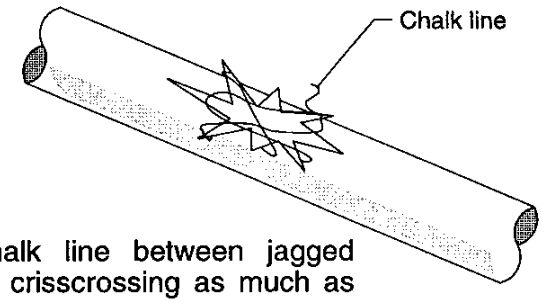
1 **PREPARATION**

1. Secure pipe area.
2. Remove lagging and clean damaged section.
3. Make sure pipe surface is clean.
4. Where practical, simplify rupture by bending or removing irregular projections.
5. Determine amount of materials needed. Allow patch to extend at least 4-5" on either side of rupture.

2 **HARDENER AND RESIN APPLICATION**

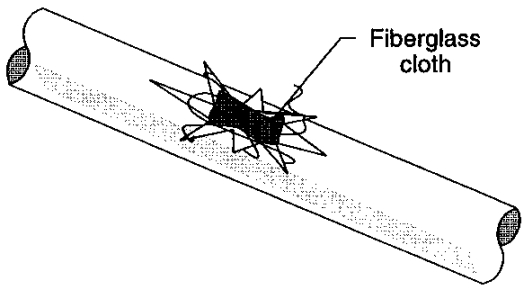
1. Put on eye shields and gloves. Then open liquid resin can and liquid hardener can.
2. Add hardener to resin can and mix for 2 minutes or until it is an uniform gray color.

3



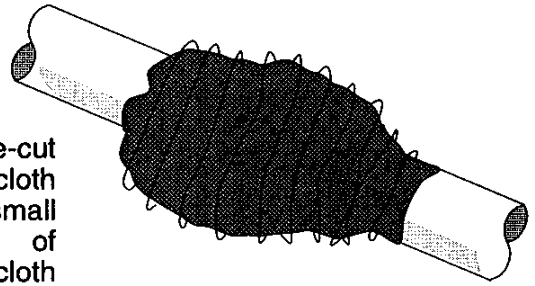
Tie chalk line between jagged edges, crisscrossing as much as possible.

4



Fold a small piece of impregnated fiberglass cloth and lay it in the void.

5



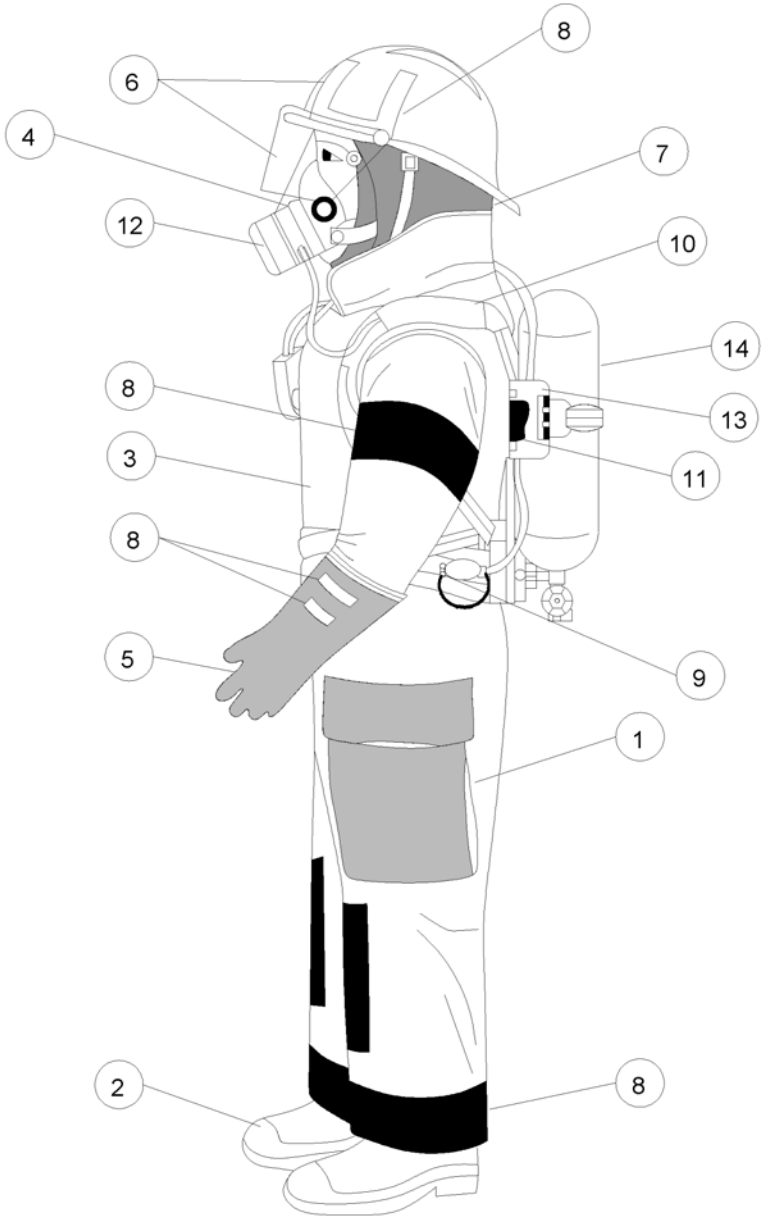
Apply pre-cut fiberglass cloth over the small folded piece of fiberglass cloth and tie it firmly

PIPE PATCHING EVOLUTION - SKETCH #013
Compound Pipe Patch

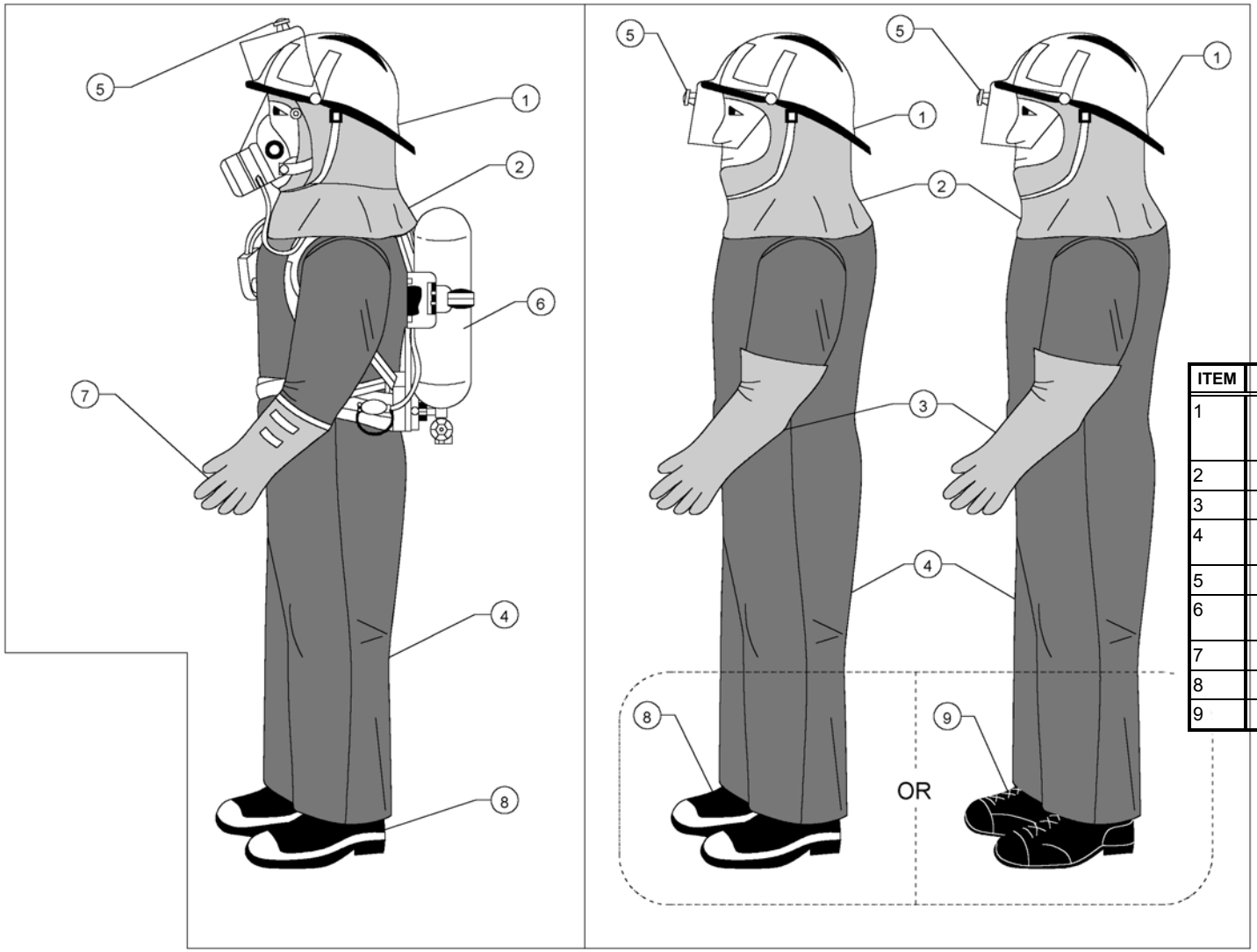
DAMAGE CONTROL LAYOUT SKETCHES

SECTION 12 – PERSONNEL PROTECTION EQUIPMENT

ITEM	QTY	EQUIPMENT
1	1	POCKET
2	1 PR	FIREMAN'S BOOTS
3	1	FIREFIGHTER'S ENSEMBLE COVERALLS
4	1	SELF-CONTAINED BREATHING APPARATUS (SCBA)
5	1 PR	FIREFIGHTER'S GLOVES
6	1	DAMAGE CONTROL/FIREFIGHTER'S HELMIT WITH LINER/VISOR
7	1	ANTI-FLASH HOOD
8	VARIOUS	REFLECTIVE TAPE
9	1	QUICK FILL CONNECTION
10	1	HARNESS, KEVLAR
11	1	QC BLOCK
12	1	E-Z FLOW REGULATOR
13	1	PRESSURE REGULATOR
14	1	CYLINDER



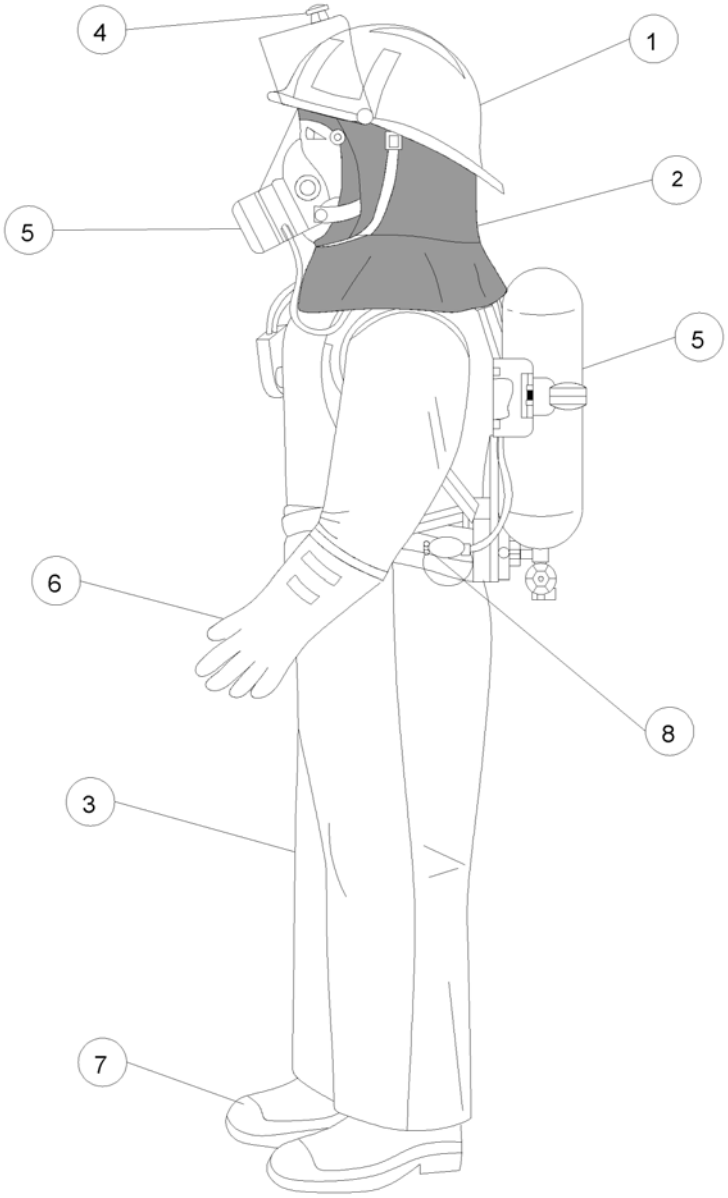
PERSONNEL PROTECTION EQUIPMENT - SKETCH #001
Firefighter's Ensemble and Self-Contained Breathing Appartus (SCBA)



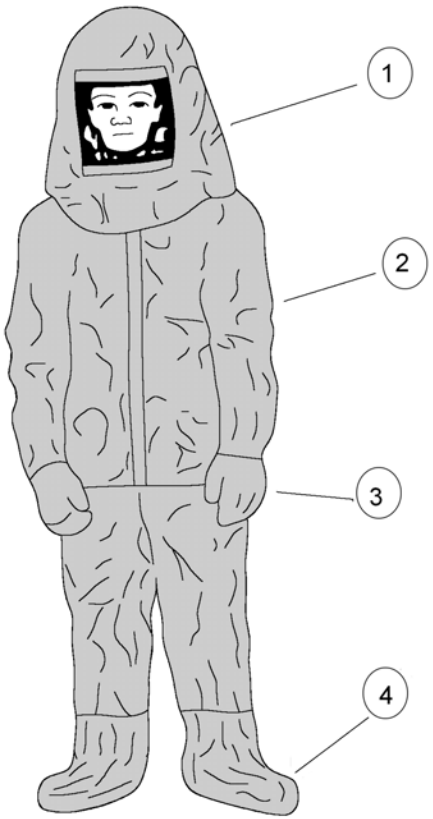
ITEM	QTY	EQUIPMENT
1	1	DAMAGE CONTROL/FIREFIGHTER'S HELMET WITH LINER/VISOR
2	1	ANTI-FLASH HOOD
3	1 PR	ANTI-FLASH GLOVES
4	1	FIRE RETARDANT COVERALLS (BLUE)
5	1	HEAD LANTERN
6	1	SELF-CONTAINED BREATHING APPARATUS (SCBA)
7	1 PR	FIREFIGHTER'S GLOVES
8	1 PR	FIREFIGHTER'S BOOTS
9	1 PR	STEEL TOE SHOES

PERSONNEL PROTECTION EQUIPMENT - SKETCH #002
Repair Party Outfit

ITEM	QTY	EQUIPMENT
1	1	DAMAGE CONTROL/FIREFIGHTER'S HELMET WITH LINER/VISOR
2	1	ANTI-FLASH HOOD
3	1	FIRE RETARDANT COVERALLS (BLUE)
4	1	HEAD LANTERN
5	1	SELF-CONTAINED BREATHING APPARATUS (SCBA)
6	1 PR	FIREFIGHTER'S GLOVES
7	1 PR	FIREFIGHTER'S BOOTS
8	1	QUICK FILL CONNECTION

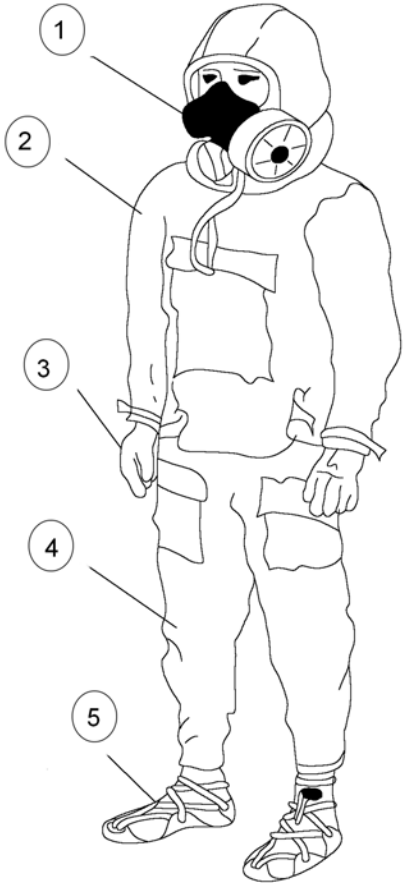


PERSONNEL PROTECTION EQUIPMENT - SKETCH #003
Repair Party Outfit and Self-Contained Breathing Apparatus (SCBA)



AIRCRAFT PROXIMITY FIREFIGHTING SUIT

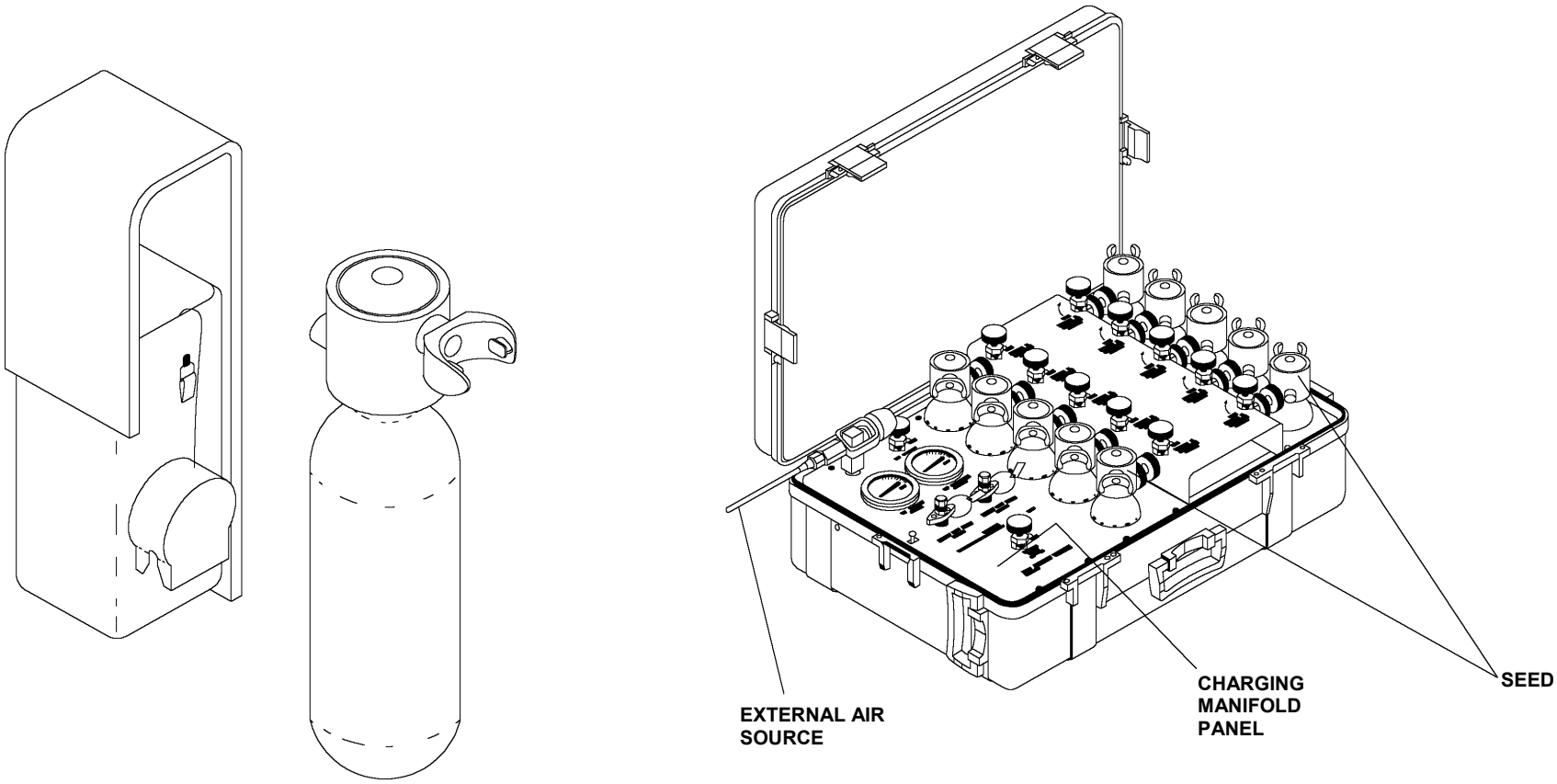
ITEM	EQUIPMENT
1	HOOD
2	SUIT
3	GLOVES
4	BOOT COVERS



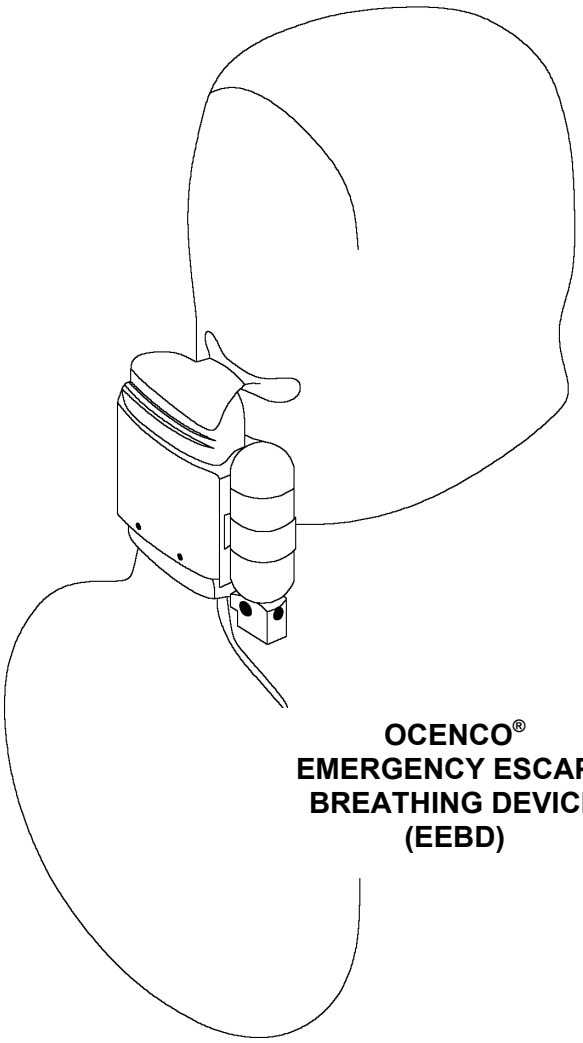
CHEMICAL PROTECTIVE OVERGARMENT

ITEM	EQUIPMENT
1	MCU-2/P
2	SMOCK
3	BUTYL RUBBER GLOVES
4	TROUSERS
5	CHEMICAL PROTECTIVE FOOTWEAR COVERS

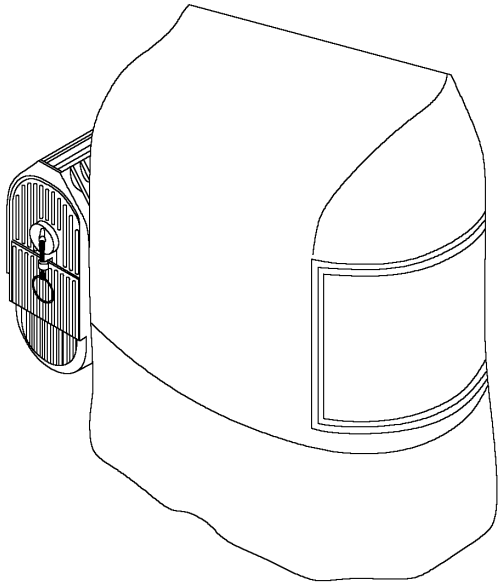
PERSONNEL PROTECTION EQUIPMENT - SKETCH #004
Aircraft Firefighting and Chemical, Biological & Radiological (CBR) Protective Clothing



PERSONNEL PROTECTION EQUIPMENT - SKETCH #005
Supplemental Emergency Egress Device (SEED) and SEED Charging Manifold

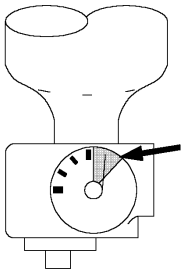


OCENCO®
EMERGENCY ESCAPE
BREATHING DEVICE
(EEBD)

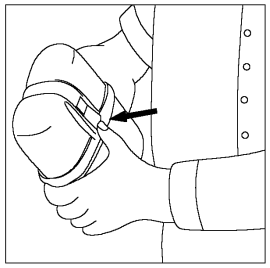
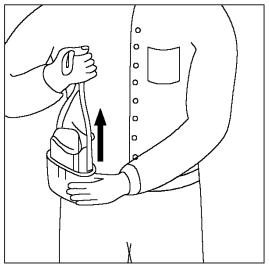
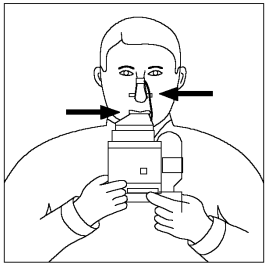
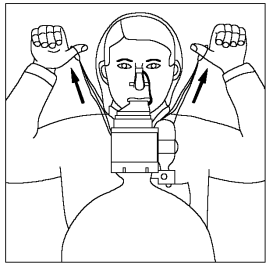


SCOTT®
EMERGENCY ESCAPE
BREATHING DEVICE
(EEBD)

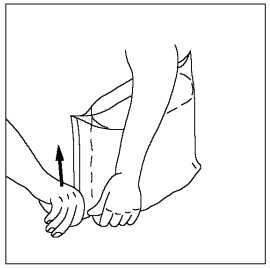
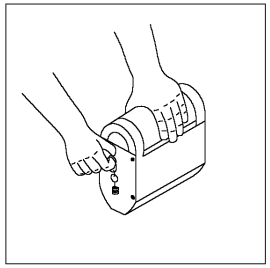
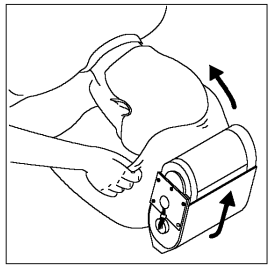
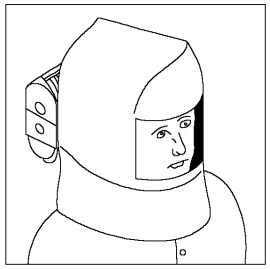
PERSONNEL PROTECTION EQUIPMENT - SKETCH #006
OCENCO® and SCOTT® Emergency Escape Breathing Devices (EEBDs)



IF THIS GAUGE IS OUT OF THE GREEN ZONE, REMOVE FROM SERVICE.

