



OPERATING
NATIONAL
AER-O-FOAM
SYSTEMS

INSTRUCTION AND SERVICE
MANUAL NATIONAL FOAM SYSTEM, INC.
1632 SANSOM STREET, PHILADELPHIA, PA.

INSTRUCTION AND SERVICE
MANUAL

NATIONAL
AER-O-FOAM SYSTEMS

NATIONAL FOAM SYSTEM, INC.
MANUFACTURERS

1632 SANSOM STREET, PHILADELPHIA, PA., U. S. A.

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CONTENTS

	PAGE
AER-O-FOAM Liquid—Data and Federal Stock Catalogue Reference	5
Mechanical Foam Nozzle, Type NPU, with Pick-up Tube.....	5
Mechanical Foam Nozzle, Type NPU, with Pick-up Tube—Spare Parts	6
Portable Pick-up, Type NPU—Operating Instructions.....	7
Premix Solution, Type PM—Operating Instructions.....	15
Pressure Proportioner, Type PP-D10-V (Duplex Proportioner)— Operating Instructions	9
Pressure Proportioner, Type PP-D10-V (Duplex Proportioner)— Spare Parts	8
Pressure Proportioner, Type PP-D25-II—Stationary—Operating Instructions	11
Pressure Proportioner, Type PP-D25-H—Stationary—Spare Parts	10
Suction Proportioner, Type SP-1 ("S" Type)—Operating Instruc- tions	13
Suction Proportioner, Type SP-2—Operating Instructions.....	14
Suction Proportioner— Type SP-1 ("S" Type)—Spare Parts.....	12
Type SP-2 ("S" Type)—Spare Parts.....	12
Suggestions	16

INTRODUCTION

This Operating and Service Manual is intended to present helpful suggestions for the production of Mechanical Foam (AER-O-FOAM) to extinguish fires.

Fire occurs when *fuel, oxygen and ignition temperature* are present in proper relationship for combustion. Therefore, the extinguishment of fire is best achieved by the elimination of one of these factors.

The elimination of oxygen from the burning area is often one of the most practical and quickest ways of extinguishment.

Mechanical Foam, by creating a gas-tight, free-flowing blanket, effectively eliminates oxygen, and the cooling effect of water in the foam helps to lower the temperature. The foam blanket also guards against a possible flashback which might occur if the gas vapors were free to become reignited by the previously heated surrounding structure.

AER-O-FOAM is a Mechanical Foam, possessing cohesive and adhesive qualities necessary for the creation of a tough, free-flowing blanket for the elimination of oxygen from the fire and the prevention of escaping vapors.

This Mechanical Foam is produced from the proper mixture of AER-O-FOAM Liquid, water and air, by equipment especially designed and developed by National Foam System, Inc.

In order that Mechanical Foam may be produced easily under different conditions and varying circumstances, there are several approved methods for the introduction of AER-O-FOAM Liquid into the water supply to form a solution which, when air is induced at the Mechanical Foam Nozzle at the end of the discharge hose, produces foam.

The following designations are applied to the several methods, and the operation for each will be found on separate pages of this Manual:

PORTABLE PICK-UP
(at Mechanical Foam Nozzle)

PRESSURE PROPORTIONERS (Duplex)
(in Water Line)

SUCTION PROPORTIONERS ("S" Type)
(at Pump Suction)

PREMIX SOLUTION

AER-O-FOAM Liquid may be used with either salt or fresh water in any method.



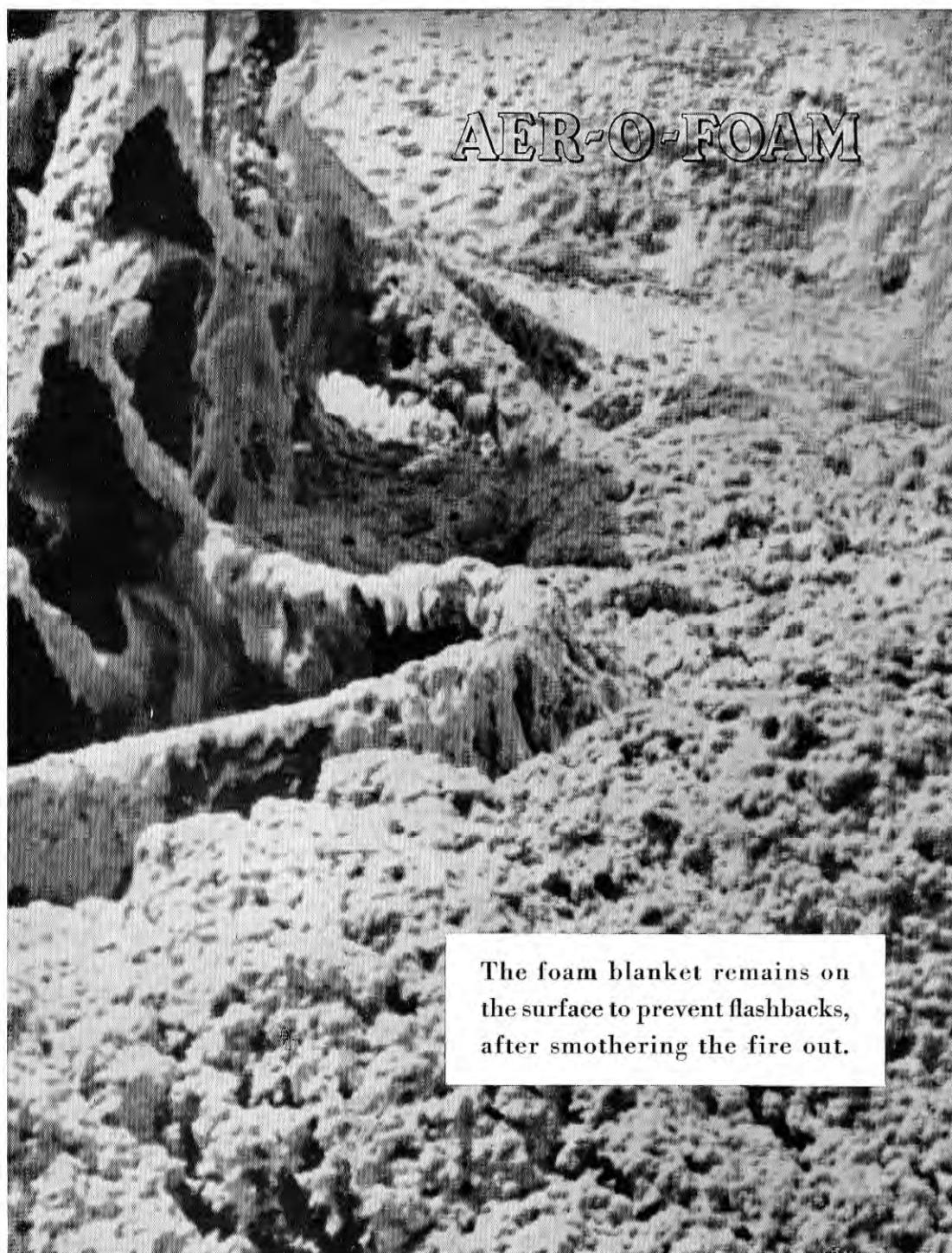
The personnel assigned to operate this equipment should familiarize themselves thoroughly with the operation of the AER-O-FOAM Units available so that speed and efficiency may be obtained at all times.

