



INFLATABLE LIFE JACKET BASICS

Stu Soffer, N-MS

Inflatable life jackets are comfortable and make patrolling in hot/humid weather a lot easier. They also contribute in alleviating crew fatigue. Regardless if you prefer the old style or new, we should all know how to maintain inflatable life jackets and be able to answer boater's questions.

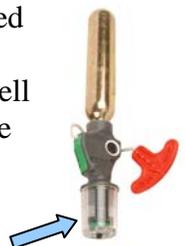
The term "*life jacket*" rather than "*PFD*" is used exclusively in this article because we are part of the Coast Guard Office of Boating Safety's national thrust to promote life jacket wear and their endorsement of the "Wear It" theme which is replacing "You're in Command." The National Safe Boating Council and state boating authorities are also embracing "Wear It"; and promoting "*life jackets*" not "*PFD's*." In order to standardize the terminology used with the boating public, all are asked to begin using the term "life jacket." There were 710 recreational boating deaths in 2006, two thirds of them drowned and ninety (90) percent of the victims were not wearing their life jacket. Promoting life jacket wear can save lives.



The Coast Guard initially classified inflatable life jackets as Type V Hybrid Inflatable Devices with performance levels equal to a Type I, II or III as noted on the label. They have evolved into the Type II and Type III categories making it easier for boaters to comply with boating laws. Read the label or data printed inside the life jacket to determine its Type and any restrictions.

There are three brands of mechanisms accepted by the USCG for automatic inflating life jackets. A table provided by Lifesaving & Fire Safety Division that identifies the different model inflator systems on the USCG approved inflatable life jacket list is at the end of this article. The diagrams and other detailed information are worth having handy at boat shows so questions can be accurately answered. It should also be noted that some inflatable life jackets being sold are not USCG approved but may use components similar to those used in USCG approved life jackets.

Many Auxiliarists wear Mustang Survival and SOSpenders brand life jackets activated by a Halkey-Roberts automatic inflating mechanism (photo on right) which uses a 33 or 38 gram CO₂ cylinder and round chemical inflator bobbin. The "new and improved" yellow shell bobbin replaced the original red shell bobbin in August 2002; and any red bobbins still in use should be replaced. Mustang Survival retails a pack of 12 bobbins for about \$41.00 (government price), and two sources for individual components are listed below.



The bobbin only fits into the holder one way and it should be completely screwed down before the CO₂ cylinder is screwed in to prevent puncturing the cylinder. When the bobbin holder is screwed down, the firing pin retracts and a green indicator is visible on the bottom (blue arrow). If there is a red indicator check because there is a chance the holder is not screwed all of the way in.



Stearns brand life jackets use a Secumar inflator mechanism activated by a “pill” rather than bobbin. Some Stearns and Mustang models may have a bayonet tip cylinder that requires a 1/8th turn clockwise to a full stop to secure the cylinder rather than a screw in CO₂ cylinder. Regardless of type, the concept is the same. The bobbin/pill assembly is designed to disintegrate when exposed to water and allow the firing mechanism to puncture a CO₂ cylinder and fill the inflatable chamber in about 3 seconds to provide approximately 35 pounds of buoyancy.

The photo’s left side shows a life jacket before inflation. After inflation is shown on the right side.

Particular care should be given when inserting CO₂ cylinders with bayonet tips. If the CO₂ cylinder is not completely turned, the mechanism is supposed to eject it. It was discovered in some production units a false positive green indication can be achieved by simply pushing the cylinder into the mechanism without turning it to a full stop. If the cylinder is not fully turned to secure it in-place, the life jacket will not inflate. To be safe, periodically check the Coast Guard Office of Boating Safety web site at: <http://www.uscgboating.org/> for recalls and the latest information.

The third accepted mechanism is the CM Hammar inflator (photo on right) used in the Mustang hydrostatic life jacket. The Hammar automatic system is activated by water pressure and has a hydrostatic valve in place of a bobbin/pill. When submerged in at least 4 inches of water, the hydrostatic valve activates, and the CO₂ cylinder is pierced allowing the CO₂ to inflate the bladder. This type life jacket is not affected by getting wet. But unlike the other two systems, the CO₂ cylinder is positioned inside of the bladder. Once used, or every five years, the complete inflator and CO₂ cylinder must be replaced to rearm it.



