# BAMBI BUCKET®

**Issue Date: May 2002**

**OPERATOR'S MANUAL**
**Please read before using Bambi Bucket**

**Manufactured under one or more of the following patents:**

U.S. Patents 4,576,237 and 4,474,245
Canada Patents 232,889 and 1,231,311
U.K. Patent 2,145,624B

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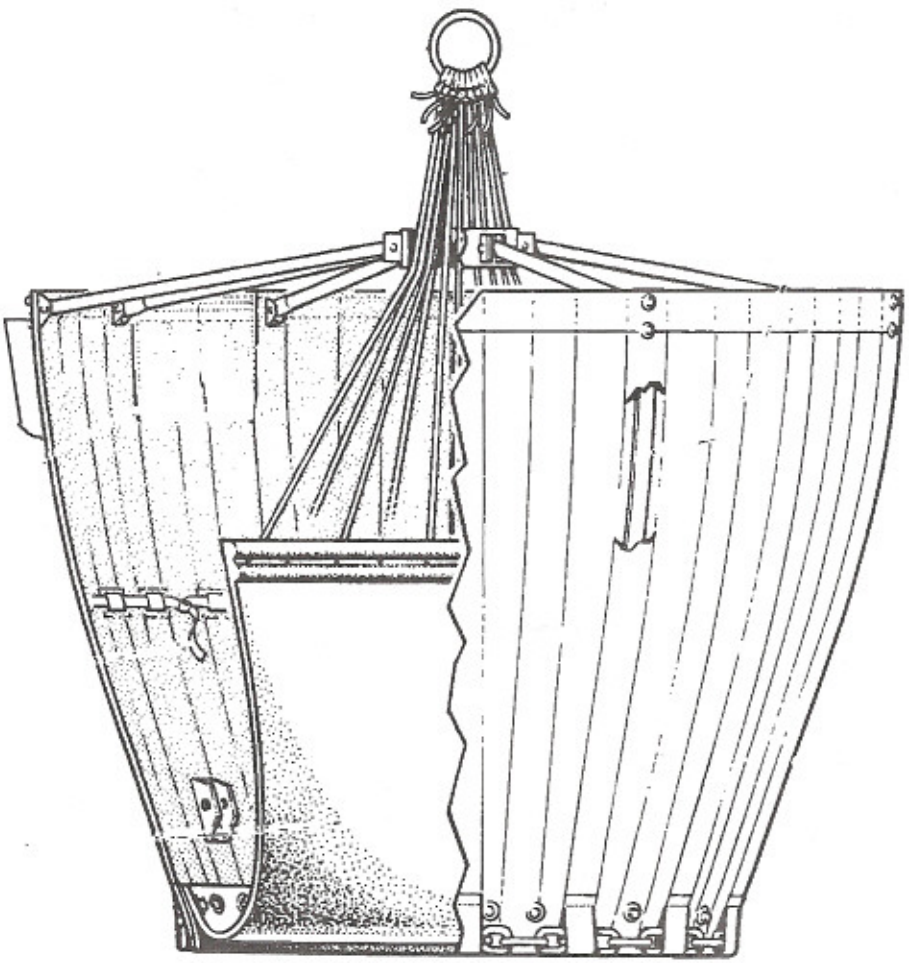
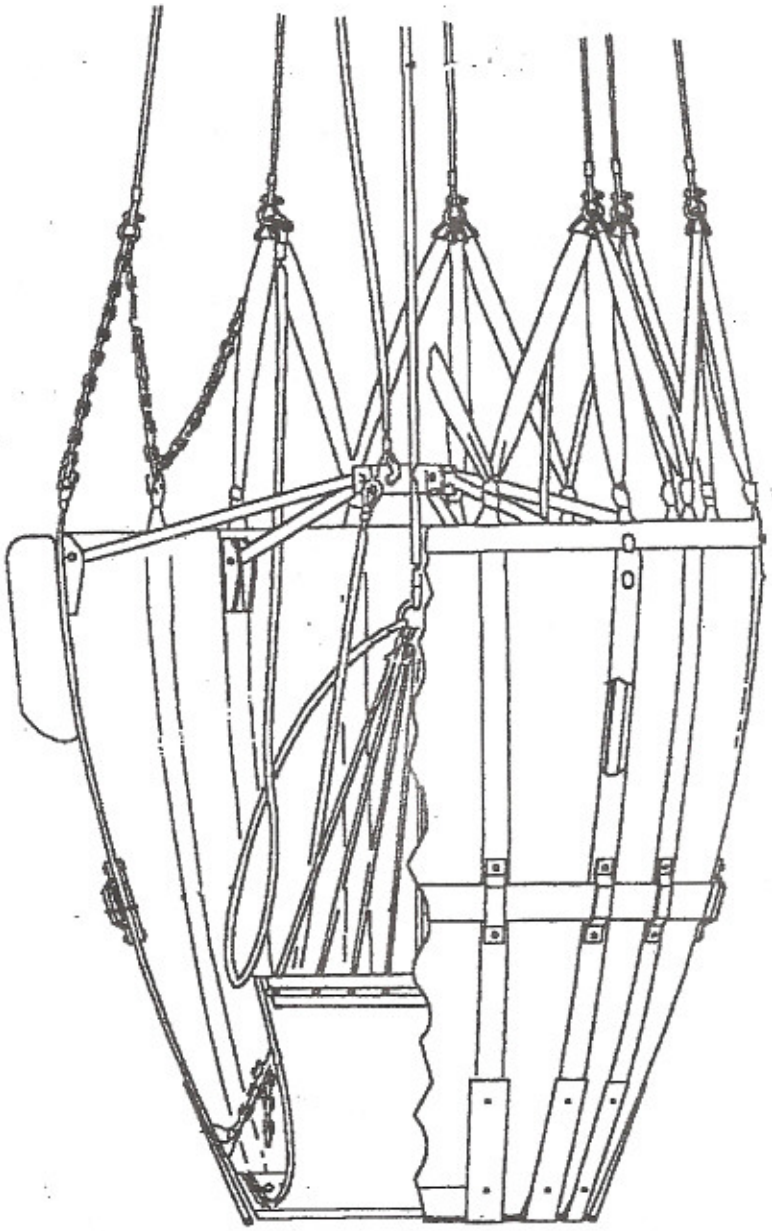
# TABLE OF CONTENTS

# BAMBI BUCKET SMALL SERIES 6072-4453



## BAMBI BUCKET HEAVY LIFT SERIES 5566-HL9800



# 1. INTRODUCTION TO THE BAMBI BUCKET

This manual provides helicopter operators with information on the operation and maintenance of the Bambi Bucket.

Since its introduction in 1983, the Bambi Bucket has become the preferred means of helicopter fire fighting by over 600 companies and agencies worldwide. This acceptance by the industry is a result of the Bambi's effectiveness, reliability, simplicity and ease of use.

The operation of the Bambi Bucket can be quickly mastered by operators with no prior experience. The bucket requires no pre-assembly. Once airborne, the operator quickly becomes familiar with the flight characteristics of the bucket. Several fills will provide familiarity with the variable fill capability of the bucket.

Please read this manual prior to flying the bucket, particularly the sections on deploying, filling and dumping. If problems are experienced, please refer to the manual. Section 11 on "Adjustments" and Section 12 on "Troubleshooting" may be especially helpful.

For your own protection and for longer bucket life, always heed the instructions and warnings. Ignoring them could result in bucket or aircraft damage or personal injury. The warning notices are divided by the severity of the outcome into WARNING and CAUTION.

**WARNING:** Hazards or unsafe practices which could result in personal injury or death.

**CAUTION:** Hazards or unsafe practices which could result in minor personal injury or property damage.

SEI offers complete parts supply and repair facilities for the Bambi Bucket. For maintenance and repair purposes, parts diagrams and descriptions are provided in Sections 18 to 26. When ordering parts, please provide the Model and Serial number of your Bambi Bucket.

Additional copies of this manual are available from SEI Industries Ltd.

## 2. PREFLIGHT SAFETY CHECK

Just as the pilot preflights his aircraft, he should also preflight his Bambi Bucket each day. Start at the bottom of the bucket and work up:

1) Check the bottom chain and look for any tears in the fabric straps; check the lockwire or tie wraps on the shackles.

2) Check for loose bolts around the bucket shell: IDS brackets at the top, FCAS (Cinch strap) brackets at the midpoint, wear strips at the bottom.

3) Check the diagonal "M-straps" that connect the suspension cables to the top of the bucket and examine for any wear.

4) Check the purse lines on the dump valve. Frayed lines should be replaced. Do not wait for a line to break before replacing it.

5) Check the internal or external Frusto-Conical Arrest System™ (FCAS or cinch strap).

6) Check the suspension cables for frays, kinks or loose swages.

7) Check the ballast pouch in the bucket for any rips from which the ballast shot could escape. Full ballast is essential for safe operation. Check that the solid metal ballast (if fitted) is securely attached.

8) Check the control head for secure fittings. Never operate the bucket with the control head cover removed.

9) Pull the trip line cable to full extension from the control head and check for kinks, frays or loose swages.

10) Check solenoid operation.

# 3. DEPLOYING THE BAMBI BUCKET

## 3.1 Attaching to Cargo Hook

The Bambi Bucket is rigged for a lateral cargo hook. Correct attachment is indicated when the name plate on the control head faces forward in flight; this ensures that the ballast on the Bambi will face forward in flight.

**CAUTION: It is IMPORTANT that the ballast faces forward In flight. This will avoid twisting of the suspension lines and possible jamming of the trip line.***

There are two different styles of control head used on the Bambi Bucket. The head used on Models 6072-4453 has a moveable yoke which can be rotated by 90 degrees. The yoke is machined to orient in either direction.

If your helicopter has a longitudinal hook, rotate the shackle yoke unit at the top of the head by 90 degrees. This will place the name plate on the control head forward in flight.

The head used on Models 5566-HL9800 is rigged for a lateral cargo hook. It has a fixed top shackle. If your helicopter has a longitudinal hook, use a second shackle attached to the head shackle. This will effectively rotate the attachment point by 90 degrees.

**CAUTION: If using a second shackle on Models 5566-HL9800, it must have a load rating equivalent to the top shackle supplied with the head. Using a shackle with a lower load rating could result in a shackle failure.**

For either style of head, if using a swivel hook, operate in the locked position to assure that the ballast is always facing forward in flight.*

**Caution: The Bambi Bucket may not be suitable for a direct hook-up to the cargo hook. The actual hook-up will be different for various aircraft, and operators must comply to all instructions and bulletins supplied by the aircraft manufacturer. It is the operator's responsibility to ensure that the Bambi Bucket is correctly fitted to the helicopter.**

## 3.2 Connecting Power

NOTE: To operate the solenoid and release the water use a **momentary contact** switch rated only for 5.5 amps at 24 VDC. A suitable switch is available from SEI. Alternatively, a lower rated switch may be used with a relay--see suggested wiring diagram Section 17. The solenoid has a 10% duty cycle. This means it is not intended to be operated more than 10% of the time. Operating the solenoid continuously will result in solenoid failure.

The control head of the Bambi Bucket comes equipped with a short length of two wire electrical cable. A popular wiring hookup involves fitting a common household plug to the end of the cable. To complete the wiring hookup:

1. Connect a 110 volt household plug to the wire supplied on the control head.

2. Make a 12 AWG or heavier two wire interconnecting electrical cable long enough to run from the bucket cable to the accessory plug on the belly of the helicopter (leave enough length for the control head to swing freely).

3. Attach the mating household plug to one end of the interconnecting cable.

4. To check for continuity in the connections, push the momentary contact switch. A clicking sound should be heard from the control head.

5. With the engine running, test for a minimum of 24 VDC at the breakaway plug (12 volts for 6072). If the voltage is lower than 24 volts, use a heavier gauge wire for the interconnecting cable. Re-test to confirm a minimum of 24 VDC at the breakaway plug.

The purpose of the household plugs is to offer a clean "breakaway" if the Bambi Bucket has to be jettisoned from the aircraft in an emergency. It is suggested that the household plugs be lightly taped together with vinyl tape while in use to ensure that wind action does not separate the plugs. Current draw is only 5.5 amps. (24/28 VDC)or 5.0 amps for 6072 (12-14 VDC).

***EXCEPTION:** If you are using a swivel with an electrical connection, then it is acceptable for the bucket to be flown without the ballast facing forward. The Bambi Bucket has been tested with the Canam Aerospace swivel, and performs very well despite rotating in flight. The swivel also prevents the suspension lines from twisting up after dipping the bucket.

# 3. DEPLOYING THE BAMBI BUCKET

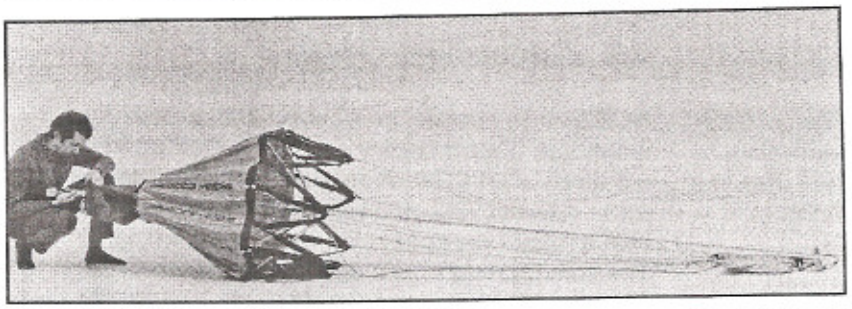


*Fig. 2: Measuring overall length of Bambi.*

*Fig. 2A: Avoid Potential Rotor Strikes*

## 3.3. Checking Suspension Cable Length

**WARNING: Using a Bambi Bucket with a greater overall length than the distance from the cargo hook to the front tip of the tail rotor on your helicopter could result in a tail rotor strike and possible loss of control of the helicopter.**

Overall length of the Bambi with standard rigging is given in Table 1. Before using your Bambi Bucket, check for **MAXIMUM TOTAL LENGTH**. To determine **MAXIMUM TOTAL LENGTH**, measure the distance from the cargo hook to the front tip of the tail rotor on the helicopter you will be using and subtract 6" (152 mm). To determine overall bucket length:

1. Stretch out the Bambi on the ground; secure the control head. See Fig. 2.

2. Pull out the dump valve fully; pull taut to ensure the suspension cables are straight.

3. Measure the distance from the shackle on the control head to the bottom of the dump valve. This measurement should be less than the **MAXIMUM TOTAL LENGTH** determined above.

**IMPORTANT: To avoid potential rotor strikes when using the Bambi Bucket the operator must measure the extended length of the Bambi Bucket and the distance from the belly hook to the closest possible point of the tail rotor.**

**A) Always measure the overall, extended length of your Bambi Bucket.**

***And***

**B) Measure the distance from the belly hook to the closest possible point on the tail rotor.**

**"B" must always exceed "A" by at least six (6) inches.**

**IMPORTANT: It is recommended that operators who choose to use the Bambi Bucket with a longline, ensure the longline is at least 50' long.**

## 3.4 Shortening Suspension Cables

If the overall length of the Bambi exceeds the distance from the cargo hook to the front tip of tail rotor of the helicopter, the suspension lines must be shortened.

| Model | Overall Length | |
|---|---|---|
| 6072 | 12'11" | 3.94 M |
| 8096 | 14' 6" | 4.42 M |
| 8096 Short | 12' 11" | 3.94 M |
| 9011 | 14'6" | 4.42 M |
| 1012 | 14'6" | 4.42 M |
| 1012 Short | 12' 11" | 3.98 M |
| 1214 | 14' 10" | 4.52 M |
| 1214 Short | 13'3" | 4.04 M |
| 1518 | 15'2" | 4.62 M |
| 1821 | 15'5" | 4.70 M |
| 2024 | 19'5" | 5.92 M |
| 2732 | 23'0" | 7.01 M |
| 3542 | 23'5" | 7.14 M |
| 4453 | 23'8" | 7.21 M |
| 5566 | 24'7" | 7.49 M |
| 5566HD | 24'7" | 7.49 M |
| 6578 | 25'1" | 7.63 M |
| 6578HD | 25'1" | 7.63 M |
| 7590 | 30'6" | 9.30 M |
| HL 5000 | 32'0" | 9.75 M |
| HL 7600 | 33' 1" | 10.08 M |
| HL 9800 | 34' 3" | 10.44 M |

Table 1: Overall lengths with standard rigging.

Note: For Bambi Bucket Models 6578 sold prior to May 2001 the overall length of the bucket is 31'2". Please specify model and serial number when ordering parts.

## 3. DEPLOYING THE BAMBI BUCKET

The following procedure reduces overall length by 19" (483 mm). This 19" (483 mm) reduction in overall length is standard when converting a bucket with regular length suspension cables for operation with a McDonnell Douglas, Hughes, or Schweizer helicopter.

1) The overall length reduced should be adjusted for your specific overall length requirement.

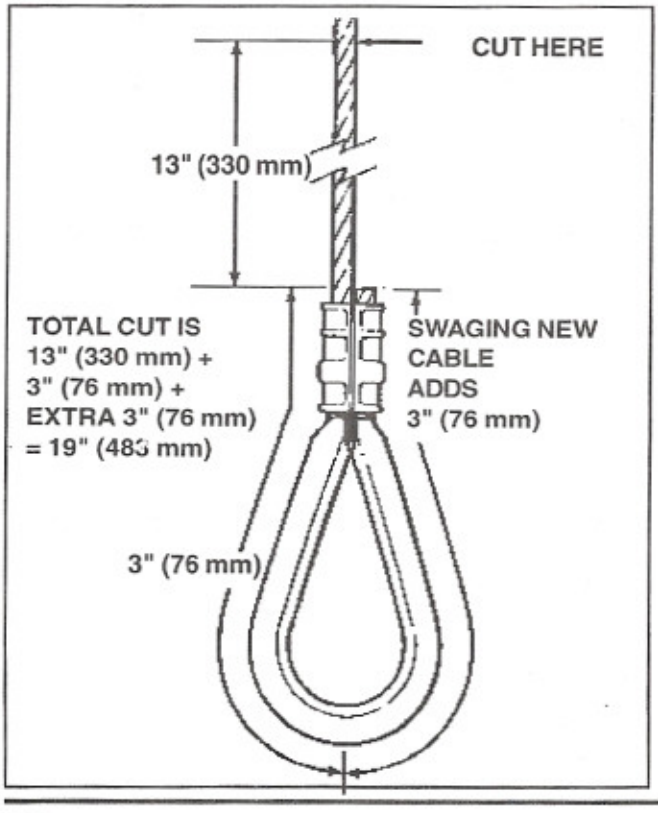
**IMPORTANT: Models 2024 - HL 9800 do not have a pulley on the trip line. Shorten the trip line by the same amount as the suspension cables.**

2) In determining the new length, allow for the cable that passes around the thimble and into the new sleeve for swaging.

Example: To shorten suspension cable by 19" (483 mm) in effective length, cut original cable by 13" (330 mm) i.e. 19" (483 mm) minus 6" (152 mm). This example is illustrated in Fig. 3.

3) Cut the suspension cables one at a time (to avoid mixing them up) just above the swage where the thimble attaches to the M-straps. Cut off 13" (330 mm) as shown in Fig. 4.

*Fig. 3: Shortening cable 19"(483 mm)*




4) Install a new thimble and sleeve onto the cable. Swage the sleeve securely using the correct size swaging tool.

5) Cut 13" (330 mm) off the IDS Deployment Cable as shown in Fig. 5.

6) Install a new thimble and sleeve and swage the IDS Deployment Cable securely.

7) Cut 32" (813 mm) off the trip line as shown in Fig. 6.

**IMPORTANT: For Models 2024 - HL9800 shorten the trip line by the same amount as the suspension cables.**

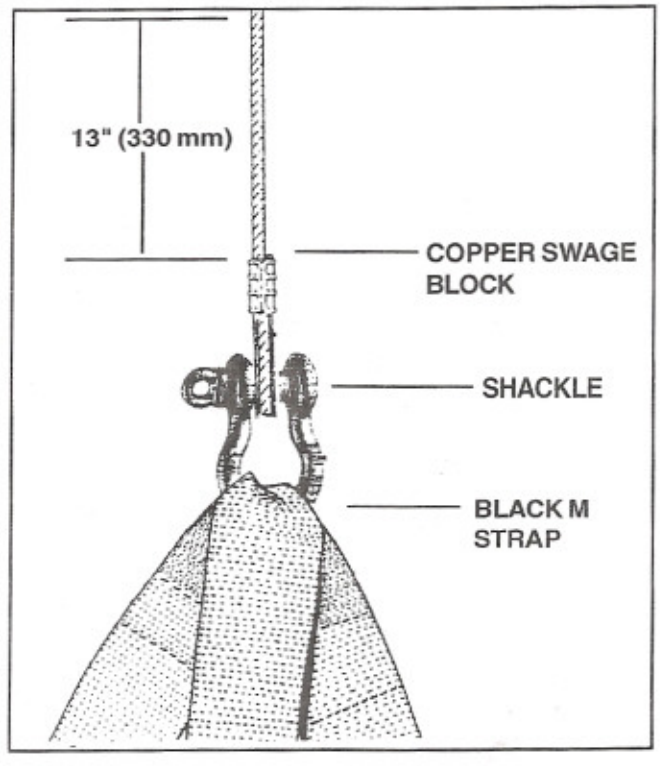



*Fig. 4: Cut 13' (330 mm) off the suspension cables.*

8) Install a new thimble and sleeve and swage the trip line securely.

9) Grasp the top shackle and extend the control head to stretch out the suspension lines. Check for correct cable sequence and/or twisted cables.