Suggestions for applying Mechanical Foam to fires and other uses will be found on the last page of this Manual.

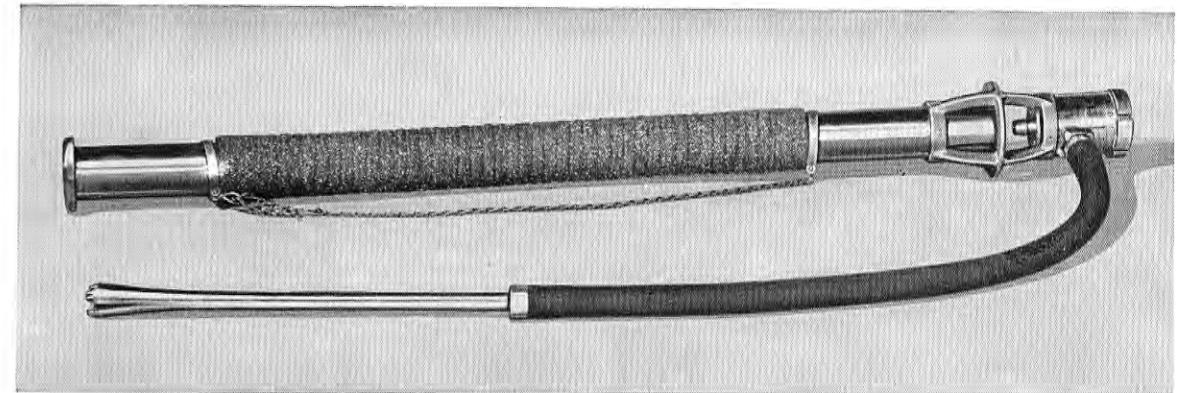
AER-O-FOAM is not harmful to individuals or clothing.

NATIONAL FOAM SYSTEM, INC.

1632 SANSOM STREET, PHILADELPHIA, PENNA.



MECHANICAL FOAM NOZZLE TYPE NPU WITH PICK-UP TUBE



The AER-O-FOAM Mechanical Foam Nozzle must be used for the production of foam, regardless of the method employed to introduce AER-O-FOAM Liquid into the water supply.

It is attached to the end of the discharge hose, and through its scientifically designed base, air is induced into the stream.

The Type NPU AER-O-FOAM Nozzle, illustrated above, also has incorporated in the base a Pick-up tube for use as described on page 7. This Nozzle can be operated in this manner without Pressure Proportioners, Suction Proportioners, or Premix Solution.

When the NPU Nozzle is used with the Pressure Proportioners, Suction Proportioners, or Premix Solution, the Pick-up tube performs no function and may be removed or disregarded, as the AER-O-FOAM Liquid has previously been induced into the stream.

The Nozzle is constructed to bend for convenience in directing the foam stream through hatchways or small openings.

AER-O-FOAM LIQUID



5-gal. containers.

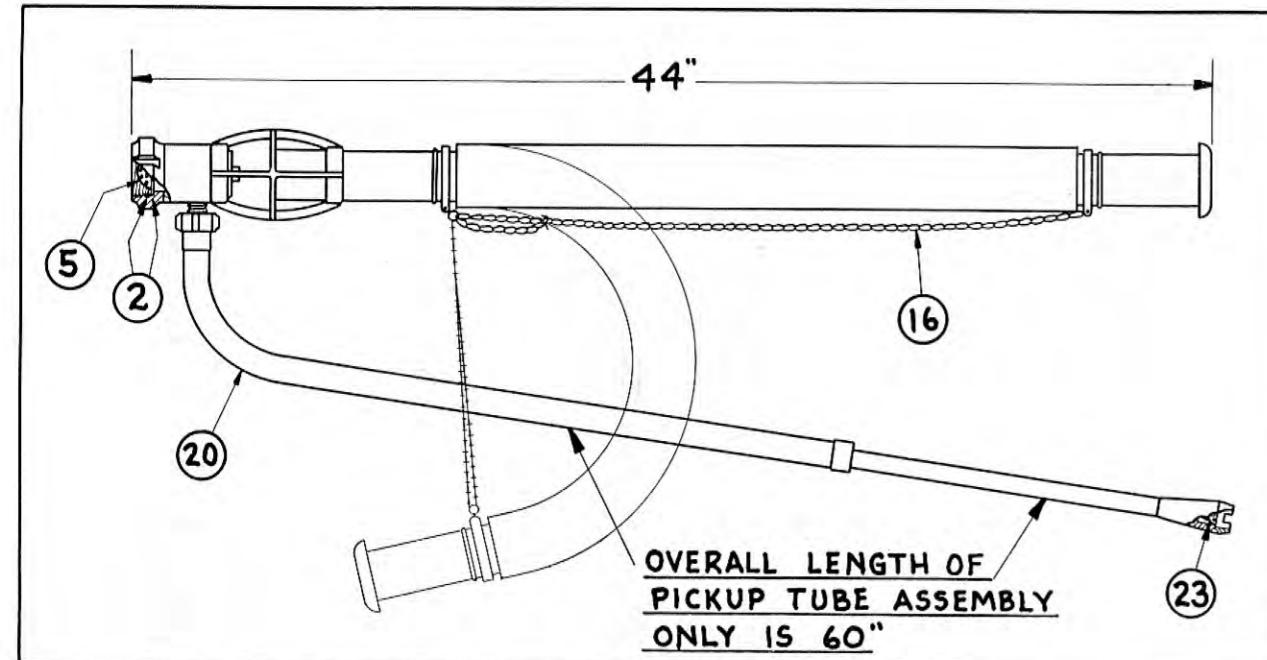
Weight—net 47 lbs., gross 52.25 lbs.

