3. <u>Boats Imported for Tests or Experiments</u>.

Noncomplying boats or associated equipment imported for tests or experiments may remain in the United States for as long as 1 year. The Customs Service requires the consignee (recipient of the product) to submit a signed declaration to the District Director of Customs giving name and U.S. address, entry number (assigned by Customs) and date, and the make and model of boats or a description of equipment and components. The consignee must provide a description of the tests and experiments that will be performed, the estimated time needed to complete them, and what will be done with the boat or equipment after the tests or experiments are finished. In addition the consignee should specify, if possible, the city and State where the boat, equipment or component will be kept while in the United States.
[BSCs 2-73, 27, 46, 57, 60 & 62]

THE EFFECT OF HOLES ON LOAD CAPACITY

Several years ago an independent laboratory bought a 17-foot inboard-outdrive runabout manufactured by a well-known and respected company for compliance testing. Its U.S. Coast Guard Maximum Capacities label showed that the boat was certified for a Maximum Weight Capacity of 1550 pounds. The boat was equipped with generous ventilation louvers in the aft quarter of each hull side. They ventilated the engine space and also made a rather handsome and distinctive styling device.

When the lab tested the boat for load capacity, its static float plane was drawn from the extreme point of the bow to the stern, under every point of major water ingress (entry). Sketch "A" shows how this is done. More to the point, the load tests resulted in a capacity figure for the 17-footer of 730 pounds, slightly less than half the figure on the capacity label.

Further investigation showed that the builder had drawn the static float plane at gunwale level. In other words, with the boat immersed to its "float plane" for testing, water would pour through the ventilation louvers and the 3-inch plus ducts to the engine space. Thus, it becomes obvious that what may be good for ventilation may be very bad for a boat's static float plane and testing for Maximum Weight Capacity.

Subpart C of Part 183 of Title 33, Code of Federal Regulations contains the regulations on Maximum Weight Capacity and Safe Loading. Paragraph 183.33(b)(1) says "Maximum displacement is the weight of the volume of water displaced by the boat at its maximum level immersion in calm water without water coming aboard. For the purposes of this paragraph, a boat is level when it is transversely level and when either of the two following conditions is met:

(1) The forward point where the sheer intersects the vertical centerline plane, and the aft point where the sheer intersects the upper boundary of the transom (stern), are equidistant above the water surface or are equidistant below the water surface; OR

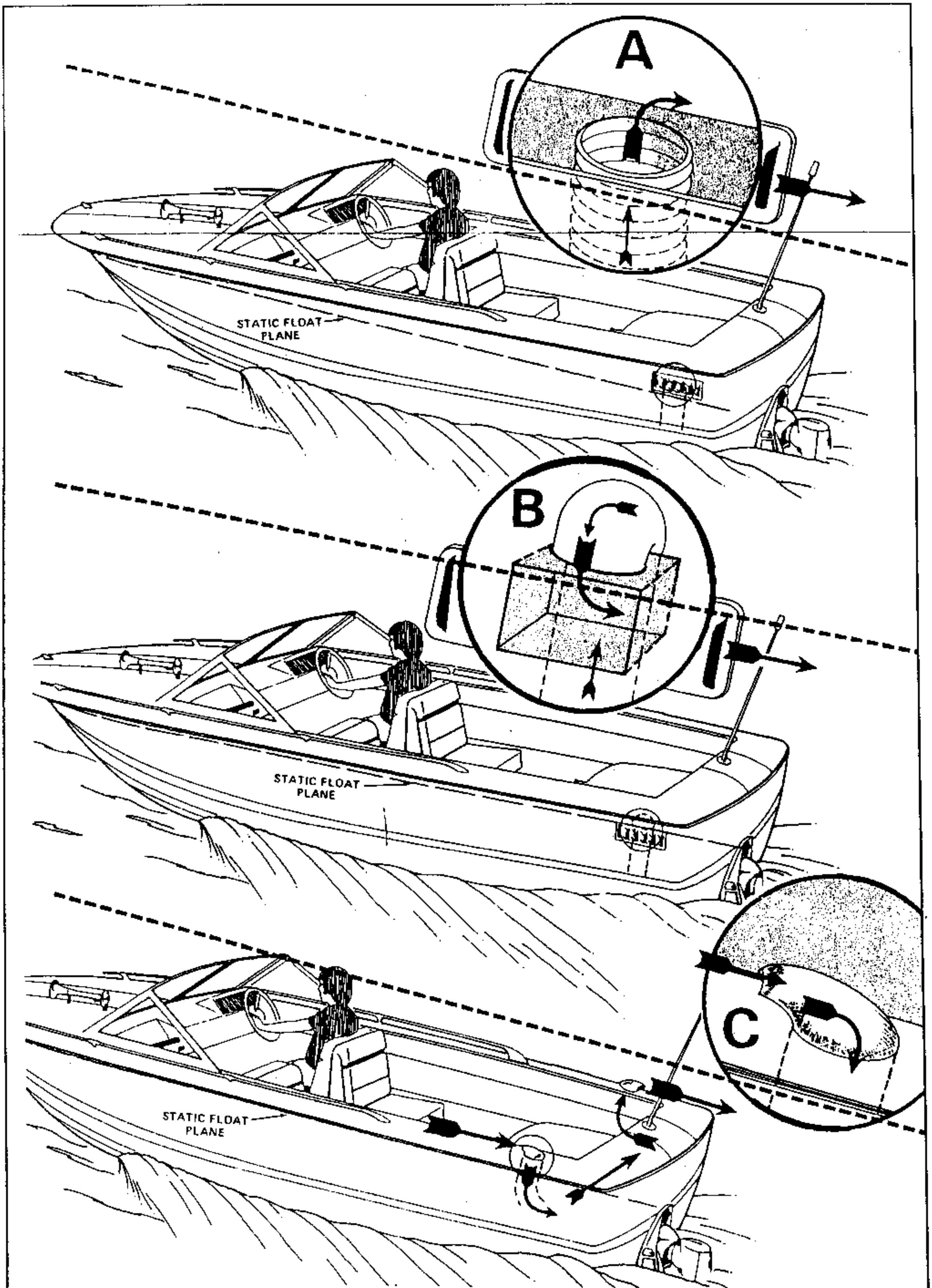
(2) The most forward point of the boat is level with or above the lowest point of water ingress."