1 Remove unit from case.	2  Lift yellow lever and discard cover.	3  Remove unit by pulling yellow neck strap upwards.
4  Insert yellow mouthpiece and fit yellow nose clip.	5  Fit and adjust yellow neck strap and face shield.	6 Escape. Remove EEBD when bag remains flat.

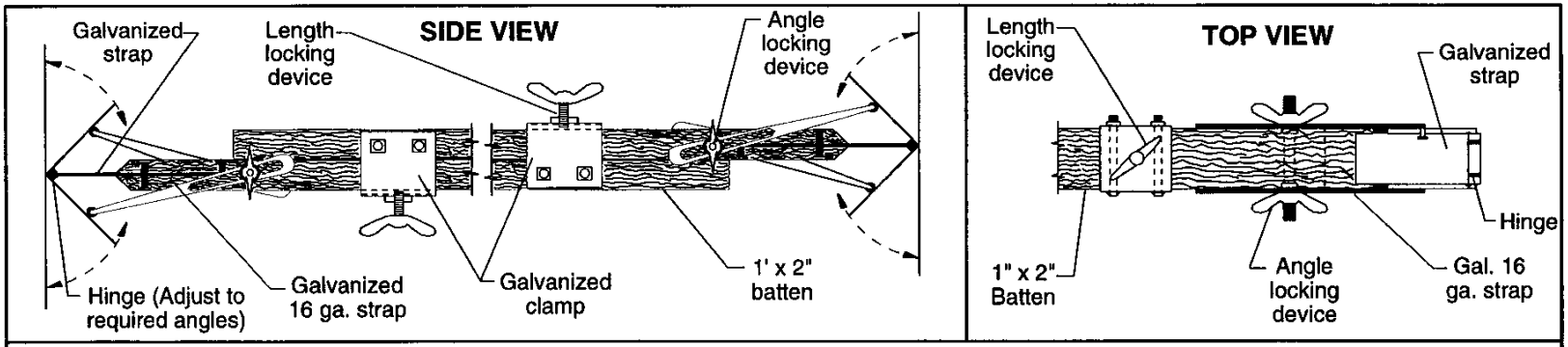
PERSONNEL PROTECTION EQUIPMENT - SKETCH #007
Donning the OCENCO® Emergency Escape Breathing Device (EEBD)

1 Remove unit from case.	2  Tear off red pull strip and remove unit from bag.	3  Pull out actuation ring.
4  Bend down, grasp hood opening with thumbs and pull hood over head.	5  Pull hood down on forehead to assure a secure fit. Check neck seal.	6 Escape. Normal operation causes air flow noise inside the hood. Remove hood when noise stops!

PERSONNEL PROTECTION EQUIPMENT - SKETCH #008
Donning the SCOTT® Emergency Escape Breathing Device (EEBD)

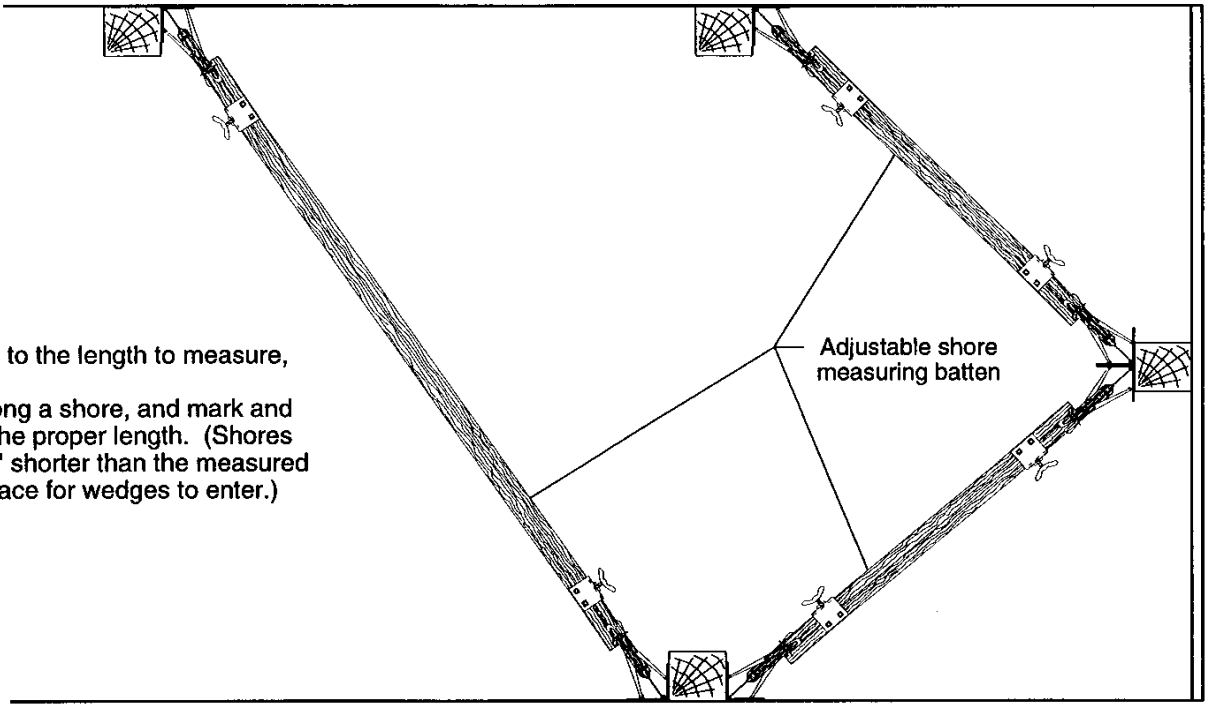
DAMAGE CONTROL LAYOUT SKETCHES

SECTION 13 – SHORING EVOLUTION

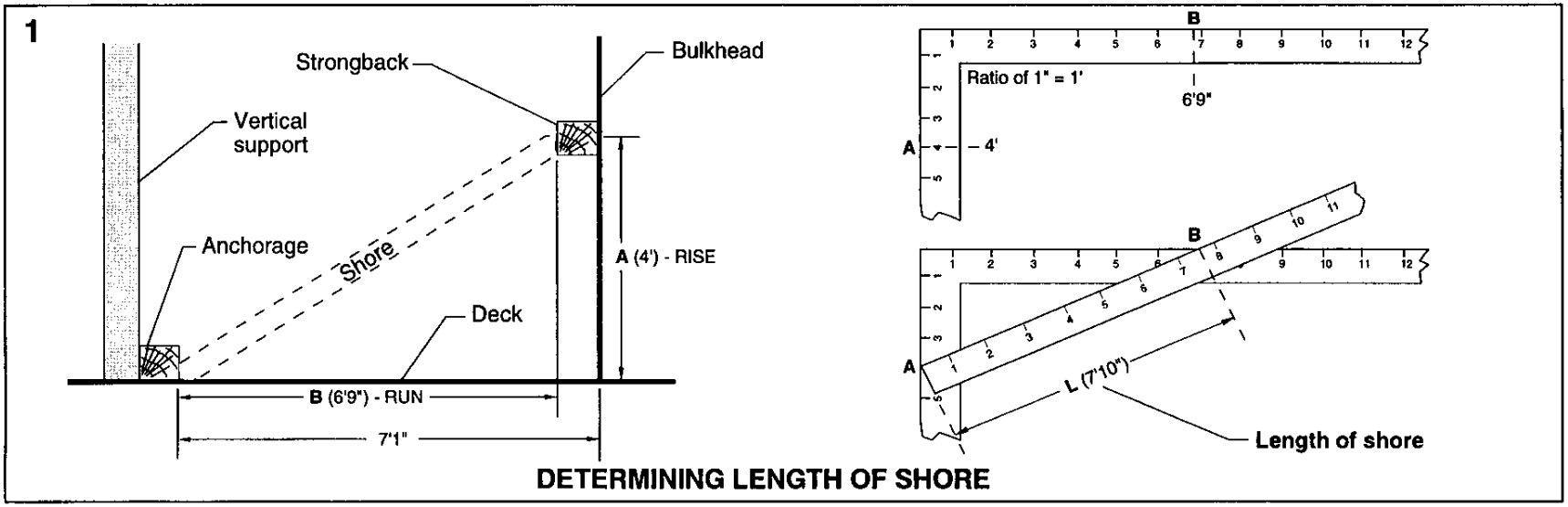


MEASURING BATTEN
(Length of Batten Varies and Is Adjustable to Suit Condition)

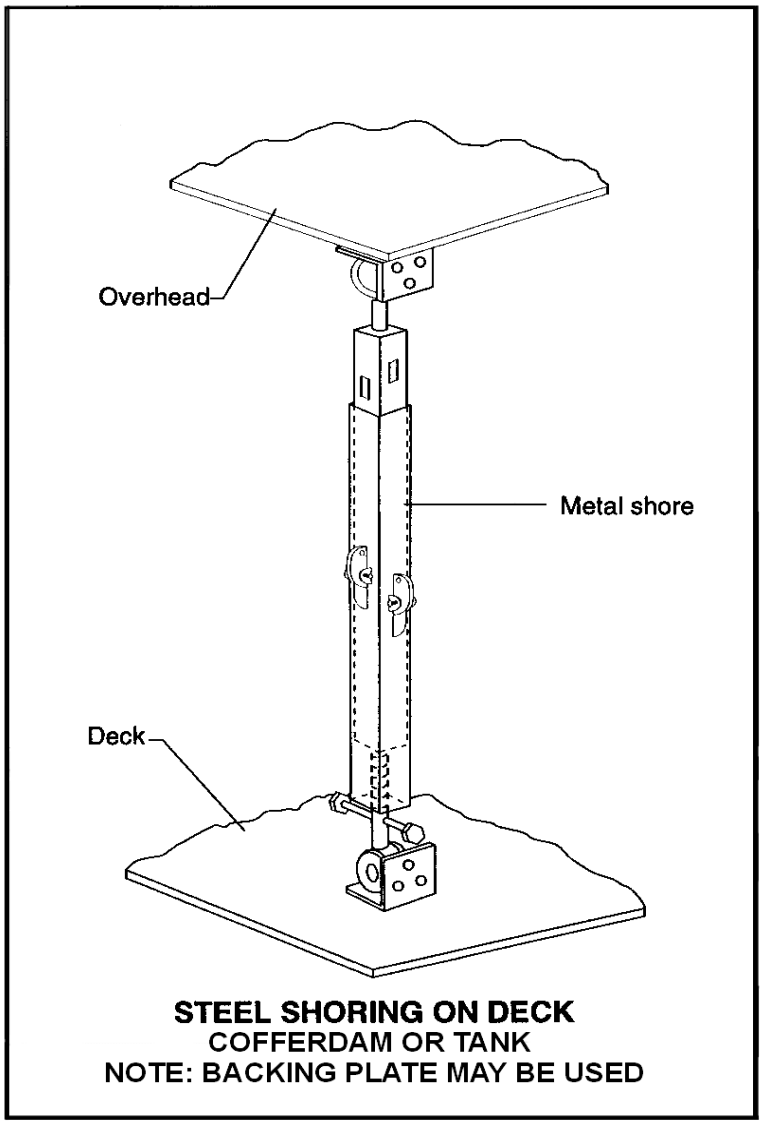
1. Extend the batten to the length to measure, and lock it.
2. Lay the batten along a shore, and mark and cut the timber to the proper length. (Shores should be cut 1/2" shorter than the measured length to allow space for wedges to enter.)



SHORING EVOLUTION - SKETCH #001
Measuring Length and Angle of Shore Using Measuring Batten

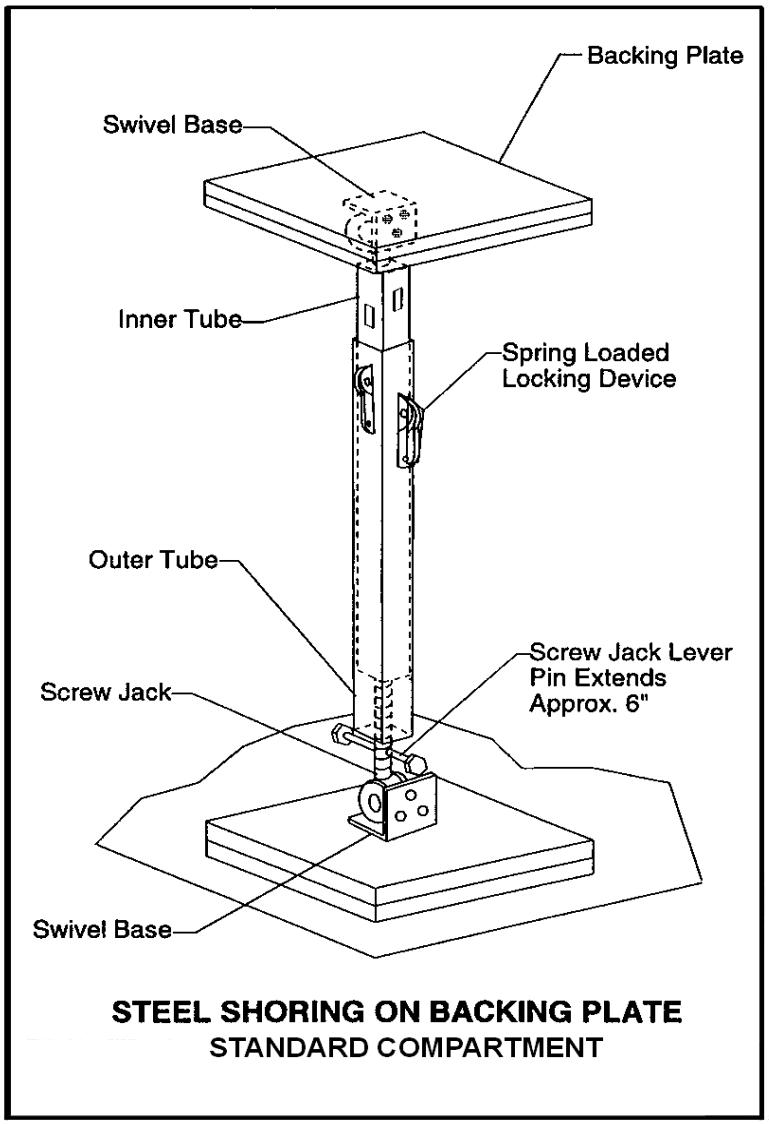


SHORING EVOLUTION - SKETCH #002
Measuring and Cutting Shores Using Folding Rule or Steel Tape and Carpenter's Square



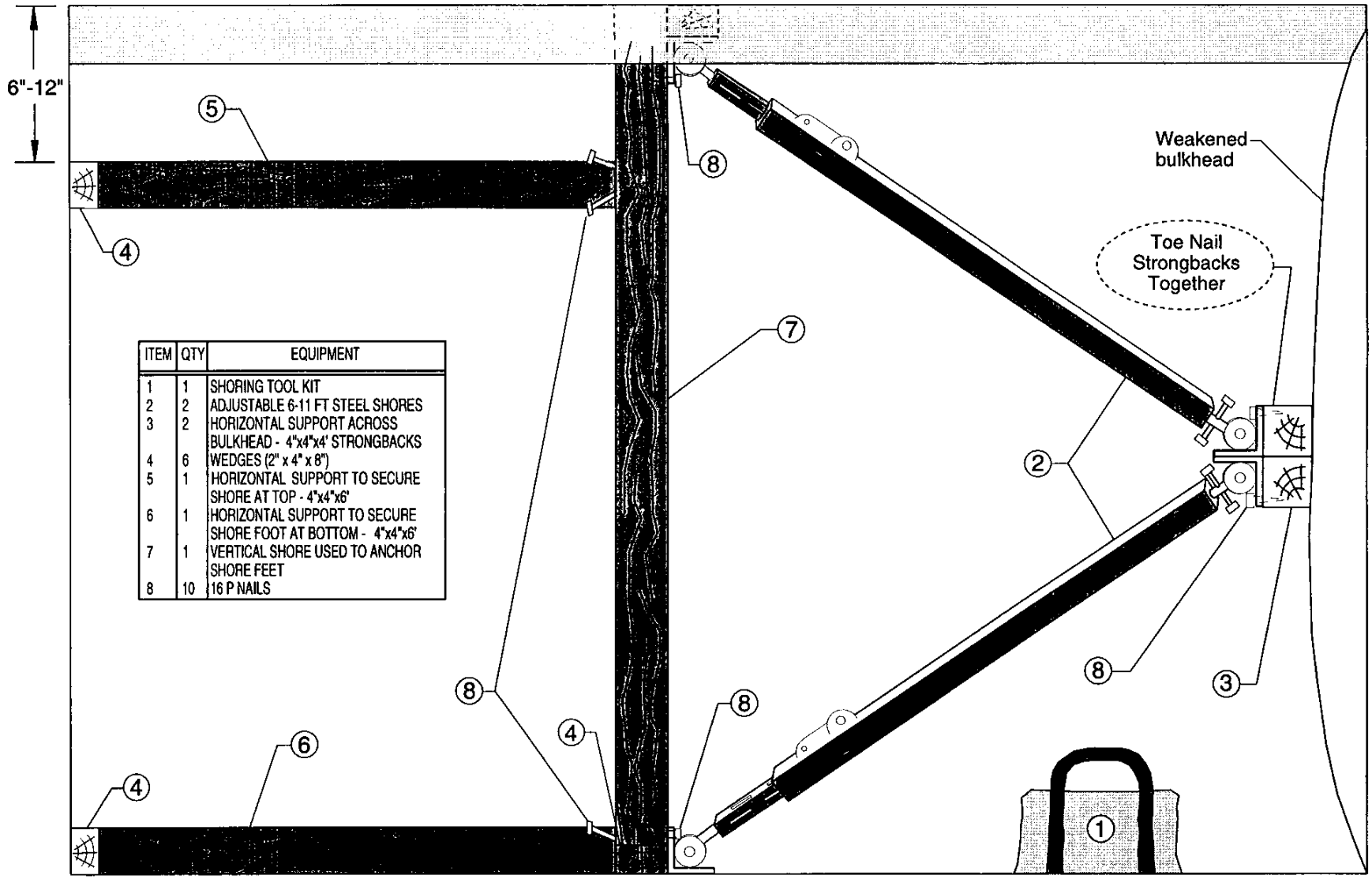
STEEL SHORING ON DECK
COFFERDAM OR TANK
NOTE: BACKING PLATE MAY BE USED

OR

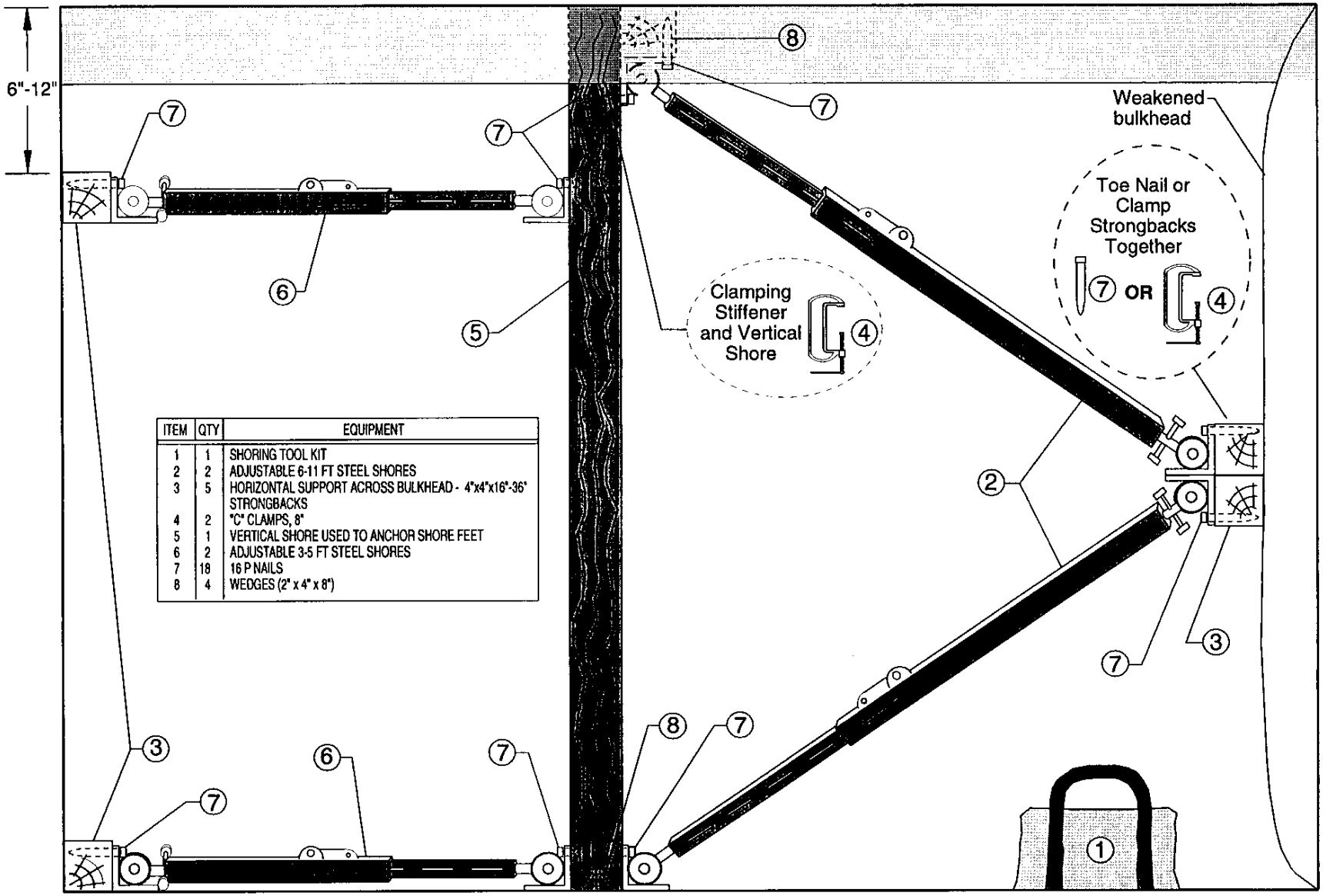


STEEL SHORING ON BACKING PLATE
STANDARD COMPARTMENT

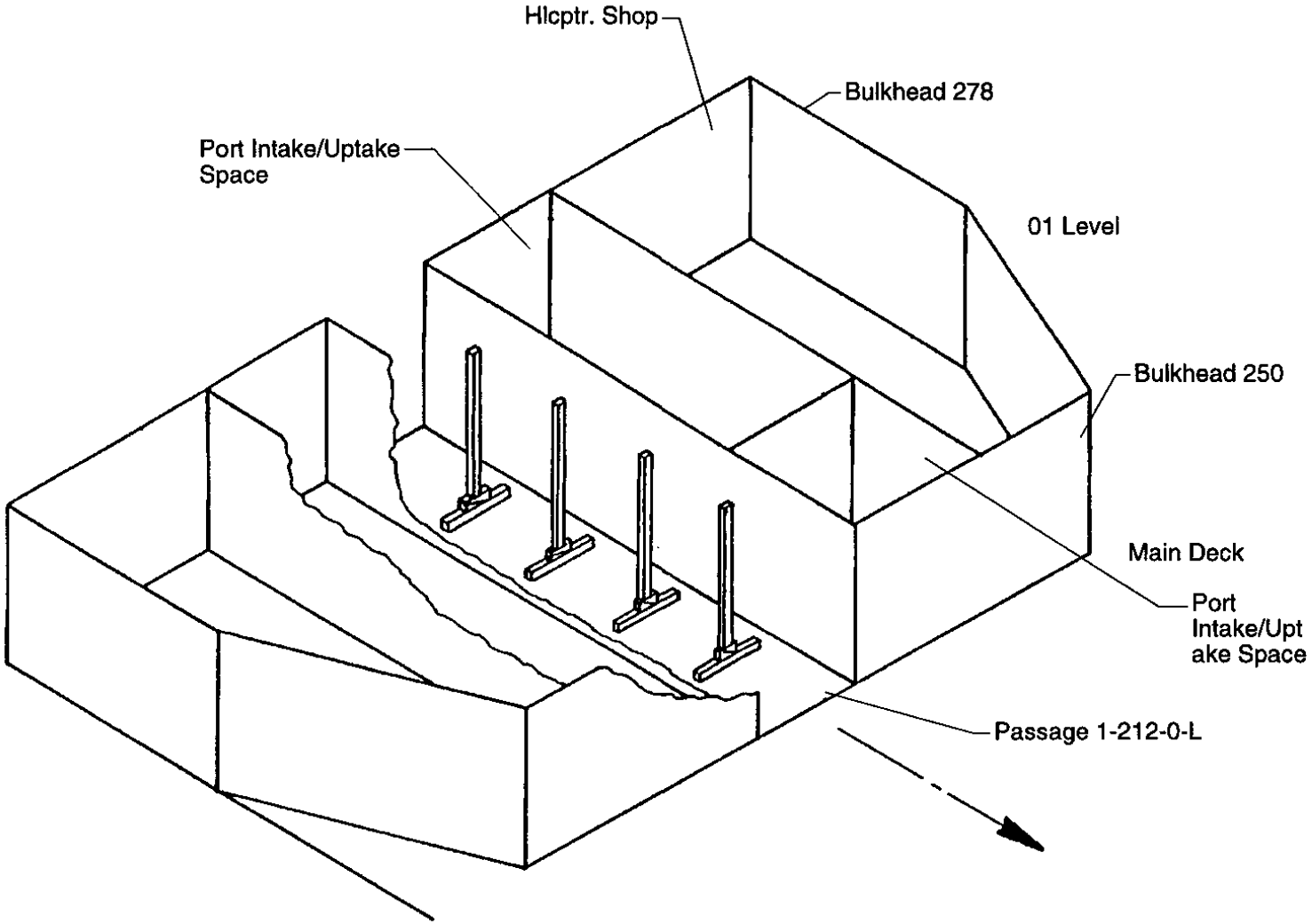
SHORING EVOLUTION - SKETCH #003
I-Type Shoring Using 3-5 Foot or 6-11 Foot Metal Shores