Dimensions—dia. 11½", height 13½".

Listed in Federal Stock Catalogue No. 51-C-1060. Foam Charges, Mechanical, Type V (for all mechanical foam apparatus. One 5-gal. can per charge).

Protect from freezing

MECHANICAL FOAM NOZZLE TYPE NPU WITH PICK-UP TUBE



Weight with tube, 12½ lbs.

1½" intake swivel thread is in accordance with Navy Department Specification 34F3(INT) 1 Sept., '42.

SPARE OR REPLACEMENT PARTS LIST

Reference No.	Part No.	Description	Quantity	Material
2	NPU-2	1½" Rubber Washer	2	Rubber
5	NPU-5	Inlet Strainer	1	Perf. Sheet Brass
16	NPU-16	Chain Assembly	1	Zinc-Coated Steel
20	NPU-20	Pick-up Tube Complete	1	Rubber and Brass
23	NPU-23	Pick-up Tube Strainer	1	Perf. Sheet Brass

No Other Parts Are Removable or Replaceable

AER-O-FOAM

PORTABLE PICK-UP TYPE NPU NOZZLE



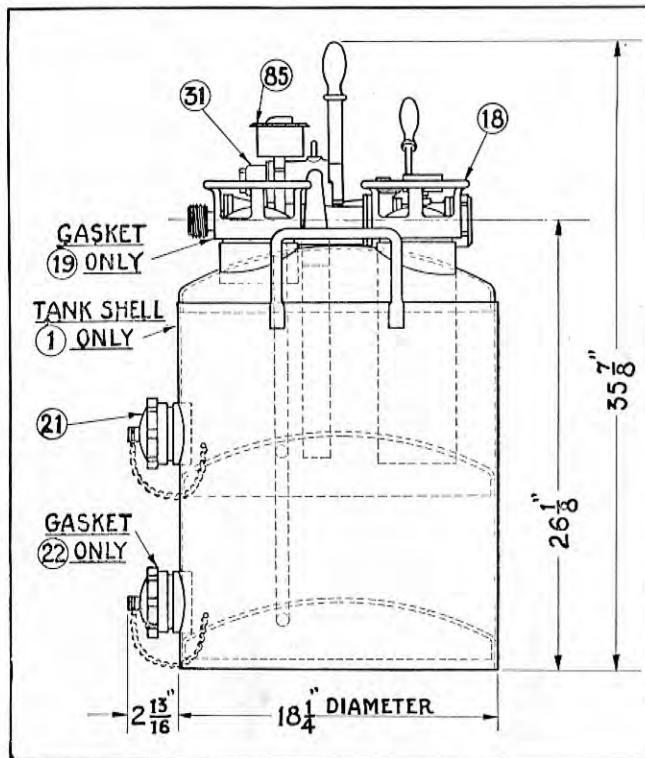
Capacity: The Mechanical Foam Nozzle, Type NPU, consumes AER-O-FOAM Liquid at the rate of approximately 3.6 g.p.m. and water at 56 g.p.m. to produce between 540 and 600 gallons of foam per minute. A 5-gallon can of liquid will be used in approximately 1½ minutes of operation.

OPERATING INSTRUCTIONS

1. Attach AER-O-FOAM Mechanical Foam Nozzle Type NPU to outlet end of hose.
2. Screw threaded end of Pick-up tube securely in hole at base of nozzle.
3. Remove cap of AER-O-FOAM Liquid 5-gal. can.
4. When at least 75 lbs. pressure is obtained, insert loose end of Pick-up tube into can of AER-O-FOAM Liquid so that tube end reaches the bottom.
5. Continuous foam production can be maintained by having additional cans of liquid on hand, so that the Pick-up tube can be quickly transferred from a used can to a full one.

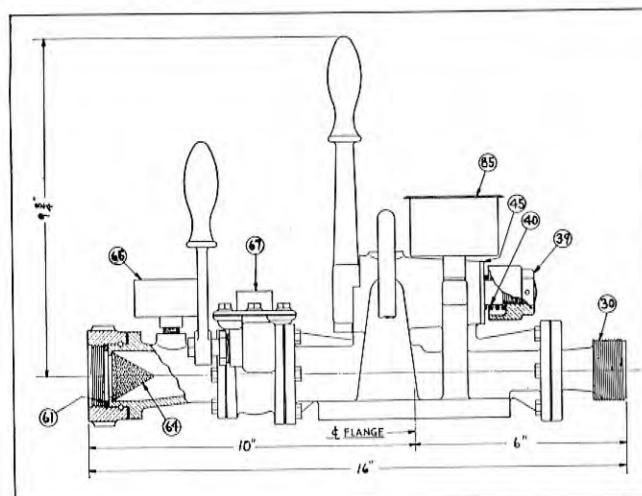
Mechanical Foam Nozzle, Type NPU without Pick-up tube, may also be operated with Pressure Proportioner, Suction Proportioner, or Premix Solution, as described in the following pages.

PRESSURE PROPORTIONER TYPE PP-D10-V (DUPLEX)



Weight, 138 lbs. empty

1 1/2" intake swivel thread, 1 1/2" discharge thread and 2 1/2" threads on drain caps are in accordance with Navy Dept. Spec. 34F3(INT) 1 Sept. '42.