If an inflatable life jacket does not automatically inflate when a boater goes overboard, all models have a manual alternative. The wearer pulls a lanyard attached to the mechanism to puncture the CO₂ cylinder. A third option is orally inflate the life jacket using the tube located on the upper left side of the inner life jacket. If the inflation mechanism does not have a bobbin or pill holder, it is only a manual (and oral) inflating life jacket. I have encountered boaters who thought they received an automatic inflating life jacket as a gift and it turned out to be a manual model. One boater almost drowned before pulling the lanyard and the life jacket inflated saving his life.



When worn by vessel examiners or at boat show exhibits, an inflatable life jacket’s comfort quotient is readily apparent to recreational boaters and anglers, which is why we wear them on land. Recommend you unscrew the CO₂ cylinder at boat shows to prevent manual inflation by a prankster. Then it’s always a good idea to check the mechanism before embarking on a patrol. Be prepared to answer questions when wearing an inflatable life jacket because there is a lot of interest in them.

If an automatic inflating life jacket mechanism is activated by a liquid, ensure all parts of the compartment are thoroughly dried before inserting a new bobbin/pill. If there is an immediate need to rearm the life jacket for automatic inflation, you can try to blow dry the compartment then place the life jacket in the sun to dry any remaining moisture. I prefer using a hair dryer to dry up the moisture, and then let it air out for 24 hours to be sure. Rearming a wet mechanism for automatic inflation will result in the bobbin/pill dissolving and the life jacket inflating again.

Not all automatic inflatable life jackets can be rearmed for manual inflation with only a CO₂ cylinder and no bobbin/pill. While some convertible models are designed to be armed in manual only modes, Auxiliary crews under orders are precluded from using manually inflating life jackets. The Auxiliary Operations Policy Manual says: *"Auxiliarists utilizing an automatic inflatable PFD must check before donning that the device is armed and packed in accordance with the owner's manual, and that a fully charged CO₂ cylinder is in place. Scheduled maintenance recommended in the owner's manual must be completed. Uncharged or manual only inflatable PFD's are not authorized for Auxiliary use while on orders."* Automatic inflatable life jackets hinder egress in an enclosed cabin environment and are not authorized for use on Auxiliary aircraft of any type.

A Worksheet form found on the Eighth Western Rivers web site (a copy is at the end of this article) is a good preventative maintenance guide and record if used in conjunction with the life jacket owner's manual/label; *and what you learn from reading this article*. For example, even if not called for in the manual, periodically orally inflating a life jacket for an inflation leak check is a good idea. You should submerge it to check that the bladder, oral inflator tube and cap do not leak. Coast Guard literature reviewed requires a 2 hour inflated observation period semi-annually. The label on a SOSpenders recommends overnight evaluation. You can use a small round nozzle shop vacuum cleaner attachment to deflate an inflatable life jacket making it a lot easier to repack.



Halkey-Roberts recommends changing their recreational use bobbins every 3 years, more often in extreme conditions such as high temperature and high humidity where a chemical bobbin (photo on left) may deteriorate in less than 30 days. However, most of us are not operating under those conditions and a bobbin can provide years of functional use if inspected. The date of manufacture is on the bobbin's side; and, they have a life jacket manufacturer's **shelf life** of up to 4 years if properly stored. **Service life** commences at point of sale to the user. Bobbins used in a commercial marine environment should be changed every 2 years. Owners should visually inspect bobbins to ensure the "ridges" are still evident (the exposed surface has ridges) and the bobbin is not cracked or the white fill discolored.

The Secumatic inflator mechanism in Stearns brand life jackets uses a "pill" which has a smooth surface (photo on right). A visual inspection of the pill encompasses ensuring the pill retains its original shape, is not cracked, discolored or otherwise damaged. Recommend the same change rules as for bobbins apply.



A half moon top green plastic pin inserts into Halkey-Roberts (blue arrow at photo on left) and Secumatic mechanisms and retains the manual arm in place. These can break when removed. We found two sources that offer rearming kits and/or individual components. They are Leland Limited: www.maximuminflation.com/ and Lifesaving Systems Corp: www.lifesavingsystems.com/; however, a word of caution is warranted. While knowledgeable Auxiliarists obtaining individual replacement components, such as a pin, bobbin or pill, may be cost effective, as a rule inflatable life jacket owners should purchase the rearm kit specified for their life jacket. That is because the opportunity to use an incorrect CO₂ cylinder exists.