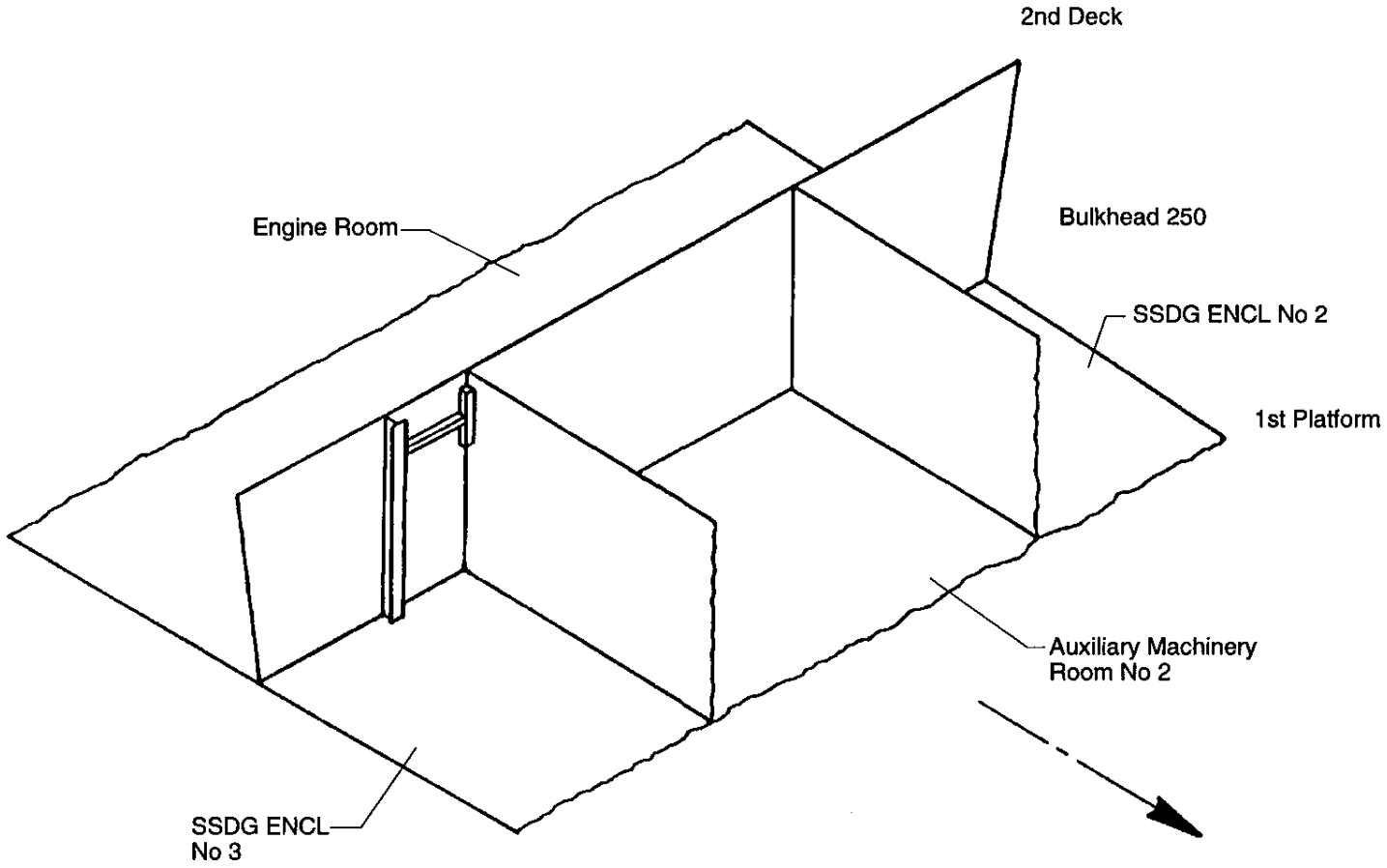
SHORING EVOLUTION - SKETCH #004
I and K-Type Shoring Using Wooden and Adjustable 6-11 Foot Metal Shores



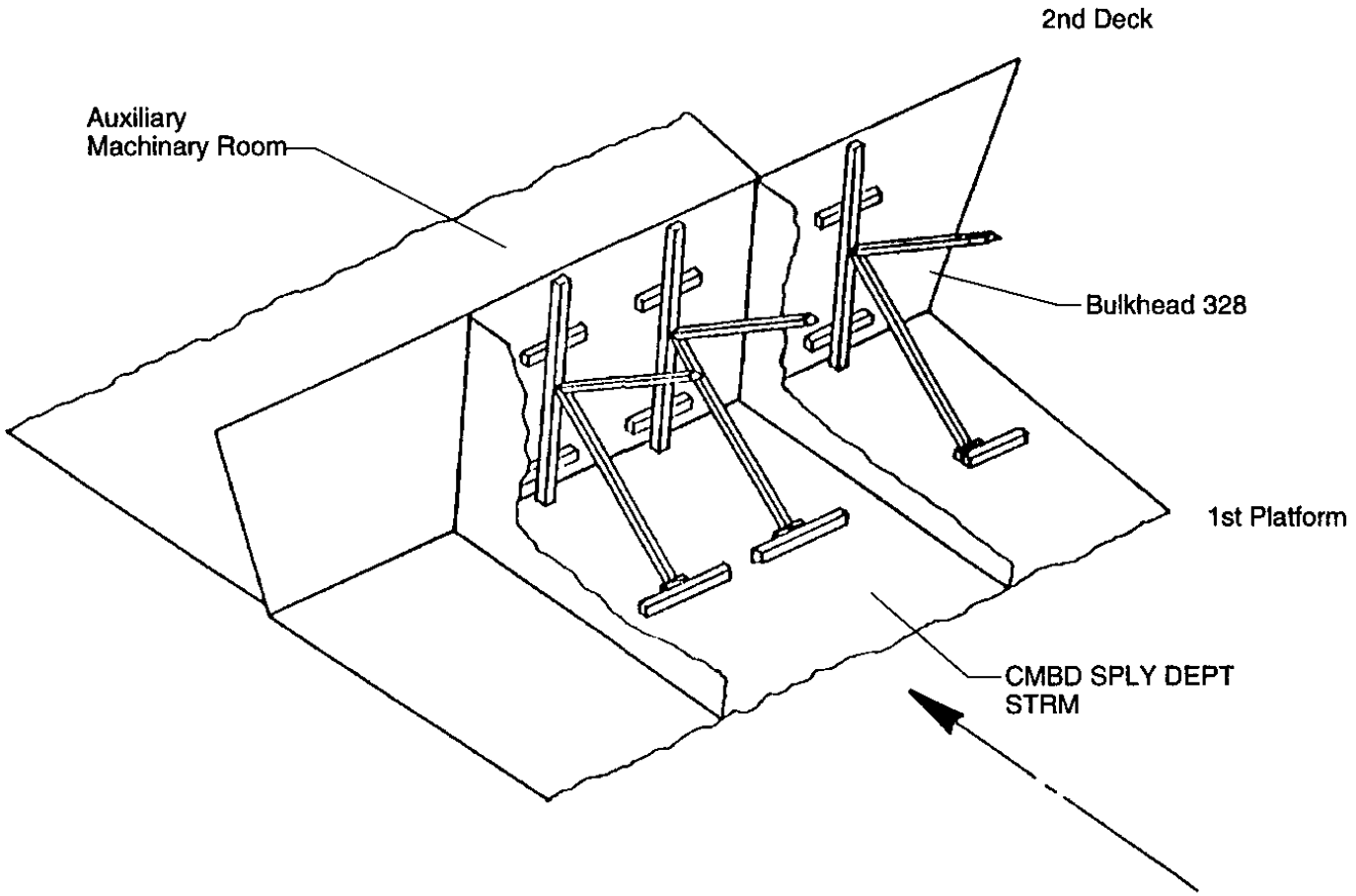
SHORING EVOLUTION - SKETCH #005
I and K-Type Shoring Using Adjustable 3-5 and 6-11 Foot Metal Shores



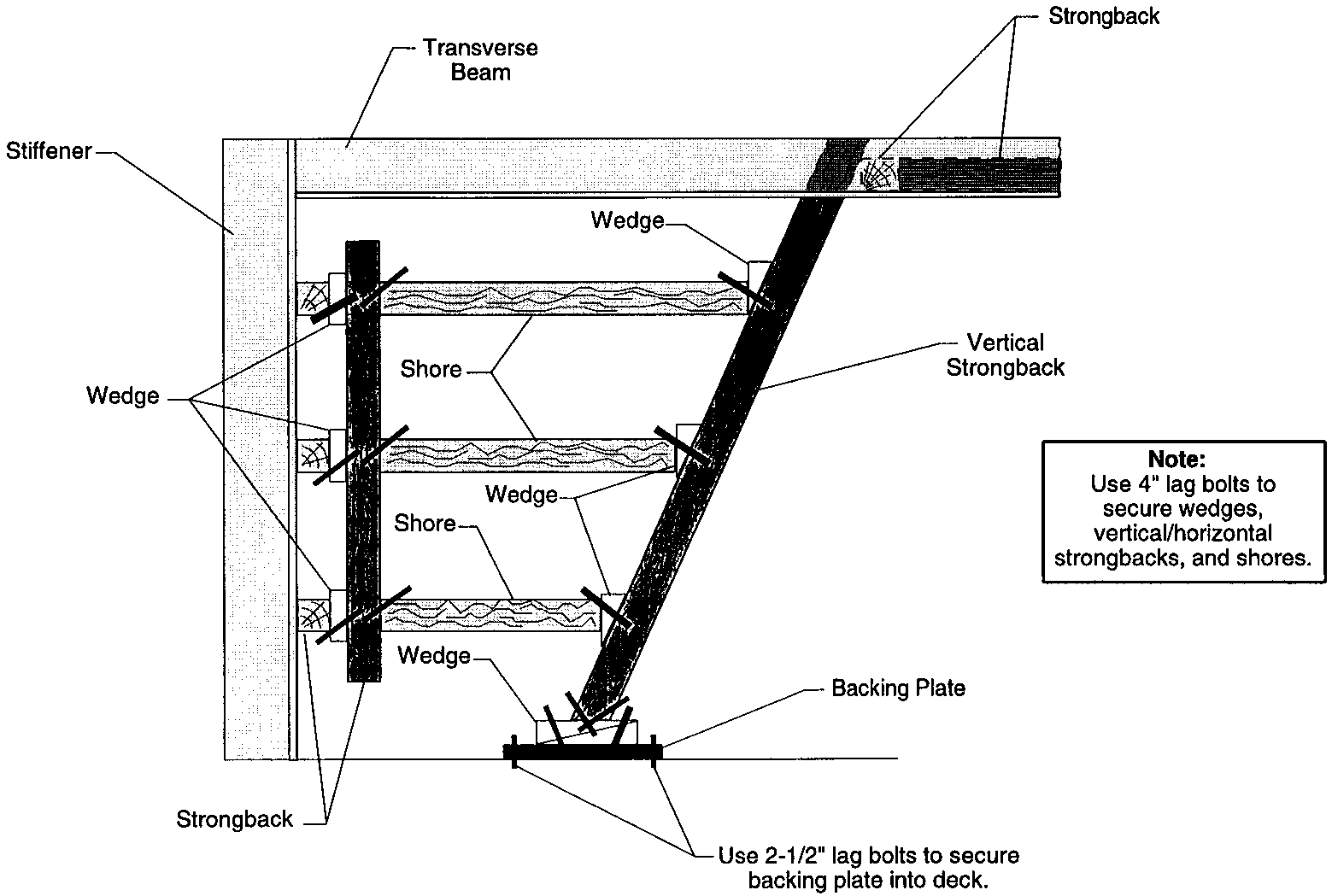
SHORING EVOLUTION - SKETCH #006
I-Type Shoring as Erected in Passage on USS SAMUEL B. ROBERTS (FFG 58)



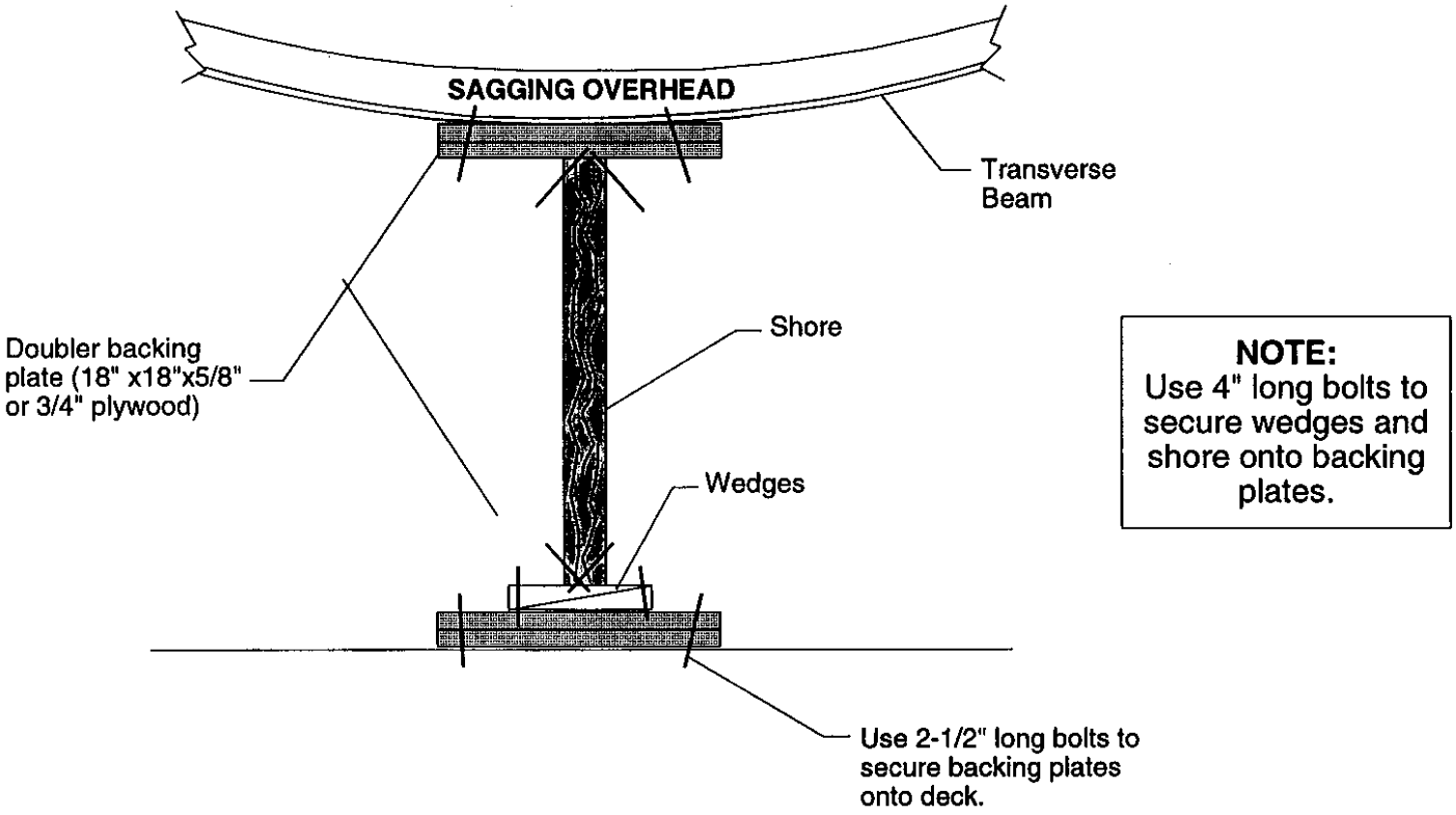
SHORING EVOLUTION - SKETCH #007
Shoring Split Seam After Bulkhead of Auxiliary Machinery Room on USS SAMUEL B. ROBERTS (FFG 58)



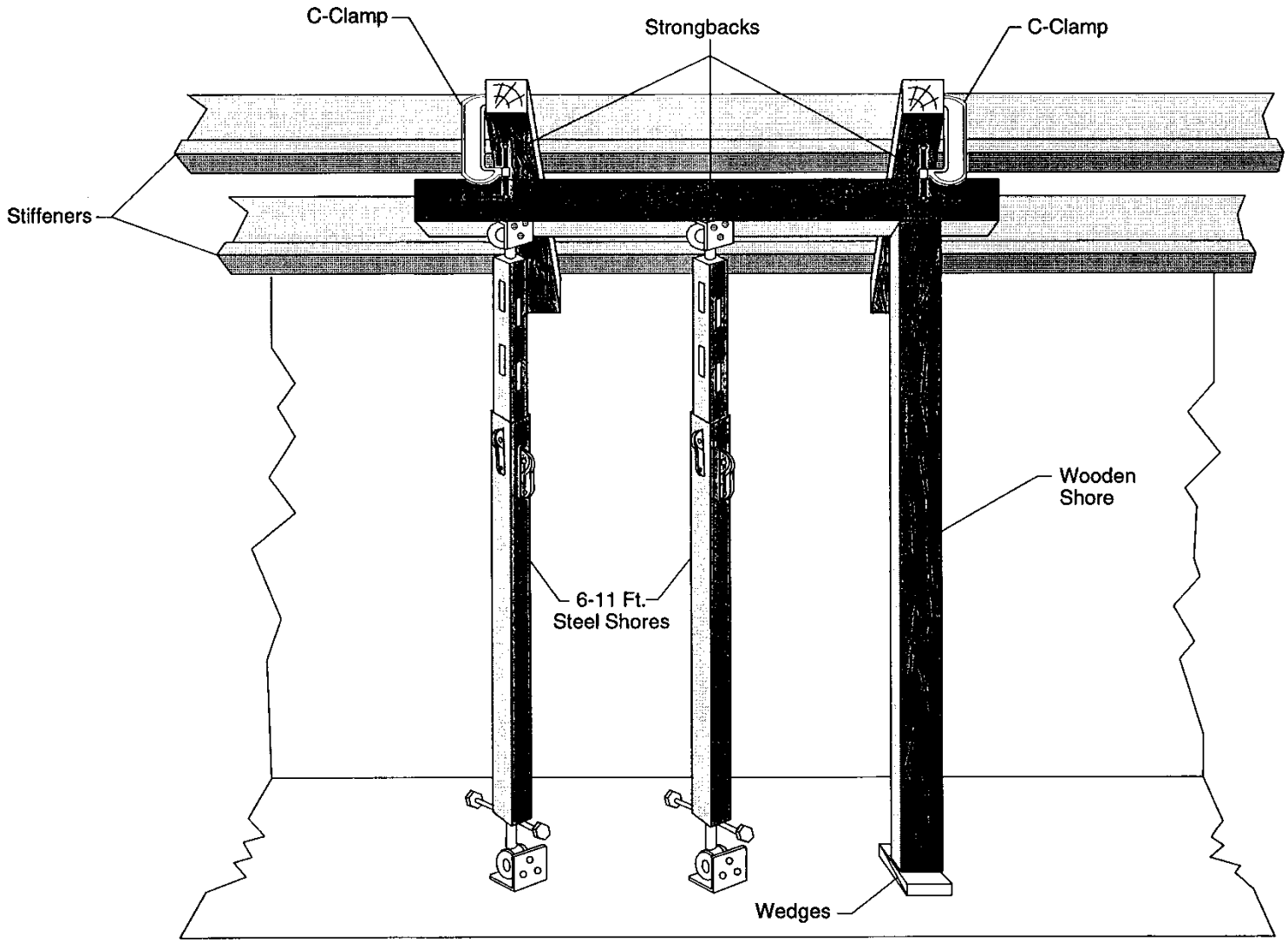
SHORING EVOLUTION - SKETCH #008
K-Type Shoring Forward Bulkhead in CMBD SPLY DEPT STRM - USS SAMUEL B. ROBERTS (FFG 58)



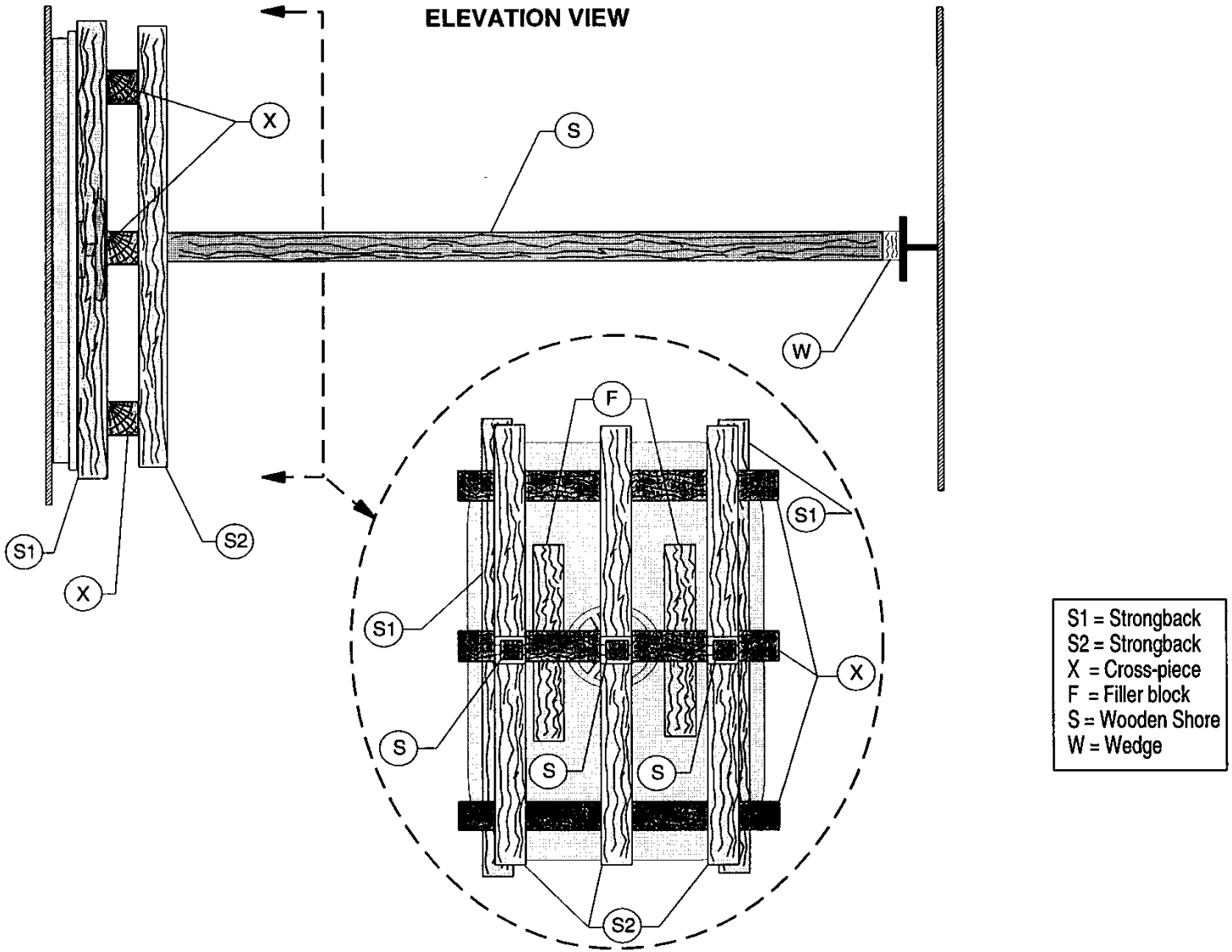
SHORING EVOLUTION - SKETCH #009
H-Type Shoring with Wooden Shores



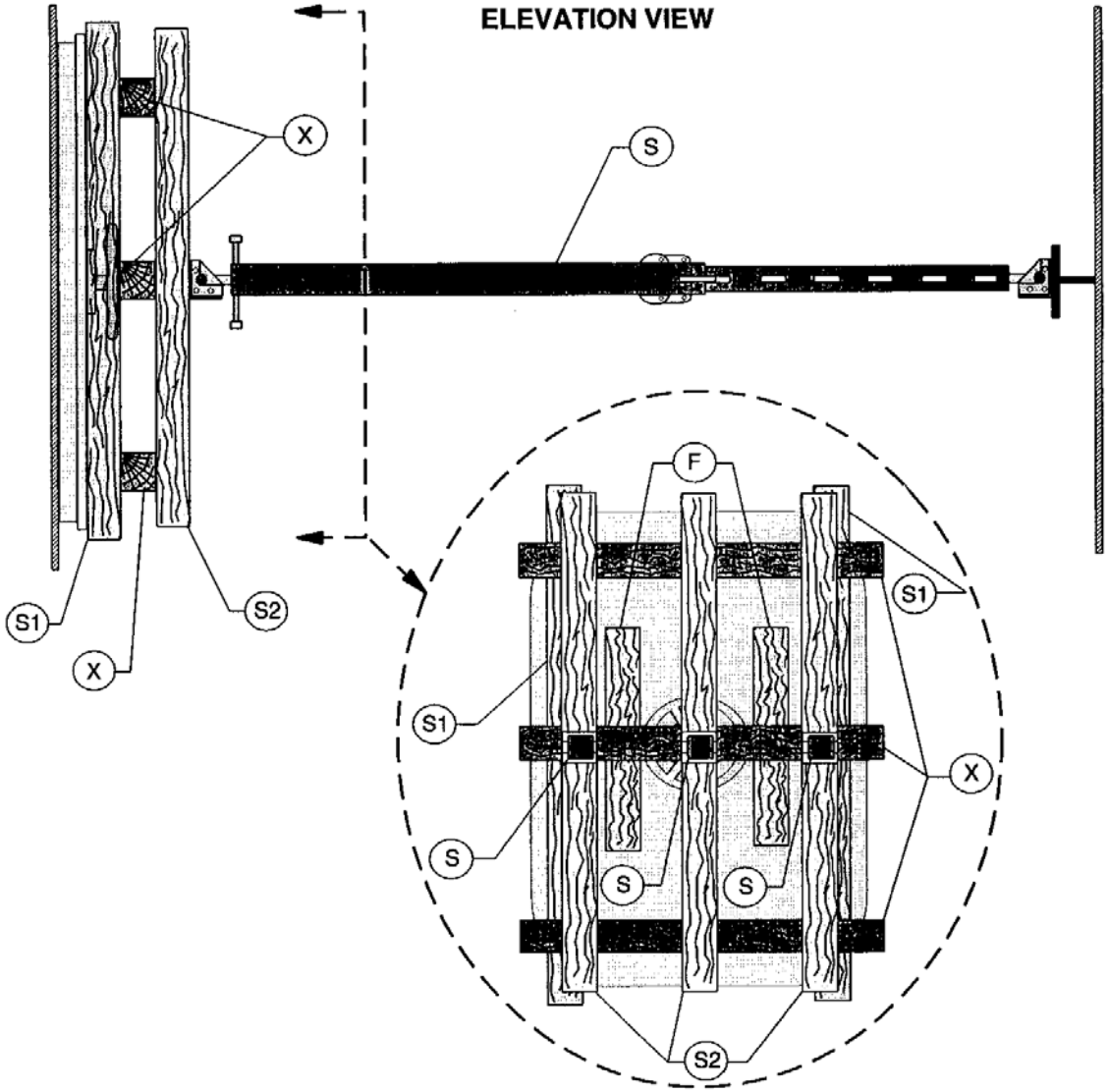
SHORING EVOLUTION - SKETCH #010
I-Type Shoring Using Wood Shore to Support Sagging Overhead on Mine Warfare Class Ships