No Other Parts Are Removable or Replaceable

SPARE OR REPLACEMENT PARTS LIST

Ref. No.	Part No.	Description	Quan. Req.	Material
1	PV-1001	Tank Shell	1	No. 14 Gauge Sheet Steel
18	PV-1018	Fill Cap	2	Brass
19	PV-1019	Fill Cap Gasket	2	Rubber
21	PV-1021	Drain Cap	2	Brass
22	PV-1022	Drain Cap Gasket	2	Rubber
31	PV-1031	Valve Assembly Complete	1	Brass
85	PV-1085	Timer	1	Steel Case

In addition—
PV-1041 Plug Valve Lubricant

SPARE OR REPLACEMENT PARTS LIST FOR VALVE ASSEMBLY—PART No. PV-1031

Ref. No.	Part No.	Description	Quan. Req.	Material
30	PV-1030	Discharge Fitting, 1 1/2" Navy standard thread	1	Brass
39	PV-1039	Proportioning Valve Retaining Nut	1	Brass
40	PV-1040	Proportioning Valve Spring	1	Steel
45	PV-1045	Proportioning Valve Washer	1	Brass
61	PV-1061	Inlet Swivel Gasket	1	Rubber
64	PV-1064	Inlet Strainer	1	Perforated Sheet Brass
65	PV-1065	Pressure Gauge	1	Brass Case
67	PV-1067	Inlet Water Valve	1	Brass
85	PV-1085	Timer	1	Steel Case

In addition—
PV-1041 Plug Valve Lubricant

PRESSURE PROPORTIONER TYPE PP-D10-V (DUPLEX)

The Pressure Proportioner introduces AER-O-FOAM Liquid into the water stream under pressure to form a solution for delivery to the Mechanical Foam Nozzle at the end of discharge hose.

Capacity: When used with Mechanical Foam Nozzle, Type NPU, one original filling of both compartments (20 gals.) will produce 3240 to 3600 gallons of foam at the rate of 540 to 600 gallons per minute for approximately 6 minutes of operation.

OPERATING INSTRUCTIONS (FOR PORTABLE UNITS)

TO FILL:

(Because of the weight of Proportioner filled with liquid, it should not be filled until carried to place where it is to be used. Four foam charges, Type V, 20 gallons, are required, two in each compartment.)

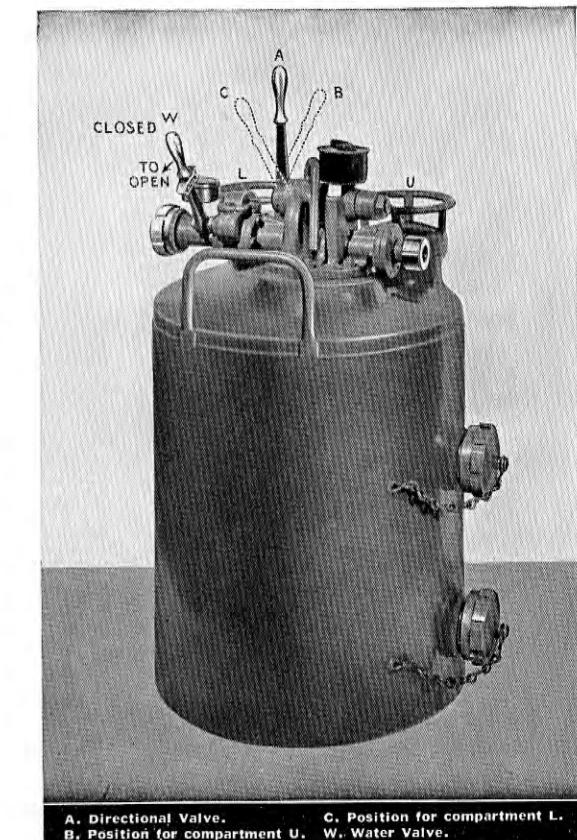
1. Remove fill cap (U). Open two cans of liquid, using spike (which is built into under side of fill cap), to puncture hole in top of can to admit air. Pour contents of both cans into upper compartment, and replace fill cap.
2. Repeat same operations for lower compartment, removing fill cap (L).

(Before a compartment is refilled it must be drained. A drain cap is provided for this purpose on each compartment.)

TO OPERATE:

1. With the supply hose connected to inlet, and the discharge hose equipped with Mechanical Foam Nozzle, Type NPU, connected to outlet, open water valve (W).
2. Keep directional valve (A) temporarily in position (A). (Water now passes through Proportioner without picking up foam liquid.)
3. Start water supply. Note pressure registered by gauge on the Proportioner. (A pressure of 75 lbs. or more gives best results.)
4. Operate directional valve (A) to position (B), marked "upper," and start timer. (Timer will ring when compartment is empty—in approximately 2 1/2 minutes.)
5. When timer rings, operate directional valve (A) to position (C), marked "lower." Reset timer.
6. Drain and refill compartment as directed above.
7. Repeat same operations as long as foam is needed.

(Note: Either compartment can be used in starting.)



(FOR STATIONARY UNITS)

As a stationary unit—the Proportioner is permanently attached to the water supply, and both compartments should be kept filled, ready for use. Until the Proportioner is to be operated, the directional valve (A) must be left in vertical position (A) to close both compartments.

Operating instructions as a stationary unit are the same as for the portable.

In the stationary unit, a leak-away should be installed at a low point in the piping between the fire-main shut-off valve and the water valve of the Proportioner.