**WARNING: For Models 6072 to 4453, do not tighten control head suspension bolts over 5 ft-lbs. (6.5 Nm) torque. Overtightening suspension bolts may cause failure of control head casting.**

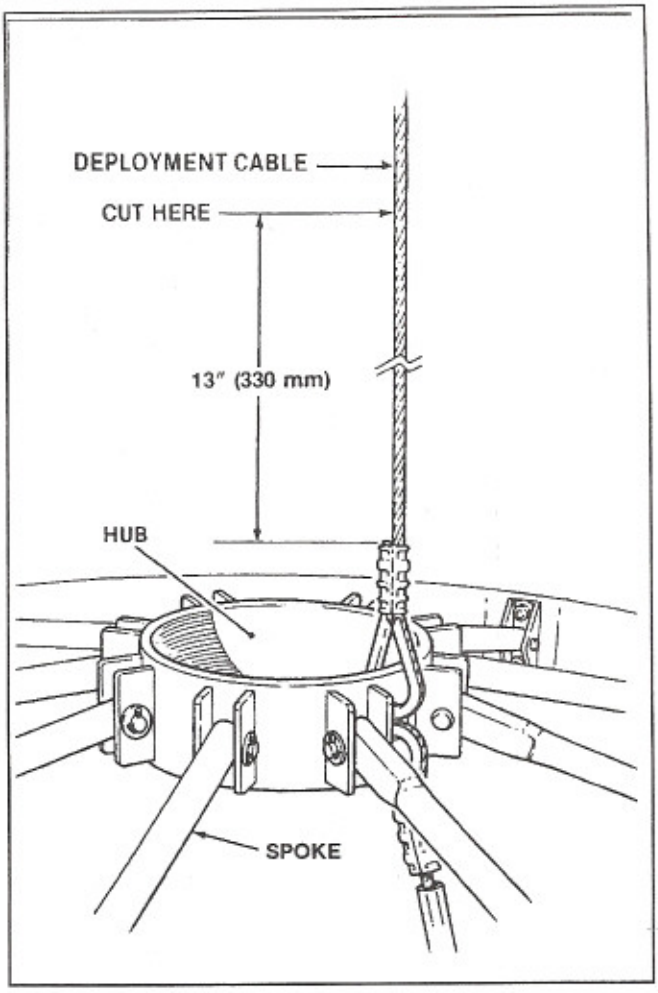



*Fig. 5: Cut 13"(330 mm) off the IDS Deployment Cable.*

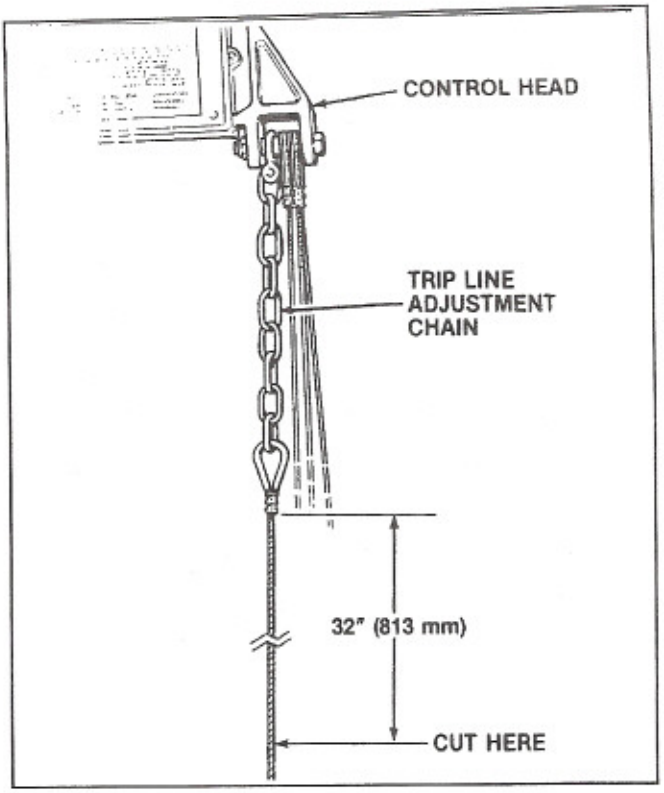



*Fig. 6: Cut 32" (813 mm) off the trip line.*

## 3.5 Instant Deployment System (IDS)™

The Instant Deployment System uses a hub and spoke mechanism to automatically expand the mouth of the bucket as soon as the weight of the Bambi is taken by the suspension cables.

When the bucket is full, the IDS Deployment Cable and Hub Restrainer Cables should be slack; they should not bear any load. Their function is to position the hub and spoke mechanism to hold the bucket open.

The main parts of the IDS are illustrated in Fig. 7. To deploy the IDS System on the ground, reach into the bucket, grasp the hub of the IDS and pull outward fully until the two cables from the hub to the lower bucket shell are tight.

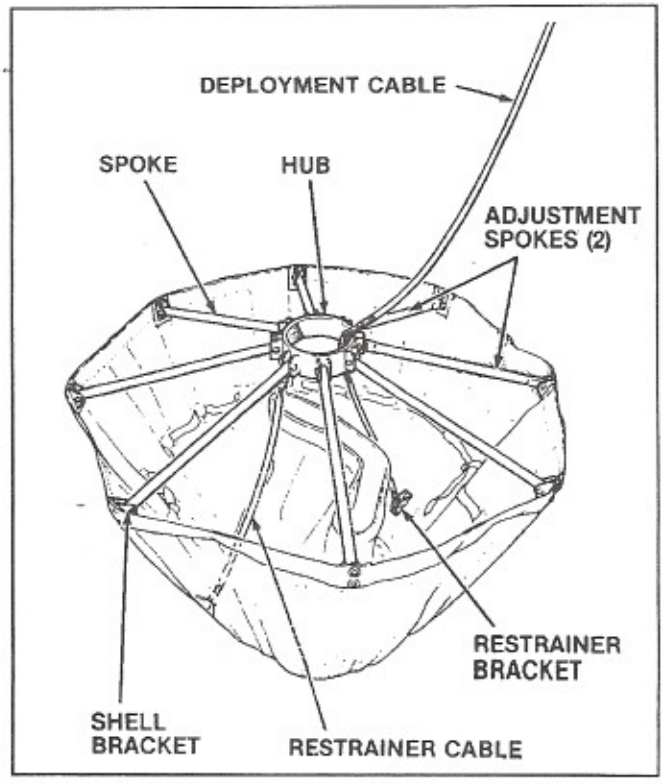



*Fig. 7: Instant Deployment System, main parts.*

# 4. FLYING THE BAMBI BUCKET

## 4.1 Flying Empty

The Bambi Bucket has been flown at speeds to 110 mph (176 kph) and has proven stable at all speeds. Nevertheless, we suggest you build up to speed slowly with your Bambi Bucket on your helicopter under the prevailing operating conditions to determine a safe maximum speed.

## 4.2 Flying Full

The dead weight of the load ensures different handling characteristics than when flying empty. You will notice that the Bambi Bucket does not 'pulse' or 'throb' under load in flight.
Once the Bambi Bucket touches the water surface, it immediately tips and sinks. This is a result of the ballast on one side of the bucket which makes it unstable on the water. You don't have to tow the Bambi to make it sink.

**IMPORTANT: When using the larger buckets, (Models 2024 and up) you may notice the dump valve does not fully return after dumping. This is normal for the larger model buckets. The valve will return as soon as the bucket is immersed in water. To ensure the valve is fully returned and locked, when filling, hit the dump switch again when the suspension lines are slack and before lifting out.**

**WARNING: When filling the Bambi, do not execute an abrupt 90 degree pedal turn with the helicopter close to the water while towing the bucket. In this altitude, there is the danger that the Bambi suspension lines (as with any other external load) could get caught on a rear skid resulting in a dynamic rollover on liftout. This could cause personal injury and helicopter damage. Check the load and suspension cables with your mirrors before liftout.**

## 5.1 Variable Fill Capability

The pilot can vary the bucket's capacity by the speed at which it is pulled from the water. As the submerged bucket is lifted, water pressure bends the bucket shell and its internal fiberglass battens outward, increasing the bucket's volume. The greater the pressure, the more volume the bucket holds. That is:

**A slow lift gives minimum fill.**
**A fast lift gives maximum fill.**

## 5.2 Frusto-Conical Arrest System™ (Cinch Strap)

The Frusto-Conical Arrest System (FCAS) allows the pilot to reduce the volume of the bucket to a preset position. The FCAS is composed of a cinch strap on the inside or outside of the bucket. The cinch strap is marked with one or more load levels. The illustration in Fig. 8 shows a Bambi Bucket with volume reduced by cinching in the bucket with the cinch strap. The cinch strap allows you to reduce the volume of the bucket to lower levels than can be done by straight fill speed alone.

**When the cinch strap is tight, below 100% load level, the trip line must be lengthened by moving 3 or 4 links on the adjustment chain. See Sections 11.1 and 11.3.**

The bucket may not dump if the trip line is not properly adjusted.

It is important to note that with the FCAS the top of the bucket is always the spill line. The second that the bucket breaks the surface of the water, it is ready to fly.

**IMPORTANT: Varying the speed of the lift is often the best way to adjust volume. This allows the pilot to vary the load at each fill to best suit the fuel load and prevailing lift conditions. Most pilots find it takes a dozen or so fills to get the feel for the variable fill action of the Bambi Bucket.**

**CAUTION: Do not tighten the cinch strap past the smallest load marking. Overtightening can damage the bucket shell.**

## 5.3 ADJUSTING THE IDS ADJUSTMENT CHAIN

An IDS adjustment chain is fitted to older models 2024 - HL9800. This chain must be adjusted when using the cinch strap to reduce bucket volume. The chain is lengthened for lower fill settings (eg. 70%) to allow the IDS to rise and thereby reduce IDS stresses. This will avoid possible damage to the IDS. The chain is shortened for higher fill settings (eg. 90%) to retain the maximum bucket mouth diameter and hence allow maximum filling efficiency. The recommended chain adjustments are summarized in Fig. 8.1.

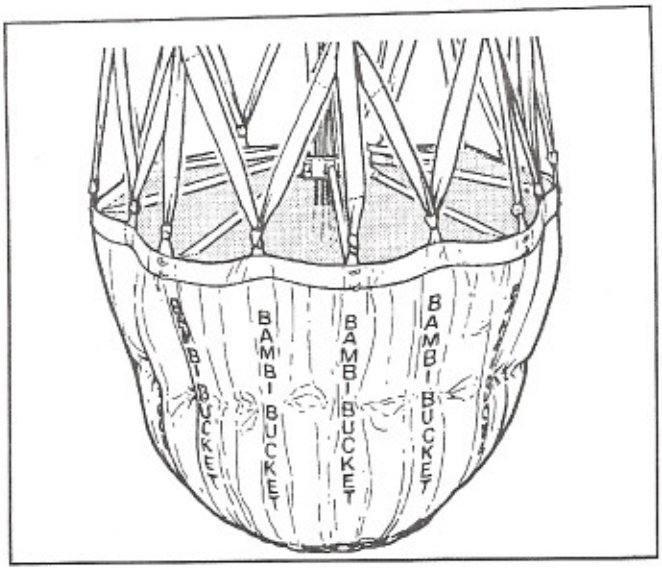



*Fig. 8: Bambi Bucket cinched in with the FCAS.*

**CAUTION: The lowest fill setting for all models is 70%*. Overtightening the cinch strap could damage the bucket.**
***See Figure 5.5 for exceptions**

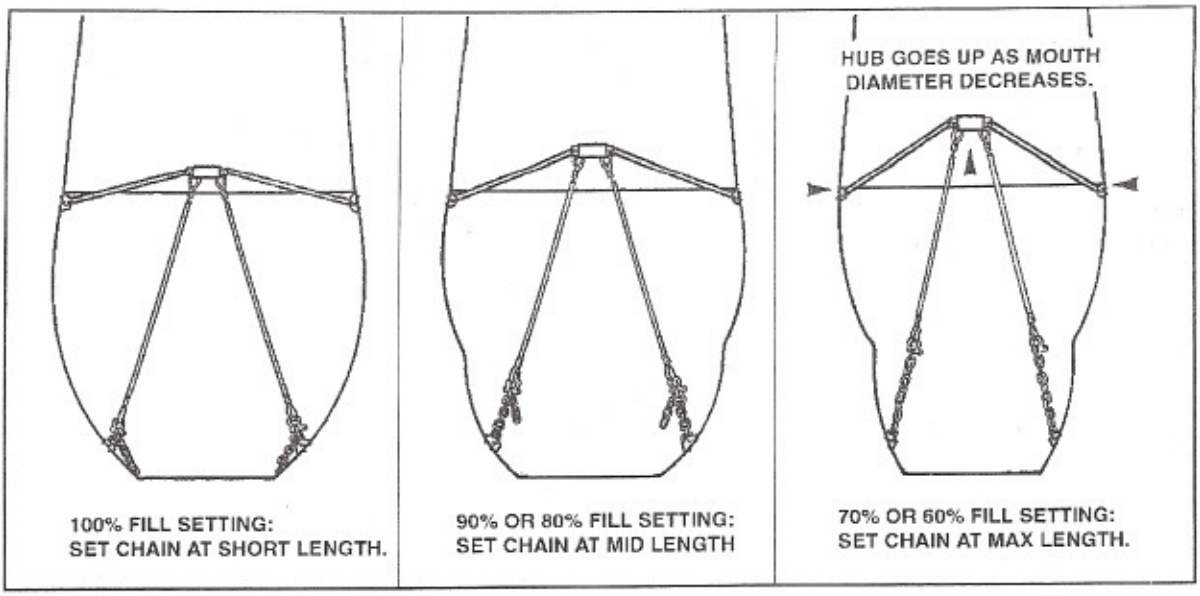



*Fig 8.1 Adjusting the IDS Adjustment Chain*

## 5.4 Shallow Fill Capability

The flexible nature of the Bambi Bucket makes filling in shallow ponds or streams easy.

The new PowerFill and PowerFill II Systems have been designed to provide the Bambi Bucket with shallow fill capability.

The PowerFill is designed for use with the Torrentula Valve Bambi Buckets and enables a fast bottom fill from water sources as shallow as 18 inches.

The PowerFill II is retrofitable to the Bambi Bucket and can fill in 6 inches of water through an electric pump.

**CAUTION: Snagging the Bambi on submerged objects could result in bucket shell damage.**

## 5.5 High Elevation Operations

Fire conditions in some areas require the reduction of bucket loads to accommodate weight restrictions caused by high elevation operations. For the short term a 60% cinch strap may be used to increase the cinching of the bucket to a 60% capacity. Extended use of the 60% cinch may cause excessive stress causing breakage of the battens.

For long term solutions - a smaller bucket, or the use of a Bambi Bucket with a Torrentula Valve should be considered.

## 5.6 Filling from the Fireflex Tank™

The Fireflex Tank is a self-supported open top tank that can be used as a dip tank for helicopters equipped with the Bambi Bucket fire-fighting system. The following table gives recommended tank sizes for different models of the Bambi Bucket.

Table 1: Standing height of empty buckets.

| Bambi Bucket Model No. | Empty Bucket Height (inch/M) | Recommended Fireflex Tank Model No. | Fireflex Tank Full Height (inch/M) |
|---|---|---|---|
| 6072 | 28/0.71 | FFTF-1518 | 48/1.22 |
| 8096 | 29/0.74 | FFTF-1518 | 48/1.22 |
| 9011 | 29/0.74 | FFTF-1518 | 48/1.22 |
| 1012 | 31/0.79 | FFTF-1518 | 48/1.22 |
| 1214 | 33/0.84 | FFTF-1518 | 48/1.22 |
| 1518 | 39/1.00 | FFTF-3036 | 57/1.45 |
| 1821 | 41/1.04 | FFTF-3036 | 57/1.45 |
| 2024 | 43/1.09 | FFTF-4048 | 60/1.52 |
| 2732 | 48/1.22 | FFTF-80100 | 79/2.00 |
| 3542 | 57/1.45 | FFTF-80100 | 79/2.00 |
| 4453 | 57/1.45 | FFTF-80100 | 79/2.00 |
| 5566 | 62/1.57 | FFTF-80100 | 79/2.00 |
| 6578 | 67/1.70 | FFTF-120144 | 93/2.36 |
| 7590 | 73/1.85 | FFTF-120144 | 93/2.36 |
| HL5000 | 80/2.03 | FFTF-160190 | 100/2.54 |
| HL7600 | 95/2.41 | FFTF-176211 | 103/2.62 |
| HL 9800 | 106/2.7 | Contact SEI about the Heliwell Tank | |

The Heliwell™ is a large capacity dip tank which can hold up to 14,900 US Gallons. Due to its large size, the Heliwell is an ideal transportable water source for large Bambi Buckets as it is big enough to easily dip a 2,000 US Gallon Bambi Bucket.

The Bambi Bucket is designed to be effective with foam. All materials used in the manufacture of the Bambi Bucket are resistant the chemical action of foam.

**CAUTION: After using foam or retardants, cycle through several dumps with water only or hose down with fresh water. This will prolong the bucket life.**

## 6.1 SACKSAFOAM™ Foam Injection System

The Sacksafoam™ is SEI Industries' state of the art foam dispensing system for use with your Bambi Bucket. This system, exclusive to the Bambi, allows foam to be dispensed into the bucket en route from the filling source to the fire site.

There are four models of Sacksafoam to fit the full range of Bambi Buckets. The operation of the Sacksafoam is controlled by the pilot through a Control Unit, which is mounted in the cockpit. This model of the Sacksafoam contains the foam reservoir directly installed inside the bucket.

Also available are the Sacksafoam II and III units, which are self-contained units stowed onboard the helicopter. The system is all housed in a foam-resistant case. With the Sacksafoam II, the pilot still controls the foam dispensing through the Control Unit. With the Sacksafoam III, designed for medium and heavy lift helicopters equipped with larger Bambi Buckets, the operation of the system is performed by crew members in the back. The Control Unit is mounted directly on the case of the Sacksafoam III. See Table 2 for Sacksafoam size requirements.

For further instructions on operating the Sacksafoam units, please refer to the applicable Sacksafoam Operator's Manual.

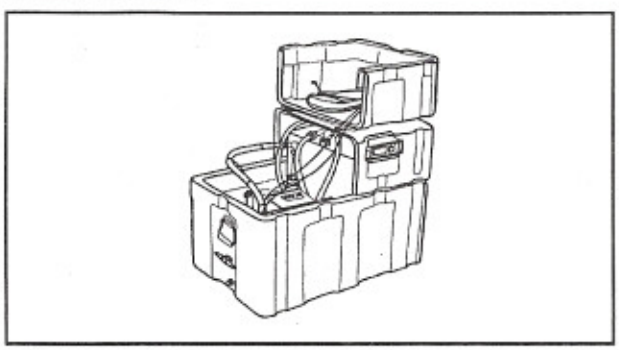


*Fig. 8.2 Sacksafoam III foam injection system for medium and heavy-lift Bambi Buckets*

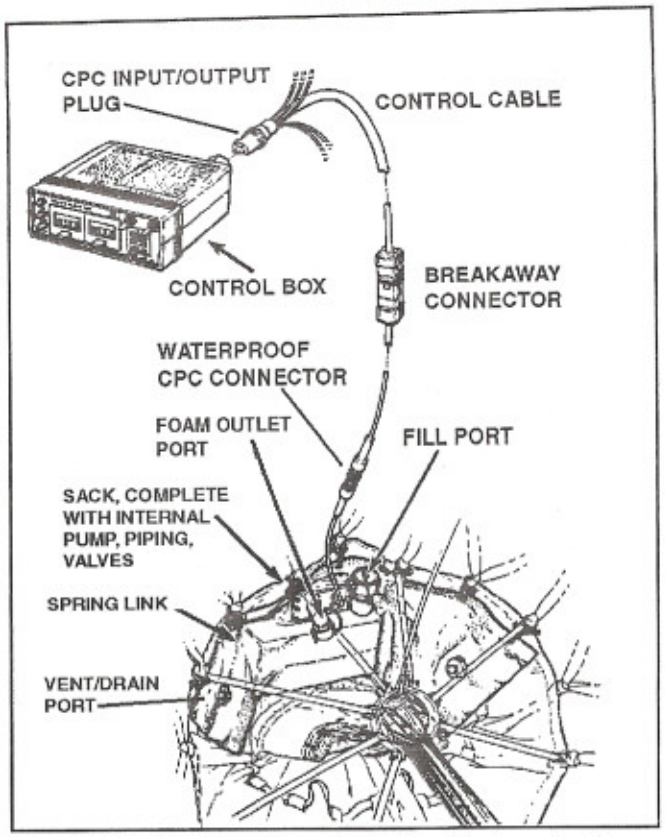



*Fig. 8.3 Sacksafoam Foam Injection System for the Bambi Bucket*

Table 2: Sacksafoam Models

| Model | For Bambi Bucket | Reservoir Capacity USG | Liters |
|---|---|---|---|
| **Sacksafoam I** | | | |
| SFF01-8018 | 8096-1821 | 12 | 45 |
| SFF01-2044 | 2024-4453 | 30 | 114 |
| SFF01-5550 | 5566-HL5000 | 72 | 272 |
| SFF01-7698 | HL7600-HL9800 | 132 | 500 |
| **Sacksafoam II** | | | |
| SFF02-8044 | 6072-1821 | 10 | 38 |
| SFF02-5598 | 1821-4453 | 25 | 94 |
| **Sacksafoam III** | | | |
| SFF03-6698 | 5566-HL9800 | 25 | 94 |
| **Sacksafoam Plus** (for additional foam storage for SFII and SFIII) | | | |
| SFF-PLUS | | 40 | 151 |

# 7. DUMPING THE BUCKET

To dump, simply hit the dump switch once and the rest is automatic. The weight of the water inside the bucket will cause the fabric dump valve to turn inside-out through the bottom of the bucket, thereby giving "obstruction-free" passage to the escaping water and producing the best possible dump pattern. You may wish to get in the habit of hitting the switch a second time just before lift out at filling to ensure that the release mechanism is in the "locked" position.

**IMPORTANT: When dumping the larger buckets, (Models 2024 and up) you may notice the dump valve does not fully return after dumping. This is normal for the larger model buckets. The valve will return as soon as the bucket is immersed in water. To ensure the valve is fully returned and locked, when filing, hit the dump switch again when the suspension lines are slack, and before lifting out.**

## 7.1 Dump Pattern

The dump pattern is affected by height and airspeed. It is most concentrated at lower altitudes above ground level (AGL) and at a hover. The pattern will "spread" with height and speed. Most operators take advantage of these characteristics to maximize their assault on the fireline.

**WARNING: Never dump onto ground personnel as the water impact could result in injury.**

## 7.2 Dump Speed

We suggest that you get familiar with flight characteristics while dumping from your particular helicopter. Make dumps at slower speeds before progressing to faster dumps.

**NOTE: SEI does not recommend dumping at airspeeds above 50 knots.**

## 7.3 Reducing Mouth Opening of The Dump Valve

The dump valve mouth can be reduced by bolting shut some of the grommets in the dump valve itself, starting with the outside edges of the valve and working in. Always bolt in pairs, one grommet on one side of the valve and its opposite on the other side.
Leave the purse lines in place when bolting to ensure proper support for the valve.

You will find that if the valve is bolted down beyond a certain point not all the water will escape before the spring power reel begins to pull the valve back in. This necessitates the pilot hitting the dump switch a second time to lock the release mechanism during the next fill.

Experience has shown that bolting the valve down three grommets on each side reduces the water flow by 50%.

**NOTE: It is uncommon for the valve to need to be stopped down. Most operators regulate water coverage with altitude and airspeed.**

## 8. Landing

A recommended landing procedure is to allow the bucket to touch down ahead of the helicopter and then maintain tension on the suspension lines by backing up slightly, thereby keeping the control head at an angle while landing.

**CAUTION: To avoid damage to helicopters with low skids, never land on a vertical control head. This could damage the helicopter and/ or the control head. The head is approximately 24" (610 mm) in length.**

Do not release the control head from the cargo hook while hovering. This could damage the control head. If the control head must be released while hovering, have ground personnel support the control head before releasing.

**CAUTION: If the control head has experienced a severe impact, it is necessary to visually examine the top stub of the control head base casting to determine if it has been bent or otherwise damaged. This examination requires the unbolting and removal of the cast yoke surrounding the stub.**

**If the stub is damaged, the control head base casting requires replacement.**

**Operating with a damaged top stub could result in failure of the attachment point and unintentional release of the bucket.**

Do not drag the Bambi over rough surfaces when landing or ground handling. This will damage the bucket shell.