SHORING EVOLUTION - SKETCH #011
I-Type Shoring Using Multiple Combination of 6-11 Foot Metal Shores and Wooden Shore to Support Overhead Deck or Load

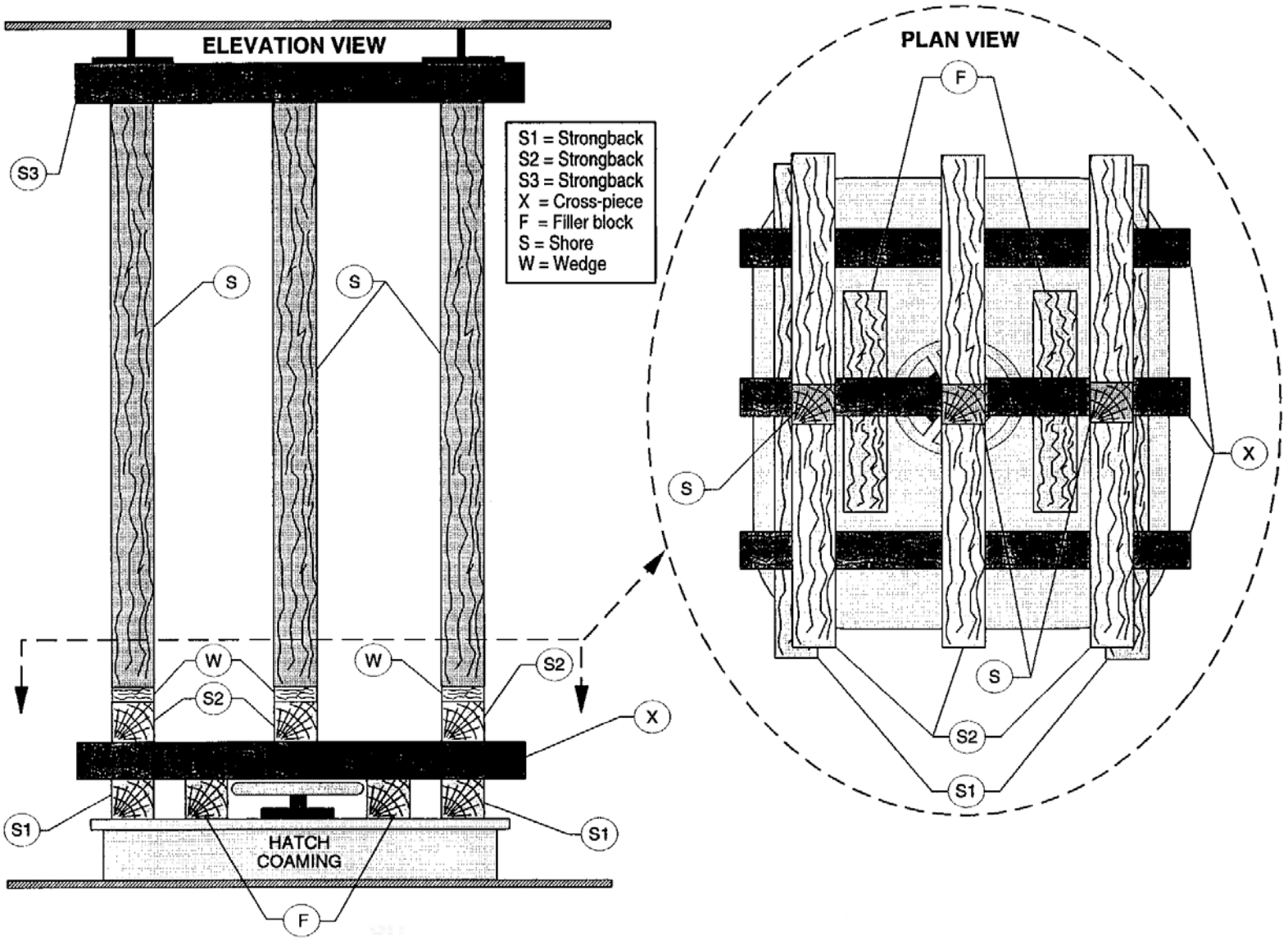


SHORING EVOLUTION - SKETCH #012
I-Type Shoring on Watertight Door Using Wooden Shores

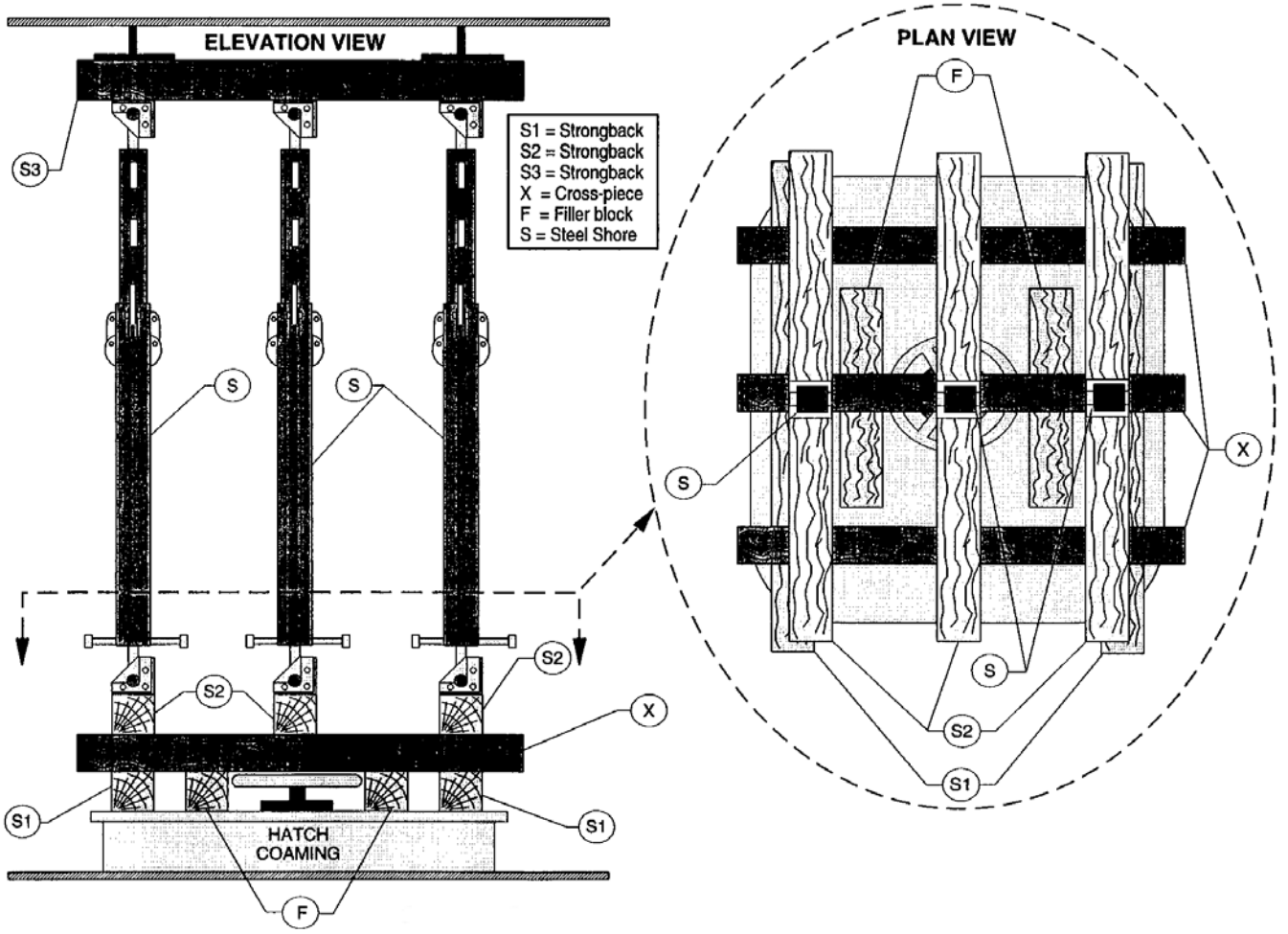


S1 = Strongback
S2 = Strongback
X = Cross-piece
F = Filler block
S = Metal Shore
W = Wedge

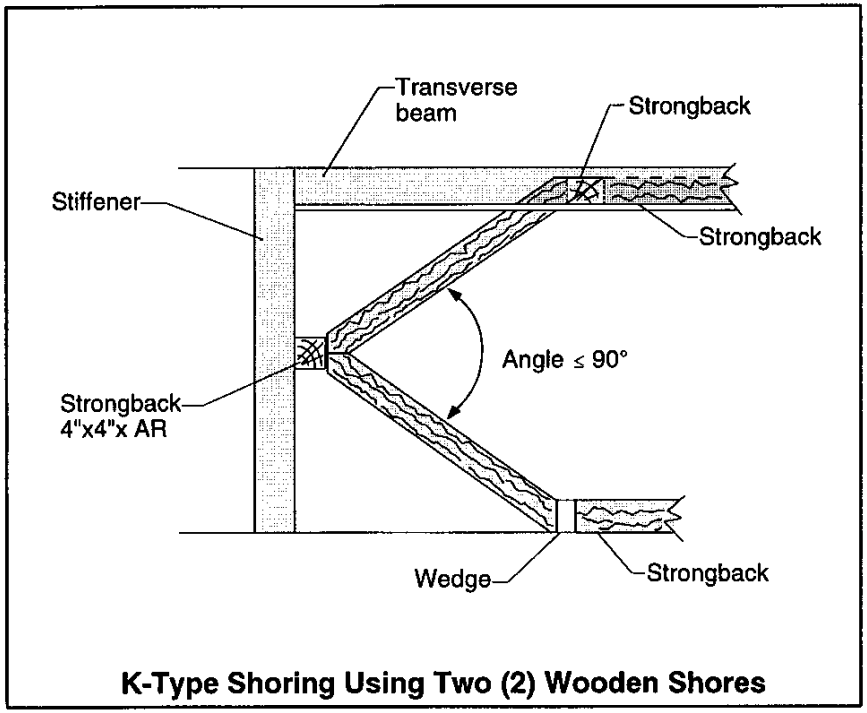
SHORING EVOLUTION - SKETCH #013
I-Type Shoring on Watertight Door Using Metal Shores



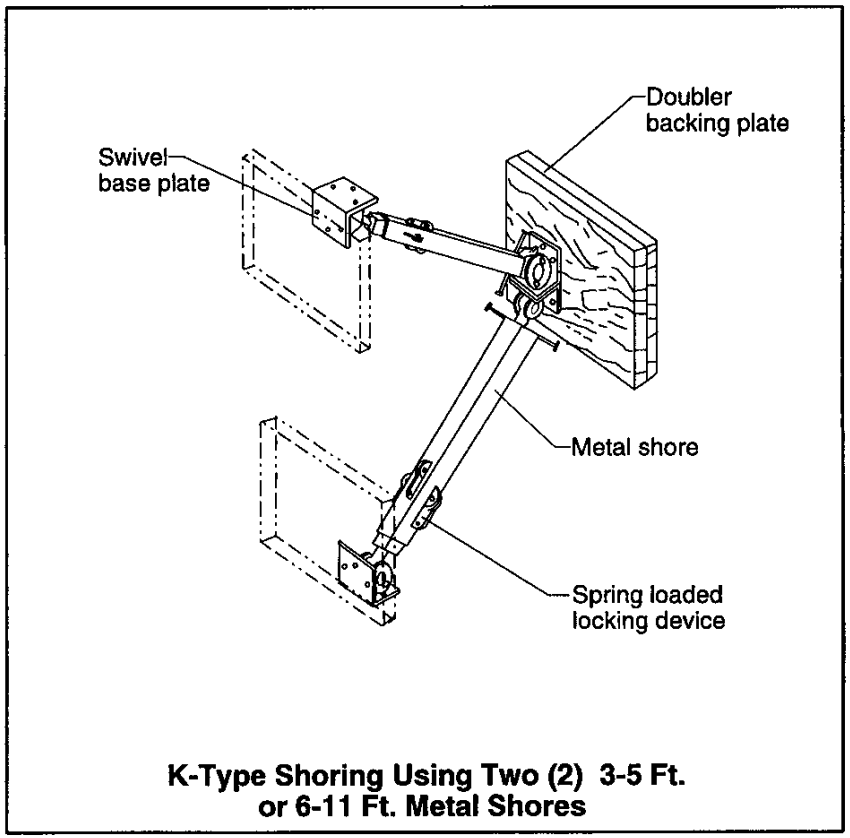
SHORING EVOLUTION - SKETCH #014
I-Type Shoring on Hatch with Scuttle Using Wooden Shores



SHORING EVOLUTION - SKETCH #015
I-Type Shoring on Hatch with Scuttle Using Metal Shores

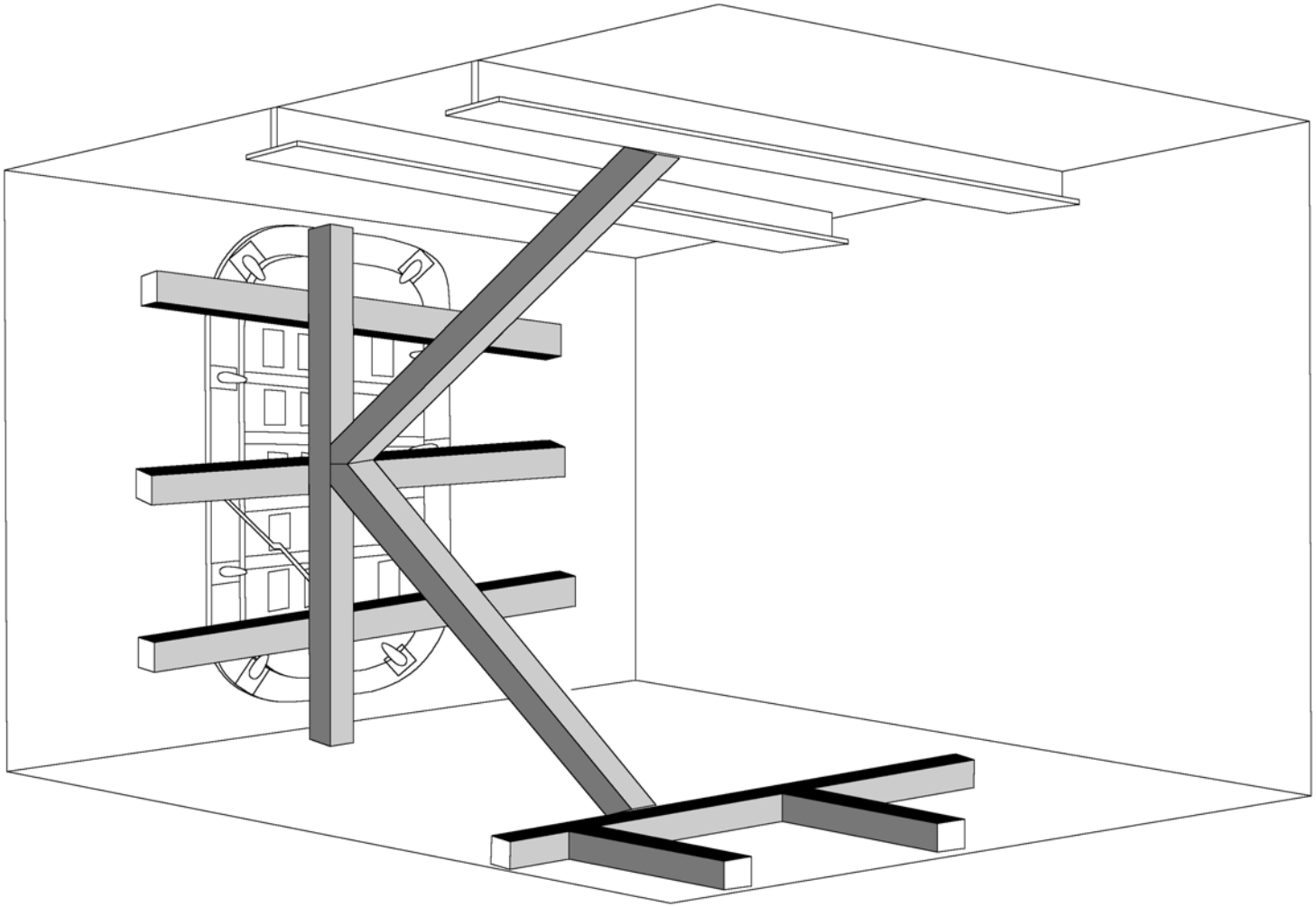


K-Type Shoring Using Two (2) Wooden Shores

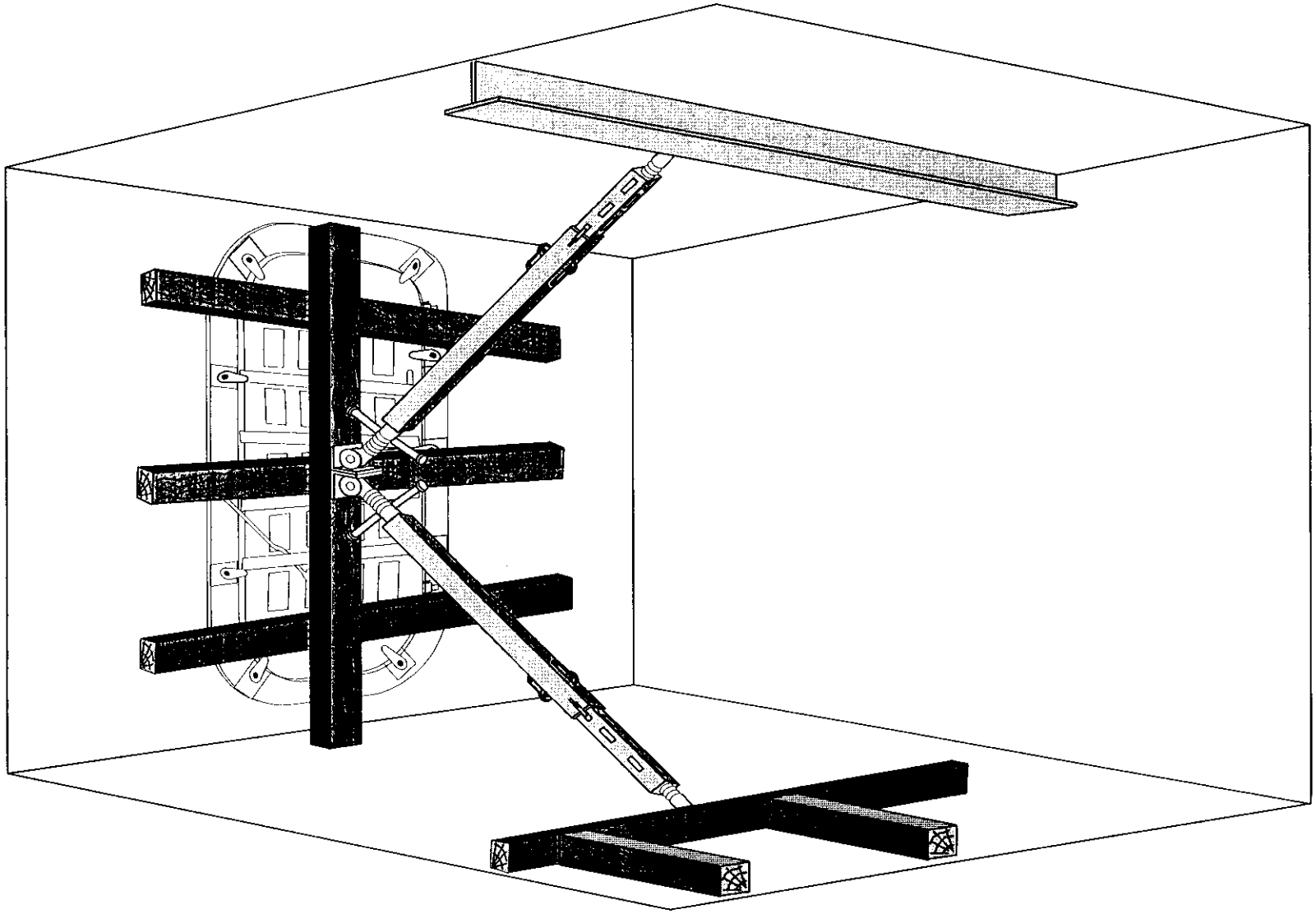


K-Type Shoring Using Two (2) 3-5 Ft. or 6-11 Ft. Metal Shores

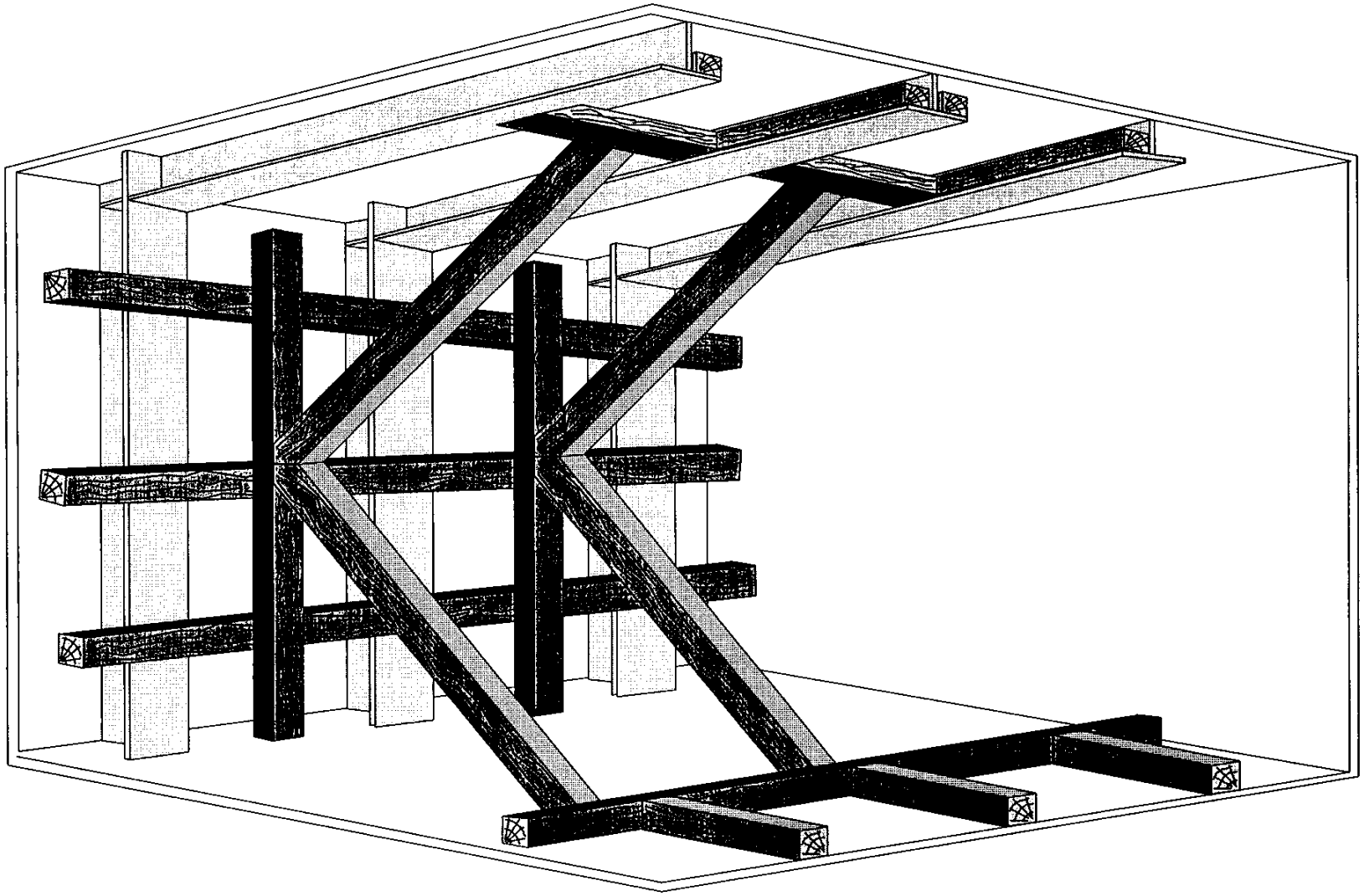
SHORING EVOLUTION - SKETCH #016
K-Type Shoring