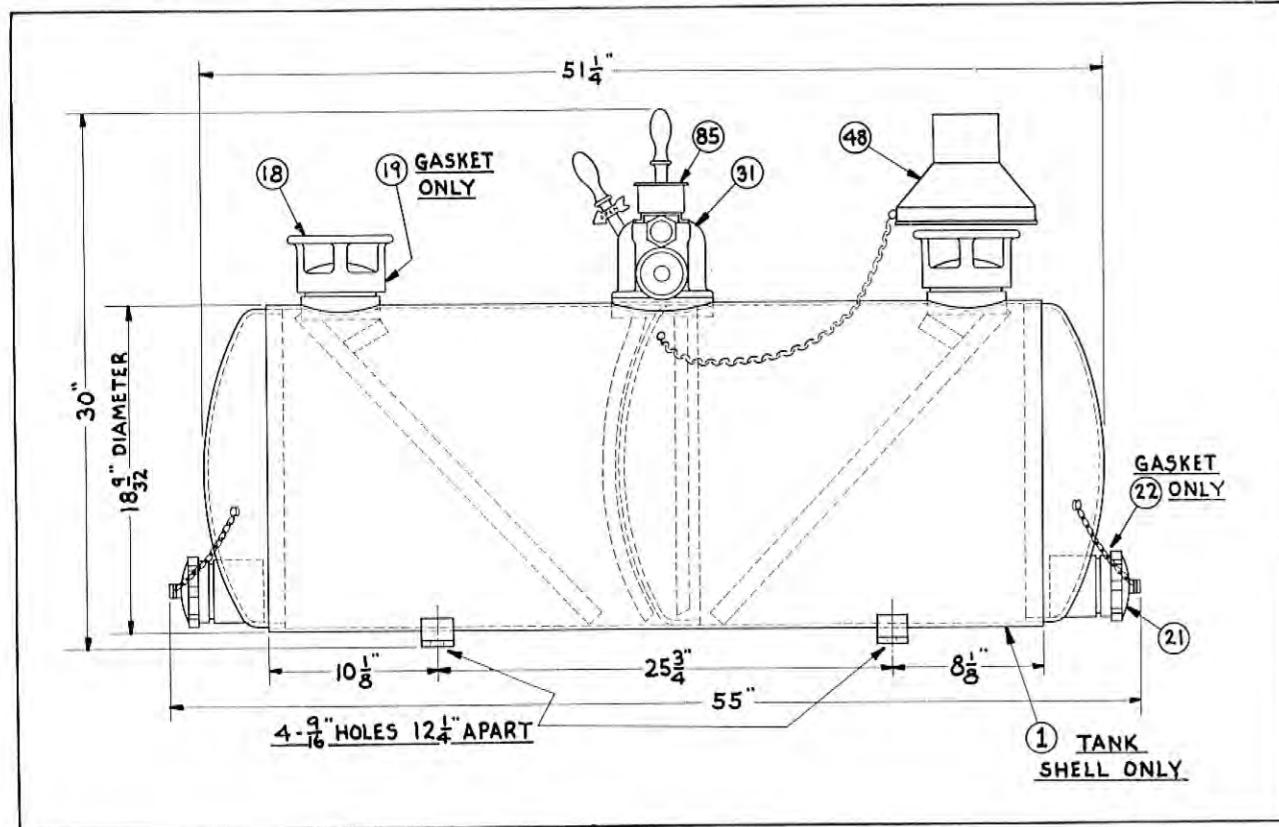
IMPORTANT

After using, flush apparatus (use fresh water if possible). Inspect gaskets, strainers and moving parts. Completely drain compartments before refilling with Mechanical Foam Liquid.

Caution: Protect liquid from freezing.

PRESSURE PROPORTIONER

TYPE PP-D25-H
STATIONARY
(DUPLEX)



Weight, 235 lbs. empty

SPARE OR REPLACEMENT PARTS LIST

Reference No.	Part No.	Description	Quantity Required	Material
1	PH-2501	Tank Shell	1	No. 10 Ga. Sheet Steel
18	PH-2518	Fill Cap	2	Brass
19	PH-2519	Fill Cap Gasket	2	Rubber
21	PH-2521	Drain Cap	2	Brass
22	PH-2522	Drain Cap Gasket	2	Rubber
31	PH-2531	Valve Assembly complete	1	Brass
48	PH-2548	Filling Funnel	1	Sheet Steel
85	PH-2585	Timer	1	Steel Case
In addition—		Plug Valve Lubricant		

No Other Parts Are Removable or Replaceable

Spare or replacement parts for Valve Assembly—Part No. PH-2531, same as for Valve Assembly—Part No. PV-1031 shown on page 8 except Part PV-1030 is 2" i.p.t.

PRESSURE PROPORTIONER

TYPE PP-D25-H
STATIONARY
(DUPLEX)

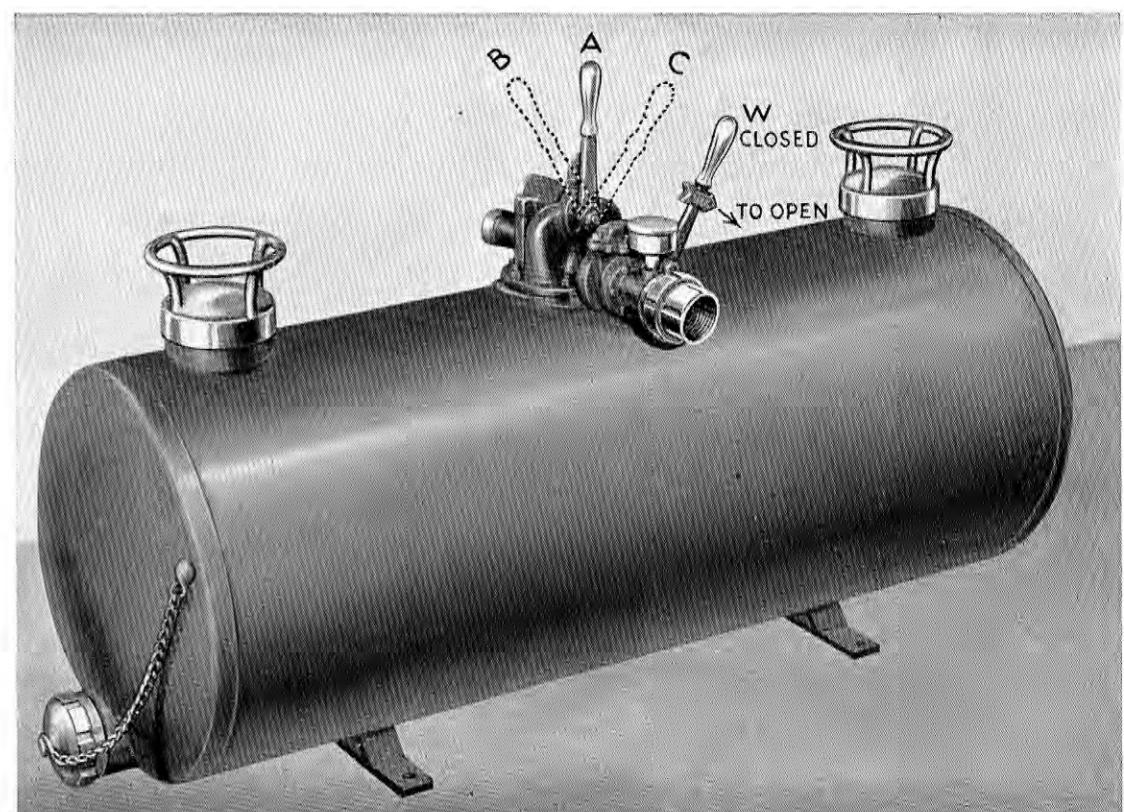
The Pressure Proportioner introduces AER-O-FOAM Liquid into the water stream under pressure to form a solution for delivery to the Mechanical Foam Nozzle at the end of the discharge hose.

