SEI INDUSTRIES

Bambi BUCKET®
Driven by Innovation

BAMBI BUCKET
(ALL MODELS)
OPERATIONS MANUAL

BAMBI BUCKET OPERATIONS MANUAL - Version F

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PLEASE READ BEFORE USING.

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Section 1: Introduction to the Bambi Bucket

Overview (All Models)

This manual provides helicopter operators with information on the operation of the Bambi bucket. For service and maintenance information, please refer to the separate service manual for your specific bucket model number.

Since its introduction in 1983, the Bambi bucket has become the preferred means of helicopter fire fighting for more than 600 companies and agencies worldwide. This universal industry acceptance is the result of the Bambi bucket's effectiveness, reliability, simplicity and ease of use.

Cut away view of standard Bambi bucket.

There are several models of buckets available as well as a number of accessories and enhancements including the Aqualanche valve, the Torrentula valve, the Powerfill Torrentula system and the Powerfill Snorkel system.

The operation of the Bambi bucket can be quickly mastered by operators with no previous experience and the bucket requires no pre-assembly.

Once airborne, the operator can easily become familiar with the flight characteristics of the bucket. Several test fills will also 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. For your own protection, and for longer bucket life, always read the instructions and warnings. Ignoring these warnings could result in personal injury, bucket damage or aircraft damage.

SEI Industries Ltd. offers complete parts supply and repair services for the Bambi bucket. For a repair facility in your area, please contact SEI. For maintenance and repair purposes, parts diagrams and descriptions are provided in a separate service manual (specific to your model). When ordering parts, please provide the model and serial number of your Bambi bucket.

For more copies of this manual, please contact SEI or visit our website at www.bambibucket.com for more information on these products.

Section 2: Preflight Safety Check

Safety Checklist

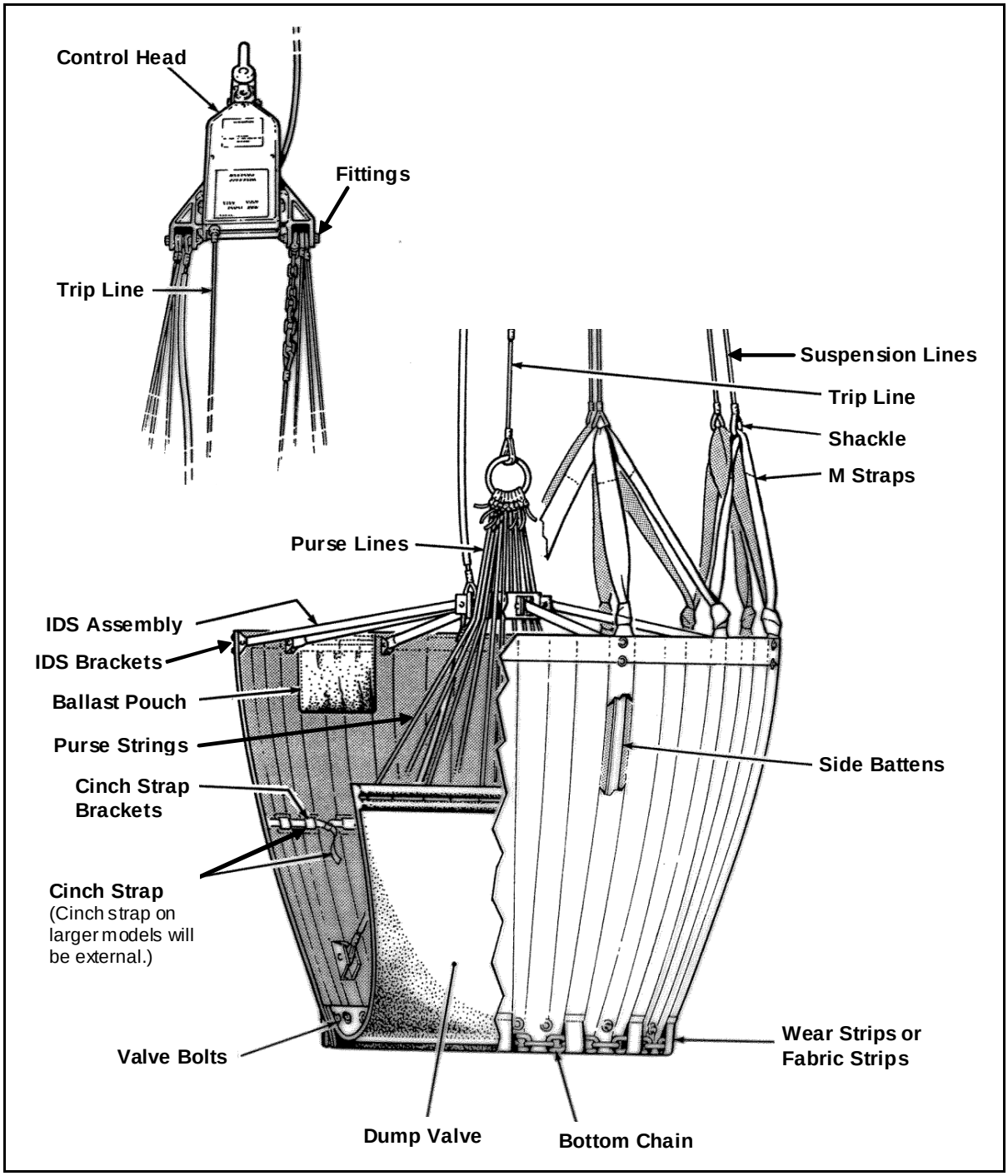
Along with the aircraft, the Bambi bucket should also receive a preflight inspection each day. Follow the checklist below, beginning at the bottom of the bucket and working upwards.