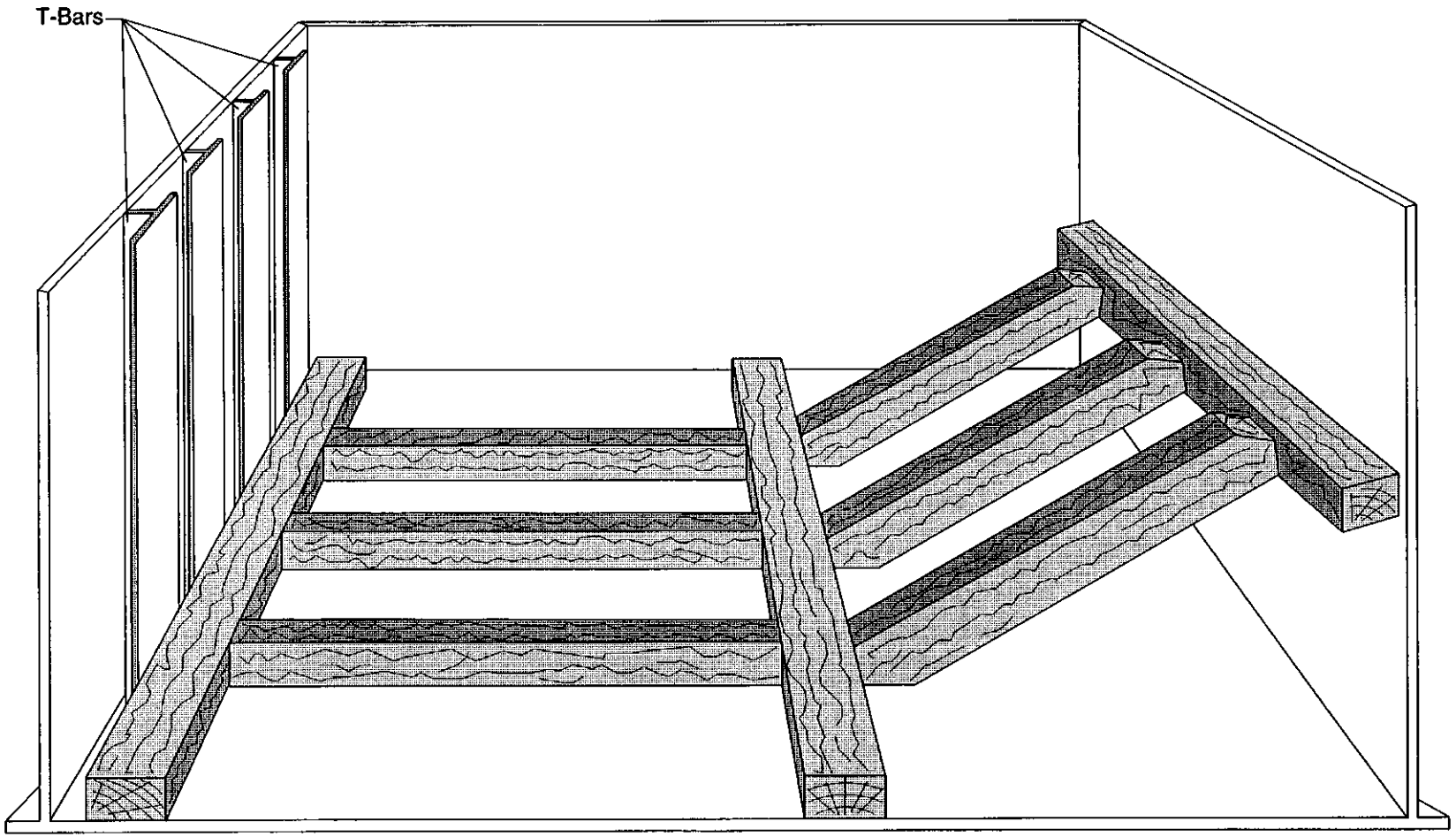
SHORING EVOLUTION - SKETCH #017
K-Type Shoring on Watertight Door Using Wooden Shores



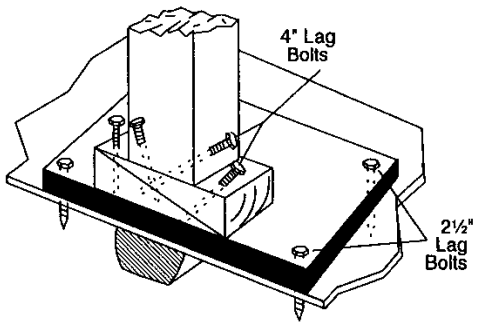
SHORING EVOLUTION - SKETCH #018
K-Type Shoring on Watertight Door Using Metal Shores



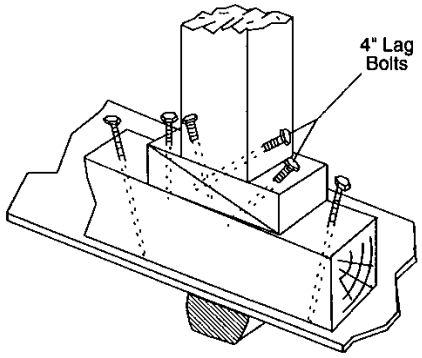
SHORING EVOLUTION - SKETCH #019
Distributing Bulkhead Pressure Over Stiffeners with K-Type Shoring
(Using Wooden or/and Metal Shores)



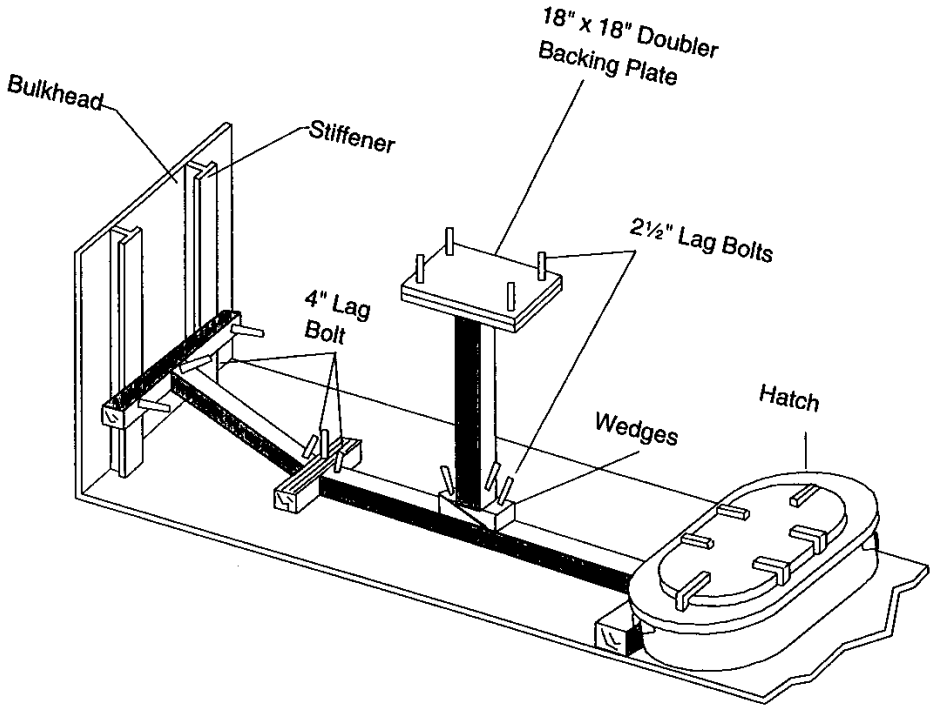
SHORING EVOLUTION - SKETCH #020
Compound Shoring



SHORING PRACTICE INVOLVING USE OF PAIR OF WEDGES BENEATH A SHORE, SECURED WITH 4" LAG BOLTS THROUGH WEDGES INTO DECK AND SECURING SHORE TO WEDGES.

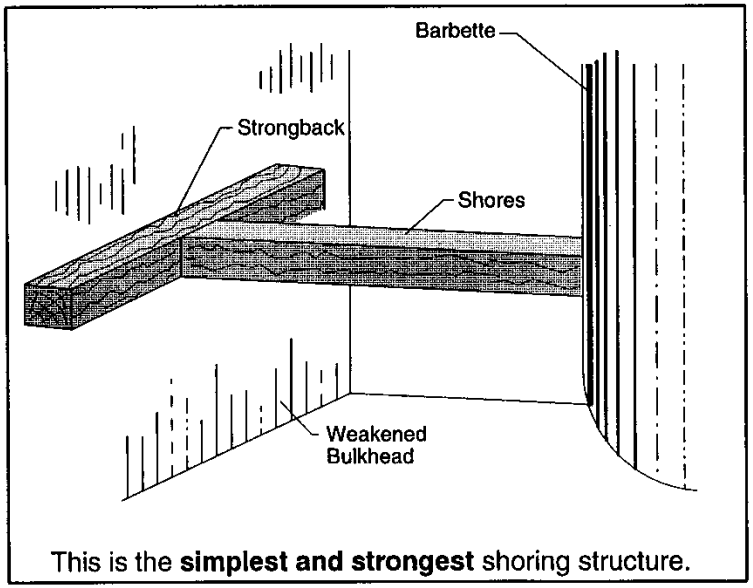


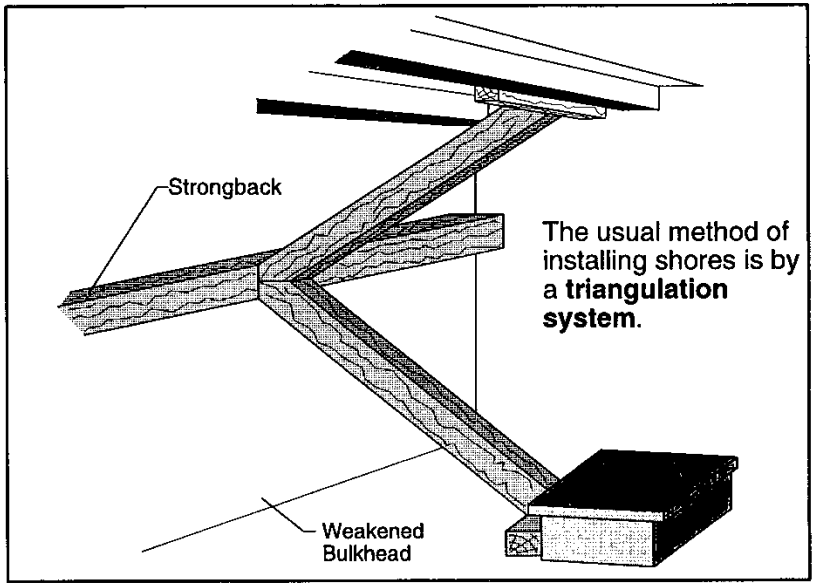
SHORING PRACTICE INVOLVING USE OF PAIR OF WEDGES BENEATH A SHORE, SECURED WITH 4" LAG BOLTS THROUGH WEDGES INTO BACKING PLATE AND SECURING SHORE TO WEDGES, BACKING PLATE WITH 2-1/2" LAG BOLTS.

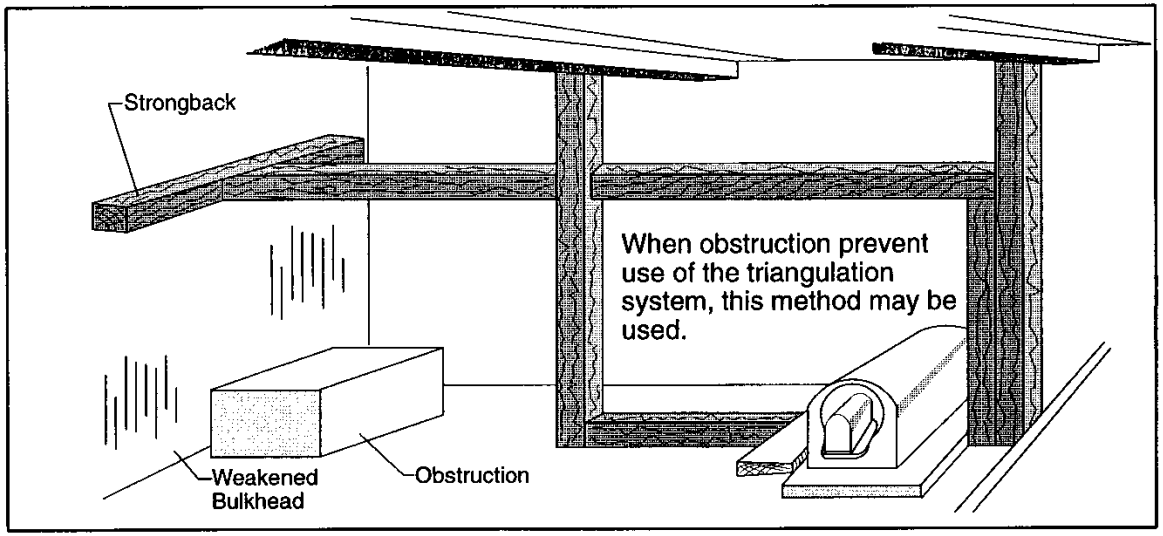


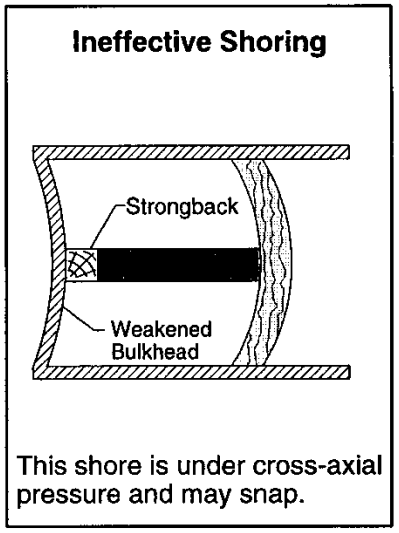
SHORING EVOLUTION - SKETCH #021

Shoring from Bulkhead to Hatch and Providing Support for Weakened Overhead on Mine Warfare Class Ships

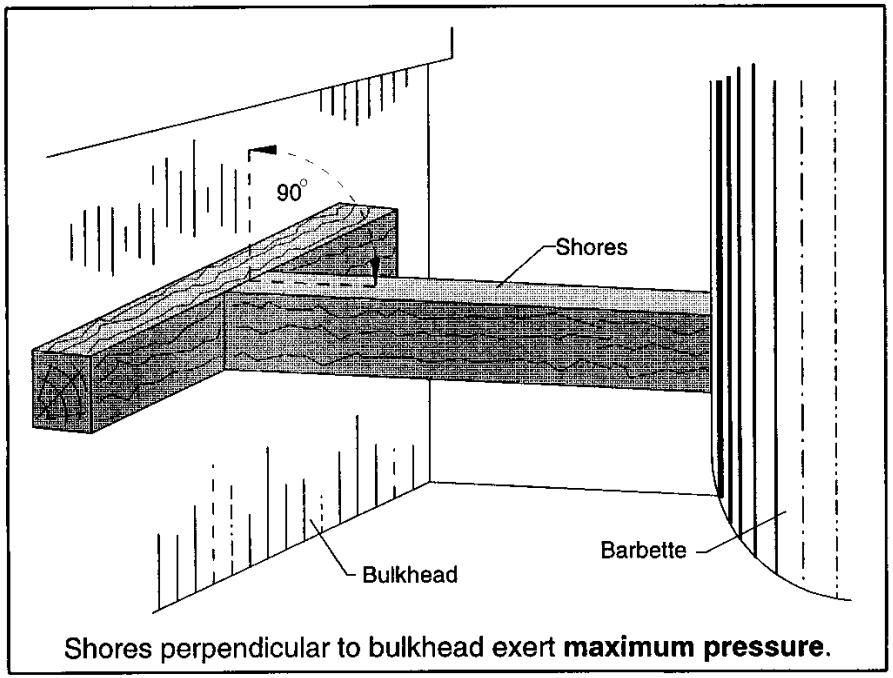




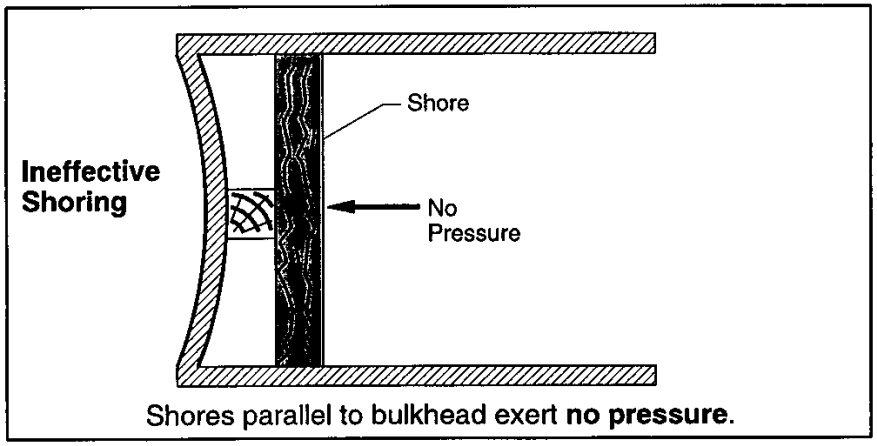




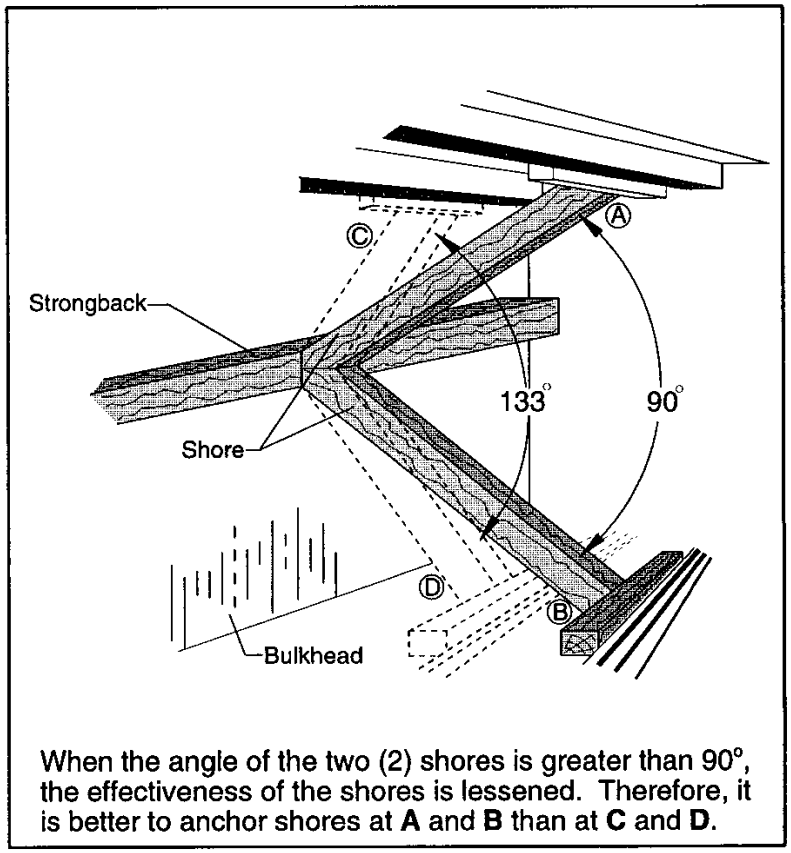
SHORING EVOLUTION - SKETCH #022
General Rules for Shoring Against Horizontal Pressure



Shores perpendicular to bulkhead exert **maximum pressure.**

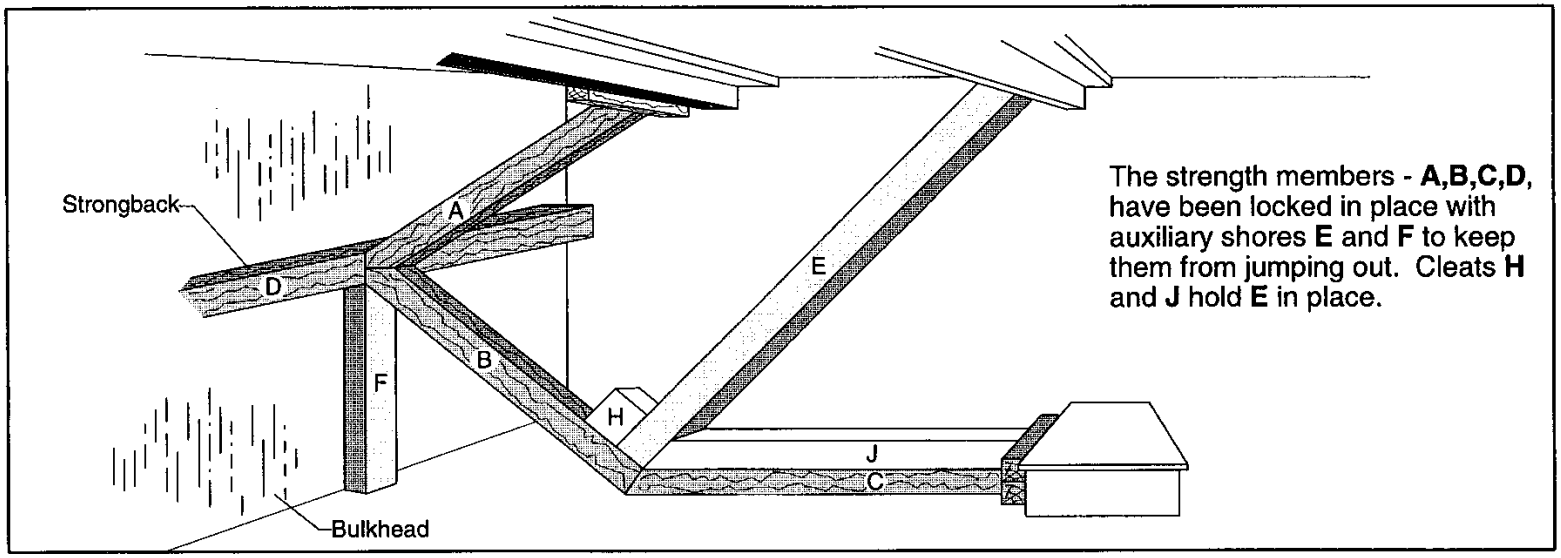


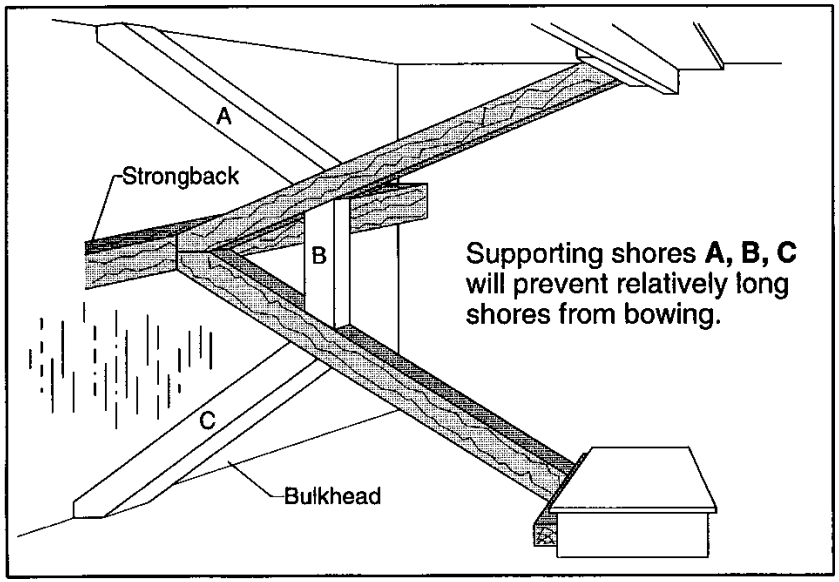
Shores parallel to bulkhead exert **no pressure.**

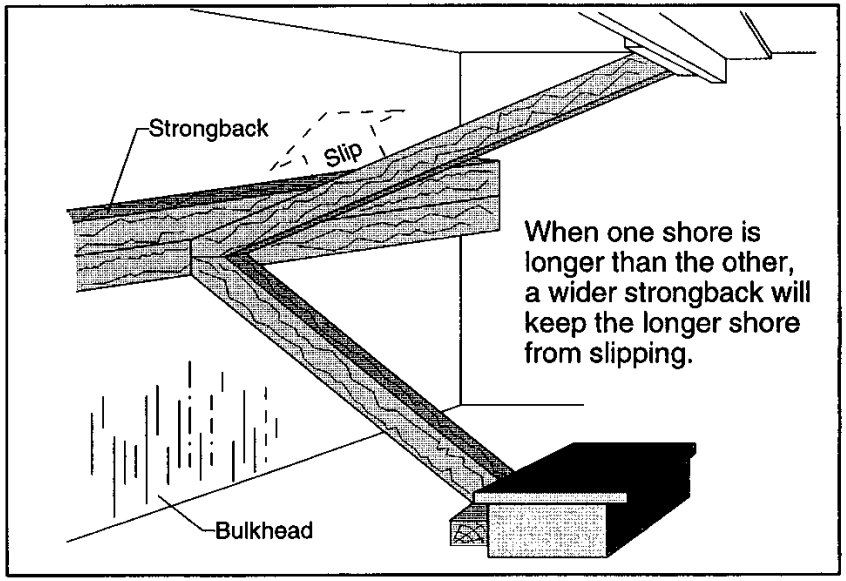


When the angle of the two (2) shores is greater than 90°, the effectiveness of the shores is lessened. Therefore, it is better to anchor shores at **A** and **B** than at **C** and **D**.