Capacity: When used with Mechanical Foam Nozzle, Type NPU, one original filling of both compartments, 50 gallons (25 in each), will produce from 8100 to 9000 gallons of foam at the rate of 540 to 600 gallons per minute for approximately 15 minutes.

Charging Directions: After installation, fill both compartments with AER-O-FOAM Liquid, 25 gallons in each. Set directional valve (A) in vertical position (A) to close both compartments.

OPERATING INSTRUCTIONS

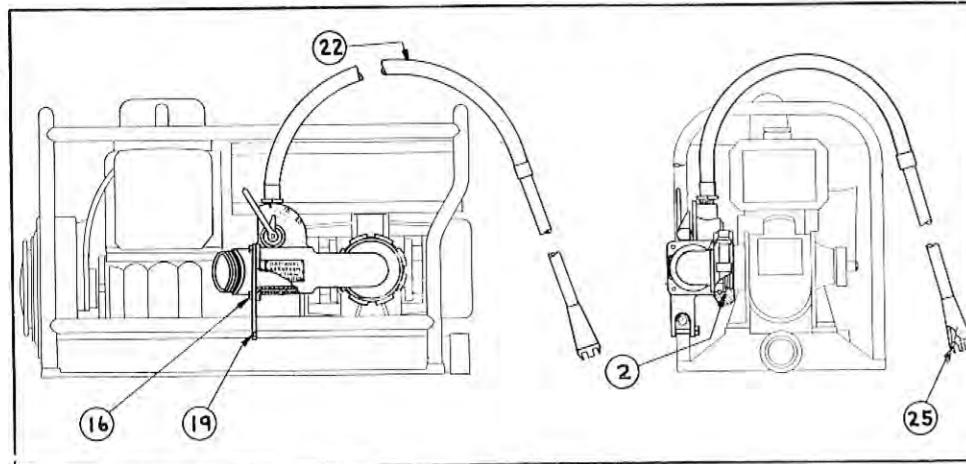
1. Connect 1 1/2" discharge hose to Proportioner outlet.
2. Attach Mechanical Foam Nozzle to the other end of discharge hose.
3. Open water valve (W).
4. Keep directional valve (A) in vertical position (A). Water will then pass through without picking up liquid.
5. Start pump or open main water valve. Wait until pressure gauge on Proportioner registers 75 lbs. or more per square inch.
6. Throw directional valve (A) to position (B) to discharge first compartment. Start timer. Each compartment will be discharged in approximately 7 minutes.
7. When timer rings or compartment is empty, throw direc-
- tional valve (A) to position (C) to discharge other compartment. Reset timer.
8. While discharging from second compartment, remove fill and drain caps of first discharge compartment to empty water. When drained, replace drain cap and refill with 5 cans of liquid (25 gallons), using spike (which is built into under side of fill cap) to puncture hole in top of can to admit air; replace fill cap.
9. When timer rings or second compartment is discharged, throw directional valve (A) to position (B). Reset timer.
10. Repeat same process as long as foam is desired by alternating from one compartment to the other.
11. After operation, partially or completely used compartments should be emptied and refilled with new liquid.



Caution: Protect liquid from freezing

SUCTION PROPORTIONERS MOUNTED ON PUMPS

TYPE SP-1
("S" Type)



Weight with tube, 13 lbs.

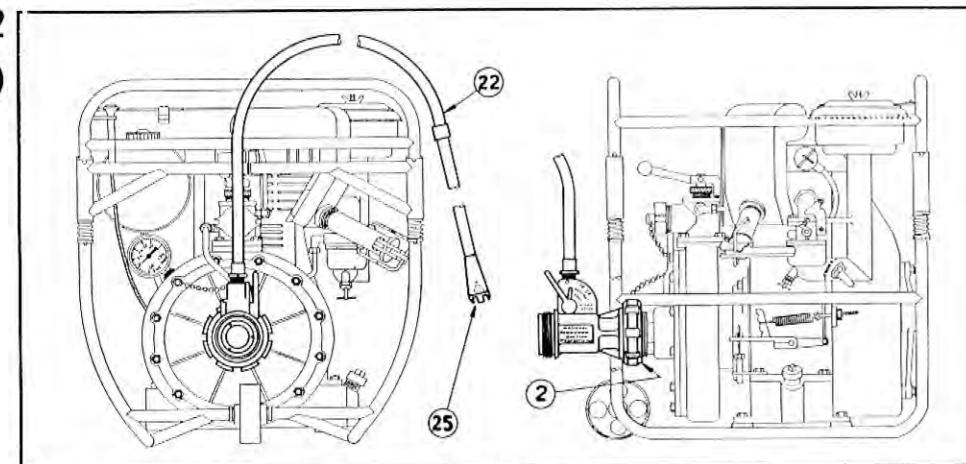
2" intake and discharge threads are in accordance with Navy Department Specifications 34F3(INT) 1 Sept., '42.

SPARE OR REPLACEMENT PARTS LIST

Reference No.	Part No.	Description	Quantity Required	Material
2	SP-1-2	2" Swivel Gasket	1	Rubber
16	SP-1-16	Body Flange Stud	4	Silicon Bronze
19	SP-1-19	Locking Screw and Nut	1	Brass
22	SP-1-22	Pick-up Tube Complete	1	Rubber and Brass
25	SP-1-25	Pick-up Tube Strainer	1	Perf. Sheet Brass

No Other Parts Are Removable or Replaceable

TYPE SP-2
("S" Type)



Weight with tube, 13 lbs.

2½" intake and discharge threads are in accordance with Navy Department Specifications 34F3(INT) 1 Sept., '42.