Paragraph 183.35, Maximum Weight Capacity - Outboard boats - is worded like §183.33 with the exception of one phrase, which follows: "Maximum displacement is the weight of the volume of water displaced by the boat at its maximum level immersion in calm water without water coming aboard except for water coming through one opening in the motorwell with its greatest dimension not over 3 inches for outboard motor controls or fuel lines . . ."

The ABYC publication "Standards and Recommended Practices for Small Craft" contains a similar definition of the static float plane, but with a cautionary note that ventilation openings may become points of major leakage.

Some boats, as we mentioned, have been built with engine or fuel space ventilating louvers installed in the extreme quarter of each side of the hull. In the two most common sizes, the small louvers have an area of eight square inches and the large ones measure 14 square inches. Remember that any opening larger than three inches in its greatest dimension is a "major means of water ingress" or entry. The accompanying sketch "A" shows how to draw the static float plane in instances where ventilation louvers are in the hull sides.

In some instances we have found that recalculation of the Maximum Weight and Maximum Persons


A
STATIC FLOAT PLANE
B
STATIC FLOAT PLANE
C
STATIC FLOAT PLANE

Capacities using the correct static float plane gives figures that seem much too small for the size of the boat. When recalculation of the static float plane lowers capacity figures drastically, the float plane and the capacity figures can be raised in relatively simple ways. An effective way is shown in sketch "B". Here a box is built with the louver on one side. The ventilating tube is fastened to an opening in the top of the box. The tube then rises up and loops over and up under the gunwale, effectively restoring the static float plane to its original point.

Another, and possibly the simplest way to raise the float plane, is to close the louvers and install vents on the aft deck or gunwale, as shown in sketch "C".
[BSC 21]

WHEN A BEER KEG WON'T WORK

One of the most frequently asked questions from boat owners is how to build a replacement fuel tank. Our first advice is to try to purchase the tank from the original boat manufacturer or from an established supplier of marine fuel tanks. A great deal of engineering is required to build a safe and satisfactory fuel tank for a boat. Your local welding or tinsmith's shops may not know all of the answers and you have to live (or die) with their solutions.

If you have to build the tank yourself or have it fabricated locally, get a copy of American Boat and Yacht Council Standard H-24, Gasoline Fuel Systems. The standard isn't a substitute for proper engineering design, but it covers the safety aspects of a good design.