## 9. PACKING THE BAMBI BUCKET

To pack the Bucket:

1) Collapse the Instant Deployment System by pushing the hub into the bucket.

2) Grab the control head and pull the suspen sion lines taut as shown in Fig.7.

3) Gather the suspension lines into a coil and stow inside the bucket as shown in Fig.8. Placing the control head outside and the lines inside prevents the possibility of the lines tangling.

4) Bring the control head back and place on collapsed bucket.

5) Roll the bucket into a bundle and wrap with rope supplied.

6) Take the carrying bag and drape it over the bucket.

7) Roll the bucket over into the open bag and zip up the bag.

The carrying bag with the Bambi Bucket makes a suitable shipping container when shipping via airfreight.

Because of the compactness of the Bambi, many operators carry it aboard the helicopter at all times during the fire season. This allows a very rapid response to a fire call.

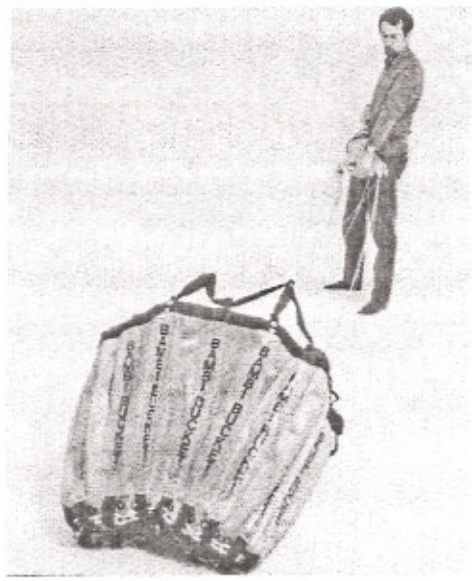


*Fig. 9: Stretch out suspension lines*

*Fig. 10: Loop suspension lines and stow inside bucket*

*Fig. 11: Place head on collapsed bucket.*

## 10. STORING THE BAMBI BUCKET

We suggest that you follow these guidelines to ensure the longevity of your Bambi Bucket:

1) Do not pile heavy objects on the Bambi in storage. This may result in creases in the neoprene seal in the dump valve, which may cause leakage.

2) If foam has been used, wash the bucket prior to storing it.

3) Do not store a wet bucket. This will result in the growth of mildew.

We recommend that you store the bucket in an unfolded position, preferably by suspending the main shackle from an overhead hook. An alternative is to suspend the bucket upside down from its bottom chain.

## 11.1 Adjusting the Dump Valve 'Udder'

*"Udder" refers to the amount the dump valve bulges out* below the bucket shell, when the bucket is full.

Dump valve "udder" adjustment has a significant effect on the valve seal between the fabric dump valve itself and the bucket shell.

Ninety percent of the valve seal is produced by the stainless steel bolts passing through the neoprene foam and the bucket. The balance of the sealing action is a result of the valve "uddering" out the bottom of the bucket and compressing the foam between the valve and the bucket.

A properly adjusted dump valve will have a maximum of 3" (76 mm) of 'udder'. Too much "udder" will add to the volume and thus the weight of the bucket. Too little 'udder' will prevent the secondary sealing action and will result in the valve leaking. Correct dump valve adjustment is shown in Fig. 12.

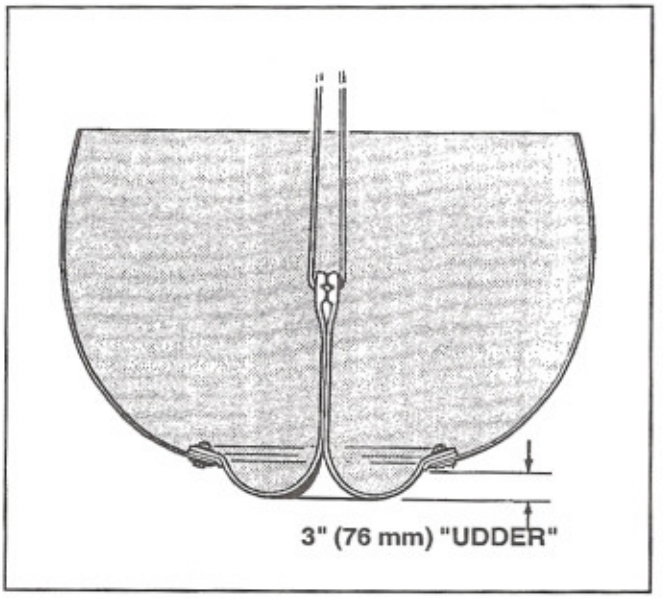



*Fig. 12: Cross section view of Bambi Bucket showing correct amount of 'udder'.*

## 11.2 FCAS and Valve Sealing

The Frusto-Conical Arrest System (FCAS) involves the use of a cinch strap to reduce the volume of the bucket. Use of the FCAS cinch strap at minimal bucket volume may result in some loss of the secondary seal because of the sidewalls of the bucket being more vertical (ideal sealing results from the angle between the sidewall of the bucket and the valve fabric being close to 90 degrees).

## 11.3 Adjusting "Udder" via Trip Line

Each new Bambi Bucket is adjusted and checked at the factory under full fill for proper dump valve adjustment. To adjust the "udder"; change the length of the trip line by adjusting it at the trip line adjustment chain.

There are two methods of securing the trip line at its adjustment chain on Bambi Buckets. On Models 8096 to 1821, the adjustment chain is secured to the suspension bolt on the control head. On Models 2024 to HL9800, the adjustment chain is located at the top of the trip line riser.

If a new trip line is installed, first install at the same point on the adjustment chain and then test the dump valve in use. Remember to secure the adjustment shackle with a lockwire or tie wrap first. It is impossible to judge "udder" with an empty bucket on the ground.

## 11.4 Adjusting "Udder" Following Shortening of Suspension Cables

Whenever the length of the main suspension cables are modified (See Section 3.4), the trip line should also be modified. For Models 8096 to 1821, which have a pulley on the trip line, modify the trip line by double the amount. For Models 2024 to HL9800, modify the trip line "riser" by the same amount as the suspension cables. The riser should then be attached with the adjustment chain in the original position. A final check for "udder" should then be made when the bucket is full.

## 11.5 Adjusting Purse Lines in Dump Valve

Adjustment of the purse lines in the dump valve is important to effect a good seal at the neoprene lips of the valve mouth. The purse line adjustment is set and tested at the factory. The purse lines may shrink or stretch after use and require adjustment. Also, whenever new purse lines are installed, adjustments must be made.

**See Section 14 for purse line specification for all sizes of Bambis.**

Note that braided nylon is specified for purse lines since it is self-lubricating under water.

When initially tying up purse lines, note that more tension should be on the outside lines with progressively less tension towards the middle. If the tension is too great on the middle lines, the valve action will be sluggish when the valve is retracting.

**To adjust a single line** simply adjust the tension of the line to equal that of adjacent lines.

**To adjust all the lines:**

1) Stand the bucket vertically.

2) With the valve bottom flat on the floor, pull the bucket shell into a round shape.

3) Run a rope from an overhead support to the ring on the top of the valve.

4) Proceed to adjust the lines. See Section 14.1 for complete details.

On medium to large Bambi Buckets, it may be more convenient to stand in the bucket as shown in Fig. 13.

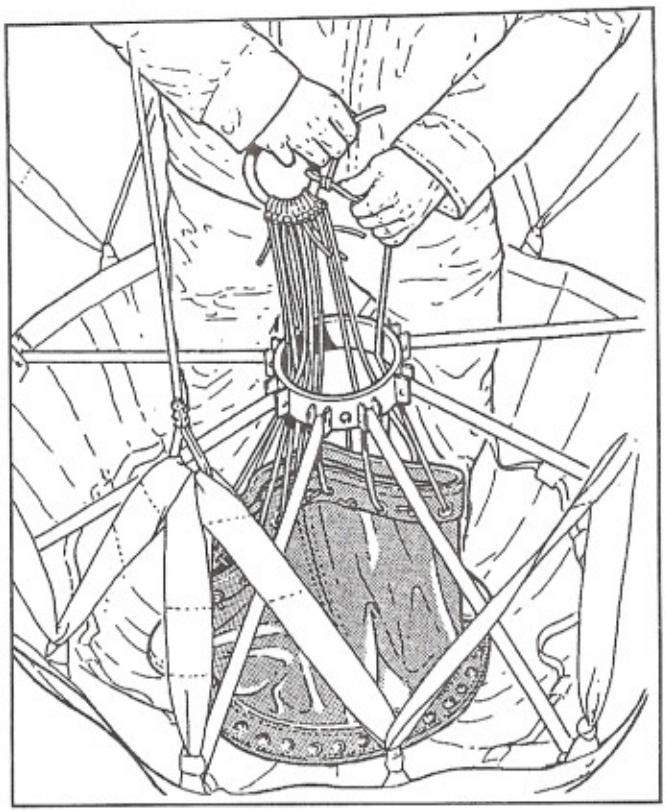


*Fig. 13: Adjusting purse lines.*

## 11.6 Checking Purse Line Adjustment

Once the lines are adjusted, fill the Bambi half full, with the water just below the top of the valve. Check to see if both lips of the valve are matched right across the top. Sometimes one lip will 'track' slightly above or below the other as shown in Fig. 14.

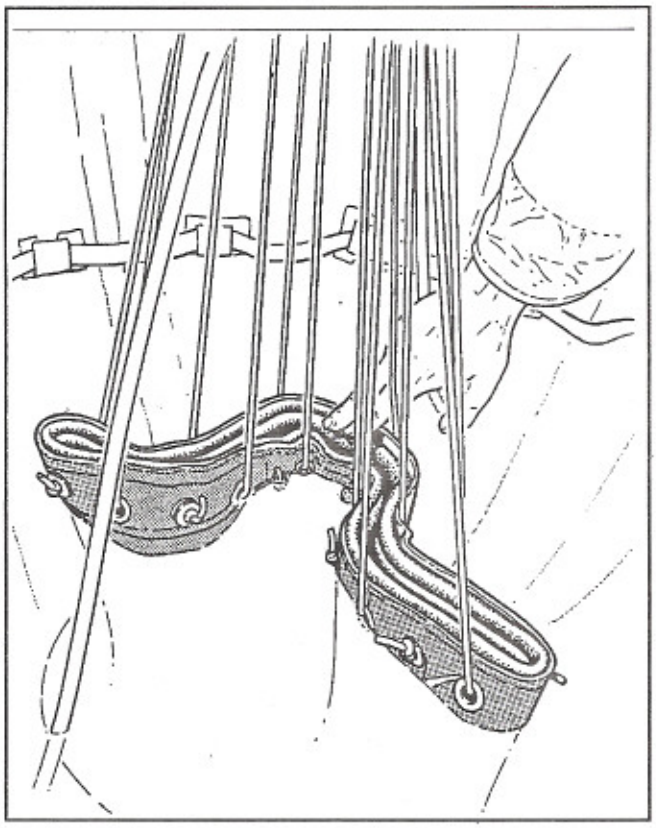


*Fig. 14: Dump valve showing one lip tracking above the other.*

Usually one or two specific purse lines will cause this improper tracking. To correct:

1) Grasp the purse lines at the centre of the section of low lip as shown in Fig. 15.

2) Pull it/them several times to bring the lip into alignment.

3) Re-tie the purse lines so that the line is just snug. Do not over-tension this line. Over-tension will result in misalignment at another position on the valve.

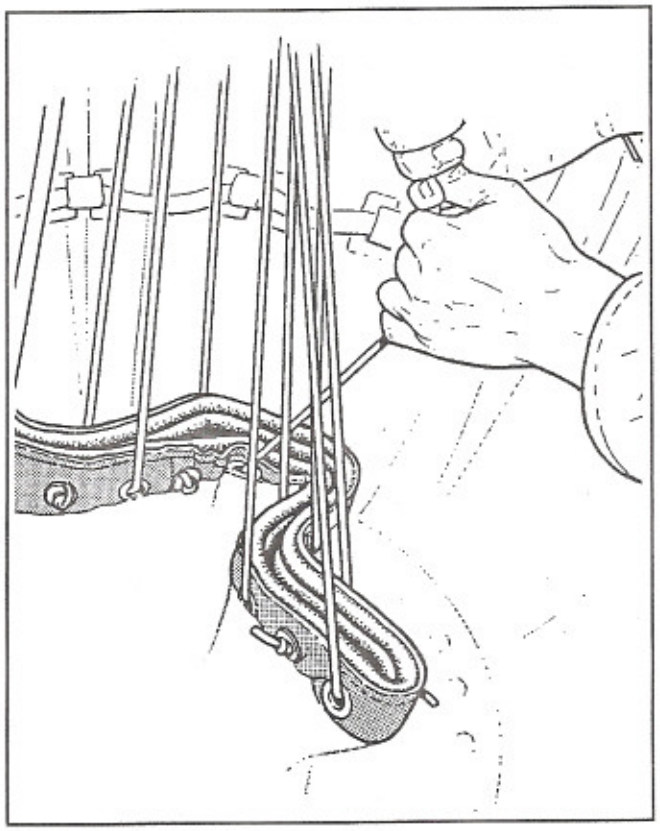


*Fig. 15: Pulling the purse line to bring lower lip into alignment.*

# 12. GENERAL TROUBLE SHOOTING

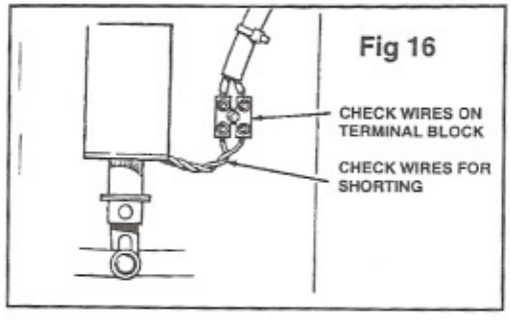
Your Bambi Bucket should provide you with trouble free operation if it is properly maintained. Following are some checks and adjustments which may be made should a problem occur in the mechanical operation of the bucket.

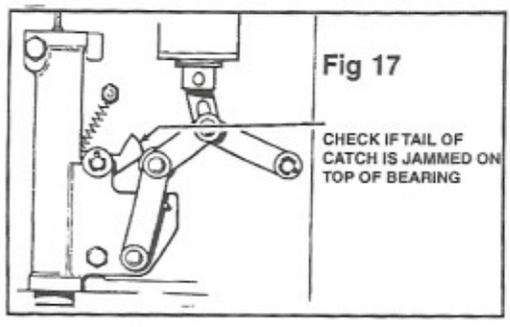
## 12.1 Valve Troubleshooting

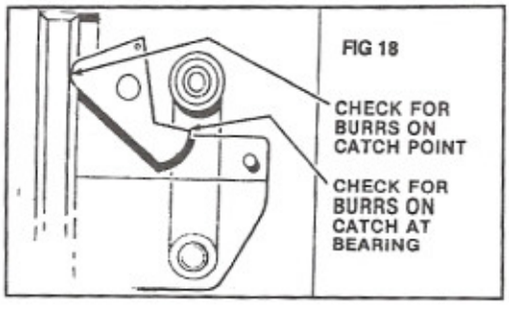
| Problem | Possible Cause | Solution |
|---|---|---|
| Leaking dump valve. | Overtightening of FCAS (cinch strap) affecting seal. | Re-adjust cinch strap See Section 11.2 |
| | Lack of seal between valve and bucket shell. | Apply butyl rubber sealant as described in Section 14.4. |
| | Deterioration of the waterproofing of the dump valve fabric (pre-1989 buckets). | Apply silicone sealant to the outer face of the dump valve fabric, working it into the fabric. This can be done by pressing the sealant into the fabric with a spatula, with a hard surface behind the valve fabric. |
| | Creases or deterioration in the foam lips of the dump valve. | Work out creases or replace foam. |
| | Misaligned Purse Lines | Adjust Purse Lines as described in Section 11.6. |

## 12.2 Control Head Troubleshooting

| Problem | Possible Cause | Solution |
|---|---|---|
| Head doesn't release dump valve | Solenoid malfunction | Check the electrical connections for proper operation of the solenoid. A click should be heard when the circuit is closed. |
| | | Check the white wires on the solenoid for shorting. See Fig. 16 |
| | | Check that the white wires have not come loose from the terminal block. See Fig. 16. |
| | | Check for a burned-out solenoid. measured with an ohmeter, the solenoid should have about 5.7 ohms resistance. A higher resistance may indicate a poor connection or a burned-out solenoid. A lower resistance may indicate a shorted-out solenoid coil. (12 volt model 6072 solenoid resistance should be about 1.5 ohms) |
| | Jammed linkage | With the cover plate removed, activate the solenoid and check for jamming of linkage. |
| | | The tail of the catch may ride up on the bearing,as shown in Fig. 17. Activate solenoid to release. |
| | | Check that the spring link is resting on the body of the stop bolt, as shown in Fig. 20, and not on the head of the bolt, with the control head sitting vertically. |
| | | Check the catch for burrs at the bearing or the point. The point can be worn by the passage of the trip line bullet. Remove burrs with a fine file. See Fig. 18. |

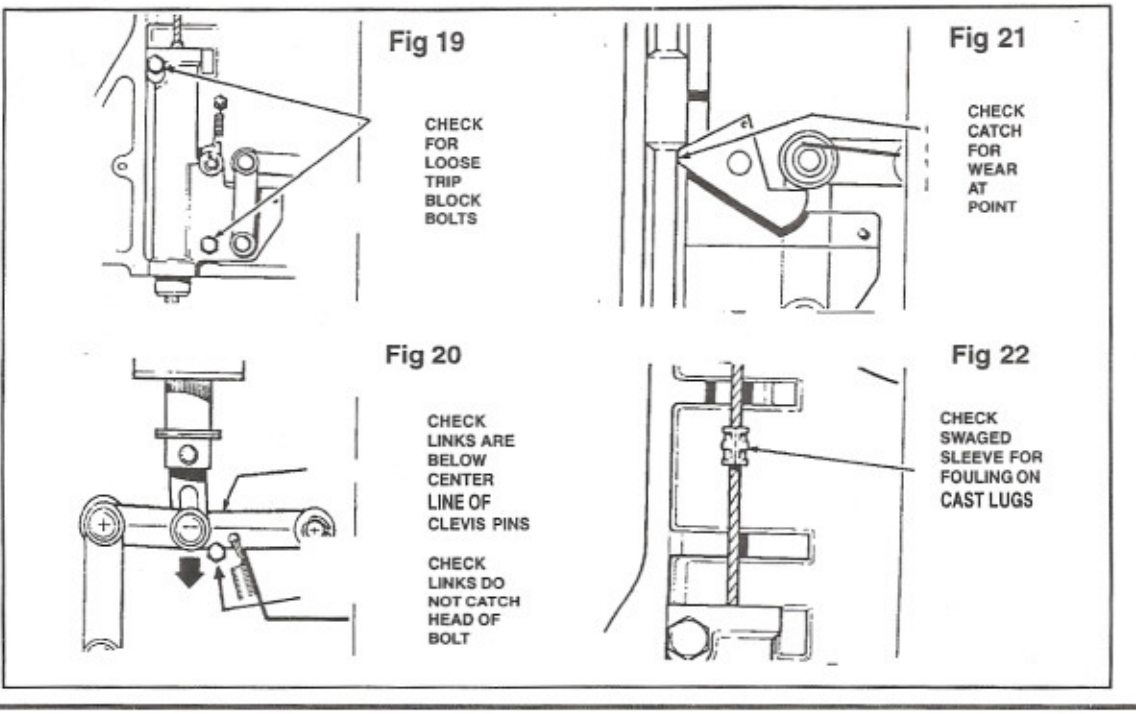


## 12. GENERAL TROUBLE SHOOTING

| Problem | Possible Cause | Solution |
|---|---|---|
| Head releases dump valve prematurely | Loose trip block bolts | Tighten trip block bolts. See Fig. 19. |
| | Links are above center | Check that links are below center line of clevis pins. Adjust links. See Fig. 20. |
| | Worn catch at point | Check the catch point for wear at the bullet. Replace catch. See Fig. 21. See Section 13.3 for catch replacement procedure. |
| Trip line jams on returning | Trip line sleeves are fouling cast lugs on head | Pull the trip line completely out. Check that the swaged sleeves at the end of the trip line are not fouling the cast guide lugs on the head and cover. Round the end of the swage sleeves with a file. See Fig. 22. If necessary the lower set of cast lugs (closest to the trip block) on the head act as a safety keeper to prevent a trip line broken at the top end from causing a tail rotor strike. The swage blocks should not pass between them. |
| Trip line doesn't return. | Broken spring in reel | Check for a broken spring in the reel. A broken spring is indicated if the tension on the reel doesn't increase as the reel is wound, or if the tension increases in jerks or the spring seems to "slip" inside the reel. See Section 13.2 for reel replacement procedure. |



**WARNING: Do not remove the cover on the control head while operating the Bambi Bucket. Part of the trip line safety keeper is cast into the control head cover. With the cover removed, this safety feature is no longer functional. Without the safety keeper functioning, a separated trip line could cause a tail rotor strike which could result in severe injury or death and/or helicopter damage.**

NOTE: For proper operation of the control head avoid the following modifications:

1) Do not use another type of bearing as a replacement for the ball bearing.

2) Do not use lockwire as a substitute for the swage blocks on the trip line.

3) Do not shorten or change the portion of the trip line which attaches to the reel.

4) Do not use threaded bolts as a substitute for clevis pins.

5) Do not modify the size or angles of the catch, other than as recommended in Section 13.3.

6) Do not tighten control head suspension bolts over 5 ft-lbs. (6.5 Nm).

## 13.1 Trip Line Replacement

The trip line should be examined daily for kinks, frays or loose swages. Replace the trip line as soon as any deterioration is observed.

**CAUTION: Accidental release of a wound spring reel can result in injury to your hands. Wear gloves and use caution when winding the spring reel or pulling the tripline.**

**Remove Old Tripline**

1) If the tripline is not broken above the trip block, and the spring reel is functional, then push in the solenoid to activate the linkage and pull the tripline out to its full extent.

2) Secure the spring reel to prevent the reel from unwinding. This can be done by clamping a small pair of vice-grips onto the bottom flange of the reel, locking the reel against the solenoid. See Fig. 23.