1. Check the bottom chain looking for any tears in the fabric straps. Also, check the lockwire or tie wraps on the shackles.
2. Check for loose bolts around the bucket shell; IDS brackets at the top, cinch strap brackets at the midpoint and the wear strips at the bottom.
3. Check the diagonal M-straps that connect the suspension cables to the top of the bucket, looking for signs of wear or incorrect suspension line connections.
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 cinch strap, ensuring it is at the correct percentage.
6. Check the suspension cables for frays, kinks or loose swages.
7. Check that the ballast is securely attached. Full ballast is essential for safe operations.
8. Check the control head for secure fittings. Never operate the bucket with the control head cover removed.
9. Check solenoid operation by activating it several times.
10. Activate the head with 24 volts to release the catch, then pull the tripline cable to full extension from the control head, checking for kinks, frays or loose swages.

Important Note

When releasing the tripline, the head must be upright at no less than a 60-degree angle.

Bambi Bucket Drawing



Section 3: Deploying the Bambi Bucket

Deployment Instructions

Attaching to the Cargo Hook

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 with 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.

Control Head Orientation (Models 6072-4453 only)

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 tripline.

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.

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

Important Note

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

The control 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.

Hole used when rotating head.

In some cases, where the cargo hook is too large for the standard shackle, a second larger shackle can be used.

Warning

When a second shackle is used to turn the bucket 90 degrees, choose a shackle that is close to the same size as the shackle on the head. If a larger shackle is used, as shown in the photo below, it may cause the power cable to tangle in the shackle, pulling apart the break-away plug.

If the shackle is too large, it may cause the power cable to tangle, pulling apart the break-away plug.

Control Head Orientation (Models 5566-HL9800 only)

For these models, it may be necessary to use a second shackle to rotate the bucket 90 degrees.

Control Head Operation

Warning

Do not remove the cover on the control head while operating the Bambi bucket. Part of the tripline 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 tripline could cause a tail rotor strike which could result in severe injury or death and/or helicopter damage.

Connecting Power

The Bambi bucket's electrical supply is connected through a breakaway plug. The purpose of the plug 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 plug be lightly taped together with vinyl tape, while in use, to ensure that wind action does not separate the plug. If the control cable is not secured to the longline, duct tape should be wrapped every 24-36" to prevent any damage to the cable.

Important Note

To operate the solenoid and release the water, a **momentary contact** switch is used. The solenoid has a 10% duty cycle (designed to not be operated more than 10% of the time). Operating the solenoid continuously will result in solenoid failure.

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 which could result in injury or death.

Overall lengths of Bambi buckets with standard rigging are provided on the next page of this manual. Before using the Bambi bucket, check for the maximum total length. To determine this 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:

Measuring the bucket. If a Firesock is to be used, attach first and then measure to the bottom of the sock. See Section 4: Flight Operations for information on how to use the Firesock.

1. Stretch out the bucket on the ground; secure the control head.
2. Pull out the dump valve fully, pulling taut to ensure the suspension cables are straight.