SHORING EVOLUTION - SKETCH #023
General Rules for Setting Correct Shoring Angles



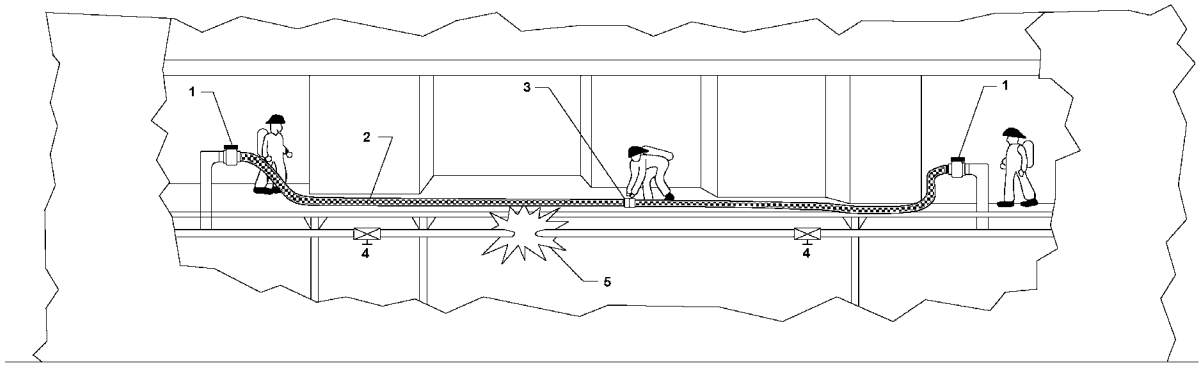


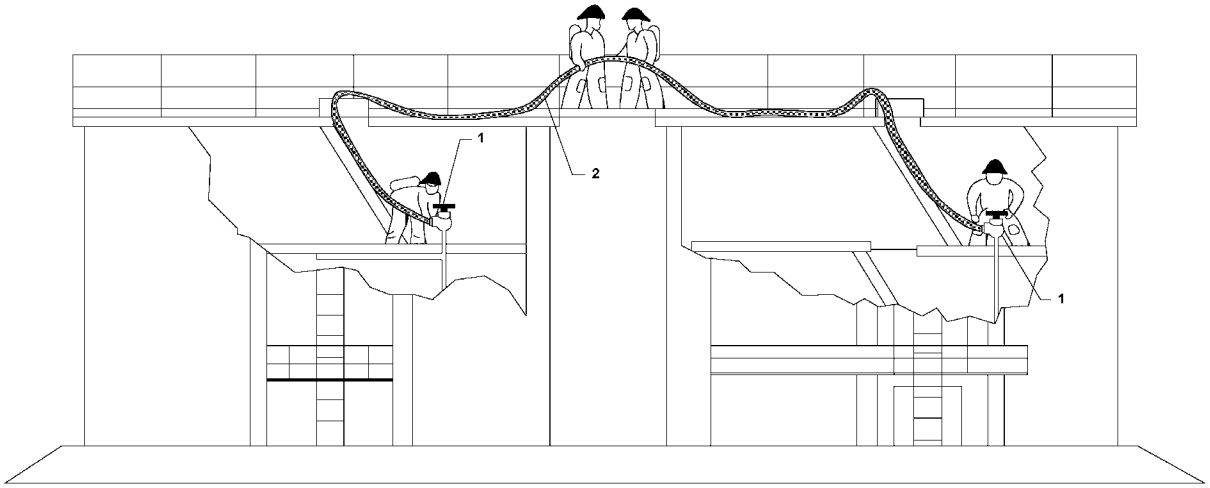


SHORING EVOLUTION - SKETCH #024
Strengthening Shores

DAMAGE CONTROL LAYOUT SKETCHES

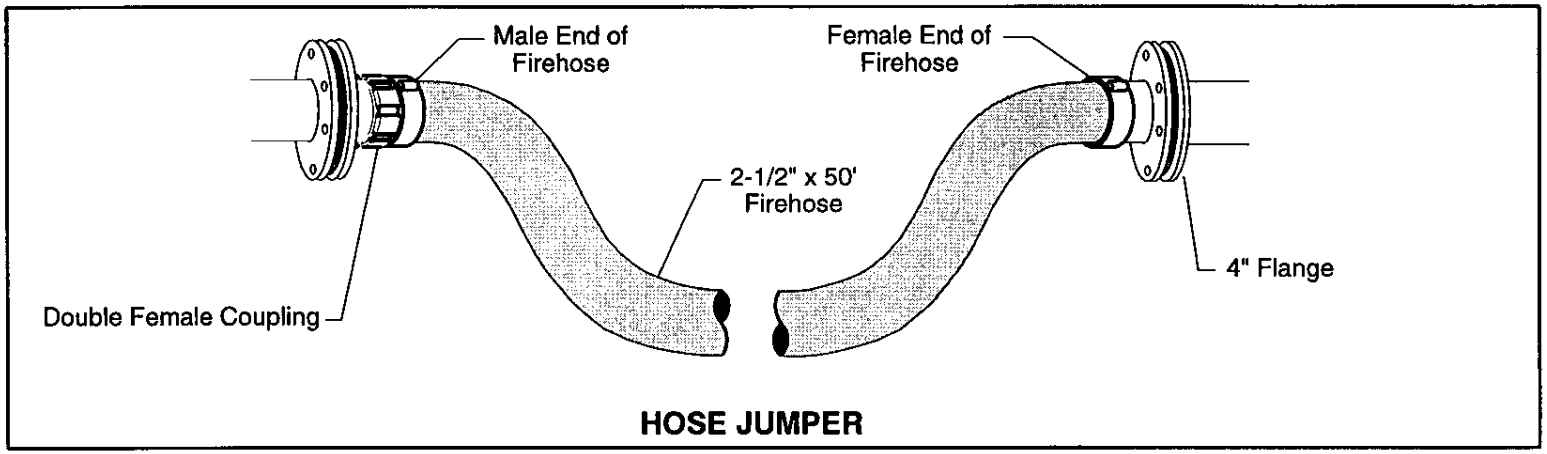
SECTION 14 - SYSTEM RESTORE/RECONFIGURE EVOLUTION

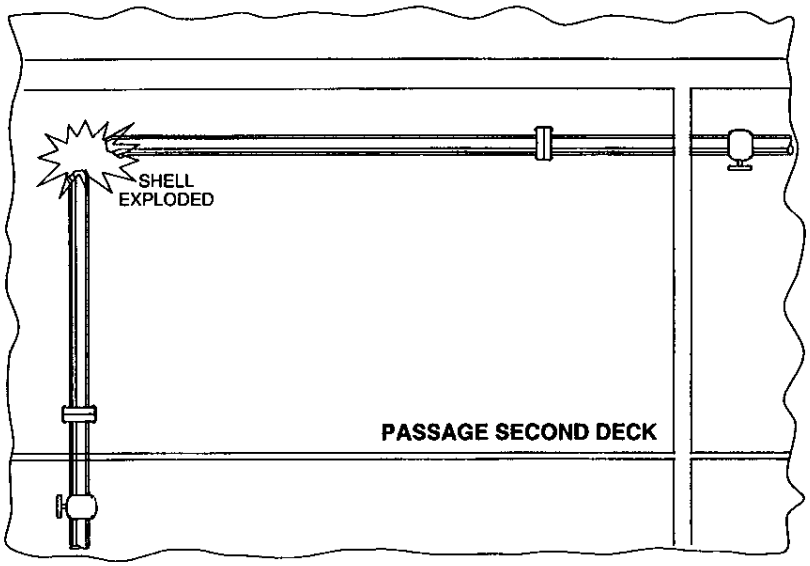




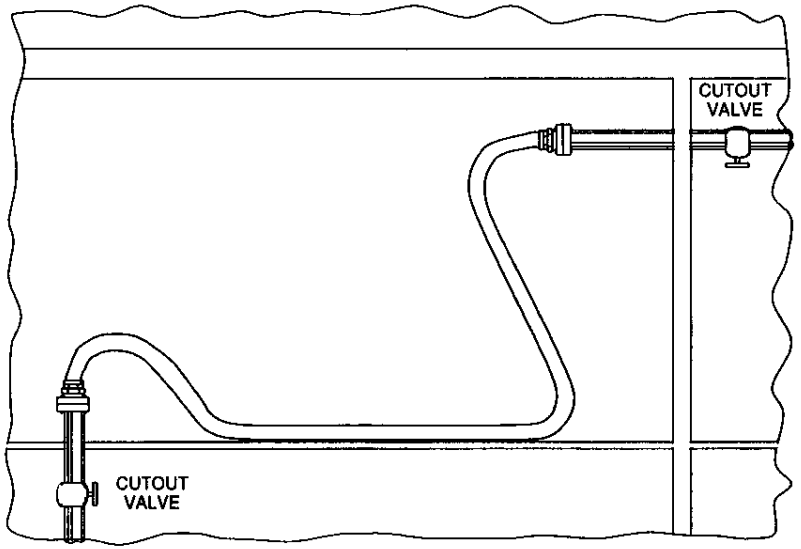
ITEM	QTY	EQUIPMENT
1	4	FIRE PLUG
2	2	2-1/2" X 50' JUMPER HOSE LINE
3	1	2-1/2" DOUBLE FEMALE FITTING
4	2	CUTOUT VALVE (CLOSED)
5	1	RUPTURED FIREMAIN

SYSTEM RESTORE/RECONFIGURE EVOLUTION - SKETCH #001
Providing Temporary Firemain Service Using Firehose Bypassing Damaged Firemain



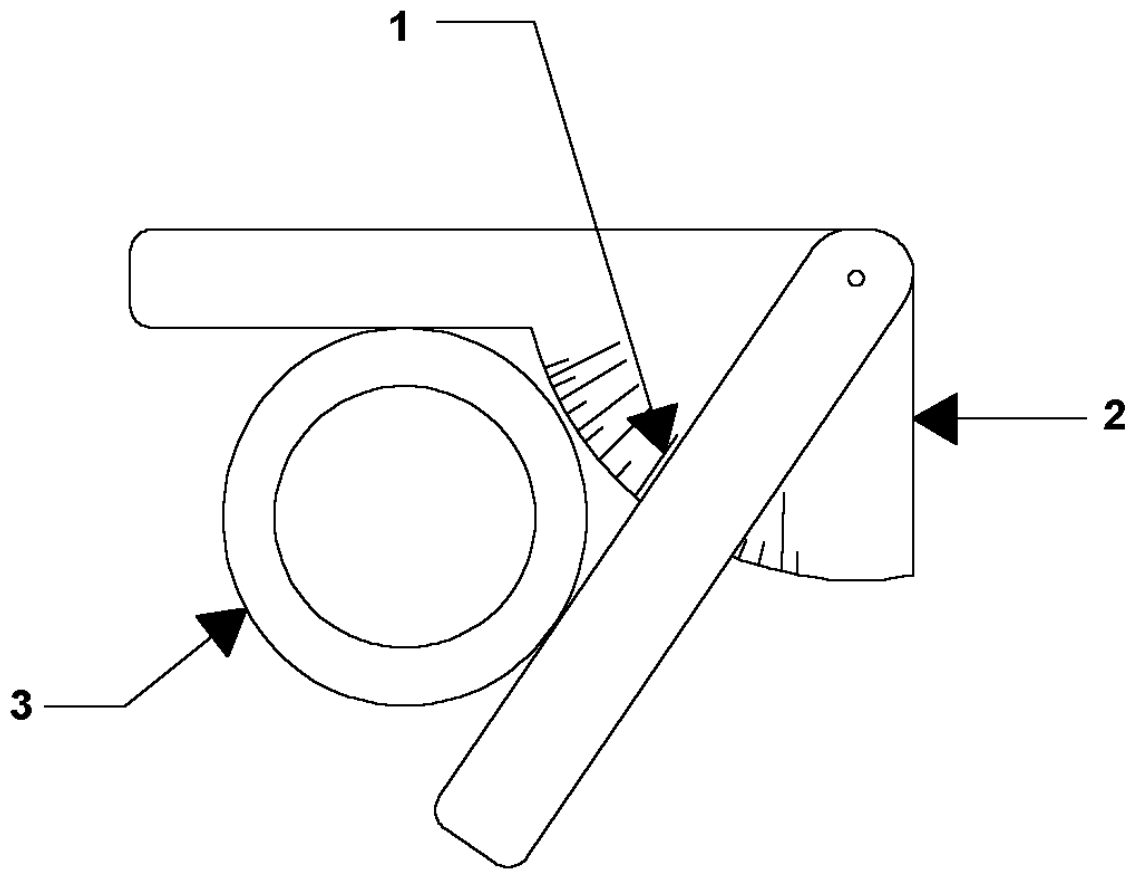


1



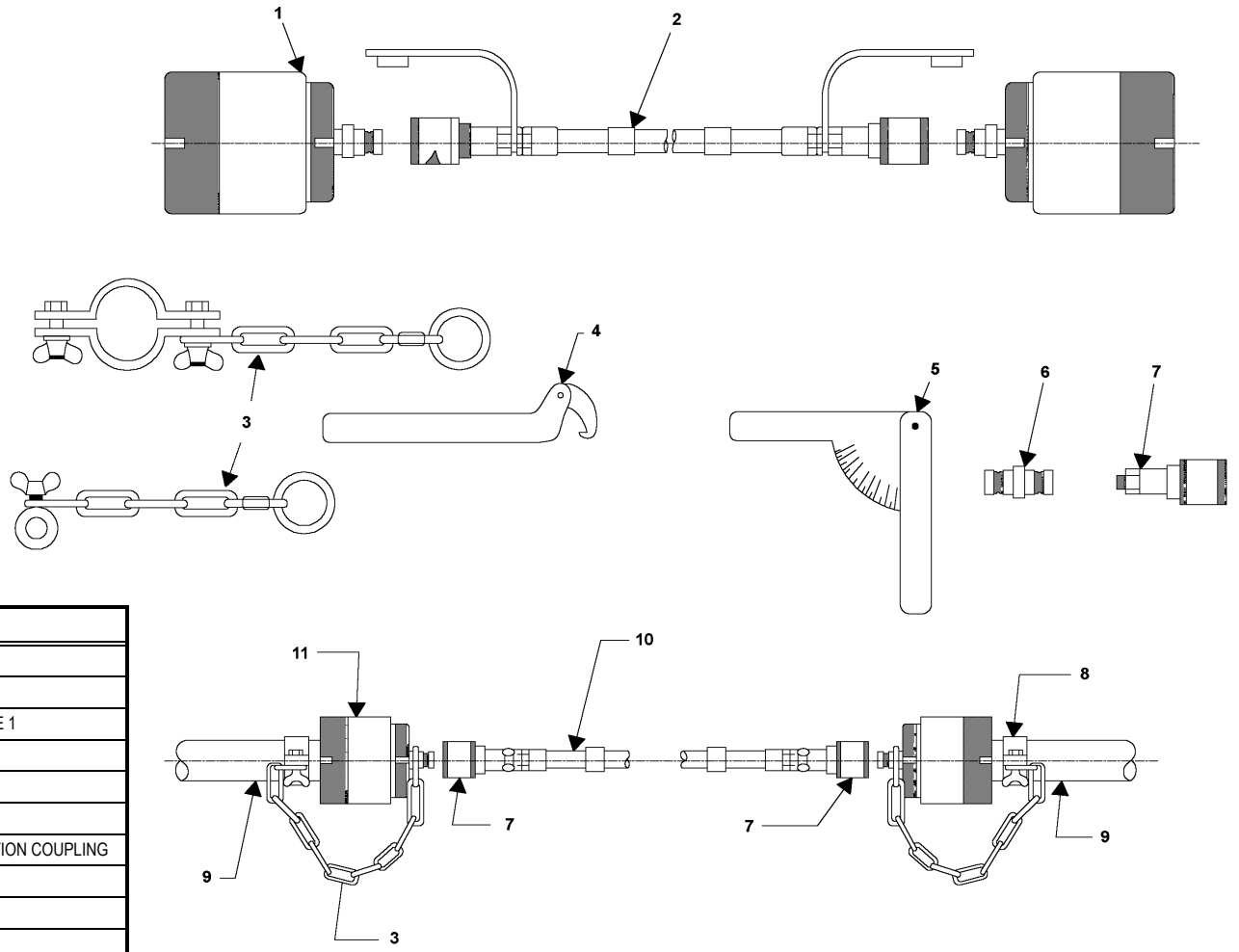
2

SYSTEM RESTORE/RECONFIGURE EVOLUTION - SKETCH #002
Providing Temporary Firemain Service by Hose Jumping at Flanges



ITEM	EQUIPMENT
1	READ PIPE SIZE ALONG THIS EDGE
2	PIPE MEASURING DEVICE
3	PIPE

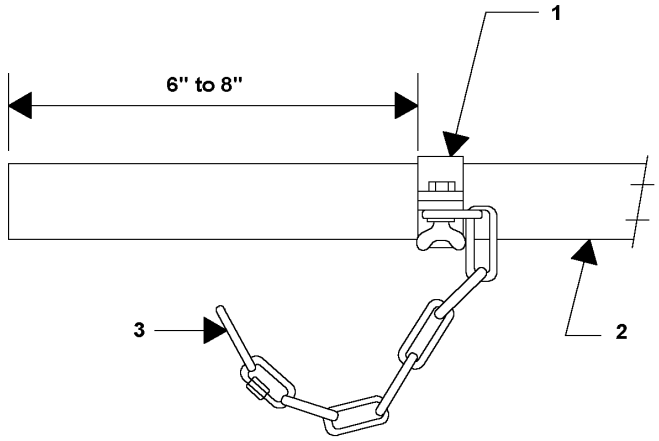
SYSTEM RESTORE/RECONFIGURE EVOLUTION - SKETCH #003
Pipe Jumper Evolution – Pipe Measuring Device

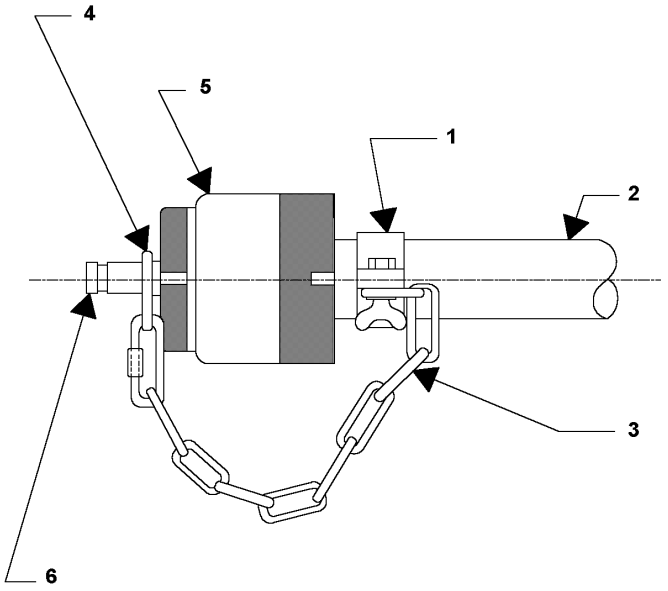


ITEM	QTY	EQUIPMENT
1	2	BODY – JUMPER FITTING
2	1	JUMPER HOSE ASSEMBLY
3	1	SAFETY GAG CHAIN – SEE NOTE 1
4	2	SPANNER WRENCH
5	1	PIPE MEASURING DEVICE
6	1	PIPE FITTING
7	3	ISO 7241-1 SERIES B QUICK ACTION COUPLING
8	2	SAFETY GAG
9	2	PIPE SYSTEM
10	1	JUMPER HOSE ASSEMBLY
11	2	JUMPER FITTING

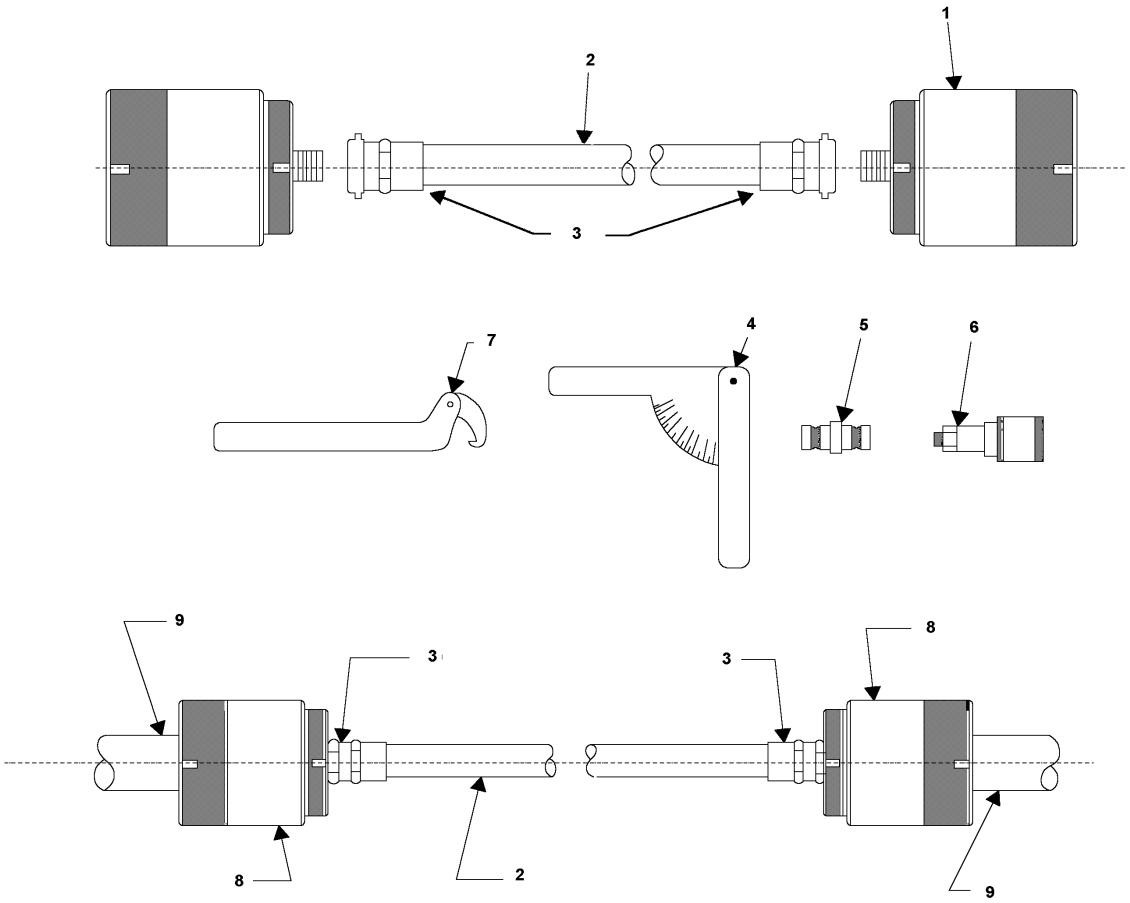
SYSTEM RESTORE/RECONFIGURE EVOLUTION - SKETCH #004
Pipe Jumper Evolution – PJHS KIT NO.1, Assembly/Installation

ITEM	QTY	EQUIPMENT
1	2	SAFETY GAG
2	2	PIPE
3	2	SAFETY GAG CHAIN
4	1	SAFETY GAG CHAIN RING
5	1	JUMPER FITTING
6	1	MALE QUICK CONNECT FITTING





SYSTEM RESTORE/RECONFIGURE EVOLUTION - SKETCH #005
Pipe Jumper Evolution – PJHS KIT NO.1, Safety Gag Installation

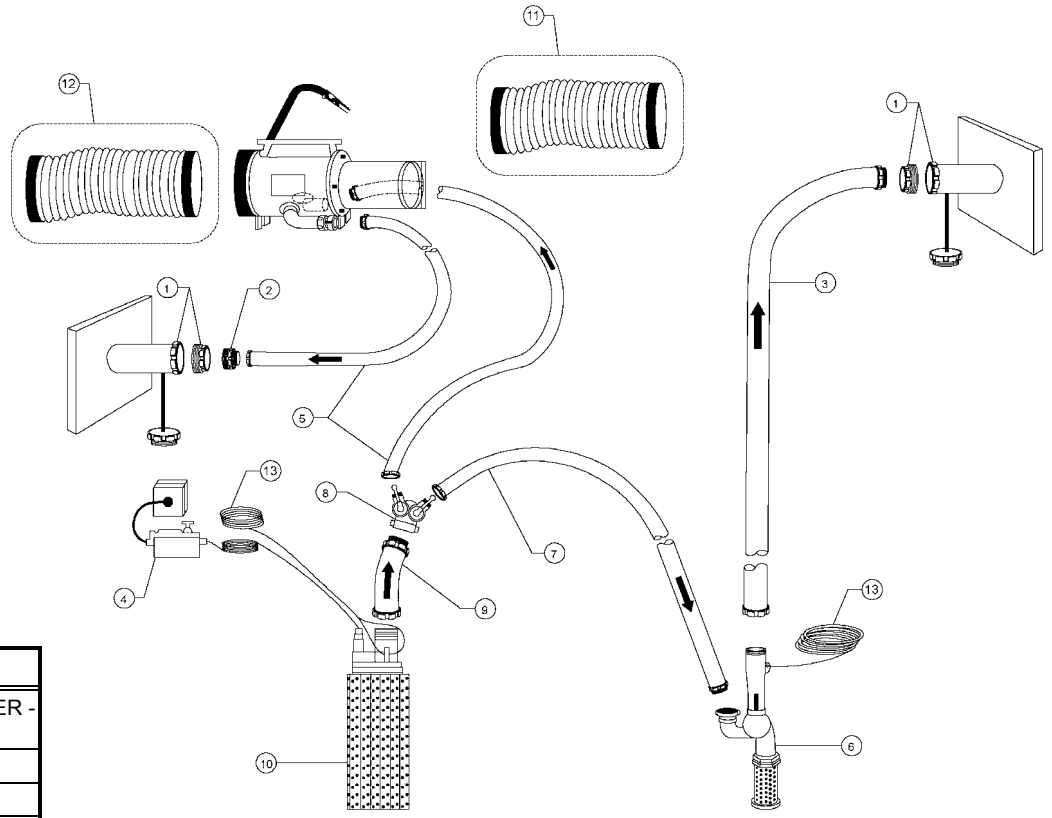


ITEM	QTY	EQUIPMENT
1	2	BODY – JUMPER FITTING
2	1	JUMPER HOSE ASSEMBLY
3	2	NAVY STANDARD FIRE HOSE COUPLING
4	2	PIPE MEASURING DEVICE
5	1	DOUBLE MALE PIPE FITTING
6	1	FITTING – END CAP
7	2	SPANNER WRENCH
8	2	JUMPER FITTING
9	2	PIPE SYSTEM

SYSTEM RESTORE/RECONFIGURE EVOLUTION - SKETCH #006
Pipe Jumper Evolution – PJHS KIT NO.2, Assembly/Installation