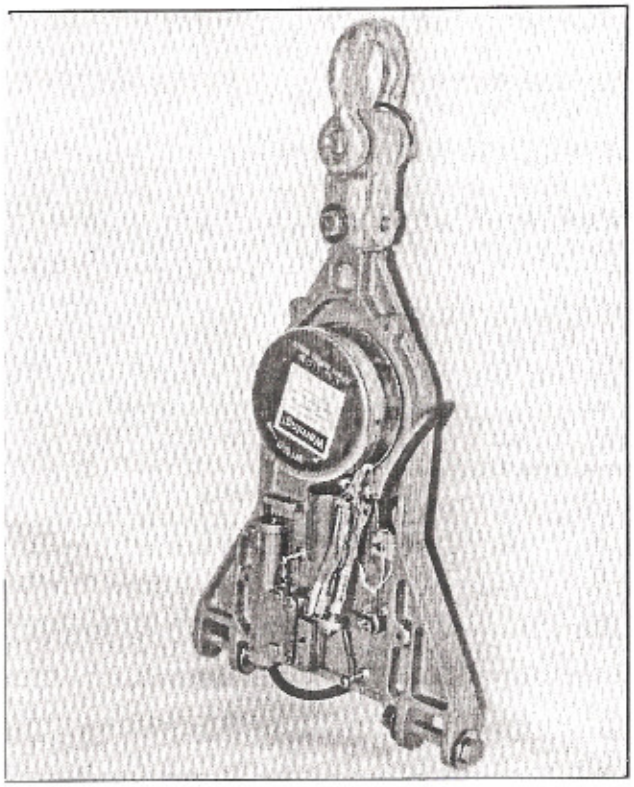


*Fig. 23: Securing the spring reel.*

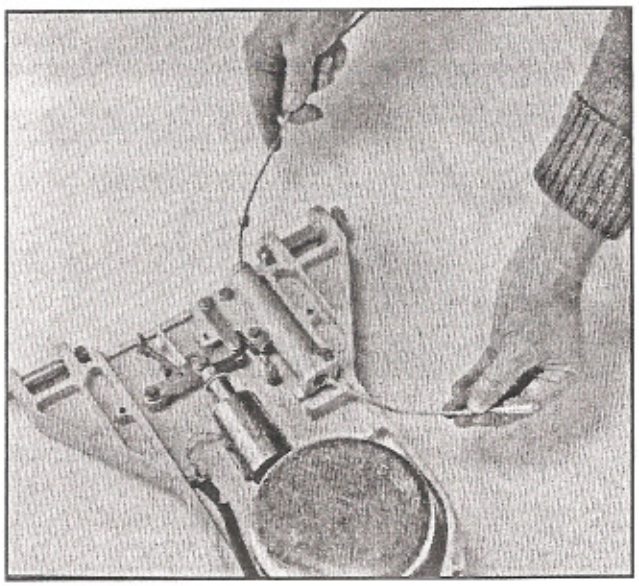


*Fig. 24: Pass trip line through hole in trip block.*

3) Use a small screwdriver through the hole in the spring reel drum to remove the end of the tripline from the locking finger. See Fig. 29.

### Winding the Spring Reel

If the spring reel tension has been released, the reel must be re-wound before the new tripline is installed.

4) Wind the spring reel in the direction indictated by the arrow stamped on the cover to its maximum, then back off until the three holdes in the reel are positioned at the top (Approx. one full turn). Secure reel as per 2) above.

**Install New Tripline**

5) Pass the trip line through the hole in the trip block as shown in Fig. 24.

6) Bend the end of the trip line into a tight spiral using a pair of pliers. See Fig. 25.

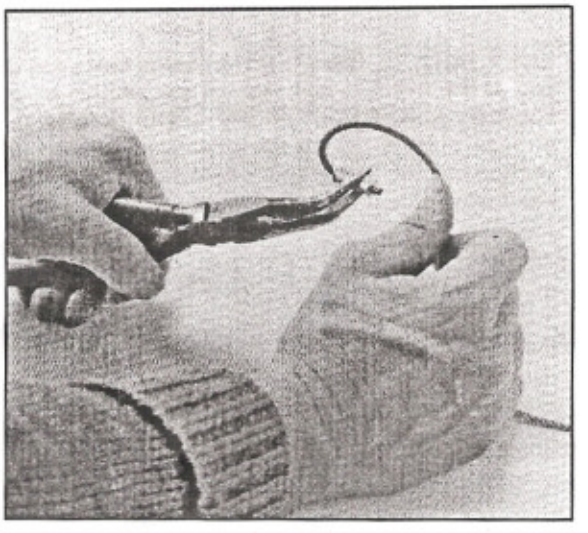


*Fig. 25: Bend the end of the trip line into a tight spiral.*

7) Insert the end of the trip line through the large center hole of the drum. See Fig. 26.

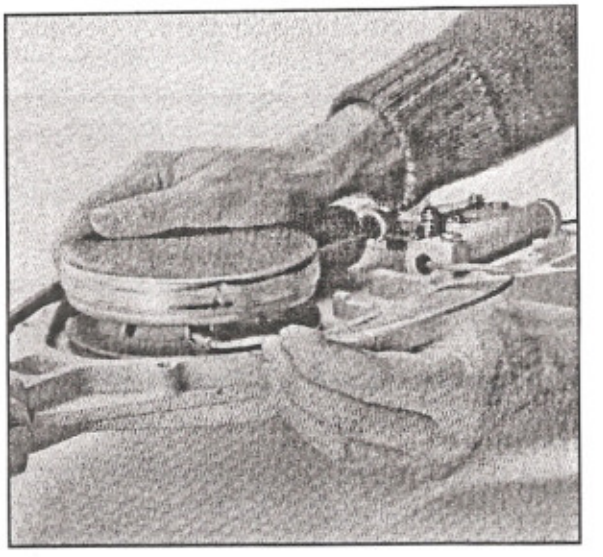


*Fig. 26: Insert the end of the trip line.*

8) Fish the trip line out through the small hole to the left of the center hole with needle nose pliers. See Fig. 27.
9) Pull 12"-14" (30-35 cm) of line from the hole and pull

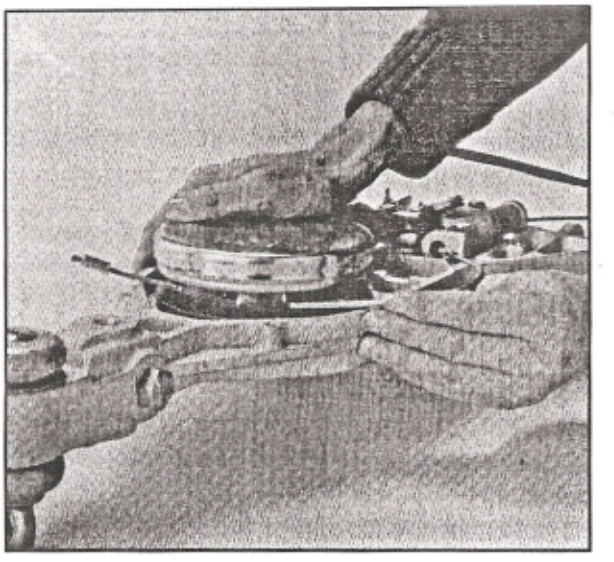


*Fig. 27: Fish the trip line out.*

it around the drum in a clockwise direction and insert the trip line into the small hole to the right of the large hole. See Fig. 28.

10) Look into the large center hole of the reel, you will

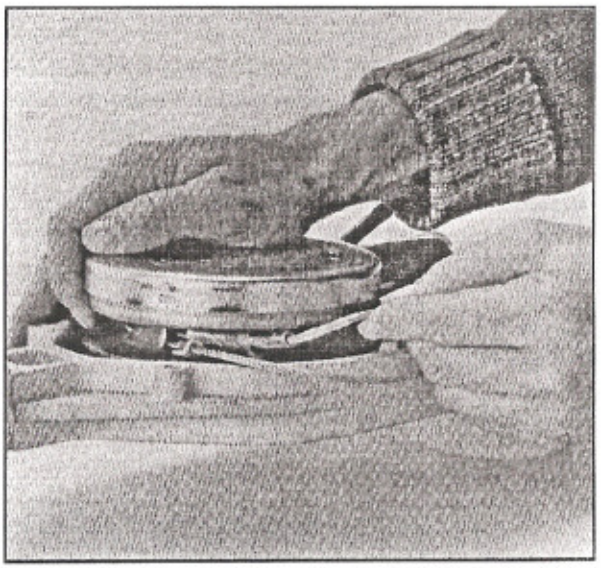


*Fig. 28: Insert trip line into small hole.*

see a locking finger.

11) Push the swage on the end of the trip line past this locking finger.

12) Pull the line up over the finger and into the slot between the finger and the drum. A completed rear view of this step is shown in Fig. 29.

To assist in the above step:

a) Bend a piece of lockwire into a U shape.

b) Insert the bent end of the U into the large center hole of the reel.

c) Push the trip line through the U and past the finger on the reel.

d) Pull on the lockwire to lift the trip line outward past the finger.

e) Push the trip line into the slot.

f) Remove the lockwire.

13) Pull the free end of the trip line to remove any slack around the drum. See Fig. 29.

**IMPORTANT: Ensure that the swage blocks at the**

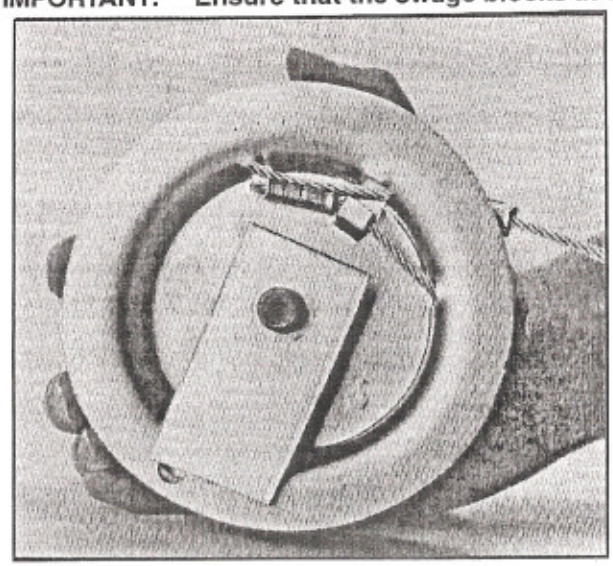


*Fig. 29: Rear view of reel showing correctly installed trip line.*

**end of the trip line lays behind the section of trip line that passes through the centre hole to one outside hole. If the swage blocks lie outside the section of wire, it may foul the two cast lugs on the head which locate the reel anti-torque plate. This will stop the trip line from winding up onto the reel.**

14) With the trip line fully connected to the drum, note that there is a swage block about 1" to 2" (2-5 cm) from the drum. This block will be stopped by the safety keeper cast into the head should the trip line break where it enters the reel drum, thus ensuring the trip line cannot come free of the control head.

15) While holding the reel securely, release the temporary lock. Allow cable to wind in gradually, do not let the reel free-wind. Use gloves to protect your hands from injury.

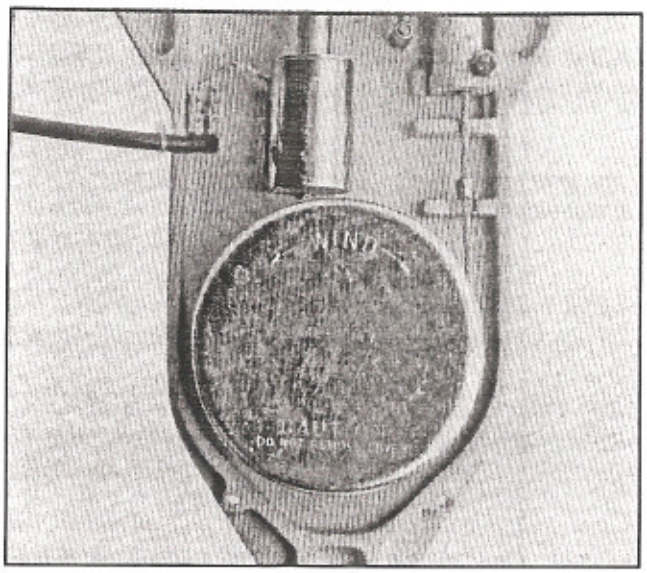



*Fig. 30: Completed trip line installation.*

### 13.2 Spring Power Reel Replacement

#### Remove Old Spring Reel

**CAUTION: The spring reel must be unwound before its securing nut is loosened. Loosening the nut on a wound spring reel could result in damage to the reel and/or injury to your hands.**

1) Remove the tripline per 13.1, paragraphs 1) through 3).

2) Wear gloves to protect your hands. Hold the spring reel firmly and remove the clamp or other locking device. Release the tension gradually until the reel is completely unwound.

3) Locate the spring reel locking nut on the back of the control head. Use a chisel or file to remove the locking burr next to the locknut.

4) Remove the locking nut, and then the spring reel.

**IMPORTANT: Note the position of the anti-torque plate on the back of the spring reel. The spring reel must be installed with the anti-torque plate positioned between the two lugs cast in the control head.**

5) When fitting the new spring reel, check the clearance between the reel and the control head. There must be a gap of approximately 1/8" (3 mm) to prevent rubbing. Older fabricated heads may require spacer washers under the spring reel to achieve the required clearance.

6) Install the spring reel locking nut. Use an allen key to prevent the reel shaft from turning. Tighten the reel locking nut to 40 ft-lbs (5.5 Nm).

7) Use a chisel to make a burr to prevent the locking nut from loosening. "Loctite" may also be used. See Fig. 31.

#### Installing New Spring Reel Models 6072 - 4453 (Small head)

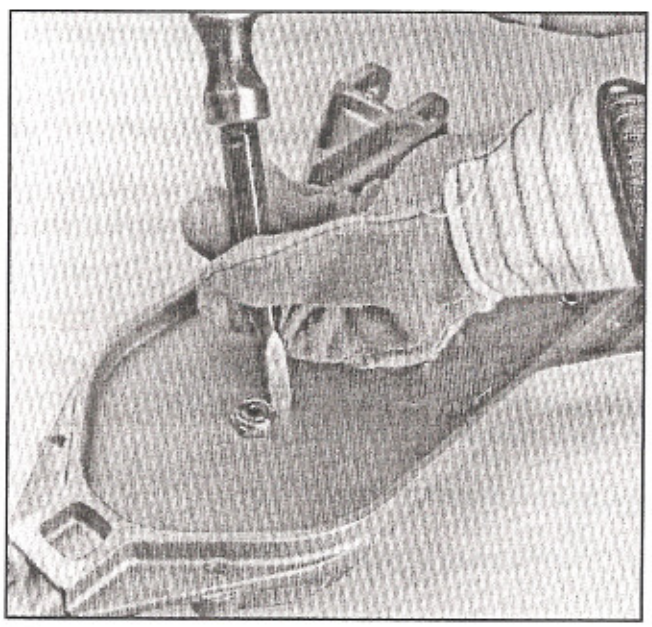


*Fig. 31: Make a burr to secure the tightened nut.*

**IMPORTANT: The new spring reel is supplied with a vinyl coated cable attached. This vinyl coated cable must NOT be used as a tripline.**

8) Wind the spring reel by hand in the direction indicated by the arrow on the cover four complete revolutions.

9) Pull the vinyl covered cable out to its full extent, and secure the spring reel per Section 13.1, paragraph 2).

10) Wrap the vinyl covered cable back around the spring reel. Remove the temporary lock, and again pull the cable out to its full extent.

11) Back the spring reel off until the three holes are positioned at the top (approx. one full turn), and secure the reel.

12) **Remove the vinyl covered cable and discard.** Install the tripline per Section 13.1.

**Install New Spring Reel**
**Models 5566-HL9800 (Large head)**

**IMPORTANT: The new spring reel is supplied with a vinyl coated cable attached. This vinyl coated cable must NOT be used as a tripline.**

## 13.3 Catch Replacement

Newer buckets use a standardized catch and trip block which should not require the following procedure when replacing the catch.

However, replacing the catch in older buckets (manufactured before June 1993) the following procedure may be required.

1) Check the trip line for play in the tube and snug up swage sleeves with a swaging tool if necessary to ensure tube is snug between the bullets.

2) Remove the catch spring and the return spring. These parts are identified in Parts Diagram 18.1.

3) Remove the bottom cotter pin on the catch clevis pin and then remove the catch clevis pin and the damaged catch.

4) With the trip line installed, place the new blank catch in its slot and slide the point in against the tube on the trip line. Keep the tail of the catch in place under the ball bearing. Note the amount that must be filed off the point of the catch to allow the hole in the catch to fit through the hole in the trip block (see Fig. 32). File or grind off the point of the catch in a radius centered on the hole in the catch. Keep the ground point square to the faces of the catch. Round the corners of the filed point smoothly to remove burrs.

5) Install the catch with the catch clevis pin and check that the filed point just touches the tube on the trip line.

6) When the solenoid retracts, the tail of the catch must clear the bearing in order for the trip line to be released. Operate the solenoid by hand to check that the tail of the catch will clear the bearing. If it does not, remove the catch and grind the tail of the catch so that it will clear the bearing. File edges just enough to remove any burrs.

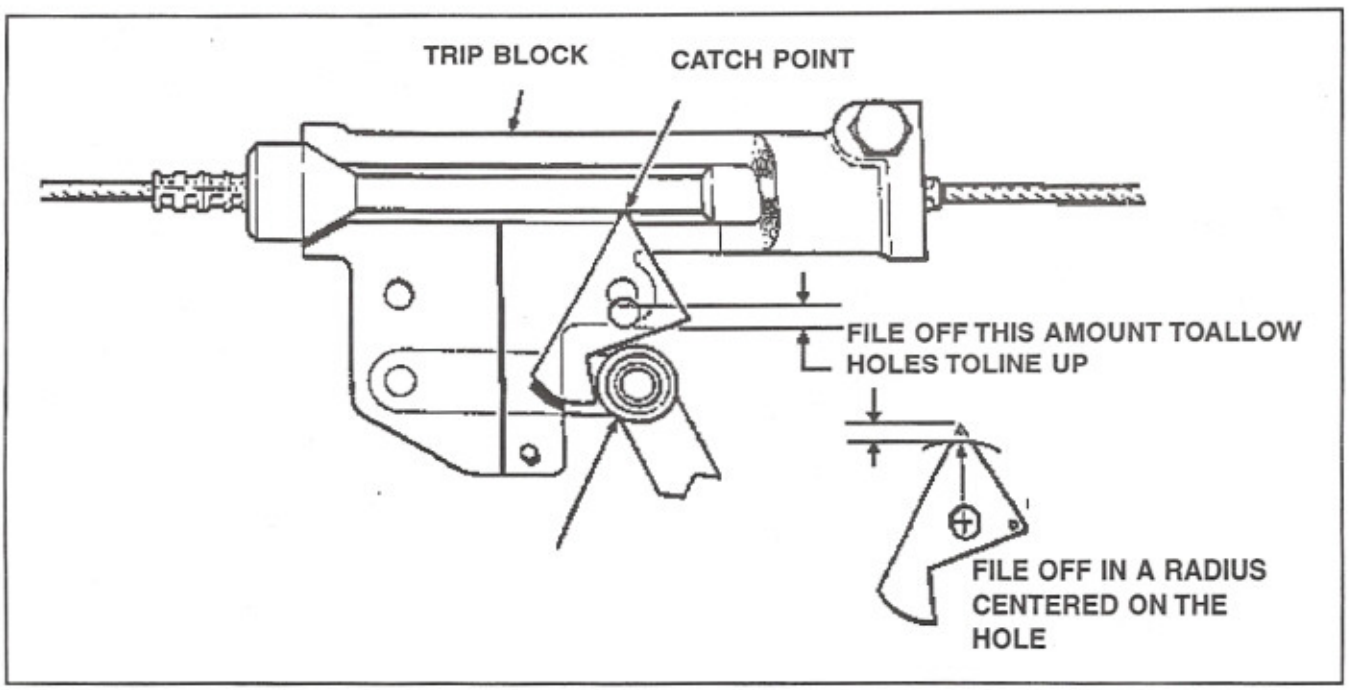



*Fig. 32: File off point of catch to align catch clevis pin.*

Table 2: Purse line specifications

| Bambi Model | Purse line dia. | Cut length | Approximate tie length |
|---|---|---|---|
| 6072 to 1214 | #4-1/8"(3.2 mm) | 42" (1067 mm) | 28" (711 mm) |
| 1518 to 1821 | #4-1/8"(3.2 mm) | 48" (1219 mm) | 31" (787 mm) |
| 2024 | #5-5/32"(4.0 mm) | 48" (1219 mm) | 31" (787 mm) |
| 2732 to 3542 | #5-5/32"(4.0 mm) | 48" (1219 mm) | 33" (838 mm) |
| 4453 to HL9800 | #6-3/16"(4.8 mm) | 56" (1422 mm) | 37" (940 mm) |

## 14.1 Purse Line Replacement

The purse line specifications for various models of Bambi Buckets are given above in Table 2. The tie length refers to the distance from the fender washer up to the top side of the lower section of the ring used to secure the purse lines. The tie length is illustrated in Fig. 35.

The purse lines alternate from one side of the valve to the other. When threading the valve, insert the first purse line from one side. The next purse line is inserted from the opposite side. Any or all lines replaced should follow the same sequence. Refer to Adjusting Purse Lines in Dump Valve, Section 11.5. Braided nylon for new purse lines can usually be purchased locally. Make sure you use nylon since it is self-lubricating underwater. After cutting new line, melt the ends to prevent fraying. Using a lighter tie a knot on the end of a new line large enough to prevent passage of the line through the fender washer. A recommended knot is illustrated in Fig. 35.

To replace all the purse lines:

1) Ensure the valve grommets are aligned properly. The two pairs of grommets with a larger space between them mark where the valve is folded. When folded correctly all the grommets will line up. When the valve is correctly installed in the bucket, the folded seal will be parallel to the ballast.

2) Ensure the new purse lines are melted at the loose end, and have a large enough knot to be secure at the fender washer. See Fig. 35 for recommended knot.

3) Mark the purse lines to the tie length given in Table 2. The tie length is described above and illustrated in Fig. 35.

4) Thread the purse lines, alternating from one side of the valve to the other.

5) Starting from one end fold of the valve, tie the purse line to the metal ring at the mark with a round turn and three half hitches.

6) Work towards the other end, tying the lines with equal tension from alternate sides of the ring.

**IMPORTANT: The best valve sealing action is effected when the outside lines of the valve have slightly greater tension than the inside lines.**

Further details on purse line adjustments are given in Section 11.5.

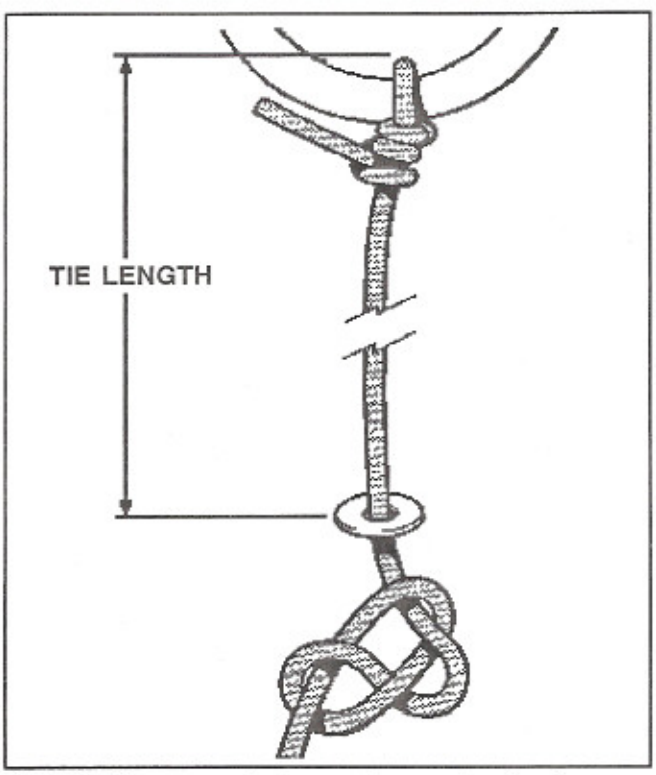



*Fig. 35: Recommended purse line washer knot.*

## 14.2 Suspension Line Replacement

Suspension lines should be replaced whenever they display noticeable kinking or fraying. Factory replacement lines can be ordered with or without the end thimbles swaged on. The incomplete lines can be swaged directly onto the fabric M-straps (as original equipment). Complete lines are attached to the M-straps with shackles. When using shackles, ensure that they are secured with a tie wrap or lock-wire before using bucket.