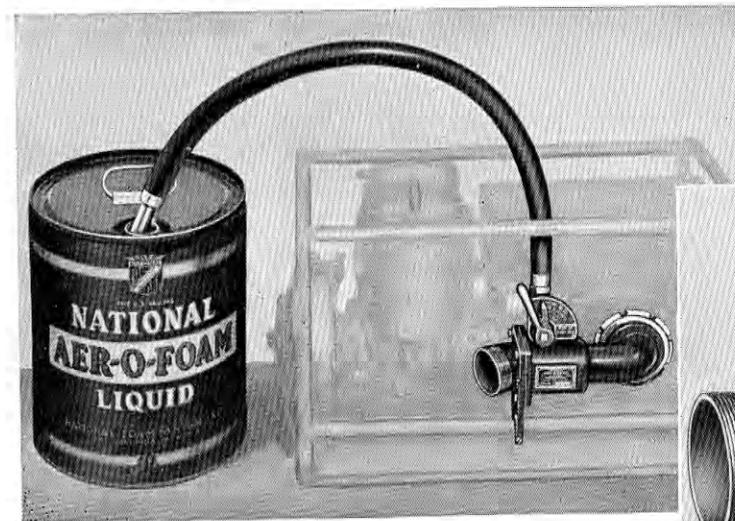
SPARE OR REPLACEMENT PARTS LIST

Reference No.	Part No.	Description	Quantity Required	Material
2	SP-2-2	2½" Swivel Gasket	1	Rubber
22	SP-2-22	Pick-up Tube Complete	1	Rubber and Brass
25	SP-2-25	Pick-up Tube Strainer	1	Perf. Sheet Brass

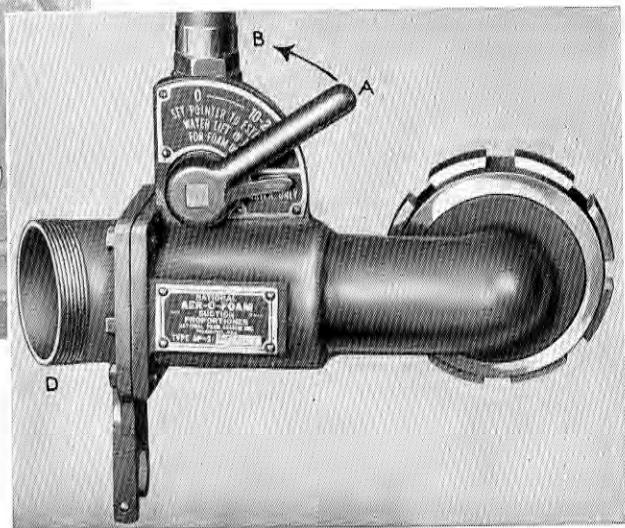
No Other Parts Are Removable or Replaceable

AER-O-FOAM

SUCTION PROPORTIONER TYPE SP-1 ("S" Type)



The Suction Proportioner introduces AER-O-FOAM Liquid into the water stream on the suction side of the pump, to form a solution for delivery to the Mechanical Foam Nozzle.



OPERATING INSTRUCTIONS

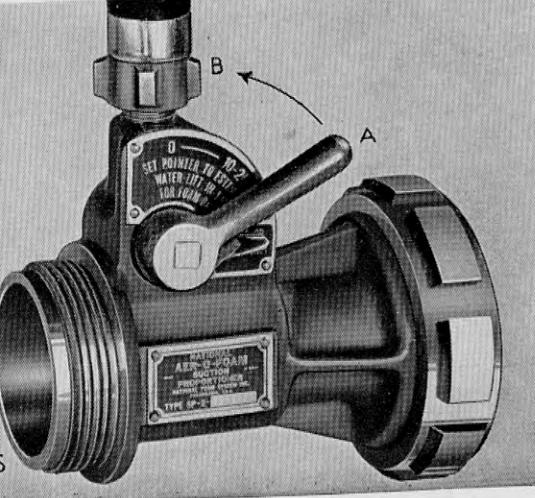
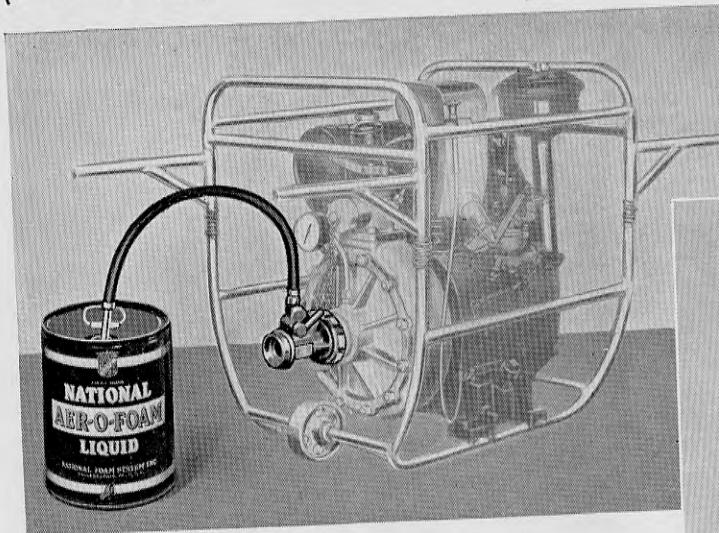
1. Attach AER-O-FOAM SUCTION PROPORTIONER SP-1 to Suction fitting on pump.
2. Screw Pick-up tube securely into connection on Suction Proportioner.
3. Attach 2" Suction Hose at D. Attach 1½" discharge hose to opposite side of pump.
4. Attach Mechanical Foam Nozzle to outlet end of discharge hose.
5. Insert Pick-up tube attached to Suction Proportioner into can of AER-O-FOAM Liquid so that the tube end reaches the bottom.
6. Before starting pump, cock on Suction Proportioner must be in "prime" or "water" position (A) and must remain in that position until water pressure reaches 100 lbs. per square inch.
7. When water pressure equals 100 lbs. or more turn cock towards "foam position" (B), setting pointer mark at estimated lift in feet from water level to pump.
8. To assure continuous operation without loss of pump suction: when first can is nearly empty turn cock to "water" position (A), insert Pick-up tube into full can of liquid and return cock towards "foam position" (B) at original setting. This process may be repeated indefinitely.

Capacity: When used with Mechanical Foam Nozzle, Type NPU, one 5-gallon can of AER-O-FOAM Liquid (consumed at the rate of approximately 3.6 g.p.m.) will produce between 810 and 900 gallons of foam at the rate of 540 to 600 gallons of foam per minute for approximately 1½ minutes of operation.

Whenever pump unit is inspected, turn cock on Suction Proportioner to make sure it turns freely. After use: flush clean, remove all dirt, grit, etc. Inspect strainer on Pick-up tube and flush clean.

For Spare or Replacement Parts—See Page 12

SUCTION PROPORTIONER TYPE SP-2 ("S" TYPE)



The Suction Proportioner introduces AER-O-FOAM Liquid into the water stream on the suction side of the pump, to form a solution for delivery to the Mechanical Foam Nozzle.