The critical time for needing a functioning life jacket is not when a boater should discover a

mistake was made rearming. When purchasing a rearm kit, ensure that kit is specified for that model life jacket. Model numbers can be found on the inner side near the “U.S. Coast Guard Approved” statement. Always ensure the correct CO₂ cylinder is used. This is particularly important if a belt pack life jacket, which uses a smaller CO₂ cylinder than regular life jacket, is being rearmed. Stick with the manufacturers’ recommended product to be safe and always check your life jackets bobbin and CO₂ cylinder before getting underway. We made checking part of the patrol crew briefing.



In addition to the Stearns’ regular pet life jackets, there now are automatic inflatable life jackets available for dogs and cats from Critter’s Inflatable that operate on the same life saving principal as for humans. When inflated, in addition to keeping the animal afloat, they keep its head out of the water. A Critter’s Inflatable life jacket uses a Halkey-Roberts bobbin equipped mechanism with an 8 gram CO₂ cylinder for up to 15 pound pets, 12 gram for up to 40 pounds, and a 25 gram for up to 200 pounds. These life jackets also have the manual and oral inflation capability that owners can use. While animal life jackets are not USCG approved, they nevertheless have a place and can help promote pet owner life jacket wear, and especially life jacket wear by children. Visit: <http://www.crittersinflatable.com/> to view the selection.



BEFORE INFLATION



PET INFLATED

The most significant factors in life jacket service life are their use, storage and maintenance. With a high usage, poor storage, and poor maintenance, a life jacket can wear out to the point of being unserviceable within a year or less. For inflatable life jackets, beside routine checks on the CO₂ cylinder and inflation mechanisms, there is some added maintenance at least annually for checking the bladder as specified by the manufacturer. For automatic inflatables, the care of the automatic components are particularly important and may have a limit on service life of only a few years or less in accordance with the manufacturer's instructions.

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important and may have a limit on service life of only a few years or less in accordance with the manufacturer's instructions.

The USCG does not specify a maximum service life for inflatable life jackets like some foreign countries do. A lifejacket remains approved if it is in "serviceable condition." If a life jacket can be used properly and is not deteriorated, it is acceptable as meeting carriage requirements.

As with most items aboard any vessel, reading instructions, becoming familiar with how to properly wear and inflate the life jacket, and properly maintaining the equipment with clean storage will promote a better service life which could possibly save a life when necessary.

We hope this article answered all your questions about the operation, rearming, care and maintenance of inflatable life jackets. If it did not, Mustang Survival has videos that can be viewed at: <http://www.mustangsurvival.com/resources/documentation/training/md3031/index.html>. Readers are invited to contact the author at: cgauxstu@yahoo.com with questions or comments.

Disclaimer: Although brands, manufacturer names and item, and sources are mentioned, the U.S. Coast Guard and Coast Guard Auxiliary do not endorse any particular product or brand over another. What we do endorse is wearing a Coast Guard approved life jacket on the water.

Contributors: Mr. Martin Jackson from Coast Guard Lifesaving & Fire Safety Division, Leland Ltd., Halkey-Roberts and Coast Guard Auxiliary B, O and V Departments all provided valuable information used in writing this article.

Photo credits: Our appreciation to Halkey-Roberts, CM Hammar/Mustang Survival, Stearns and Critter's Inflatable for permitting use of their photos.



PERFORMANCE QUALIFICATION STANDARD FOR MUSTANG SURVIVAL MD3031 WITH SURVIVAL EQUIPMENT POCKET, SOSPENDERS MODEL 38ASTD, AND STEARNS, INC MODEL 1341 AUTOMATIC INFLATION PFD'S.

Crewmember: _____

Date: _____

In some weather conditions, the chemical bobbin may deteriorate in less than 30 days. Commanding Officers/Officers in Charge should consider training their crews to deflate, rearm and stow the bladder after inadvertent inflations. In addition, inadvertent inflations can cause a user to become temporarily disoriented. Training should include donning the vest and inflating to ensure users are aware of how rapidly the bladder expands.