For example, Table 1 of H-24 lists most of the materials commonly used for boat fuel tanks along with a minimum thickness or sheet metal gauge. The minimum thicknesses are specified for corrosion resistance, not for strength. The thickness and reinforcement should be determined by calculation or testing. In most cases you can determine those requirements by examining the fuel tank you are replacing.

Not all of the materials listed in Table 1 of H-24 are equally durable:

* Don't use copper for fuel tanks because it is impossible to make a durable soldered joint. Copper also causes a gum to form in gasoline unless the inside surface of the tank is completely coated with tin.

* Don't use terneplate (lead-tin alloy coated steel) because it develops pinholes due to accelerated corrosion in salt water. Terneplate is the metal used for most automobile fuel tanks. Coast Guard regulations prohibit its use for tanks in certain new boats.

* Don't use stainless steel for a flat sided tank, for a cylindrical tank larger than 20 gallons or for any tank which might be in contact with bilge water. Stainless steel hardens and cracks if the sides of the tank flex or vibrate. It also develops pinholes when stagnant water lays in contact with the metal.

* Aluminum is the best choice for most custom fuel tanks, but only the marine alloys of aluminum, 5052, 5083 or 5086, which have very low copper content. Many local welding shops have the necessary shielded arc equipment (Heli-arc) to weld aluminum and the price is reasonable.

* Nickel-copper alloys which are sold under the trade name MONEL®, and copper-nickel alloys are good materials for fuel tanks because of their superior corrosion resistance, but they are expensive. Also, sometimes it is hard to find the necessary sizes and thicknesses without going to the factory. Nickel-copper alloys are approximately 70 percent nickel and 30 percent copper. These alloys have virtually no reaction with fuel. Copper-nickel alloys are 90 percent copper and 10 percent nickel and react about the same as pure copper with fuel and barnacles. These are the high and low of commercial products. A higher nickel content means a higher price. An alloy that is 60 percent nickel and 40 percent copper is suitable for a gasoline fuel tank.

* Hot-dipped galvanized steel is the lowest cost material. These tanks must be galvanized, that is, dipped in molten zinc, after they are completely fabricated. Do not confuse this with galvanized sheet metal which is OK for roofing, but should never be used for fuel tanks. Even the hot-dipped galvanized tanks should not be counted on for more than 10 years useful life. A brown or white gritty material in your fuel filter may be the first sign that the tank is ready to fail because the galvanized coating has corroded.

* Finally, fiberglass can be the best or the worst of materials for fuel tanks. Most gasoline stations have huge underground fuel storage tanks made of fiberglass. These tanks and the ones labeled by Underwriters' Laboratories for boats are the best. They are expensive and are probably beyond the ability of most small shops to make properly. The worst of the fiberglass tanks are little more than plywood covered with fiberglass.

If your boat is diesel powered, you must not use fuel tanks made of copper, copper-nickel or copper-silicon or those which are galvanized on the inside. All of the other materials which are suitable for gasoline are also OK for diesel. Many diesel powered boats use black iron or plain steel tanks. These have a limited life and must be checked frequently after five years of service; however, a leak in a diesel tank is not nearly as dangerous as in a gasoline tank.

H-24, Gasoline Fuel Systems, is available from the American Boat and Yacht Council, P. O. Box 747, Millersville, MD 21108. The price is $7.00 per copy plus $1.00 postage and handling. [BSC 62]

KEEPING OUT OF HARM'S WAY

Don't Use Automotive Parts: While some marine engine components seem overly expensive compared to their automotive equivalents, there are major differences in the environments in which they are designed to operate. Some automotive fuel components release fuel and vapor into the engineroom and some automotive electrical components emit sparks. Fuel vapors do not accumulate beneath the hood of a car, but they quickly reach explosive levels in the engineroom on a boat.

Prior to the publication of the Coast Guard Electrical and Fuel System Standards, there were no marine equivalents for many of the automotive components described below. What are the differences?

Alternators: A standard automotive alternator has exposed electrical contacts that can create sparks and ignite fuel vapors in the engineroom. On marine alternators, which must meet the ignition protection requirements in §183.410(a), the contacts are sealed inside.

Distributors: Automotive distributors create high energy sparks internally that can escape through a vent which permits the release of ozone gas. Marine distributors are ignition-protected and the vent has a flame arrestor device to prevent sparking that could cause a fire or explosion in the engineroom.