## 14.3 M-strap Replacement

Replace M-straps if they become noticeably worn. M-straps may be repaired, if frayed, by melting the fray with a lighter to stop the fray from spreading. The length of the M-straps is critical to proper functioning of the Bambi Bucket and we recommend that you replace worn straps with factory equipment. There are three types of straps: fabric long, fabric short and chain. Fabric shorts are used for the vertical straps. Fabric longs are used for the diagonal straps. Chains are used in the front of the larger Bambi Buckets where abrasion due to dragging can occur.

When replacing straps, do one set at a time to avoid confusion. Cut off the old straps from the shackle and untie them from the top of the bucket shell. Attach replacement straps per the originals. To avoid unnecessary wearing, it is important that the strapping be bound with tie wraps where it attaches to the shackles (observe originals). Secure the shackles with a tie wrap.

## 14.4 Dump Valve Replacement

Replacement dump valves come complete with new purse lines, bolts, nuts, washers, and butyl rubber sealant.

To replace a valve:

1) Remove old valve.

2) Apply a 1/2" (13 mm) x 1/8" (3 mm) bead of butyl rubber sealant in a circle around the inside of the bucket shell, just below the valve grommets, to make a seal between the shell fabric and the dump valve fabric. The correct location for the sealant is shown in Fig. 36.

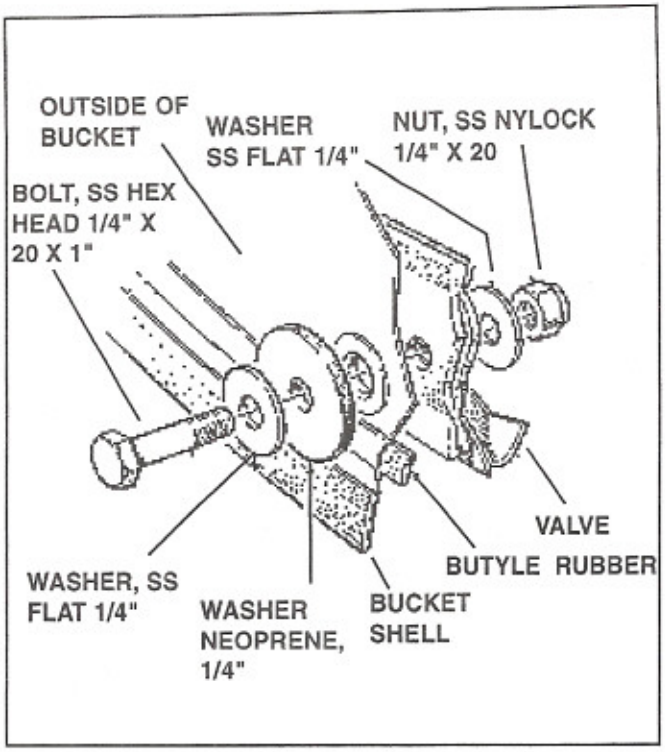



*Fig. 36. Valve fastenings: correct order.*

3) Close the mouth of the new valve.

4) There are two grommets at the top of the valve at opposite sides that are spaced further apart. This is where the valve folds flat. When the valve is folded flat, the seam will be in the middle of the top or bottom surface and the grommets at the top will line up.

5) Position the bucket with ballast pouch laying on the ground, place the new valve into the bucket with the valve mouth (when closed) parallel to the ballast pouch, and the ground. If the valve is not aligned correctly, it will leak.

6) Install the fastenings and snug up the nuts until two threads on the bolts show. See Fig. 36 for the correct order of the fastenings. Do not overtighten.

7) If the purse lines require tying or adjustment refer to the instructions in Section 11.5 and/or Section 14.1.

## 14.5 Bottom Loop Repairs

If the bottom loops which hold the chain become worn the frays can be melted with a lighter to prevent them from spreading. If the bottom loops require replacement, they should receive an overlay of heavy duty wear-resistant webbing.

## 14.6 Bucket Patching

Temporary patches using materials such as silicone sealant, roofing plastics etc. may spoil the surface for proper welded or heat-applied permanent repairs. A good quick way to repair the bucket is to apply a glued patch.

Before applying the glue and the patch, the damaged area must be thoroughly cleaned using a solvent (Isopropyl rubbing alcohol is recommended). Use Loctite 495 to glue the patch. The glue must be applied on one of the surfaces only (either patch or Bambi Bucket shell). When using this Loctite 495 glue, please consider the following:

> **WARNING:** Irritating by inhalation. Eye irritant. Combustible liquid. Contains cyanoacrilate ester which may cause allergic skin reaction. Skin contact through clothing may cause burns. Use adequate ventilation. In case of eye or body contact, flush with water. Get medical attention for any eye or internal contact.

Use Loctite 495 for the following Bambi Bucket models:

- Bambi Bucket models 6072 to 1821
- Bambi Bucket models 2024 to 6578

Please contact SEI Industries for further information on the glue and the patches to use.

## 14.7 Bucket Patching with a Hot Air Gun

**TOOLS AND MATERIALS REQUIRED**

- SEI patching kit
- One plastic hand held roller.
- One hot air gun, Steinel HL 1800E, or equivalent: 120 V - 1500 W
  200 to 1100 deg. F
  450 Lit. per min.
- One wide surface nozzle
- T.H.F. solvent or equivalent.

PROCEDURE

1. In a well ventilated location, clean the area to be repaired with T.H.F. or any other solvent compatible with the fabric. If another solvent is used, we recommend checking its compatibility on a repair piece of fabric from the kit.

2. Mount a wide surface air nozzle on the hot air gun so as to direct the heat flow in a large pattern.

3. Turn the power ON, and set the temperature in the low range first to let the hot air gun warm up. Increase the temperature as required during the operation.

> **CAUTION: DO NOT OVERHEAT OR BLACKEN THE FABRIC.**

4. Starting from the center of the patch held down by the roller as in Fig. 37 below, concentrate the heat flow equally to patch and fabric. Start applying a light pressure with the roller when the fabric starts melting. DO NOT OVERHEAT.

5. Roll the patch down to fuse it to the tank fabric moving roller and gun simultaneously.

6. Repeat until the entire patch has been fused to the tank.

7. Let the repaired area cool down.

8. With your fingers, attempt to peel off the patch at the edges. If the patch peels even slightly repeat the operation locally, otherwise the repair is complete.

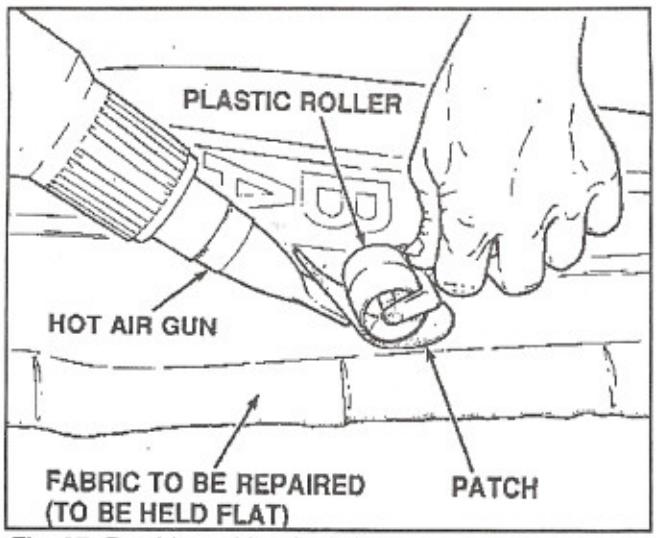



*Fig. 37: Patching with a hot air gun.*

**CAUTION: AVOID SKIN CONTACT WITH HOT AIR GUN NOZZLE OR HOT AIR BLAST. SERIOUS BURNS MAY RESULT.**

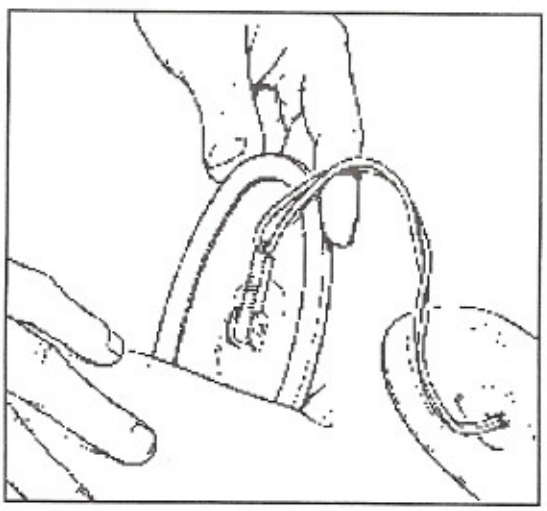
## 14.8 Bucket Patching with Repair Clamps

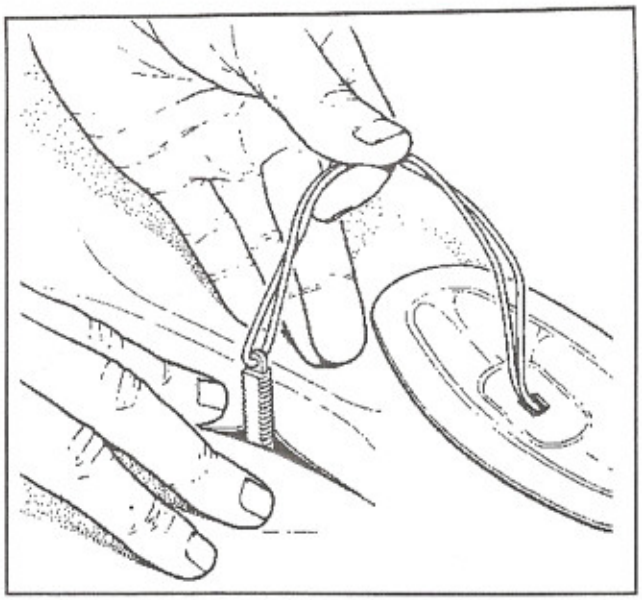
Repair clamps are used for an immediate repair to prevent loss of liquid through large rips or holes.

Repair clamps are used only for temporary repairs. The damage should be permanently repaired with a patch when convenient.

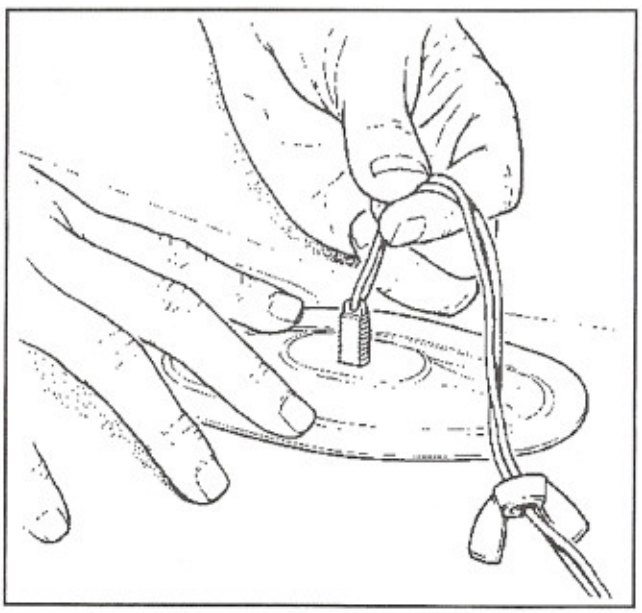
Procedure to install repair clamps:

1. Select the largest clamp that will just slip through the hole in the tank.



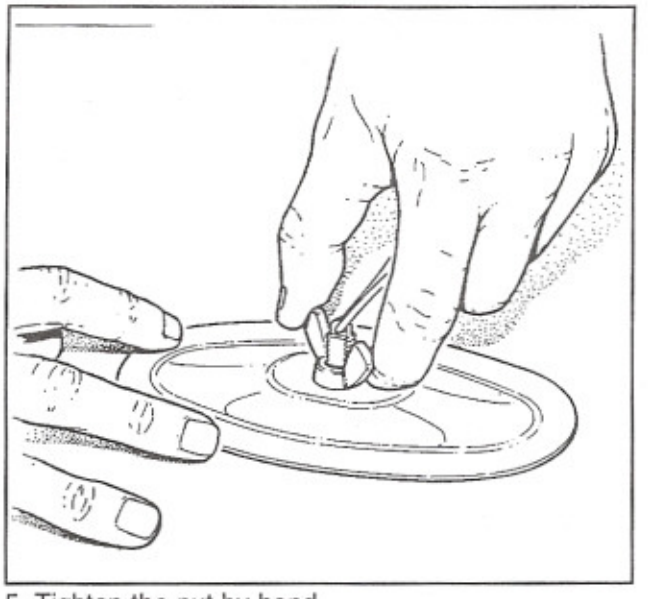


2. Keeping hold of the string, slip one half of the repair clamp through the hole as indicated above.



3. Pull the bolt up through the hole. Turn it until the clamp lines up with the hole.

4. Place the top of the clamp over the bolt.



5. Tighten the nut by hand.

**CAUTION: Tightening the nut with tools may break the bolt away from the lower clamp.**

Leaving the string on makes it easier to remove the repair clamp when placing a permanent patch on the bucket.

This procedure is to be used for repairs when hole(s) or small cuts occur. The size of cut or hole will determine the size of sealing clamp to use. Clamps may not form a leakproof repair if used on or over a seam. Sealing clamps are available from SEI Industries Ltd.

For a cut or hole up 2" (5 cm), use a 3" (7.6 cm) clamp.

For a cut or hole up to 4" (10 cm), use a 5" (12.7 cm) clamp.

For a cut or hole up to 6" (15 cm), use a 7.5" (19 cm) clamp.

Slip the inside clamp through the cut in the bucket and rotate it until it is parallel with the cut.

Center both clamps over the cut, tighten wing nut with fingers and then, if necessary, lightly tighten with pliers. The protruding cord may be cut off if desired. Overtightening can deform the clamp and cause leaks.

## 14.9 IDS HUB/SPOKES REPLACEMENT

There are three different IDS hub sizes. The small hub fits Bambi Bucket Models 6072 through 1821. The medium hub is found on Models 2024 through 5566. The large hub is found on Models 6578 and larger. Also note that spokes for small and medium hubs are hollow except for two solid spokes which are used on either side of the ballast. Model 5566 and larger have solid spokes throughout.

You can purchase the IDS system either as a complete kit or as individual pieces as required. We will describe here how to replace the entire assembly.

1) Start by removing the old IDS including the shell brackets and the old restrainer cable brackets. You will have to disconnect the trip line from the valve or control head since the trip line passes through the hub.

2) For reassembly, first install the new shell brackets. Install bolts through the bucket shell. Next, fit the fabric wear strips onto the bolts. Then fit the brackets to the bolts, and install and tighten the Nylock nuts.

3) Now install the two restrainer cable brackets. One is found below the ballast and the other is 6 o'clock directly opposite. No wear strips are required for the restrainer cable brackets.

4) With the ballast oriented at the 6 o'clock position, rotate the IDS assembly so that the deployment cable faces upward and is at the 6 o'clock on models 6072 through 1821. For models 2024 through HL9800, the deployment cable is at 3 o'clock.

5) Now attach the two spokes either side of 12 o'clock using the stainless steel clevis pins. Some models use rubber washers between the spoke and the brackets. Check the old assembly. Complete by fitting the fender washer and cotter pin. Working around the bucket perimeter, attach the rest of the spokes.

6) Attach the two restrainer cables. Refer to Section 5.3 for adjusting the length of the restrainer cables.

7) Once the IDS is fully installed, test for fit. You should be able to pull the hub past the midpoint position with a slight effort. If the IDS is either too loose or too tight, it will require adjustment.

8) Note that for Bambi Bucket Models 8096 through 1821. There are two adjustment spokes on either side of 12 o'clock opposite the ballast. For all the other models, the adjustment spokes are in either side of 6 o'clock above the ballast. If the IDS is too tight, adjust two of the spokes as follows:

Cut off the spoke just above the existing hole. Then redrill a new hole centred the same distance from the new end of the spoke as the other spokes. You will find this will likely produce a good fit.

If the IDS is still too tight or too loose, there are two extra adjustment spokes provided with your IDS kit which have one end that is undrilled. The spoke is also overlength. We recommend that you utilize a piece of scrap tubing or even some wood dowelling or broom handle to experiment with to determine a suitable spoke length. Then cut and drill the proper adjustment spokes to the corrected dimensions.

9) Don't forget to reattach the trip line to the dump valve passing the line through the hub. Also attach the IDS deployment cable to the control head small adjustment chain.

### LOAD TEST ON THE HOOK

Deployment cable adjustment can only be properly assessed on the hook of the helicopter or otherwise suspended with a full load of water. For this test with retrofits, the deployment cable is attached to the middle link of the adjustment chain. Check tension in the deployment cable. Under full load, the deployment cable should feel relaxed but not slack. The hub should be free to move up or down about 1/2" (13 mm).

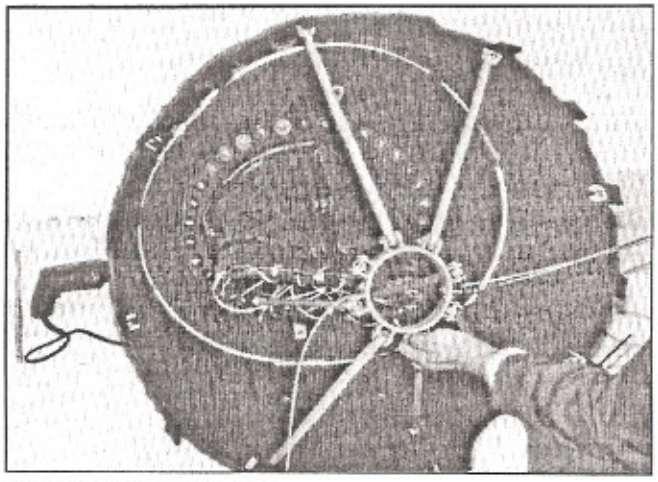


*Fig. 38: IDS Assembly*

# 15. WARRANTY

SEI Industries Ltd. (The Company) agrees to grant a Warranty for a period of one year from the date of purchase of Bambi Bucket systems on the following conditions:

a) The Company's sole obligation under this Warranty is limited to repairing or replacing, at the company's sole discretion, any product proved to be defective.

b) The Company's products are not guaranteed for any specific length of time or measure of service, but are warranted only to be free from defects in workmanship and material for a period of one year to the original purchaser.

c) To the extent allowable under applicable law, the Company's liability for consequential and incidental damages is expressly disclaimed. **The Company's liability in all events is limited to, and shall not exceed, the purchase price paid.**

d) This Warranty is granted to the original purchaser of Bambi Bucket systems and does not extend to a subsequent purchaser or assignee.

e) The Company must receive notification in writing of any claims of Warranty from the original purchaser which must give details of the claimed defect in the product.

f) Where the original purchaser is claiming under Warranty, the product must be returned to the Company for inspection with all transportation and duty charges prepaid.

g) The Warranty does not extend to any product that has been accidentally damaged, abraded, altered, punctured, abused, misused or used for a purpose which has not been approved by the Company.

h) This Warranty does not apply to any accessories used with the product that are not supplied by the Company, and any Warranty on such accessories must be requested from the manufacturer or dealer of the accessories.

i) In the event the original purchaser does not give notice of a Warranty claim within one year of the original purchase of the product, it is understood that the purchaser has waived the claim for Warranty and the purchaser and/or any subsequent purchaser must accept the condition of the product as it may be, without Warranty.

j) Any technical information supplied by the Company regarding the product is not a condition of Warranty but rather is information provided by the Company to the best of its knowledge.

k) There are no implied warranties nor is there any Warranty that can be assumed from any representation of any person, except the Company itself.

**Exclusions**

l) This Warranty is void if the product is not installed, used and/or maintained in acordance with the Field Manual supplied by SEI.

m) All Bambi Buckets are designed and manufactured with substantial safety margins. It is the responsibility of the user to ensure that the bucket is maintained to a safe standard.