PERFORMANCE CRITERIA

INITIALS

State the life jackets flotation characteristics. _____

Locate and explain the following items:

Personal Marker Light _____

Survival Knife _____

Strobe Light _____

Signal Mirror _____

Whistle _____

Oral Inflator _____

CO2 Cylinder _____

Inflator Bobbin _____

Don the vest and adjust waist belt as needed. _____

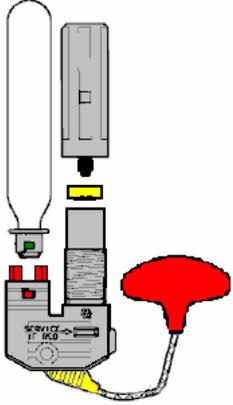
Explain the three different methods of inflation. _____

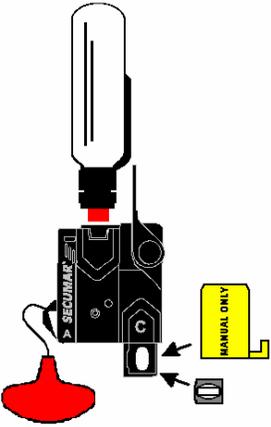
Explain two indications of an armed and charged inflation assembly. _____

FOR MUSTANG PFD'S: Remove and reinstall the equipment pouch using the "pull the dot" snaps. _____

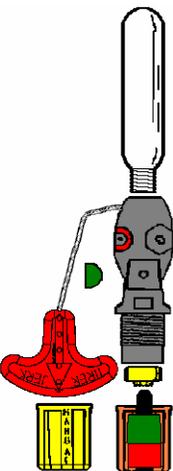
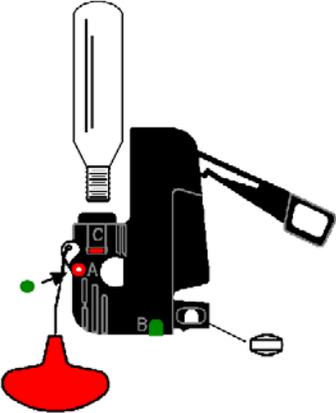
Member Signature Date

US Coast Guard Accepted Inflation Systems
 For Use on USCG Approved PFDs
 December 3, 2007

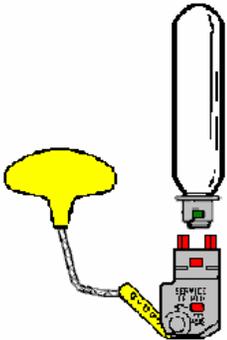
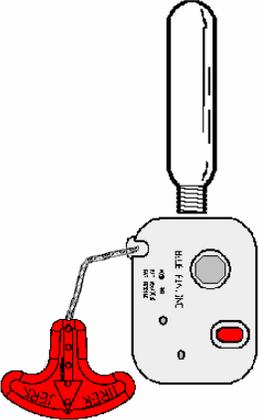
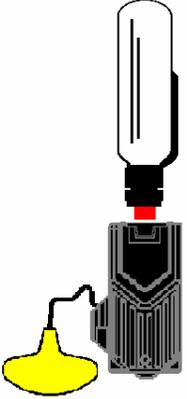
Manual-Auto 1F Cylinder seal indication		
 <p>Halkey-Roberts V86000</p>	Manufacturer/ Type	Halkey-Roberts Manual-Auto w/ Cylinder seal indication Non-Convertible
	Description	Grey inflator with red spring-loaded tab, with red pull-tab Bobbin (water sensing element) Gray threaded cap Bayonet CO2 cylinder (1/2"-20)
 <p>C M HAMMAR - MA1</p>	Manufacturer/ Type	C M HAMMAR Manual-Auto w/ Cylinder seal indication Non-Convertible
	Description	Yellow cap/body with yellow pull tab, clear sealing ring black Body with CO2 cylinder (1/2"-20)