Starters, Generators, Accessory Motors (hydraulic pump, tilt drive, etc.): These motors have brushes and an armature which spark in normal operation in an automobile. To meet the requirements of §183.410(a), the marine versions of these motors are usually completely sealed. Marine starters are also equipped with an additional seal between their motor section and bendix gear section.

Starter solenoids: Each time the solenoid operates it creates a high energy spark internally. A vent hole in the automotive starter solenoid for the release of ozone, is absent on a marine starter solenoid that is ignition-protected.

Carburetors: The float chambers on carburetors are vented to permit the free flow of fuel into and out of the chambers. On automotive carburetors any overflow from the vents flows outside the carburetor into the engineroom. On a marine carburetor the vents lead into the carburetor throat so that any overflow is consumed by the engine.

Fuel Pumps: Automotive fuel pumps have a vent hole that will leak gasoline into the engineroom if the fuel pump diaphragm fails. The Coast Guard Fuel System Standard requires that each diaphragm pump must not leak fuel if the primary diaphragm fails.

To someone who is repairing and replacing the components mentioned above, the automotive component might seem like a bargain, but have you looked at the value of a human life lately? [BSC 57]

Batteries: Some serious fires and explosions have occurred on boats equipped with side terminal batteries and portable fuel tanks. New batteries no longer have the terminals on opposite corners on the top of the battery; now they're located side by side near the top.

If the battery is not properly insulated and secured in a battery box when a boat equipped with one of the new batteries is steered into a sharp turn, the battery can slide across the deck bringing the terminals into contact with the side of the fuel tank, causing a spark and then an explosion.

If the batteries are tightly secured and the positive terminals insulated, as is required by the Electrical Systems Standard, these accidents can be prevented.

Battery Installation: Limiting Movement: The Electrical Systems Standard calls for restraint of each battery in both horizontal and vertical directions. Inboard boat manufacturers are required to install batteries in such a way that they will not move more than one inch in three different directions -- vertically, horizontally fore and aft, and horizontally port to starboard -- when subjected to a 90 pound test force for one minute. Installers of batteries would be wise to try to meet the same requirement. The typical commercially available plastic battery box, in addition to being resistant to the electrolyte in a battery (usually sulphuric acid), protects the battery terminals, and will prevent the maximum one inch movement. The box must be securely fastened and spacing material resistant to the electrolyte must be placed inside to restrict battery movement within the battery box.

Battery Installation in Relation to Fuel System: The regulations prohibit a boat manufacturer from installing a battery directly above or below a fuel tank, fuel filter or fitting in a fuel line. Leaking fuel could damage the casing of a battery installed beneath a fuel system component. Also, leaking electrolyte from a battery installed above a fuel system component, could create leaks in the fuel system.
[BSC 56]

BULLDOZERS, CHAINSAWS AND BOATS

The phrase, "product liability," invokes images of consumers who are killed, crippled or disfigured; hours of testimony; hordes of lawyers; reputations jeopardized; and finally an expensive settlement. A good reputation and a quality product help to build a solid market. Don't jeopardize your reputation or your market. Our case in point concerns the sale of "scrap."

We continue to encounter cases concerning companies which have sold boats or engines as "scrap." Products sold as scrap were supposed to have been destroyed, but they found their way back into use on the water.

Don't endanger a good reputation and a good market by selling an inferior product that could land your company in court with a product liability suit. If you sell a "scrap boat," "scrap motor" or any other non-production item to someone else, you always run the risk that your "scrap" might find its way back into the hands of a consumer who will use that product in its designed capacity.

If there is an accident, no matter what kind of disclaimer you wrote to absolve your company of responsibility concerning use of a boat or engine sold for salvage, your company could still be taken to court in a product liability lawsuit.

In one instance we found a scrap dealer who was buying both scrap boats and scrap engines and reassembling them into a finished product. Several dealers were misled into thinking the boats were "factory seconds," rejected by the manufacturer for minor cosmetic flaws and then purchased by the scrap dealer.

Actually, the boats were defective and didn't comply with Coast Guard regulations. They were considered unrepairable by the manufacturer: experimental units, freight damaged units, units returned for warranty work, prototypes, etc. To make matters worse, the engines and the manner in which they were installed by the scrap dealer, contained deficiencies in the electrical system, shift system and transom seal, all of which affected the overall safety of the boats.