# 16. SPECIFICATIONS

## 16.1 Capacity and Weight Specifications

| Model No. | Capacity | | | Gross Weight | | Empty Weight | |
|---|---|---|---|---|---|---|---|
| | U.S. Gal | Imp. Gal | Liters | Lbs | Kg | Lbs | Kg |
| 6072 | 72 | 60 | 270 | 666 | 303 | 66 | 30 |
| 8096 | 96 | 80 | 365 | 870 | 395 | 70 | 32 |
| 9011 | 108 | 90 | 410 | 971 | 441 | 70 | 32 |
| 1012 | 120 | 100 | 455 | 1072 | 487 | 72 | 33 |
| 1214 | 144 | 120 | 545 | 1273 | 579 | 73 | 33 |
| 1518 | 180 | 150 | 680 | 1574 | 797 | 75 | 34 |
| 1821 | 210 | 180 | 795 | 1876 | 853 | 76 | 35 |
| 2024 | 240 | 200 | 910 | 2135 | 970 | 135 | 61 |
| 2732 | 324 | 270 | 1225 | 2853 | 1300 | 154 | 70 |
| 3542 | 420 | 350 | 1590 | 3667 | 1667 | 167 | 76 |
| 4453 | 530 | 440 | 2000 | 4587 | 2085 | 170 | 85 |
| 5566 | 660 | 550 | 2500 | 5725 | 2602 | 225 | 102 |
| 5566HD | 660 | 550 | 2500 | 5805 | 2638 | 304 | 138 |
| 5870HD | 700 | 585 | 2655 | 6170 | 2805 | 330 | 150 |
| 6578HD | 780 | 650 | 2955 | 6846 | 3111 | 356 | 162 |
| 7590 | 900 | 750 | 3405 | 7775 | 3534 | 375 | 170 |
| HL5000 | 1320 | 1100 | 5000 | 11390 | 5177 | 390 | 177 |
| HL7600 | 2000 | 1665 | 7570 | 17115 | 7780 | 465 | 211 |
| HL9800 | 2600 | 2167 | 9840 | 22180 | 10081 | 530 | 241 |

**Note:** Specifications subject to change. Check original control head nameplate.

## 16.2 Suggested Buckets for Different Helicopters

WARNING: These are guidelines only.
The helicopter operator must make the decision as to which model Bambi Bucket is appropriate.

| Bambi Model | Gross Wt (lbs/Kg) | Suggested Helicopters |
|---|---|---|
| 6072 | 666/303 | Robinson R-44 |
| 8096 | 870/395 | Bell 47 & 206A, Enstrom F28F, F280FX, Rogerson Hiller RH-1100, UH-12E |
| 8096 (Short)* | 870/395 | McDonnell Douglas (Hughes) 500C, Schweizer 300C (Adjusted) |
| 9011 | 971/441 | Aerospatiale Alouette III & Gazelle, Bell 206B |
| 1012 | 1072/487 | EC120B |
| 1012 (Short)* | 1072/487 | McDonnell Douglas 500D, 500E, 530F |
| 1214 | 1273/579 | Aerospatiale A-Star & Ecureuil, Agusta 109A, Bell 206L1, 206L3, MBB-B0 105 CB |
| 1214 (Short)* | 1273/579 | McDonnell Douglas 530F |
| 1518 | 1574/797 | Aerospatiale Lama & Ecureuil 2, MBB-B0 105 LS, MI-2 |
| 1821 | 1876/853 | Aerospatiale AS 355, MD 600N |
| 2024 | 2135/970 | Aerospatiale AS365, MBB-BK 117, EC 135, Bell 407 |
| 2732 | 2853/1300 | Bell 204, Sikorsky S-76A, S-76B, MD Explorer, Bell 427 |
| 3542 | 3667/1667 | Augusta AB 212 & AB 412, Bell 204B, 205, 212 & 412 SP, Huey UH-1H, Bell 214ST |
| 4453 | 4587/2085 | Aerospatiale Puma, California/Sikorsky S58T, W3 Sokol |
| 5566HD | 5805/2638 | Aerospatiale Puma, Bell 214B & 214 St., Kawasaki-Boeing KV107, Sikorsky UH 60-A (Black Hawk), MI-8, MI-17 |
| 5870HD | 6170/2805 | K-MAX |
| 6578HD | 6846/3111 | UH60-L |
| 7590 | 7775/3534 | Agusta AS-61N-1, Aerospatiale Super Puma & Super Frelon, Sikorsky S-61 |
| HL5000 | 11390/5177 | Boeing Vertol CH46, EH101, MI-38, KA-32, Sikorsky CH53E |
| HL7600 | 17115/7780 | Sikorsky S-64 Skycrane |
| HL9800 | 22180/10081 | Boeing Vertol 234/CH47 (Chinook) |

# 17. WIRING DIAGRAM

A suggested wiring diagram for installing the Bambi Bucket is given below. (Note: Not for 12 volt 6072 Bambi )

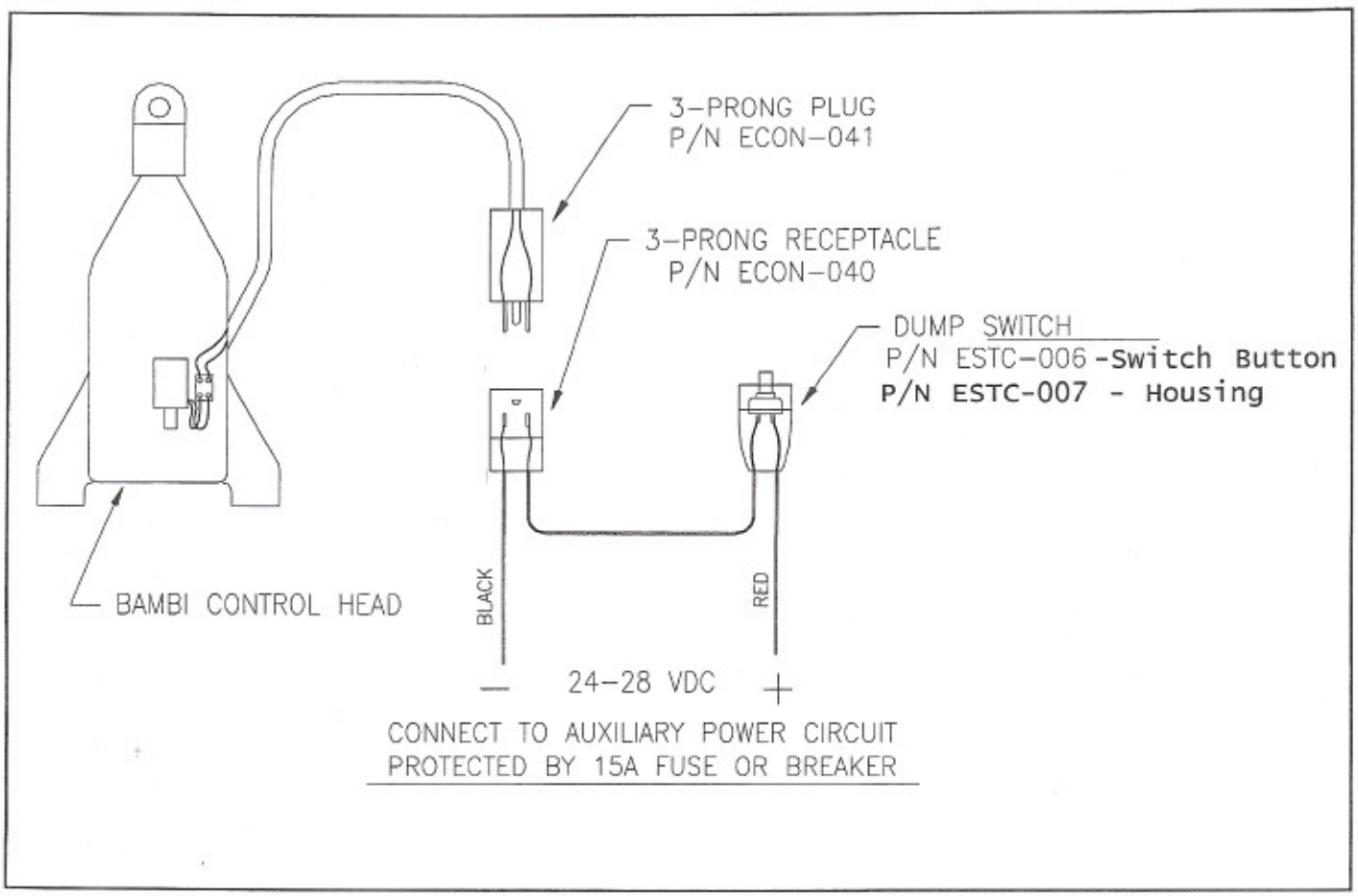
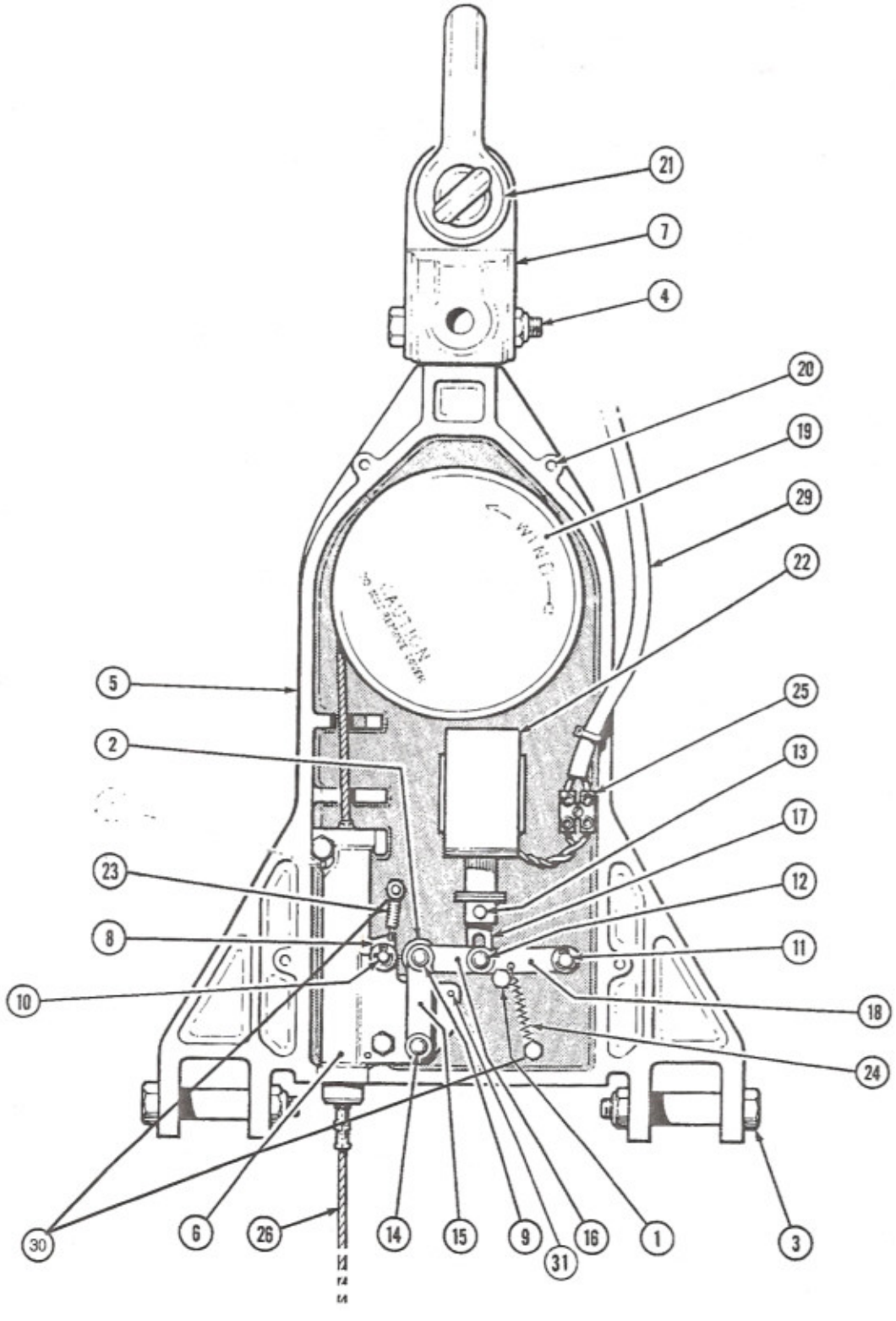



*Fig. 37: Control Wiring Diagram*

## 18.1 Parts Diagram



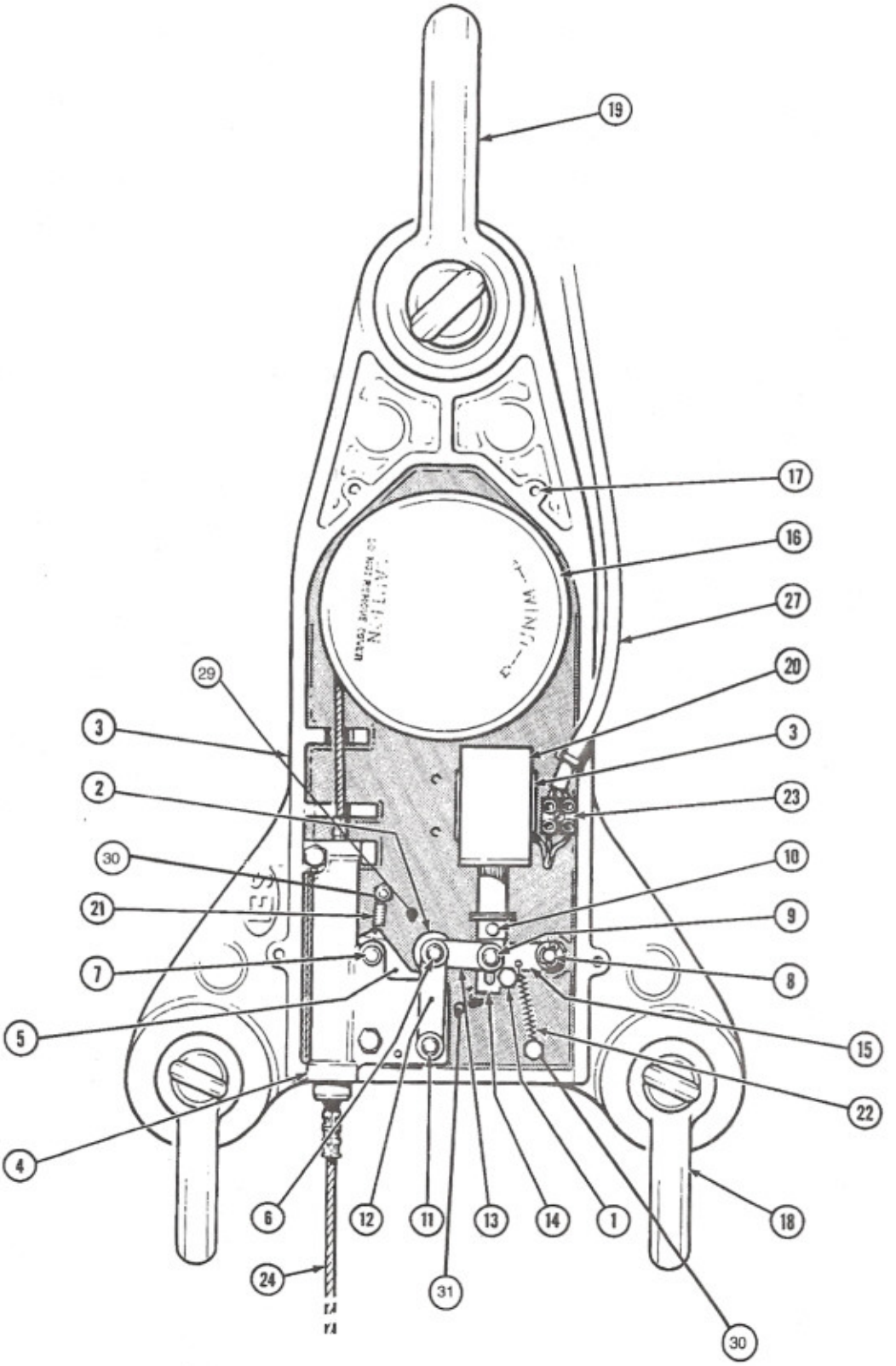
# 18. CONTROL HEAD PARTS, MODELS 6072-4453

## 18.2 Parts List

| Diagram | Part No. | Description | Qty. |
|---|---|---|---|
| 1 | FBSC-040312 | Stop bolt | 1 |
| | FNSC-0103 | Nut, stop bolt | 1 |
| 2 | PPB-002 | Bearing | 1 |
| 3 | FBCF-010830 | Bolt, suspension | 2 |
| | FNSF-0208-2 | Nut, suspension | 2 |
| 4 | FBCF-010830Y | Bolt, yoke | 1 |
| | FNSF-0208Y | Nut, yoke | 1 |
| 5 | BB-050 | Casting, base | 1 |
| | BB-060 | Casting, cover (Not shown) | 1 |
| 6 | BB-064 | Casting, trip block, machined | 1 |
| 7 | BB-066 | Casting, yoke, machined | 1 |
| 8 | BB-012 | Catch 1-1/2" long, small | 1 |
| 9 | FPCS-005 | Clevis pin, bearing | 1 |
| 10 | FPCS-003 | Clevis pin, catch | 1 |
| 11 | FPCS-005 | Clevis pin, long | 1 |
| 12 | FPCS-002 | Clevis pin, short | 1 |
| 13 | FPCS-001 | Clevis pin, solenoid | 1 |
| 14 | FPCS-005 | Clevis pin, swivel | 1 |
| 15 | BB-003 | Link, long | 2 |
| 16 | BB-004 | Link, short | 2 |
| 17 | BB-005 | Link, slotted | 1 |
| 18 | BB-006 | Link, spring | 1 |
| 19 | BB-002A | Reel, spring, std., 6072-1821 | 1 |
| | BB-019A | Reel, spring, h.d., 2024-4453 | 1 |
| 20 | FBSF-070314 | Screws, cover | 4 |
| | FNSF-0203 | Nuts, cover | 4 |
| 21 | FTAG-003 | Shackle, top | 1 |
| 22 | BB-001A | Solenoid and Piston, c/w bolts and nut, 24 volt | 1 |
| 23 | BB-021 | Spring, catch | 1 |
| 24 | BB-022 | Spring, return | 1 |
| 25 | PP-010 | Terminal block | 1 |
| | FSS-060206 | Screw, terminal block | 1 |
| 26 | BB-385 | Trip line assy., 2024-7590 | 1 |
| | BB-380 | Trip line assy., 6072-1821 | 1 |
| 27 | LB-001 | Spec. label, cover (Not shown) | 1 |
| 28 | LB-004 | Warning label, reel (Not shown) | 1 |
| 29 | BB-067 | Wire, lead | 1 |
| 30 | FBSCO40314 | 10-24 X 1 1/4 Pan Phil, SS, Machine Screw | 2 |
| 31 | FPSS-003 | Dowel pin, Link Stop | 1 |
| | BB-580-12 | Control Head, complete, 6072 only | 1 |
| | BB-580 | Control Head, complete, small (8096-1821) | 1 |
| | BB-585 | Control Head, complete, medium | 1 |

# 19. CONTROL HEAD PARTS, MODELS 5566-HL5000

## 19.1 Parts Diagram

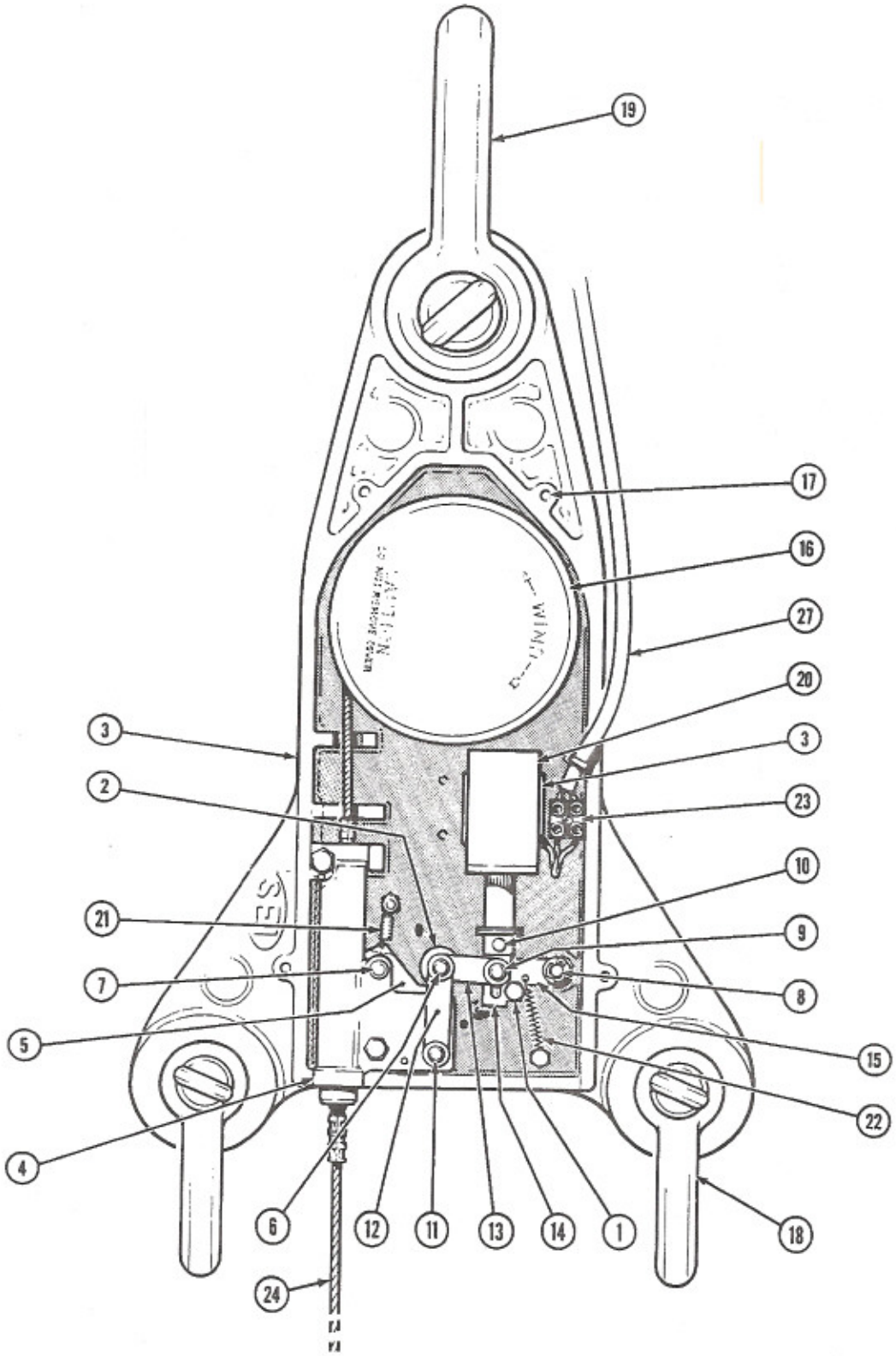


# 19. CONTROL HEAD PARTS, MODELS 5566-HL5000

## 19.2 Parts List

| Diagram | Part No. | Description | Qty. |
|---|---|---|---|
| 1 | FBSC-040312 | Stop bolt | 1 |
| | FNSC-0103 | Nut, Stop bolt | 1 |
| 2 | PPB-002 | Bearing | 1 |
| 3 | BB-055 | Casting, base, large machined | 1 |
| | BB-060 | Casting, cover, machined | 1 |
| 4 | BB-064 | Casting, trip block | 1 |
| 5 | BB-013 | Catch 2" long large | 1 |
| 6 | FPCS-005 | Clevis pin, bearing | 1 |
| 7 | FPCS-003 | Clevis pin, catch | 1 |
| 8 | FPCS-008 | Clevis pin, long | 1 |
| 9 | FPCS-002 | Clevis pin, short | 1 |
| 10 | FPCS-001 | Clevis pin, solenoid | 1 |
| 11 | FPCS-005 | Clevis pin, swivel | 1 |
| 12 | BB-003 | Link, long Bambi head | 2 |
| 13 | BB-004 | Link, short E Bambi head | 2 |
| 14 | BB-005 | Link, slotted D Bambi head | 1 |
| 15 | BB-023 | Link, spring, large Bambi head | 1 |
| 16 | BB-019A | Reel, spring, heavy duty, assembly | 1 |
| 17 | FBSF-070324 | Screws, cover | 4 |
| | FNSC-0203 | Nuts, cover | 4 |
| 18 | FTAG-003 | Shackle, suspension | 2 |
| 19 | FTAG-005 | Shackle, top | 1 |
| 20 | BB-001AL | Solenoid and Piston, c/w bolts and nuts | 1 |
| 21 | BB-021 | Spring, catch | 1 |
| 22 | BB-022 | Spring, return | 1 |
| 23 | PP-010 | Terminal block | 1 |
| | FSS-060206 | Screw, terminal block | 1 |
| 24 | BB-385 | Trip line assy., 5566-7590 | 1 |
| | BB-390 | Trip line assy., HL3800 to HL9800 | 1 |
| 25 | LB-001 | Spec label, cover (Not shown) | 1 |
| 26 | LB-003 | Warning label, reel (Not shown) | 1 |
| 27 | BB-067 | Lead wire, Bambi head | 1 |
| 29 | FBSC-010414 | 1/4-20 x 1-1/2 Hex Head Bolt with Hex Nut | |
| 30 | FBSC-040314 | 10-24 x 1-1/4 Pan Phil with Hex Nut | |
| 31 | FBSC0100410 | 1/4 - 20 x 1" Hex Head Bolt | 1 |
| | BB590 | Head Bambi large aluminium (5566-7590) | 1 |