OPERATING INSTRUCTIONS

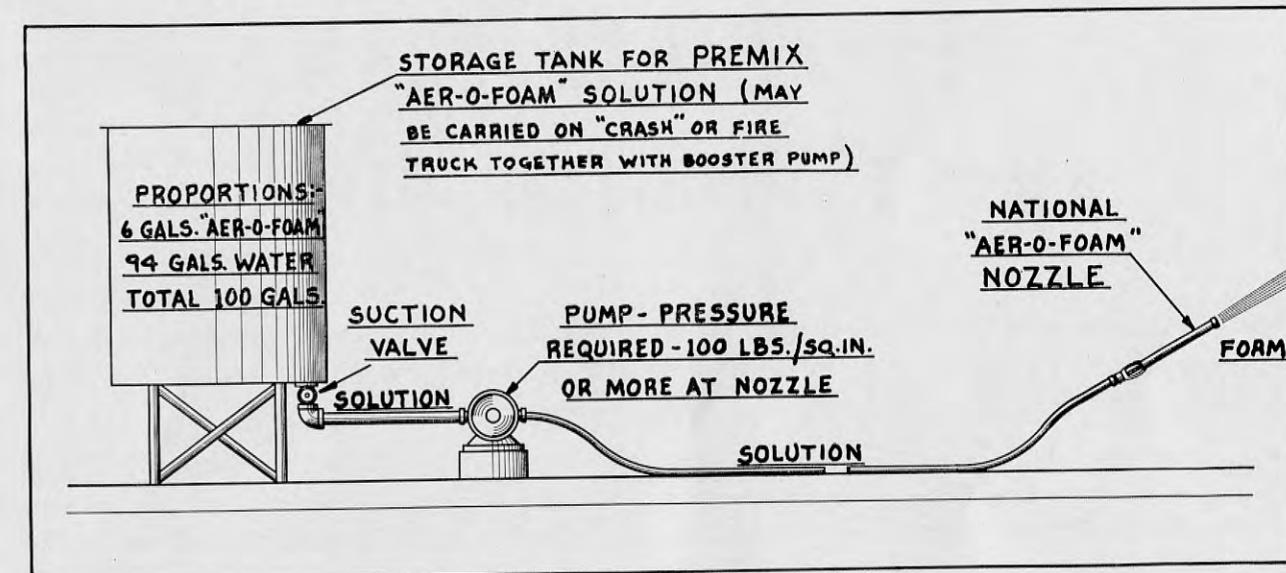
1. Attach AER-O-FOAM SUCTION PROPORTIONER SP-2 to Suction fitting on pump.
2. Screw Pick-up tube securely into connection on Suction Proportioner.
3. Attach 2½" Suction Hose at S. Attach 1½" discharge hose to discharge connection of pump.
4. Attach Mechanical Foam Nozzle to outlet end of discharge hose.
5. Insert Pick-up tube attached to Suction Proportioner into can of AER-O-FOAM Liquid so that the tube end reaches the bottom.
6. Before starting pump, cock on Suction Proportioner must be in "prime" or "water" position (A) and must remain in that position until water pressure reaches 80 or more pounds per square inch.
7. When water pressure equals 80 or more pounds per square inch, turn cock towards "foam position" (B), setting pointer mark at estimated lift in feet from water level to pump.
8. To assure continuous operation without loss of pump suction: when first can is nearly empty turn cock to "water" position (A), insert Pick-up tube into full can of liquid and return cock towards "foam position" (B) at original setting. This process may be repeated indefinitely.

Capacity: When used with Mechanical Foam Nozzle, Type NPU, one 5-gallon can of AER-O-FOAM Liquid (consumed at the rate of approximately 3.6 g.p.m.) will produce between 810 and 900 gallons of foam at the rate of 540 to 600 gallons of foam per minute for approximately 1½ minutes of operation.

Whenever pump unit is inspected, turn cock on Suction Proportioner to make sure it turns freely. After use: flush clean, remove all dirt, grit, etc. Inspect strainer on Pick-up tube and flush clean.

For Spare or Replacement Parts—See Page 12

PREMIX SOLUTION TYPE PM



FILLING INSTRUCTIONS

1. Place proper amount of water in tank based on 94 gallons water to 6 gallons AER-O-FOAM Liquid. This ratio may vary plus or minus 2%.
2. Calcium chloride may be added to the water, if desired, to prevent freezing. (Never add calcium chloride to AER-O-FOAM Liquid alone.) Special recommendations should be obtained for each case.
3. Pour AER-O-FOAM Liquid into the tank in a way to avoid undue foaming.
4. Stir slowly or circulate until thoroughly mixed.
5. Replace tank cover.

OPERATING INSTRUCTIONS

1. Run out one or two 50' lengths 1½" discharge hose from pump.
2. Attach Mechanical Foam Nozzle to outlet end of hose.
3. Open valve at Premix Solution tank.
4. Start pump.

SUGGESTIONS FOR APPLYING MECHANICAL FOAM TO EXTINGUISH FIRES

Flow foam gently over fire by building up an expanding blanket over the burning surface. This can often best be accomplished by directing foam stream against a vertical base near fire or by lobbing the stream to fall gently across and over the burning area.

Avoid undue splashing or agitation of fire. If possible, take a position to the windward side of the fire at a convenient distance so that foam stream may be deposited over the burning area with minimum velocity. It is important to create the foam blanket as quickly as possible. For best results, it is recommended that the blanket be approximately 6" to 8" deep.

OTHER MECHANICAL FOAM USES

To prevent spread of fire by insulation—apply foam stream gently to the section to be insulated, in such a manner that it will adhere to the surface.

As a dike to stop running fires, apply to selected area gently to build up a bank of foam.

MAINTENANCE

After use and before storing AER-O-FOAM Equipment—thoroughly wash all parts and remove any foreign matter (seaweed, sand, dirt, etc.) from all strainers and openings.

FOR BEST RESULTS

Use only AER-O-FOAM Liquid. Never mix AER-O-FOAM with the product of another manufacturer. To do so may cause a chemical reaction that will render the equipment inoperative.

Protect the supply of AER-O-FOAM Liquid from extreme high or low temperatures. AER-O-FOAM Liquid will freeze. If this should occur, when thawed out, its efficiency is not impaired.

Do not use any type of Foam on Electrical Fires (motors, generators, switchboards, junction boxes, transformers, or lines).

If the recommended pressures for the several methods cannot be attained, Mechanical Foam of an inferior quality will be the result.