The original boat manufacturer removed company identification information (HINs, certification labels, and capacity labels) prior to the sale and included an invoice stating the conditions of the sale, e.g. "boats sold as is," "sold as scrap," etc. Under the conditions of the original manufacturer's sale of the boats, the scrap dealer was supposed to remove any salvageable material and then destroy the boats.

Unfortunately, these "scrap boats" could still be used as boats and the scrap dealer was not aware of the Federal prohibition against the sale of a defective or noncomplying boat. Several consumers ended up buying boats that appeared to be a bargain, but were really very dangerous.

We hear that the major automobile companies don't take any chances when they sell experimental cars and production prototypes for "salvage" to a scrap company. They pick up each vehicle with a crane, raise it to a height of about 50 feet and drop it, first on the front end and then on the rear end. They make sure that vehicles sold as scrap end up as scrap and do not find their way back to the nation's highways.

Take similar precautions with your products. Keep unrepairable and dangerous boats and engines out of the hands of consumers. Don't force your company into making an expensive settlement. If you send something to the scrap heap, make sure it stays there.
[BSC 60]

QUESTIONS MOST OFTEN ASKED BY DEALERS

Q: ***What is my responsibility if I sell or install a larger outboard motor than the Maximum Horsepower Capacity displayed on the boat's Maximum Capacities label?***

A: The present Coast Guard Safe Powering regulations require the manufacturer to calculate the Maximum Horsepower Capacity for boats (less than 20 feet in length) propelled by outboards, and display this capacity on the boat for the use of the owner or prospective owner in matching a suitable outboard motor to the boat. A dealer who sells or installs an outboard motor of greater horsepower than that displayed on the capacity label on a boat is not in violation of the present Coast Guard regulations. However, the Coast Guard cannot speculate on the impact this action might or might not have on a civil suit initiated by the consumer in a product liability litigation under State law.

In this regard, we suggest that the dealer act only after obtaining proper legal advice. Every dealer should consult an attorney concerning responsibility under civil or common law, before completing the sale of a boat with an outboard of greater horsepower than the calculated capacity. Also, the dealer should consult the local Boating Law Administrator to be sure that there is no violation of State laws, and that the customer will be able to use the boat on State waters or adjoining State waters.

Q: ***When, if ever, could a dealer be considered a manufacturer as is defined by 46 U.S.C. 2101 (formerly the Act), and therefore be held responsible for defect notification and correction?***

A: According to 46 U.S.C. 2101, "recreational vessel manufacturer" means a person engaged in the manufacturing, construction, assembly, or importation of recreational vessels, components or associated equipment. As a result, a dealer can get classified as a manufacturer by the word, "assembly." When accessories are attached to the boat at the time of sale by the dealer, the dealer is considered a manufacturer, in respect to those items installed by the dealer.

In that respect, the dealer could be required to conduct defect notification and correction for assembly errors or for choosing equipment which creates a substantial risk of personal injury to the public.

We consider the administration of proper defect notification systems a "Team Effort." Dealers should exercise diligence and care in properly recording "warranty card" information. The warranty cards can provide a sound system for maintaining a list of first purchasers. Care and accuracy in taking the warranty card information and return of the cards to the manufacturer will guarantee an effective result in the event of a defect campaign for both the dealer and the manufacturer.

[BSC 1-73]

DEALERS, PRODUCT LIABILITY AND THE "COMMERCIAL BOAT"

Several States have reported to the Coast Guard that some dealers are selling "commercial boats" to people who intend to use them for recreational purposes. This may be a violation of 46 U.S.C. 4307 which could result in a $2000 fine.

Builders of boats intended for commercial use do not have to manufacture them in compliance with the same Coast Guard safety standards and regulations that apply to recreational boats. However, there are also some recreational boat builders who don't want to build their boats to the standards and are calling them commercial boats.

While there is no Federal law prohibiting sales of commercial boats, the dealer who knowingly sells a boat that doesn't comply with applicable standards may suffer serious financial penalties if the purchaser has an accident.

So, don't sell a product that is an obvious attempt to dodge Coast Guard safety standards. If you sell a boat that doesn't comply, make sure that the buyer knows what is missing and the danger involved. Because if you don't, you can bet that the plaintiff's attorneys in a product liability suit will never let you forget it.