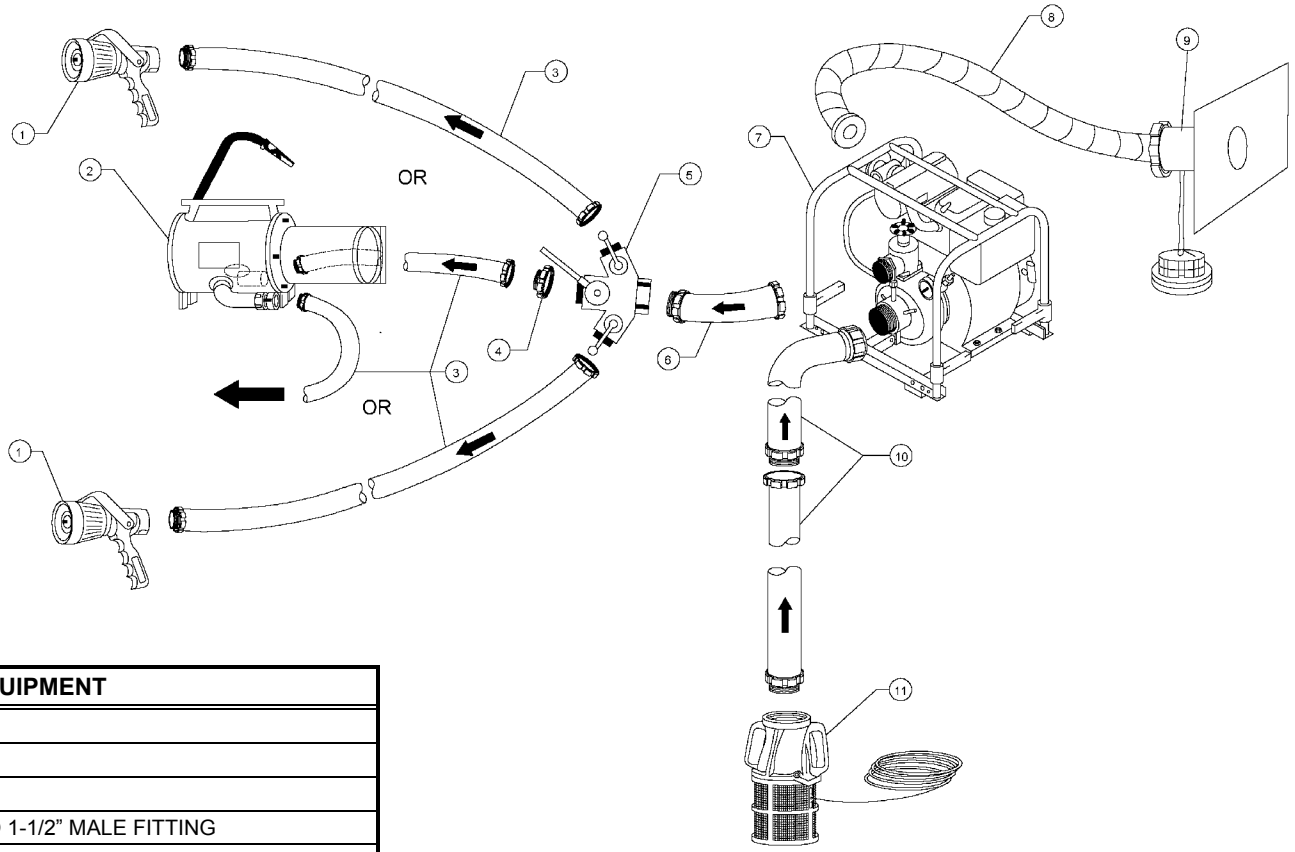
DAMAGE CONTROL LAYOUT SKETCHES

SECTION 15 – COMPLEX DAMAGE CONTROL EVOLUTION



ITEM	QTY	EQUIPMENT
1	2	4” OVERBOARD DISCHARGE WITH INSTALLED ADAPTER - 4” MALE TO 2-1/2” FEMALE AND CAP
2	1	ADAPTER - 2-1/2” MALE TO 1-1/2” MALE FITTING
3	1	2-1/2” X 50’ FIREHOSE
4	1	CONTROL BOX FOR SUB PUMP PLUGGED INTO 440 VOLT OUTLET
5	2	1-1/2” X 50’ FIREHOSE
6	1	1-1/2” EDUCTOR
7	1	1-1/2” X 25’ FIREHOSE
8	1	2-WAY WYEGATE - (1) 2-1/2” INLET & (2) 1-1/2” OUTLETS
9	1	2-1/2” X 18” JUMPER HOSE
10	1	ELECTRIC SUB PUMP WITH FOOT VALVE AND STRAINER
11	2	8” VENT DUCT, OPTIONAL
12	2	10” VENT DUCT
13	1	2” X 50’ DOUBLE-BRAIDED HANDLING LINE

COMPLEX DAMAGE CONTROL EVOLUTION - SKETCH #001
Dewatering and Desmoking Using Electric Sub Pump Discharge Actuating Water Driven Fan and 1-1/2” Eductor

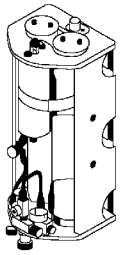


ITEM	QTY	EQUIPMENT
1	2	1-1/2” VARI-NOZZLE
2	1	WATER DRIVEN FAN
3	4	1-1/2” X 50’ FIREHOSE
4	1	ADAPTER - 2-1/2” FEMALE TO 1-1/2” MALE FITTING
5	2	TRIGATE - 2-1/2” INLET X (1) 2-1/2” & (2) 1-1/2” OUTLETS
6	1	2-1/2” X 18’ JUMPER HOSE
7	1	P-100 PUMP
8	1 NOTE 1	2” X 10’ EXHAUST HOSE
9	1	4” OVERBOARD DISCHARGE CONNECTION WITH INSTALLED ADAPTER - 4” MALE TO 2-1/2” FEMALE FITTING AND CAP (REMOVE AS UNIT)
10	2	3” X 10’ HARD RUBBER SUCTION HOSE
11	1	VALVE, FOOT STRAINER WITH 1/2” X 55’ RELEASE LINE
NOTE 1: IF MORE THAN 10” DISTANCE TO OVERBOARD OR WEATHER, INTSALL ADDITIONAL HOSE		

COMPLEX DAMAGE CONTROL EVOLUTION - SKETCH #002
Dewatering and Desmoking Using Water Driven Fan and P100 Pump Taking Suction from Flooded Compartment

DAMAGE CONTROL LAYOUT SKETCHES

SECTION 16 – SELF-CONTAINED BREATHING APPARATUS (SCBA) CHARGING EVOLUTIONS



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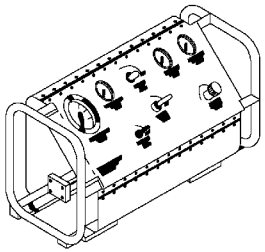

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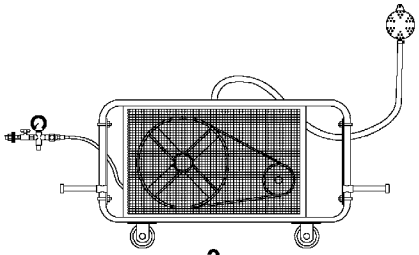

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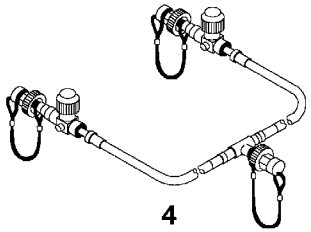

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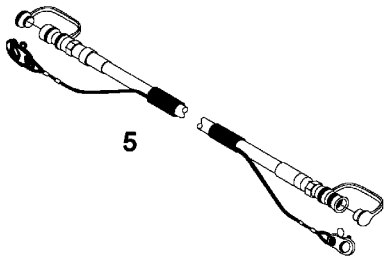

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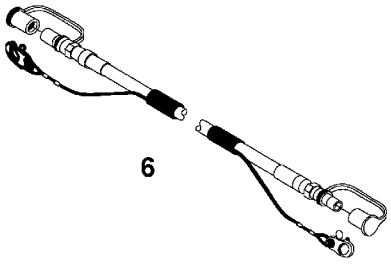
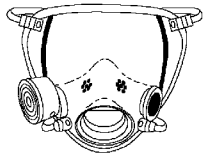


6

ITEM	EQUIPMENT
1	high pressure filter assembly (hpfa)
2	air booster pump assembly (abpa)
3	portable compressor
4	filtered air supply hose assembly
5	drive air hose assembly
6	filtered air hose assembly
7	scba facepiece
8	45 minute cylinder
9	30 minute cylinder
10	scba with harness



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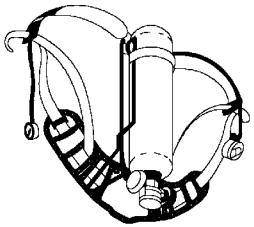
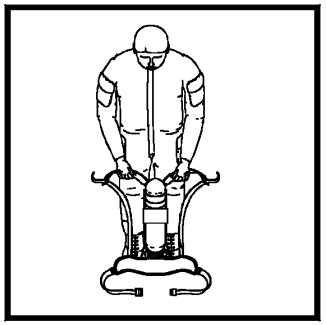
9



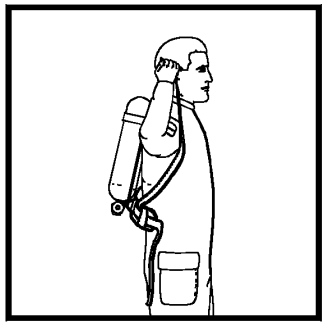
10

SELF-CONTAINED BREATHING APPARATUS (SCBA) CHARGING EVOLUTIONS - SKETCH #001
Overall View of the SCBA Charging Components

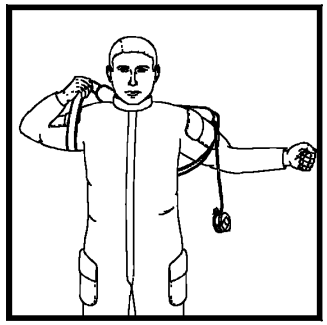
IMPROPER USE OF THIS APPARATUS IN A HAZARDOUS ATMOSPHERE MAY RESULT IN INJURY OR DEATH.
PERSONNEL SHOULD RECEIVE ADEQUATE TRAINING PRIOR TO USE.



1. Position unit valve downward with air cylinder facing you. Grasp the inside edge of shoulder straps with palms facing inward.



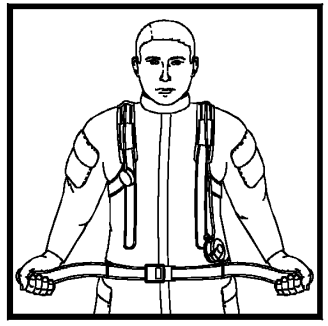
2. Swing unit up and onto your back from either side, making sure your elbow on that side extends through loop formed by shoulder strap.



3. With unit on your back, extend free arm through loop formed by other shoulder strap.

4. Pull down on both shoulder straps to snug unit on your back.

5. Grasp buckles on waist belt, extend belt and fasten buckles.



6. Adjust belt for firm fit on hips by pulling on belt ends. Loosen shoulder straps slightly to carry weight on hips.

SELF-CONTAINED BREATHING APPARATUS (SCBA) CHARGING EVOLUTIONS - SKETCH #002
Coat Style Method for Donning the SCOTT® Air-Pak® 4.5 (Sheet 1 of 2)

7. Don facepiece with 4-point head harness as follows:
   A. Adjust head straps to full outward position.
   B. Hold head harness out of the way with one hand while placing facepiece on your face with your other hand. Ensure your chin is properly located in chin pocket.
   C. Pull head harness over your head and ensure straps are lying flat against your head and neck with no twist.

STEP 7D

STEP 7F

   D. Tighten neck straps by pulling the two lower strap ends toward rear of your head.
   E. Ensure neck strap is fully extended over back of your head. Retighten neck straps.
   F. Adjust temple straps by pulling the two upper strap ends toward the rear of your head. Overtightening may cause discomfort.
   G. Retighten neck straps if required.

NOTE: If leakage around face seal is detected, a different size facepiece may be required. Refer to your respirator instruction sheet for a listing of available facepiece sizes, options and part numbers.

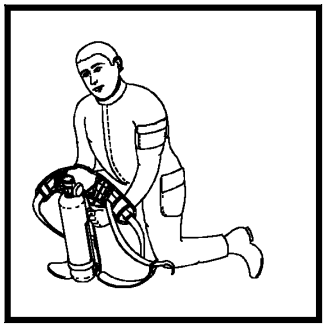
STEP 8

STEP 9

8. Activate air saver/donning switch, then turn cylinder valve knob counterclockwise until cylinder valve is fully open. Vibralert® alarm on regulator should sound momentarily and then shut off. Install regulator on facepiece and activate air flow by inhaling sharply.
9. Check remote pressure gauge for **FULL** indication.

SELF-CONTAINED BREATHING APPARATUS (SCBA) CHARGING EVOLUTIONS - SKETCH #002
Coat Style Method for Donning the SCOTT® Air-Pak® 4.5 (Sheet 2 of 2)

IMPROPER USE OF THIS APPARATUS IN A HAZARDOUS ATMOSPHERE MAY RESULT IN INJURY OR DEATH.
PERSONNEL SHOULD RECEIVE ADEQUATE TRAINING PRIOR TO USE.



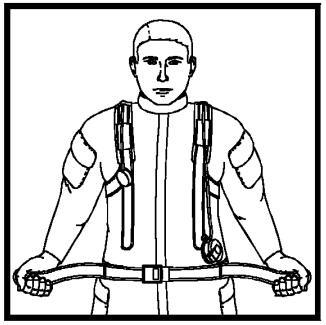
1. With unit resting on dome of air cylinder, spread shoulder straps and fold open winged waist support. Grasp support members at sides of waist support.

2. Swing unit up and over your head, making sure that both elbows extend through the loops formed by shoulder straps.

3. While leaning slightly forward, slide unit down your back and pull on the shoulder adjusting straps.

4. Pull down on both shoulder straps to snug unit on your back.

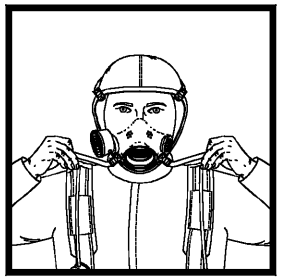
5. Grasp buckles on waist belt, extend belt and fasten buckles.



6. Adjust belt for firm fit on hips by pulling on belt ends. Loosen shoulder straps slightly to carry weight on hips.

SELF-CONTAINED BREATHING APPARATUS (SCBA) CHARGING EVOLUTIONS - SKETCH #003
Over-The-Head Method for Donning the SCOTT® Air-Pak® 4.5 (Sheet 1 of 2)

7. Don facepiece with 4-point head harness as follows:
   A. Adjust head straps to full outward position.
   B. Hold head harness out of the way with one hand while placing facepiece on your face with your other hand. Ensure your chin is properly located in chin pocket.
   C. Pull head harness over your head and ensure straps are lying flat against your head and neck with no twist.



STEP 7D

STEP 7F

   D. Tighten neck straps by pulling the two lower strap ends toward rear of your head.
   E. Ensure neck strap is fully extended over back of your head. Retighten neck straps.
   F. Adjust temple straps by pulling the two upper strap ends toward the rear of your head. Overtightening may cause discomfort.
   G. Retighten neck straps if required.

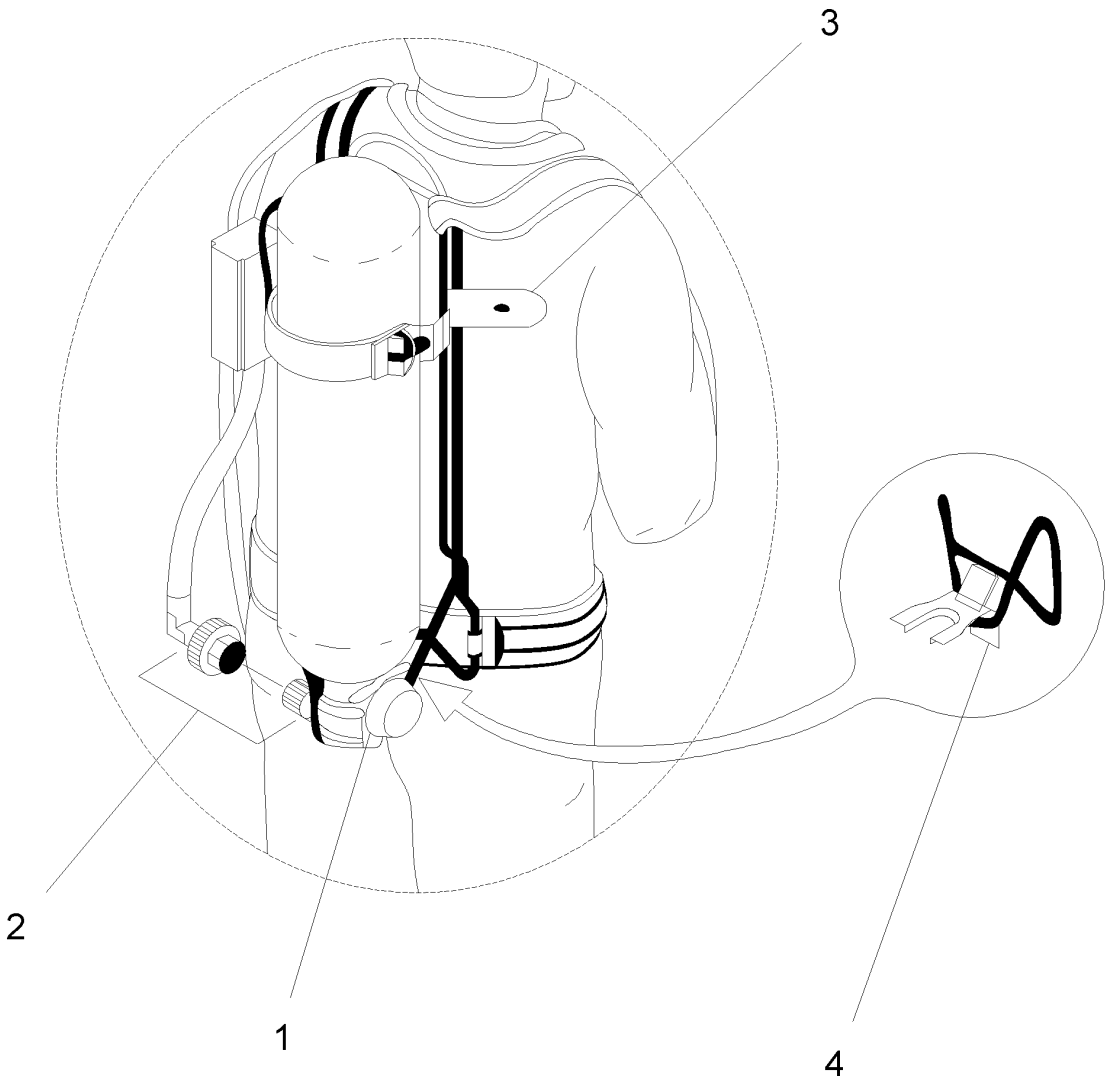
NOTE: If leakage around face seal is detected, a different size facepiece may be required. Refer to your respirator instruction sheet for a listing of available facepiece sizes, options and part numbers.

STEP 8

STEP 9

8. Activate air saver/donning switch, then turn cylinder valve knob counterclockwise until cylinder valve is fully open. Vibralert® alarm on regulator should sound momentarily and then shut off. Install regulator on facepiece and activate air flow by inhaling sharply.
9. Check remote pressure gauge for **FULL** indication.

SELF-CONTAINED BREATHING APPARATUS (SCBA) CHARGING EVOLUTIONS - SKETCH #003
Coat Style Method for Donning the SCOTT® Air-Pak® 4.5 (Sheet 2 of 2)



INSTRUCTIONS FOR CHANGING CYLINDERS:

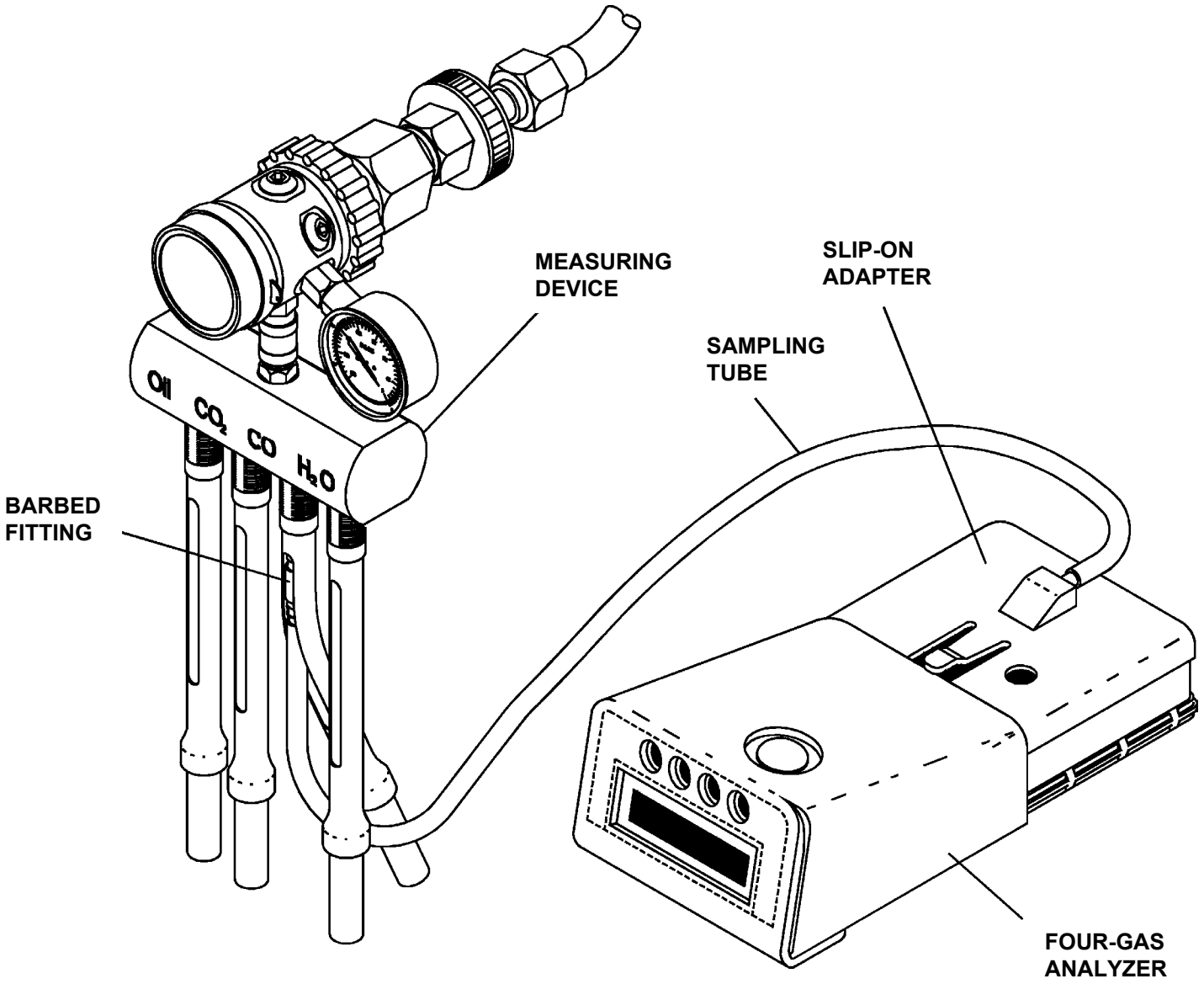
1. **ENSURE THAT CYLINDER VALVE IS IN OFF POSITION**
2. **UNSCREW TO DISCONNECT HOSE.**
3. **UNSNAP TO LOOSEN RETAINING STRAP.**
4. **PUSH LEVER TO RELEASE CYLINDER.**
5. **SLIDE CYLINDER DOWN AND OUT OF HARNESS.**

INSTALL:

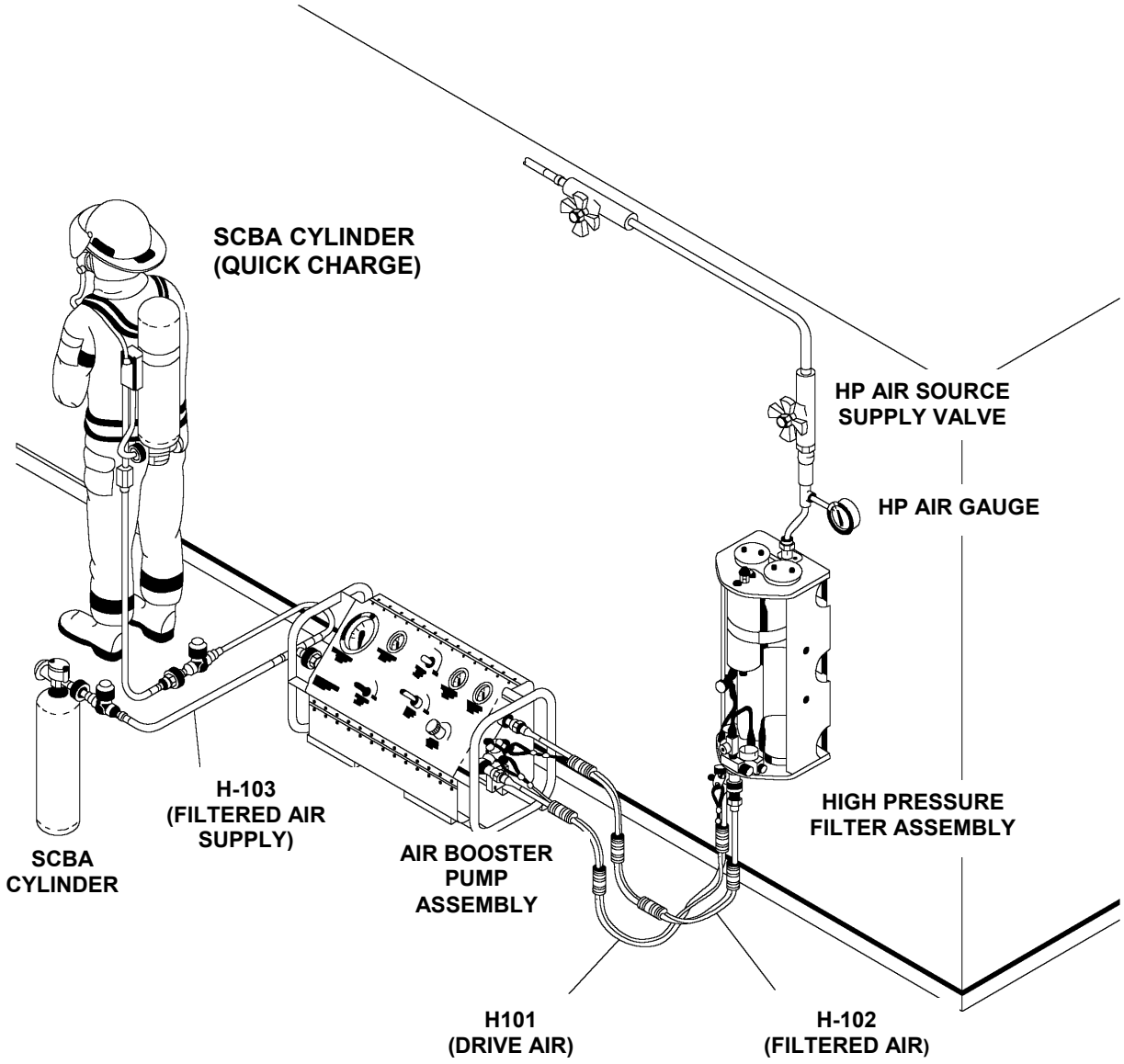
ENSURE THAT CYLINDER IS FULLY CHARGED.