Manual-Auto 6F Cylinder seal indication		
 <p>SECUMATIC 4001 and 4001S</p>	Manufacturer/ Type	SECUMAR-STEARNES Manual-Auto Convertible w/ Cylinder seal indication(See Note 1)
	Description	Black inflator body with red pull-tab Black Bayonet CO2 cylinder with green indicator (red under) on cylinder (green indicator pops-off when actuated leaving a red indicator) Gray housing with white pill (water sensing element) Yellow manual override

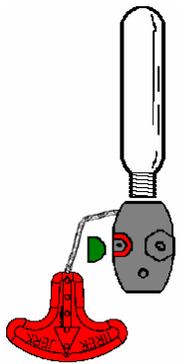
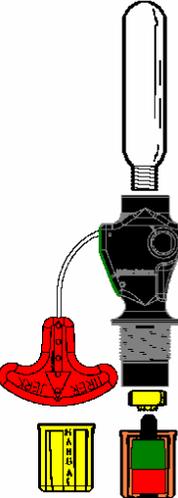
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Manual-Auto 6F Without Cylinder seal indication		
 <p>Halkey-Roberts V85000</p>	Manufacturer/ Type	Halkey-Roberts Manual-Auto Convertible (See Note 1) No Cylinder seal indication
	Description	Grey body with red or yellow pull-tab Bobbin (water sensing element) Green break away pin (red under) Gold cap and Yellow manual override cap CO2 cylinder (THD sized: 3/8"-24 or 1/2"-20)
 <p>SECUMATIC 3001S 11362</p>	Manufacturer/ Type	SECUMAR-STEARNES Manual-Auto Non-Convertible Non- Cylinder seal indication
	Description	Black body with red pull-tab Green break away pin and 2 additional red/green indicators White pill (water sensing element) CO2 cylinder (THD size 1/2" – 20)

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Manual 3F Cylinder seal indication		
 <p style="text-align: center;">Halkey-Roberts V86160</p>	Manufacturer/ Type	Halkey-Roberts Manual w/ Cylinder seal indication
	Description	Grey inflator with red spring-loaded tab, with yellow pull-tab (V86160J is right hand pull and V86160W is left hand pull) Bayonet CO2 cylinder (1/2"-20)
 <p style="text-align: center;">Blue Fin TMB-1</p>	Manufacturer/ Type	Blue Fin Manual w/ Cylinder seal indication
	Description	Grey Inflator Body with Indicator Window with Cord with Red pull tab CO2 cylinder (THD sized: 3/8"-24 or 1/2"-20)
 <p style="text-align: center;">SECUMATIC 401 and 401S P/N: 12150</p>	Manufacturer/ Type	SECUMAR-STEARNES Manual w/ Cylinder seal indication
	Description	Black Inflator Body with yellow pull-tab Black Bayonet CO2 cylinder with green indicator (red under) on cylinder (green indicator pops-off when actuated leaving a red indicator)

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Manual 6F Without Cylinder seal indication		
 <p>Halkey-Roberts 840</p>	Manufacturer/ Type	Halkey-Roberts Manual w/o Cylinder seal indication
	Description	Grey Inflator Body with red or yellow pull-tab CO2 cylinder (THD sized: 3/8"-24 or 1/2"-20) Green indicator tab pops-off when actuated leaving a red indicator
 <p>Halkey-Roberts V90000</p>	Manufacturer/ Type	Halkey-Roberts Manual-Auto Convertible (See Note 1) w/o Cylinder seal indication
	Description	Black inflation body with red pull-tab Bobbin (water sensing element) Green indicator clip Gold cap and Yellow Manual override cap CO2 cylinder (THD sized: 3/8"-24 or 1/2"-20)

Note:

1. An inflation system that is designed with an override feature that allows it to be converted from "Manual-Auto mode" to "Manual Only mode" and vice versa, may only be used on USCG approved PFDs that are marked that the PFD is convertible and the PFD must be sold with all of the features necessary for the user to be armed the PFD in both modes. This means that a manufacturer **may not** use a convertible inflator on a PFD that is marked only as "Manual-Auto inflation" and **may not** use a convertible inflator on a PFD that is only marked as "Manual inflation". The Coast Guard's policy is that once a manual-auto inflator is designed to accept an overriding feature making the inflator convertible, from that point on that model inflator may not be sold as a non-convertible inflator unless the inflator design is modified such that the overriding feature will not work on the modified inflator and the inflator is given a different model number.