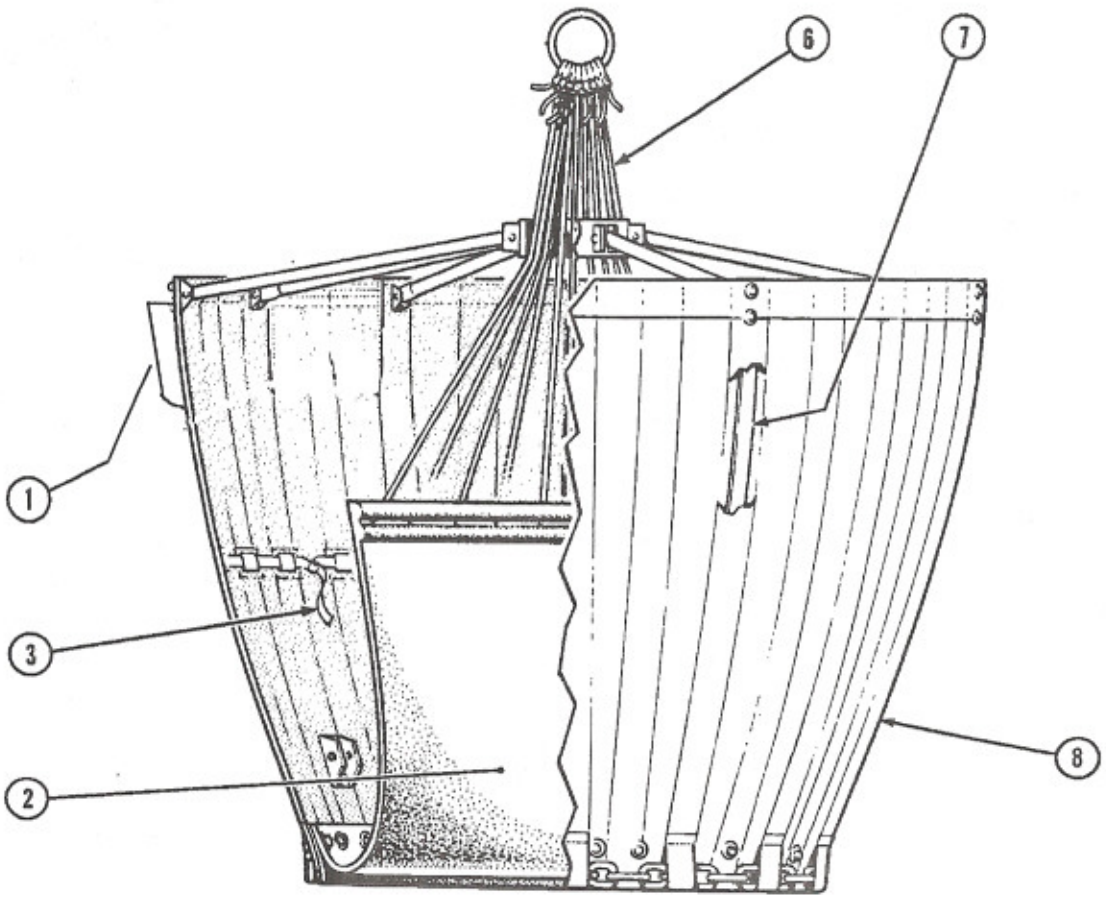
## 19.3 Parts Diagram



## 19.4 Parts List

| Diagram | Part No. | Description | Qty. |
|---|---|---|---|
| 1 | FBSF-040314 | Stop bolt | 1 |
| | FNSF-0103 | Nut, Stop bolt | 1 |
| 2 | PPB-002 | Bearing | 1 |
| 3 | BB-056 | Casting, base, AlBr machined | 1 |
| | BB-060 | Casting, cover, machined | 1 |
| 4 | BB-064 | Casting, trip block | 1 |
| 5 | BB-013 | Catch 2" long large | 1 |
| 6 | FPCS-005 | Clevis pin, bearing | 1 |
| 7 | FPCS-003 | Clevis pin, catch | 1 |
| 8 | FPCS-008 | Clevis pin, long | 1 |
| 9 | FPCS-002 | Clevis pin, short | 1 |
| 10 | FPCS-001 | Clevis pin, solenoid | 1 |
| 11 | FPCS-005 | Clevis pin, swivel | 1 |
| 12 | BB-003 | Link, long Bambi head | 2 |
| 13 | BB-004 | Link, short E Bambi head | 2 |
| 14 | BB-005 | Link, slotted D Bambi head | 1 |
| 15 | BB-023 | Link, spring, large Bambi head | 1 |
| 16 | BB-019A | Reel, spring, heavy duty, assembly | 1 |
| 17 | BSF-040306 | Screws, cover | 4 |
| 18 | FTAG-006 | Shackle, suspension | 2 |
| 19 | FTAG-005 | Shackle, top | 1 |
| 20 | BB-001AL | Solenoid and Piston, c/w bolts and nuts | 1 |
| 21 | BB-021 | Spring, catch | 1 |
| 22 | BB-022 | Spring, return | 1 |
| 23 | PP-010 | Terminal block | 1 |
| | FBSC-070105 | Screw, terminal block | 1 |
| 24 | BB-390 | Trip line assy., HL5000 to HL9800 | 1 |
| 25 | LB-001 | Spec label, cover (Not shown) | 1 |
| 26 | LB-003 | Warning label, reel (Not shown) | 1 |
| 27 | BB-067 | Lead wire, Bambi head | 1 |
| 29 | FBSF-010412 | 1/4-28 x 1-1/4 Hex Head Bolt with Hex Nut | |
| 30 | FBSF-040312 | 10-32 x 1-1/4 Pan Phil with Hex Nut | |
| 31 | FBSC0100410 | 1/4 - 20 x 1" Hex Head Bolt | 1 |
| | BB-595 | Head Bambi Bronze (HL7600-HL9800 | 1 |

# 20. SHELL AND VALVE MODELS 6072-1821



## 20.2 Parts List

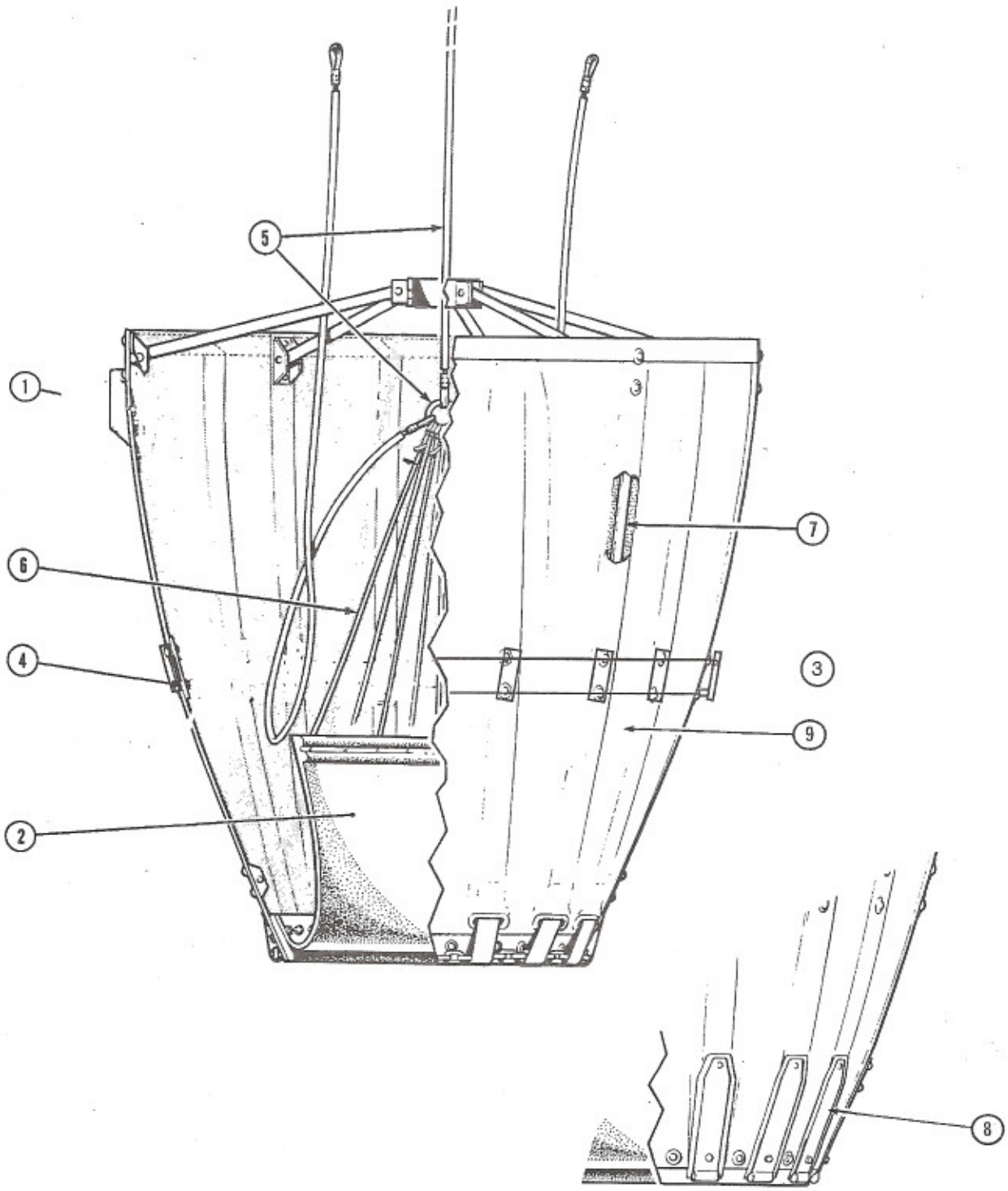
| Diagram# | Part No. | Description | Qty. |
|---|---|---|---|
| 1 | BB-650 | Ballast Plates 8 lbs. (3.6 kg) | 2 |
| | BB-656B | Backing Plates | as required |
| 2 | BB-250A | Dump Valve Kit 6072-1214 | 1 |
| | BB-251A | Valve Kit 1518-1821 | 1 |
| | BB-699 | FCAS Cinch Strap, 6072 | 1 |
| 3 | BB-700 | FCAS Cinch Strap, 8096 | 1 |
| | BB-701 | FCAS Cinch Strap, 9011 | 1 |
| | BB-702 | FCAS Cinch Strap, 1012 | 1 |
| | BB-703 | FCAS Cinch Strap, 1214 | 1 |
| | BB-704 | FCAS Cinch Strap, 1518 | 1 |
| | BB-705 | FCAS Cinch Strap, 1821 | 1 |
| 6 | BB-880 | Purse Line Set, 6072-1214 | 1 (set of 10) |
| | BB-881 | Purse Line Set, 1518-1821 | 1 (set of 10) |
| 7 | BB-599 | Side Battens, with Caps, 6072 | 16 |
| | BB-600 | Side Battens, with Caps, 8096 | 16 |
| | BB-601 | Side Battens, with Caps, 9011 | 16 |
| | BB-602 | Side Battens, with Caps, 1012 | 16 |
| | BB-603 | Side Battens, with Caps, 1214 | 16 |
| | BB-604 | Side Battens, with Caps, 1518 | 16 |
| | BB-605 | Side Battens, with Caps, 1821 | 16 |
| 8 | *BB-949 | Shell only, 6072, Small | 1 |
| | *BB-950 | Shell only, 8096, Small | 1 |
| | *BB-951 | Shell only, 9011, Small | 1 |
| | *BB-952 | Shell only, 1012, Small | 1 |
| | *BB-953 | Shell only, 1214, Small | 1 |
| | *BB-954 | Shell only, 1518, Small | 1 |
| | *BB-955 | Shell only, 1821, Small | 1 |

*Add "S" part number when a complete shell is required. Eg. BBS-952 consists of:

- Shell with
  - valve kit
  - battens
  - ballast plates
  - cinch system
  - bottom chains/plates

# 21. SHELL AND VALVE, MODELS 2024-HL9800

## 21.1 Parts Diagram



## 21.2 Parts List

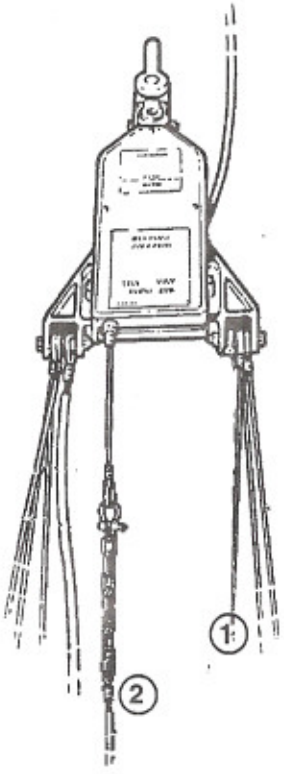
| Diagram# | Part No. | Description | | Qty |
|---|---|---|---|---|
| 1 | BB-655TG | Ballast Plate, Large (5566-HL9800, as required) 16 lbs. (7.2 kg) | | as required |
| | BB-656TG | Ballast Plate, Small (2024-5566, as required) 8 lbs. (3.6 kg) | | as required |
| | BB-657 | Bolt Kit, Ballast plate, Small (one plate) | | 1 |
| | BB-659 | Wear Strip for Cast Ballast Plate, All | | 1 |
| | BB-658 | Bolt Kit, Ballast plate, Large (one plate) | | 1 |
| 2 | BB-252A | Dump Valve Kit, 2024-3542 | 35 Bolt, 14 lines | 1 |
| | BB-253A | Dump Valve Kit, 4453-5566 | 40 Bolt, 17 lines | 1 |
| | BB-253B | Dump Valve Kit, 6578-HL7600 | | 1 |
| | BB-254A | Dump Valve Kit, HL9800 | | 1 |
| | BB-255A | Dump Valve Kit, 3542 (old style) | 40 Bolt, 14 lines | 1 |
| 3 | BB-710 | FCAS Cinch Strap, 2024 | | 1 |
| | BB-711 | FCAS Cinch Strap, 2732 | | 1 |
| | BB-712 | FCAS Cinch Strap, 3542 | | 1 |
| | BB-713 | FCAS Cinch Strap, 4453 | | 1 |
| | BB-714 | FCAS Cinch Strap, 5566 | | 1 |
| | BB-715 | FCAS Cinch Strap, 6578 | | 1 |
| | BB-720 | FCAS Cinch Strap, 7590 | | 1 |
| | BB-722 | FCAS Cinch Strap, HL5000 | | 1 |
| | BB-723 | FCAS Cinch Strap, HL7600 | | 1 |
| | BB-724 | FCAS Cinch Strap, HL9800 | | 1 |
| | BB-714E | FCAS Cinch Strap 5566 External | | 1 |
| | BB-715E | FCAS Cinch Strap 6578 External | | 1 |
| | BB-720E | FCAS Cinch Strap 7590 External | | 1 |
| | BB-722E | FCAS Cinch Strap HL5000 External | | 1 |
| | BB-723E | FCAS Cinch Strap HL7600 External | | 1 |
| | BB-724E | FCAS Cinch Strap HL9800 External | | 1 |
| 4 | BB-745 | Stand-off Spacer, plastic, square (2024-5566) | | 32 |
| | BB-746 | Stand-off Spacer, plastic, square (7590-HL9800) | | 40 |
| | BB-746A | Stand-off Spacer, plastic, round (5566-HL9800) | | 40 |
| | BB-747 | Cinch Strap Bar, alum., square (2024-HL9800) | | 20 |
| | BB-748 | Cinch Strap Bar, alum., round (5566-HL9800) | | 20 |
| | BB-749 | Cinch Strap Bar, alum., formed (2024-4453) (no spacer req'd) | | 16 |
| 5 | BB-280 | Risers 2024 | | 1 |
| | BB-281 | Risers 2732 | | 1 |
| | BB-282 | Risers 3542, 4453 | | 1 |
| | BB-283 | Risers, 5566 | | 1 |
| | BB-290 | Risers, 6578, 7590 | | 1 |
| | BB-291 | Risers, HL500, HL7600 | | 1 |
| | BB-292 | Riser, HL7600 | | 1 |
| | BB-293 | Risers, HL9800 | | 1 |
| 6 | BB-885 | Purse String Set, 2024-3542 | | 1 (set of 14) |
| | BB-890 | Purse String Set, 4453-HL9800 | | 1 (set of 17) |
| 7 | BB-610 | Batten for 2024 | | 16 |
| | BB-611 | Batten for 2732 | | 16 |
| | BB-612 | Batten for 3542 | | 16 |
| | BB-613 | Batten for 4453 | | 16 |
| | BB-614 | Batten for 5566 | | 16 |
| | BB-615 | Batten for 6578 | | 20 |
| | BB-620 | Batten for 7590 | | 20 |
| | BB-622 | Batten for HL5000 | | 20 |
| | BB-623 | Batten for HL7600 | | 20 |
| | BB-624 | Batten for HL9800 | | 20 |
| 8 | BB-080A | S/S Bottom Plate, 6578-HL9800 | | 20 |
| | BB-083 | Fastener Kit , Bottom Plates, 2024-5566 | | 1 (set for 16 plates) |
| | BB081-OBU | Wear Strip, Fabric, 7590 & larger | | |
| | BB082-OBU | Wear Strip, Fabric, 2024-5566HD | | |
| 9 | *BB-960 | Shell, 2024 Medium | | 1 |
| | *BB-961 | Shell, 2732 Medium | | 1 |
| | *BB-962 | Shell, 3542 Medium | | 1 |
| | *BB-963 | Shell, 4453 Medium | | 1 |
| | *BB-964H | Shell, 5566 Medium | | 1 |
| | *BB-965H | Shell, 6578, Large Series | | 1 |
| | *BB-970 | Shell, 7590, Large | | 1 |
| | *BB-972 | Shell, HL5000, Large | | 1 |
| | *BB-973 | Shell, HL7600, Large | | 1 |
| | *BB-974 | Shell, HL9800, Large | | 1 |

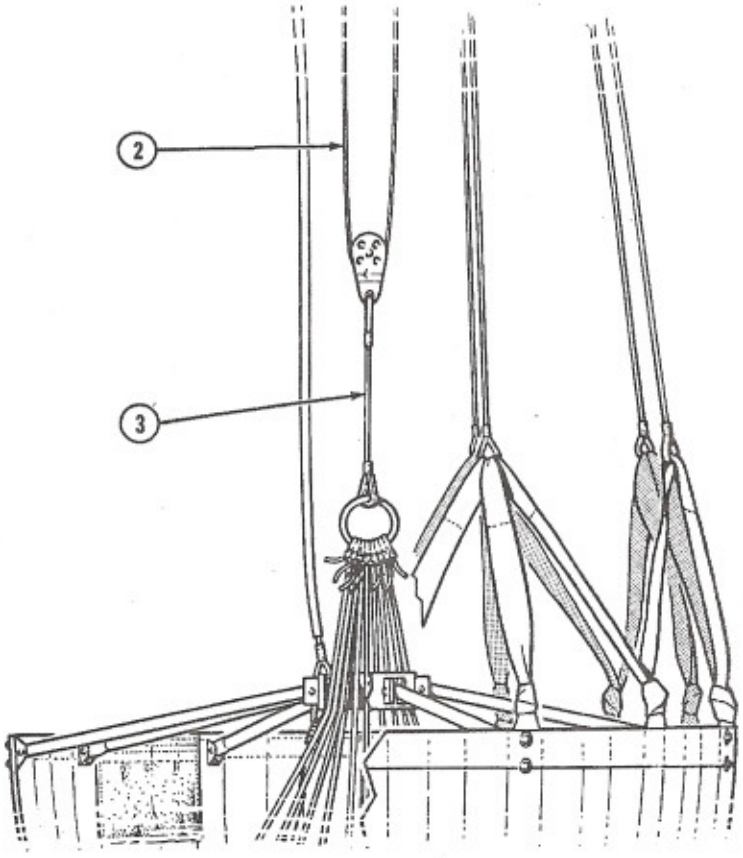
*Add "S" part number when a complete shell is required. Eg. BBS-952 consists of:

- Shell with
  - valve, battens, ballast pouch, cinch system, bottom chains/plates

# 22. RIGGING, MODELS 6072-1821

## 22.1 Parts Diagram



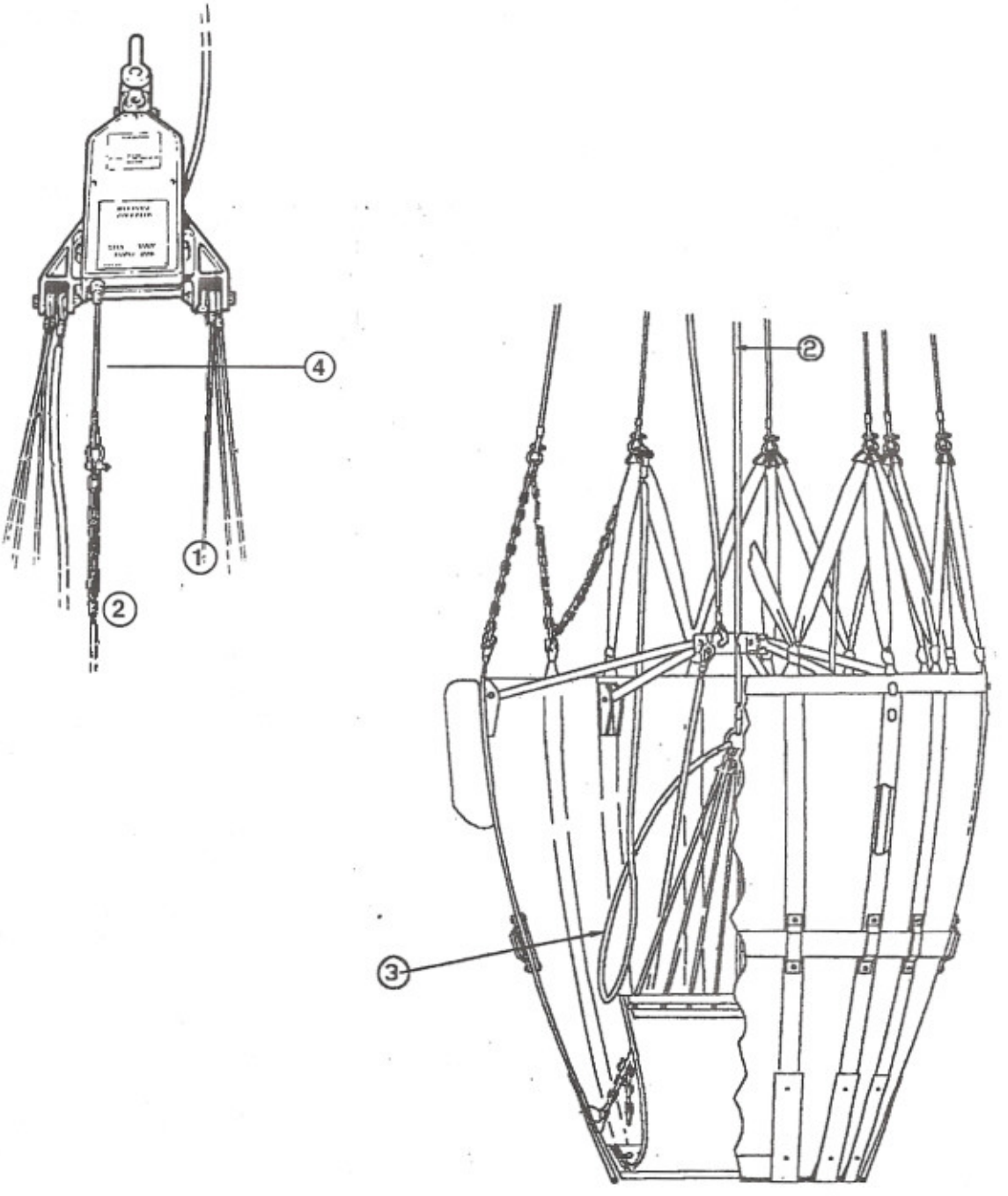



# 22. RIGGING, MODELS 6072-1821

## 22.2 Parts List

| Diagram# | Part No. | Description | Qty. |
|---|---|---|---|
| 1 | BB-829 | Suspension Line, Set, 6072 | 4 pairs/set |
| | BB-830 | Suspension Line, Set, 8096-1821 | 4 pairs/set |
| 2 | BB-380 | Trip Line and Pulley, 6072-1821 | 1 |
| 3 | BB-275 | Ring, Riser, 6072-1821 | 1 |