REVERSE REMOVAL PROCEDURE.

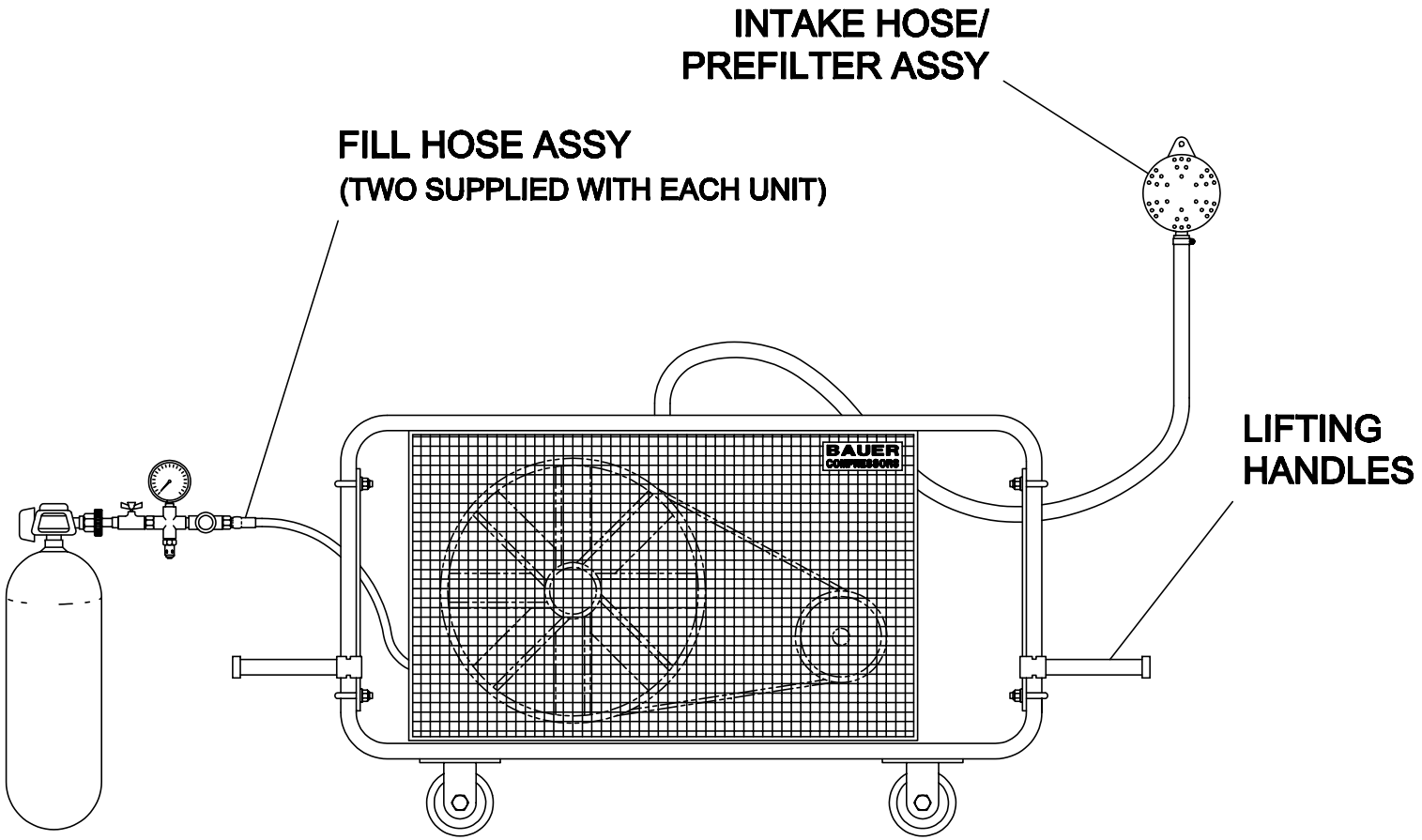
SELF-CONTAINED BREATHING APPARATUS (SCBA) CHARGING EVOLUTIONS - SKETCH #004
Changing Out the SCBA Cylinders



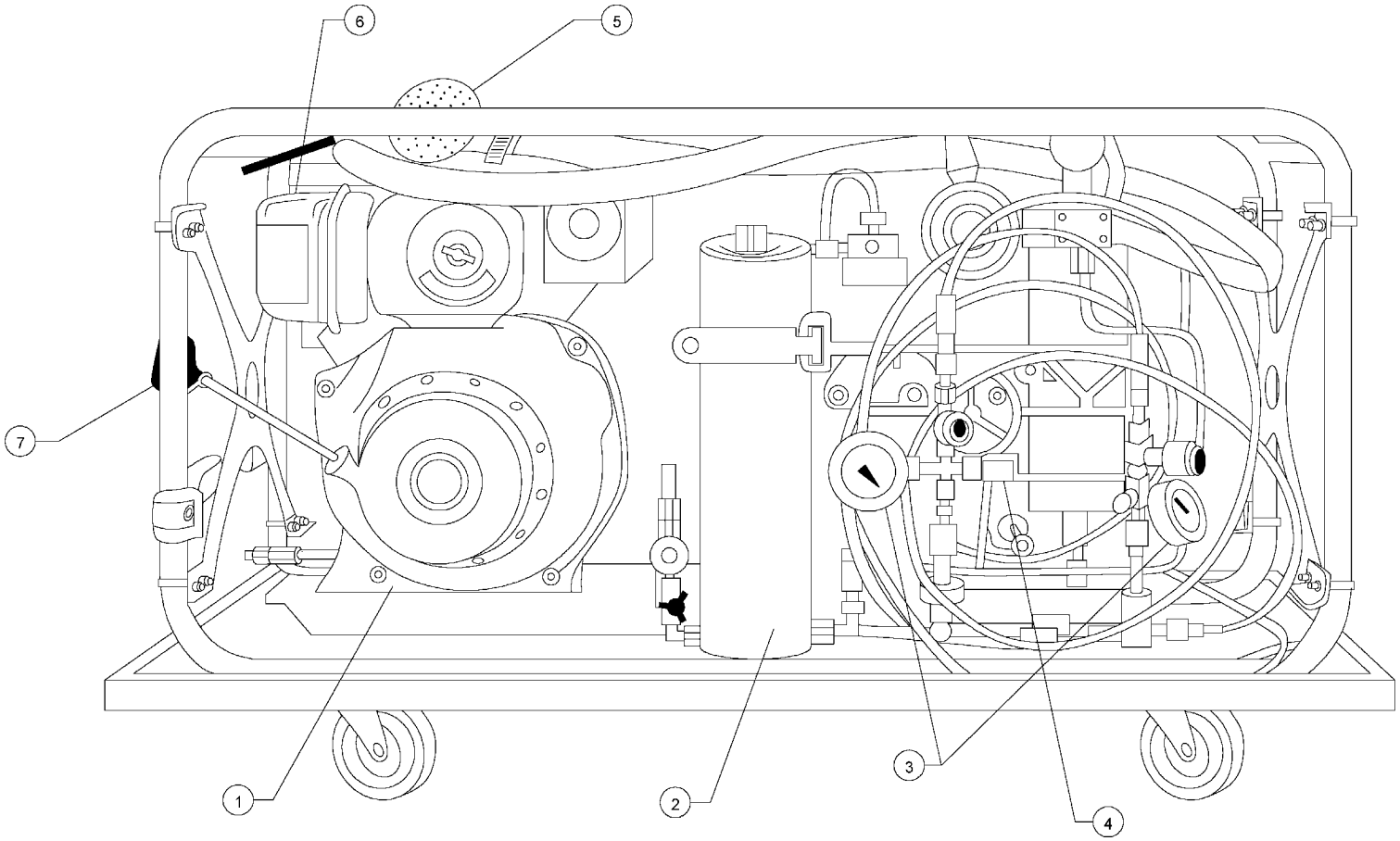
SELF-CONTAINED BREATHING APPARATUS (SCBA) CHARGING EVOLUTIONS - SKETCH #005
Setup for Sampling Air with the Breathing Air Tester (BAT)



SELF-CONTAINED BREATHING APPARATUS (SCBA) CHARGING EVOLUTIONS - SKETCH #006
Charging the SCBA Cylinder Using the Breathing Air Charging System (BACS)



SELF-CONTAINED BREATHING APPARATUS (SCBA) CHARGING EVOLUTIONS - SKETCH #007
Charging the SCBA Cylinder Using the Breathing Air Compressor (BAC)

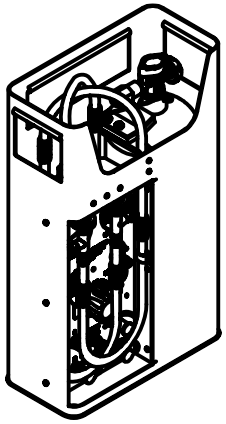


ITEM	EQUIPMENT
1	YANMAR ENGINE
2	P-1 PURIFICATION SYSEM
3	FILL GAUGE
4	FILL HOSE ASSEMBLY
5	INTAKE HOSE PRE FILTER ASSEMBLY
6	FUEL TANK
7	START PULL CABLE

SELF-CONTAINED BREATHING APPARATUS (SCBA) CHARGING EVOLUTIONS - SKETCH #008
Breathing Air Compressor (BAC)

DAMAGE CONTROL LAYOUT SKETCHES

SECTION 17 – GAS FREE (IMMEDIATELY DANGEROUS TO LIFE AND HEALTH [IDLH]) EVOLUTIONS



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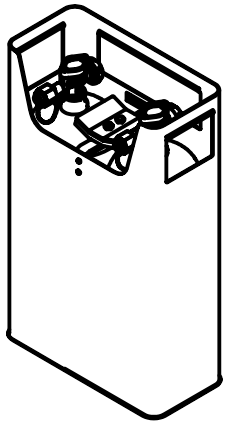
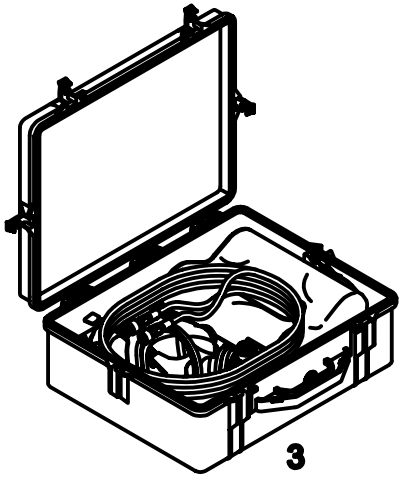


2

ITEM	EQUIPMENT
1	PRIMARY AIR SUPPLY PACK (PASP)
2	RESERVE AIR SUPPLY PACK (RASP)
3	SELF-CONTAINED BREATHING APPARATUS (SCBA)
4	AIR SUPPLY HOSE



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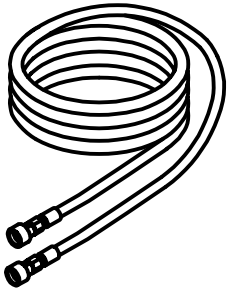
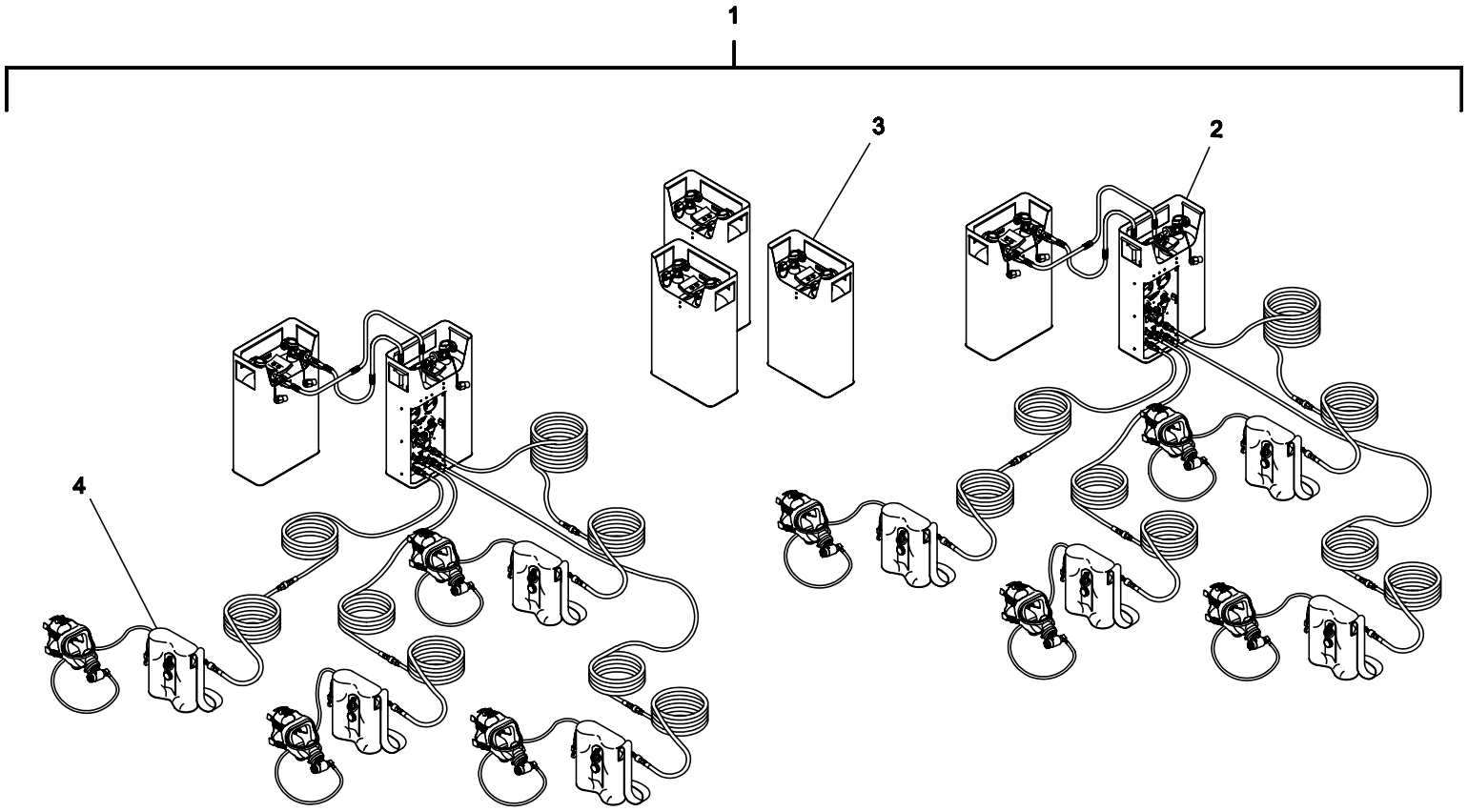


4

GAS FREE (IMMEDIATELY DANGEROUS TO LIFE AND HEALTH [IDLH])EVOLUTIONS - SKETCH #001
Supplied Air Respirator with Self-Contained Breathing Apparatus (SAR/SCBA) Components

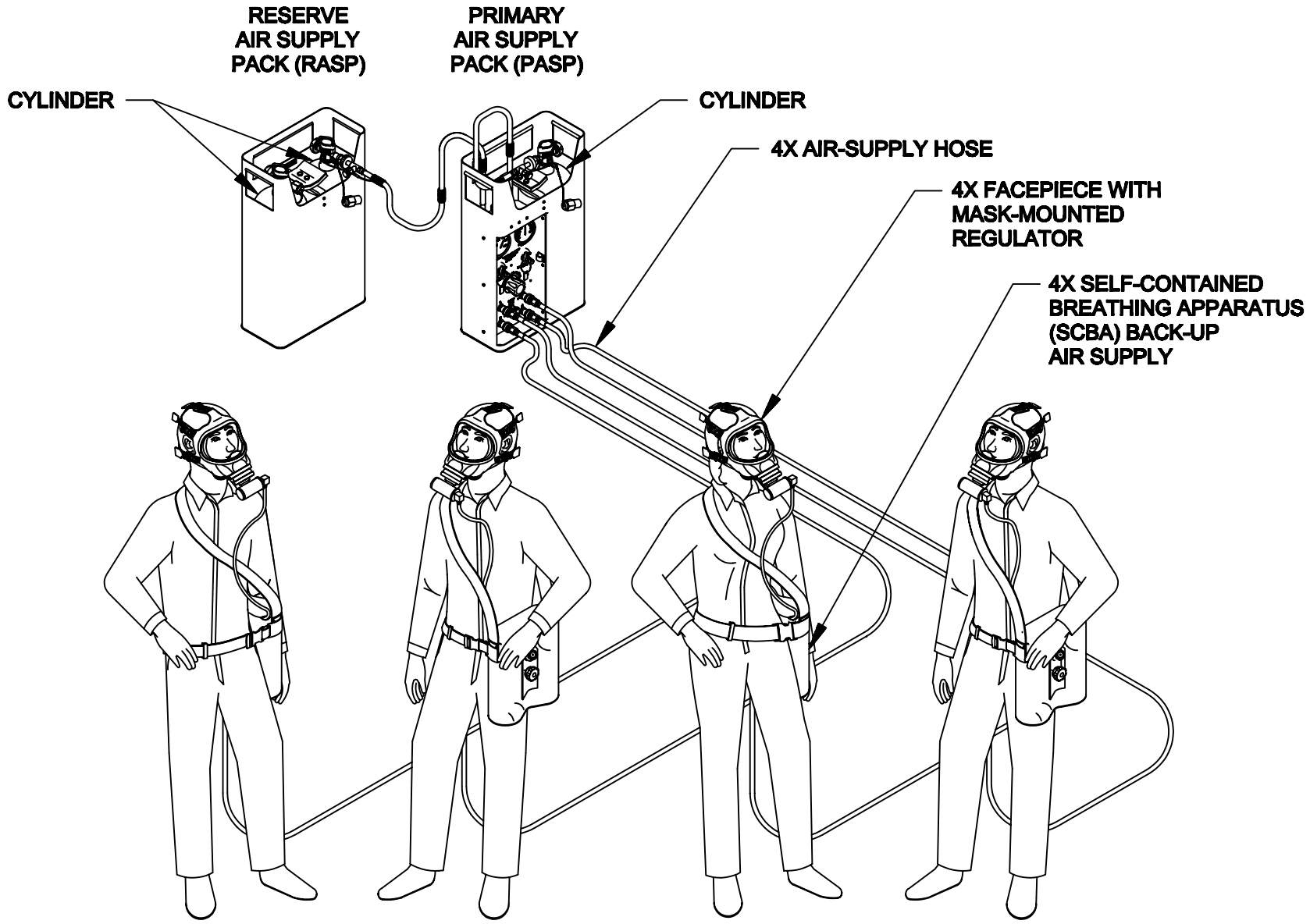


EMERGENCY RESCUE TEAM

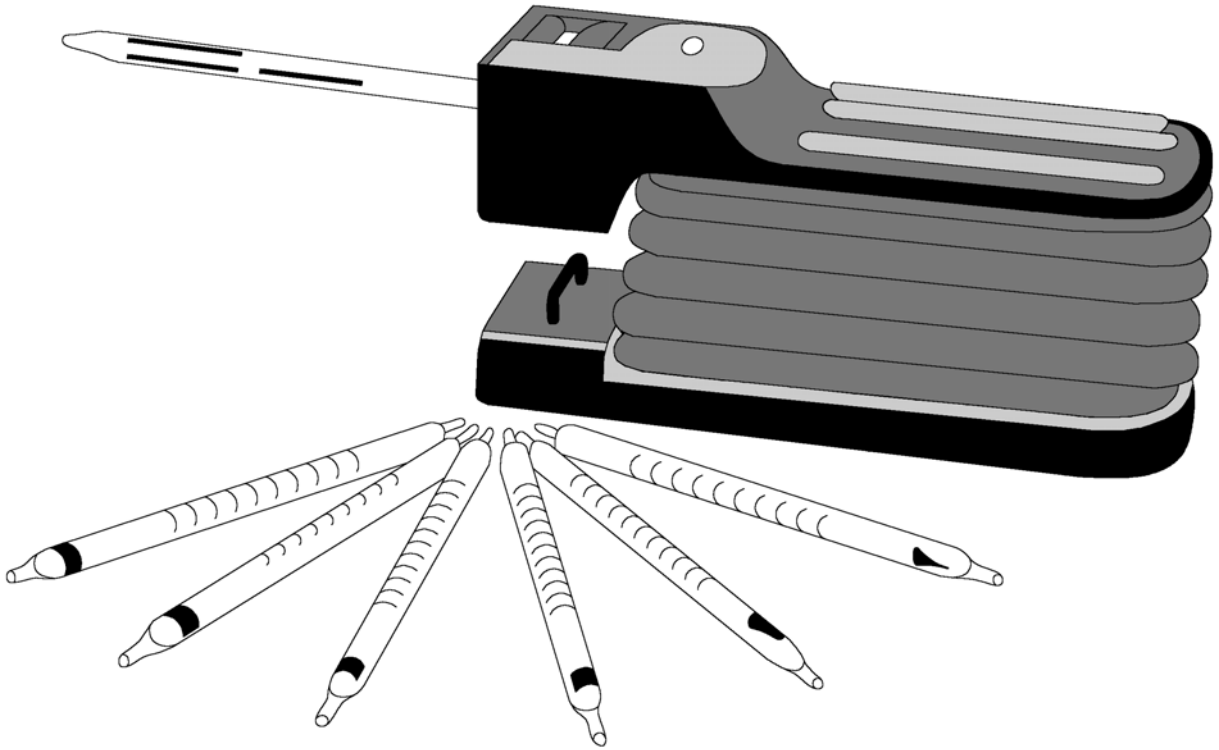
GFE INSPECTION TEAM

ITEM	QTY	EQUIPMENT
1	1	SUPPLIED AIR RESPIRATOR WITH SELF-CONTAINED BREATHING APPARATUS (SAR/SCBA)
2	2	PRIMARY AIR SUPPLY PACK (PASP)
3	5	RESERVE AIR SUPPLY PACK (RASP)
4	8	SELF-CONTAINED BREATHING APPARATUS (SCBA)

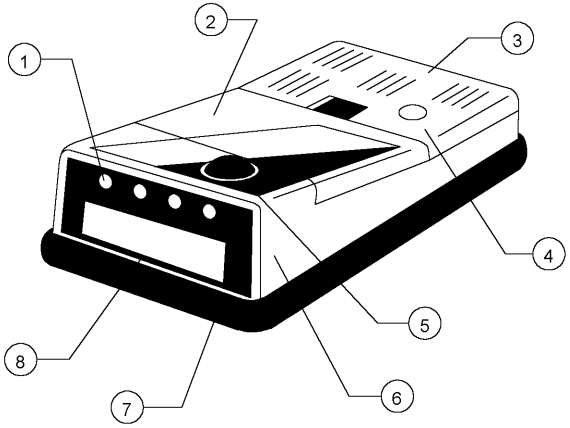
GAS FREE (IMMEDIATELY DANGEROUS TO LIFE AND HEALTH [IDLH])EVOLUTIONS - SKETCH #002
Supplied Air Respirator with Self-Contained Breathing Apparatus (SAR/SCBA) System Layout

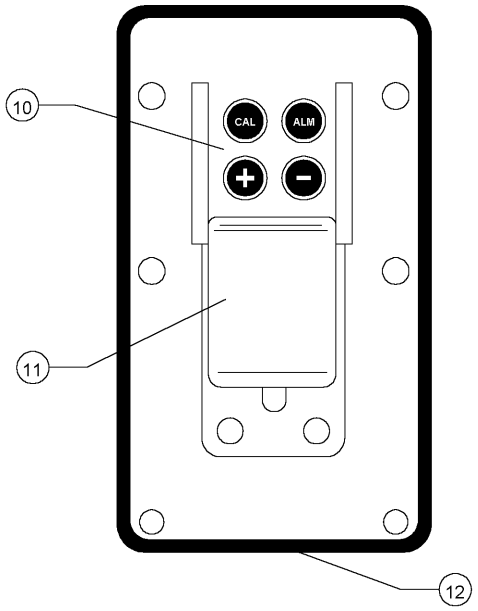


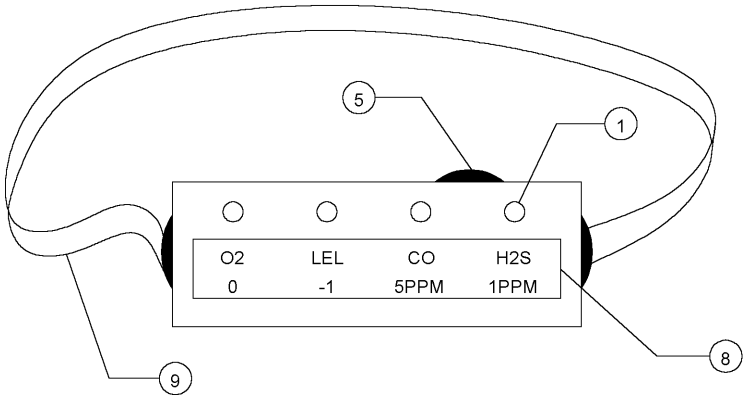
GAS FREE (IMMEDIATELY DANGEROUS TO LIFE AND HEALTH [IDLH])EVOLUTIONS - SKETCH #003
GFE Team Outfitted with Supplied Air Respirator with Self-Contained Breathing Apparatus (SAR/SCBA)



GAS FREE (IMMEDIATELY DANGEROUS TO LIFE AND HEALTH [IDLH]) EVOLUTIONS - SKETCH #004
Draeger Aerotest Simulation HP Breathing Air Tester







ITEM	EQUIPMENT
1	ALARM LIGHT
2	BATTERY PACK
3	SENSOR COMPARTMENT COVER
4	AUDIBLE ALARM
5	ON / OFF MODE BUTTON
6	CASE
7	PROTECTIVE PVC GASKET
8	LIQUID CRYSTAL DISPLAY (LCD)
9	NECK STRAP
10	KEYPAD
11	BELT CLIP
12	BATTERY CHARGER CONNECTOR (RECESSED)

GAS FREE (IMMEDIATELY DANGEROUS TO LIFE AND HEALTH [IDLH]) EVOLUTIONS - SKETCH #005
Four Gas Analyzer