[BSC 53]

CHARACTERISTICS OF SELECTED PLASTIC FOAMS

Federal boating standards developed by the Coast Guard do not specify the materials a manufacturer must use for flotation; however, they forbid the use of air chambers that are integral with the hull for flotation. Rather, the regulations specify that a flotation material must be capable of withstanding the combined effects of petroleum products, bilge solvents and fresh and salt water.

Foamed plastics can be made in an almost infinite range of densities and with either an open or closed cell formulation. Five or six basic formulations cover the range of foamed plastic types that are or could be available for use as flotation material. Their suitability is briefly discussed in the following paragraphs.

Make a physical check of the gasoline resistance of a particular foam in the following fashion. Weigh and then completely submerge a 1-inch cube of the foam in gasoline for 24 hours. Recheck its dimensions and weight. No appreciable change in size or weight should have taken place.

The commonest and cheapest flotation material is foamed polystyrene. It is produced from expandable beads (popcorn). It is also extruded in the form of boards or billets. The ordinary product called Styrofoam[R], easily dissolves in gasoline and is extremely flammable. Nevertheless, special compounds of foamed polystyrene are available that are resistant to solvents and are self-extinguishing. Major objections to foamed polystyrene are that it cannot be foamed-in-place, nor can it be made at the boat builder's plant.

Polyurethane foam is next to polystyrene in frequency of use. Usually, the boat builder uses it for foamed-in-place flotation. Otherwise, the builder molds it into shape before installation. Its cost is almost the same as polystyrene. In a practical sense, polyurethane foam is very resistant to gasoline and oil. They affect it only to the extent of causing slight swelling after hours of complete immersion when low densities (1.5 to 2 pounds per cubic foot) are used. At densities of 4.0 pounds per cubic foot and above, hydrocarbon solvents have no detectable impact on these foams. Polyurethane is not fireproof, but can be made so that it is self-extinguishing.

Polyethylene foam is already in use for flotation. It is moderate in cost, solvent-resistant, tough and flexible. Several small boat and canoe makers use it for buoyant liners or upright flotation sponsons under the trade name of Ethafoam[R]. Again, although not fireproof, it is classified as slow-burning.

Polyvinyl chloride foams (PVC) have been increasingly used for core materials in fiberglass sandwich construction, partly replacing end-grain balsa for stiffening decks and cockpit soles. Although the cost is double that of balsa, PVC foam is fireproof, doesn't rot, and is nonabsorbent. Note that though fireproof, it does melt. Some boats, especially imported ones, use PVC foam for flotation material.

Acrylonitrile-butadiene-styrene (no wonder they call it ABS) is a thermoplastic foam sandwich material used for the hulls of many canoes and some small boats. It is usually referred to by its trade name, Royalex[R]. Its density of 30 pounds per cubic foot, about the same as many woods, makes it suitable for flotation material.

Foamed epoxy resin has properties quite like polyurethane foam. It is quite resistant to solvents and absorbs only the slightest amount of water. Density can range from 2.0 pounds to 20 pounds per cubic foot. The epoxy can be foamed in place or precast blocks or slabs can be installed. Epoxies are not used for flotation because they cost twice or three times the price of polyurethane foam. Low-priced epoxies or a series of price rises in polyurethane could change the picture completely.

Please note that this discussion of flotation materials is not all inclusive. Likewise, the list on the previous page is neither Coast Guard certified, nor a "Coast Guard Approved" list. It merely presents the physical properties of some flotation materials to interested boat manufacturers.
[BSC 3-74]

SELECTED PLASTIC FOAM TYPES AND CHARACTERISTICS

TYPE	DENSITY LBS/CUFT	GASOLINE RESISTANCE	BUOYANCY LOSS IN WATER
Extruded Polystyrene, (Styrofoam)	1.8 to 4.3	Poor	Nil
Expanded Bead Polystyrene	1.0 to 5.0	Poor	< 2%
Extruded Polyethylene (Ethafoam)	2.0 to 9.0	Slight Swelling	< 0.5%
Polyurethane (Pour-in-place or slab)	1.5 to 70	Good	< 0.1% (short term) See Note 2
Polyvinyl Chloride (PVC)	2.0 to 6.0	Good	Nil
ABS (Royalex)	30	Good	Nil
Epoxy	2.0 to 20	Good	< 0.1%

Note: Over a long period polyurethane foam with a density less than 2.0 pounds per cubic foot will absorb an enormous amount of water. Therefore, low density polyurethane foam (<2.0 lbs/ft3) should not be used for flotation material below the cockpit sole or in the bilge.