## 23.1 Parts Diagram

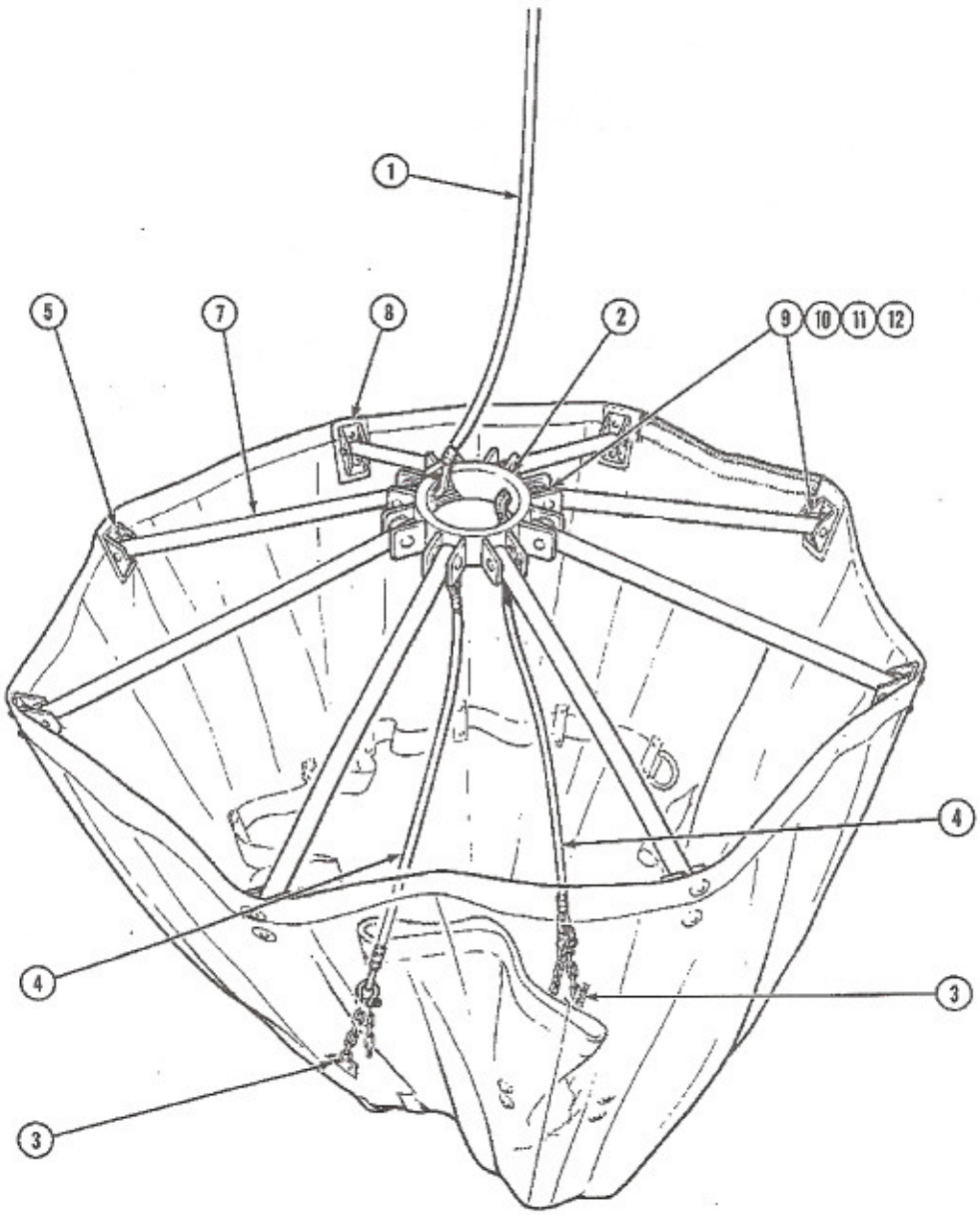


## 23.2 Parts List

| Diagram# | Part No. | Description | Qty. |
|---|---|---|---|
| 1 | BB-835 | Suspension Line Set, 2024 | 4 pairs/set |
| | BB-836 | Suspension Line Set, 2732-4453 | 4 pairs/set |
| | BB-837 | Suspension Line Set, 5566 | 4 pairs/set |
| | BB-838 | Suspension Line Set, 6578-HL5000 | 4 pairs + 2 singles/set |
| | BB-842 | Suspension Line Set, HL7600 | 4 pairs + 2 singles/set |
| | BB-844 | Suspension Line Set, HL9800 | 4 pairs + 2 singles/set |
| 2 | BB-280 | Risers, 2024 | 1 |
| | BB-281 | Risers, 2732 | 1 |
| | BB-282 | Risers, 3542-4453 | 1 |
| | BB-283 | Risers, 5566 | 1 |
| | BB-290 | Risers, 6578-7590 | 1 |
| | BB-291 | Risers, HL5000 | 1 |
| | BB-292 | Risers, HL7600 | 1 |
| | BB-293 | Risers, HL9800 | 1 |
| 3 | BB-225 | Valve Restrainer Cable, 2024 | 2 |
| | BB-226 | Valve Restrainer Cable, 2732 | 2 |
| | BB-227 | Valve Restrainer Cable, 3542 | 2 |
| | BB-228 | Valve Restrainer Cable, 4453 | 2 |
| | BB-229 | Valve Restrainer Cable, 5566 | 2 |
| | BB-230 | Valve Restrainer Cable, 6578-7590 | 2 |
| | BB-232 | Valve Restrainer Cable, HL5000 | 2 |
| | BB-233 | Valve Restrainer Cable, HL7600 | 2 |
| | BB-234 | Valve Restrainer Cable, HL9800 | 2 |
| 4 | BB-385 | Tripline, 2024-7590 | 1 |
| | BB-390 | Tripline, HL5000-HL9800 | 1 |
| | BB-670 | M-Strap, 6072 - 1821, Loop | |
| | BB-671 | M-Strap, 6072 - 1821, Straight | |
| | BB-674 | M-Strap, 2024, Loop | |
| | BB-675 | M-Strap, 2024, Straight | |
| | BB-677 | M-Strap, 2732-4453, Loop | |
| | BB-678 | M-Strap, 2732-4453, Straight | |
| | BB-679 | M-Strap, 5566, Loop | |
| | BB-680 | M-Strap, 5566-6578, Straight | |
| | BB-681 | M-Strap, 6578-7590, Loop | |
| | BB-682 | M-Straps, 7590, Straight | |
| | BB-683 | M-Straps, HL 5000, Loop | |
| | BB-684 | M-Straps, HL 5000, Straight | |
| | BB-685 | M-Straps, HL 7600, Loop | |
| | BB-686 | M-Straps, HL 7600, Straight | |
| | BB-687 | M-Straps, HL 9800, Loop | |
| | BB-688 | M-Straps, HL 9800, Straight | |
| | BB-780 | Chain Top 14 ½ - 2024 | |
| | BB-781 | Chain Top 16 ½ - 2024 | |
| | BB-781S | Chain Top, Set 2024(2XBB-780, 6XBB-781) | |
| | BB-782 | Chain Top 18 ½ - 2732-5566 | |
| | BB-783 | Chain Top 20 ½ - 2732-5566 | |
| | BB-783S | Chain Top, Set 2732-5566(2XBB-782, 6XBB783) | |
| | BB-784 | Chain Top 19 ½ - 6578-7590 | |
| | BB-785 | Chain Top 20 ¾ - 6578-7590 | |
| | BB-786 | Chain Top 17 ½ - HL 5000 | |
| | BB-787 | Chain Top 21 ½ - HL 5000 | |
| | BB-788 | Chain Top 26" HL 7600 | |
| | BB-789 | Chain Top 28" HL 7600 | |
| | BB-789S | Chain Top, Set HL7600(2XBB-788, 3XBB-789) | |
| | BB-790 | Chain Top 32" HL 9800 | |
| | BB-791 | Chain Top 34" HL 9800 | |

## 24.1 Parts Diagram

**(May not exactly be illustrated as per drawing.
Please refer to appropriate parts list.)**

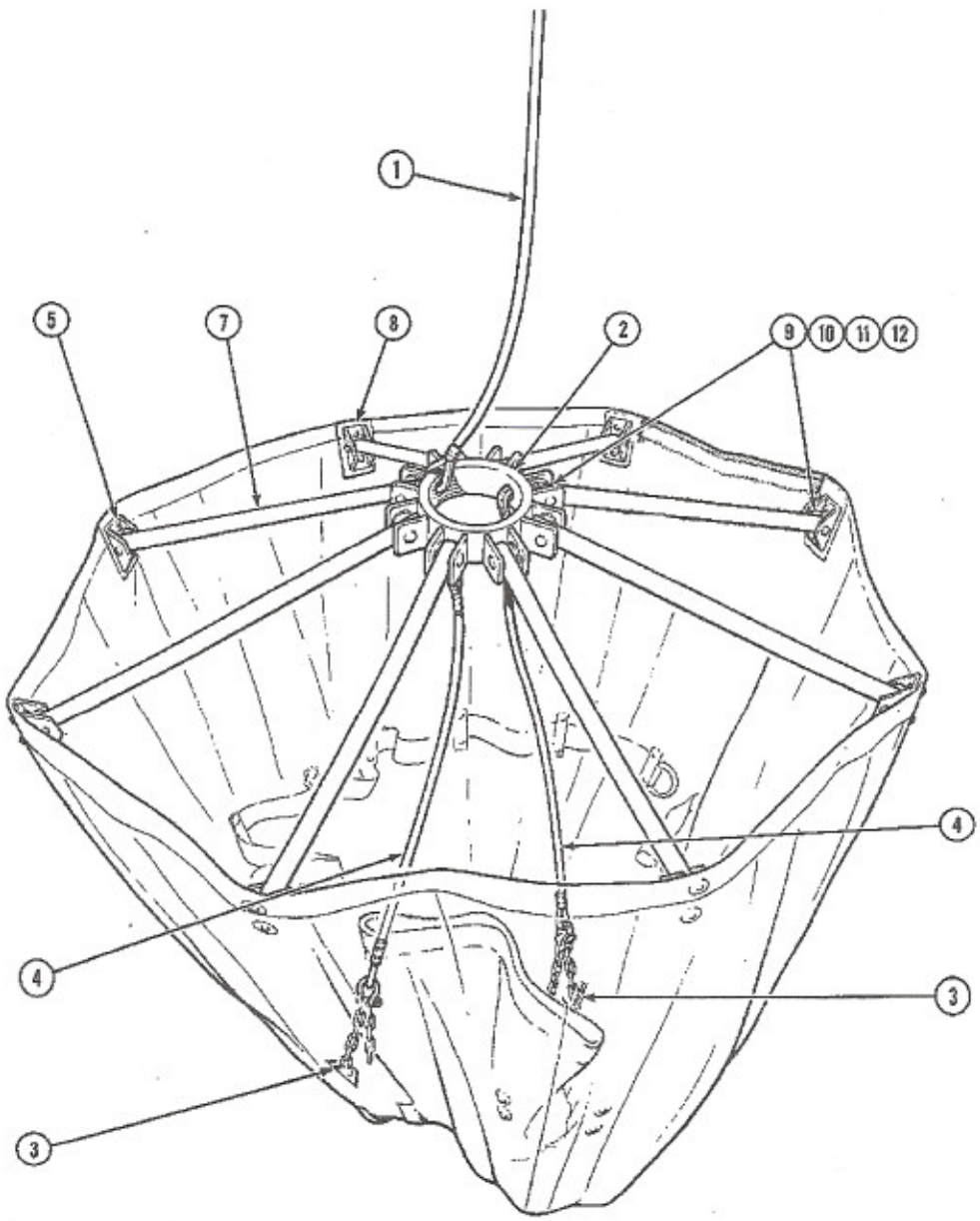


## 24.2 Parts List

| Diagram# | Part No. | Description | Qty. |
|---|---|---|---|
| 1 | BB-349 | Cable, IDS Deployment, 6072 | 1 |
| | BB-350 | Cable, IDS Deployment, 8096 | 1 |
| | BB-350S | Cable, IDS Deployment, 8096-1012, short | 1 |
| | BB-351 | Cable, IDS Deployment, 9011,1012 | 1 |
| | BB-352 | Cable, IDS Deployment, 1214 | 1 |
| | BB-352S | Cable, IDS Deployment, 1214 Short | 1 |
| | BB-353 | Cable, IDS Deployment, 1518-1821 | 1 |
| 2 | BB-451 | Hub Small Casting | 1 |
| 3 | BB-330 | Brackets Restrainer | 2 |
| 4 | BB-299 | Cables Hub Restrainer 6072 | 2 |
| | BB-300 | Cables Hub Restrainer 8096 | 2 |
| | BB-301 | Cables Hub Restrainer 9011/1012/1214 | 2 |
| | BB-302 | Cables Hub Restrainer 1518/1821 | 2 |
| 5 | BB-454 | Brackets shell small | 8 |
| 6 | BB-398 | Spokes, IDS, Solid, 6072 | 2 |
| | BB-400 | Spokes, IDS, Solid, 8096 | 2 |
| | BB-402 | Spokes, IDS, Solid, 9011-1214 | 2 |
| | BB-404 | Spokes, IDS, Solid, 1518/1821 | 2 |
| *7 | BB-399 | Spokes, IDS, Tube, 6072 | 6 |
| | BB-401 | Spokes, IDS, Tube, 8096 | 6 |
| | BB-403 | Spokes, IDS, Tube, 9011-1214 | 6 |
| | BB-405 | Spokes, IDS, Tube, 1518/1821 | 6 |
| 8 | BB-469 | Wear Strip, Bracket | 8 |
| 9 | FPCS-004 | Clevis Pin (welded hub only) | 16 |
| | FPCS-004 | Clevis Pin (cast hub) | 8 |
| | FPCS-005 | Clevis Pin (cast hub) | 8 |
| 10 | FPDB-001 | Cotter Pin | 16 |
| 11 | FWS-0104-0 | Flat Washer | 16 |

***Note: As of July 2000, all small series buckets (6072 - 1821) are manufactured with all solid spokes. If spoke tubes are ordered, solid spokes will be supplied. (Ref: Design Change No. BA-092)**

## 25.1 Parts Diagram

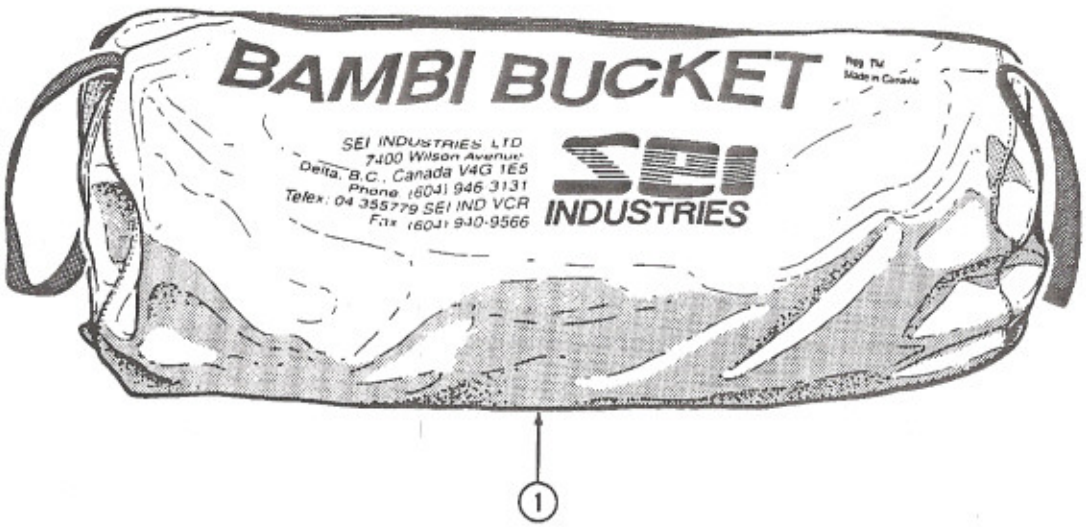


## 25.2 Parts List

| Diagram # | Part No. | Description | Qty. |
|---|---|---|---|
| 1 | BB-360 | Deployment Cable Assy, 2024 | 1 |
| | BB-361 | Deployment Cable Assy, 2732-4453 | 1 |
| | BB-364 | Deployment Cable Assy, 5566 | 1 |
| | BB-370 | Deployment Cable Assy, 6578/7590 | 1 |
| | BB-372 | Deployment Cable Assy, HL5000 | 1 |
| | BB-373 | Deployment Cable Assy, HL7600 | 1 |
| | BB-374 | Deployment Cable Assy, HL9800 | 1 |
| 2 | BB-456 | Hub, Medium Casting, Machined, 2024-5566 | 1 |
| | BB-461 | Hub, Large Casting, Machined, 6578-HL9800 | 1 |
| 3 | BB-330 | Restrainer Brackets | 2 |
| 4 | BB-310 | Cables Hub Restrainer 2024 | 2 |
| | BB-311 | Cables Hub Restrainer 2732 | 2 |
| | BB-312 | Cables Hub Restrainer 3542 | 2 |
| | BB-313 | Cables Hub Restrainer 4453 | 2 |
| | BB-314 | Cables Hub Restrainer 5566 | 2 |
| | BB-320 | Cables Hub Restrainer 6578/7590 | 2 |
| | BB-322 | Restrainer Cable Assy, Hub, HL5000 | 2 |
| | BB-323 | Restrainer Cable Assy, Hub, HL7600 | 2 |
| | BB-324 | Restrainer Cable Assy, Hub, HL9800 | 2 |
| 5 | BB-465 | Shell Brackets, 2024-5566 | 8 |
| | BB-466 | Shell Brackets, 6578-HL9800 | 8 |
| 7 | BB-410 | Spoke Tube IDS, 2024 | 8 |
| | BB-411 | Spoke Tube IDS, 2732 | 8 |
| | BB-412 | Spoke Tube IDS, 3542 | 8 |
| | BB-413 | Spoke Tube IDS, 4453 | 8 |
| | BB-414 | Spoke Tube IDS, 5566 | 8 |
| | BB-415 | Spoke Solid, 6578 | 10 |
| | BB-420 | Spoke Solid IDS, 7590 | 10 |
| | BB-422 | Spoke Solid IDS, HL5000 | 10 |
| | BB-423 | Spoke Solid IDS, HL7600 | 10 |
| | BB-424 | Spoke Solid IDS, HL9800 | 10 |
| 8 | BB-469 | IDS Bracket Wear Strip | 8 |
| 9 | FPCC-020 | Clevis Pin, 2024-5566 (cast and welded hub) | 16 |
| | FPCC-020 | Clevis Pin, 6578-HL9800 (welded hub) | 20 |
| | FPCC-023, FPCC-020 | Clevis Pin, 6578-HL9800 (cast hub) | 10 (of each part #) |
| 10 | FPDC-002 | Cotter Pin, 2024-5566 | 16 |
| | FPDC-002 | Cotter Pin, 6578-HL9800 | 20 |
| 11 | FWS-0605-06 | Flat Washer, 2024-5566 | 16 |
| | FWS-0605-06 | Flat Washer, 6578-HL9800 | 20 |
| 12 | FWR-0105 | Spacer, Rubber, 2024-5566 | 32 |
| | FWR-0105 | Spacer, Rubber, 6578-HL9800 | 40 |

# 26. PACKAGING

## 26.1 Parts Diagram



## 26.2 Parts List

| Diagram# | Part No. | Description | Qty. |
|---|---|---|---|
| 1 | BB-850 | Bag, Carrying, 6072-1821 | 1 |
| | BB-860 | Bag, Carrying, 2024-4453 | 1 |
| | BB-870 | Bag, Carrying, 5566-7590 | 1 |
| | BB-875 | Bag, Carrying, HL5000/HL7600 | 1 |
| | BB-877 | Bag, Carrying, HL9800 | 1 |
| 2 | | Fabric Patches | |

* NOTE: Specify model number and fabric color when ordering repair accessories.

### Optional Repair Accessories

| | |
|---|---|
| TT-105 | Small clamp |
| TT-106 | Medium clamp |
| TT-107 | Large clamp |
| PP-510 | Roller |
| Special order | Hot Air Gun |
| Special order | Glue - specify model/fabric type |

### Shell Repair Kit (Item#: REP-001)

| Description | Qty. |
|---|---|
| Repair Manual | 1 |
| Tool Box | 1 |
| Ziplock Bag | 2 |
| Abrasive pads | 2 |
| Rag for cleaning tank. | 1 |
| Roller for rolling down patches | 1 |
| Weight Bag | 1 |
| Scissors | 1 |
| Tape for holding down patches | 1 |
| Adhesive, Loctite 495 | 4 |
| Small clamp | 1 |
| Patch Material, as per Model # | 3 |
| Models 6072-1821 | |
| Models 2024 to 6578 | |
| Models 7590 to 9800 (pre-1996) | |
| Models 5566 to HL 9800 | |

Operator's Notes

Operator's Notes