Overall Lengths with Standard Rigging

Bambi Model	Overall Length	
	Feet	Meters
6072	12’ 11”	3.94
8096	14’ 6”	4.42
8096S	12’ 11”	3.94
9011	14’ 6”	4.42
1012	14’ 6”	4.42
1012S	12’ 11”	3.94
1214	14’10”	4.52
1214S	13’ 3”	4.04
1518	15’ 2”	4.62
1821	15’ 5”	4.70
2024	19’ 5”	5.92
2024S	15’ 2”	4.62
2226	19’ 8”	5.99
2226S	15’ 5”	4.70
2732	23’ 0”	7.01
2732S	15’ 3”	4.65
320C	23’ 0”	7.01
3542	23’ 5”	7.14
420B	23’ 5”	7.14
4453	23’ 8”	7.21
5566	24’ 7”	7.49
680K	24’ 9”	7.51
6578	25’ 1”	7.63
7590	30’ 6”	9.30
HL4000	31’ 8”	9.65
HL5000	32’ 0”	9.75
HL7600	33’ 1”	10.08
HL9800	34’ 3”	10.44

Note: Specifications subject to change. Lengths are accurate to within 1%.

Important Note

If a firesock is being used, add 8" (200 mm) to the overall length shown in the chart above.

3. If the Firesock is to be used, attach first and then measure to the bottom of the sock.

4. 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 as determined with the chart on the previous page.

Important Note

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 Note

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

Shorter Suspension Cables

If the overall length of the Bambi bucket exceeds the distance from the cargo hook to the front tip of the tail rotor of the helicopter, shorter suspension lines, triplines and deployment lines must be used and can be ordered from SEI. Please specify the model and serial number when ordering parts.

Important Note

It is important to keep the tripline adjusted properly or the bucket may not dump.

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 bucket is taken up by the suspension cables.

When the bucket is full, the IDS deployment cable and hub restrainer cables should be slack as they should not bear any load.

Their function is to position the hub and spoke mechanism to hold the bucket open.

Correct IDS position.

To deploy the IDS on the ground, reach into the bucket, grasp the hub of the IDS and pull outward fully until the two restraining cables from the hub to the lower bucket shell are tight.

The IDS is normally set in its correct position by the factory but, if the bucket has been worked on by other people, it may have been accidentally positioned wrong. Corrections can be made by lengthening or shortening the restraining cable bottom chains until the IDS is in the proper position.

The main parts of the IDS are illustrated in a separate service manual.

Section 4: Flight Operations

Flying the Bambi Bucket

The Bambi bucket should be flown in accordance with the United States Forest Service recommendations limiting all helicopters, other than tandem rotor, to a maximum 80 KIAS while conducting external cargo hook operations. The recommended never exceed speed (VNE) for the Bambi bucket is 80 KIAS, however, this is not a flight manual limitation. Speeds above 80 KIAS should be approached with caution and any decision to exceed this speed should be based on flight characteristics, aircraft flight manual limitations, aircraft/bucket configuration and load stability, etc. Any change that exceeds our recommendation should be formally authorized in your company's external load specifications.

A suggested flight procedure is to build up speed slowly with the Bambi bucket, under prevailing conditions, to determine a safe maximum flying speed. In order to reduce drag on the bucket when empty, it can be flown in a valve open position by pressing the release mechanism once while in forward flight. The dead weight of the load ensures different handling characteristics than when flying empty. As a result, the Bambi bucket does not 'pulse' or 'throb' under load in flight.

Important Note

Bambi buckets can operate in any atmospheric conditions where icing conditions are not present. If icing conditions are encountered during operations, in flight or on the ground, SEI cannot guarantee the reliable operation of the valve actuating mechanisms nor related components. Operating the Bambi bucket at 0°C or below may have adverse effects on the operation of the bucket and also to the fabrics used in its manufacture. Please refer to the Bambi bucket operations manual for information related to proper storage.

Filling the Bucket

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. A Bambi bucket does not have to be towed to make it sink.

Warning

When filling the Bambi bucket, do not execute an abrupt 90 degree pedal turn with the helicopter close to the water while towing the bucket. While filling, there is a danger that the Bambi bucket 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.

Important Note

When filling, you may wish to get in the habit of hitting the switch a second time **as you enter the water** to ensure that the release mechanism is in the "locked" position.

To fill the bucket from an open top tank, you will require a tank with a recommended depth as shown in the chart below:

Bambi Model	Bambi Height		Required Tank Height	
	Inches	Meter	Inches	Meter
6072	28”	.71	38”	1.00
8096	29”	.74	40”	1.00
9011	29”	.74	40”	1.00
1012	31”	.79	42”	1.01
1214	33”	.84	44”	1.12
1518	39”	1.00	48”	1.22
1821	41”	1.04	56”	1.42
2024	43”	1.09	58”	1.47
2226	44”	1.10	60”	1.52
2732	48”	1.22	60”	1.52
320C	48”	1.22	60”	1.52
3542	57”	1.45	78”	1.98
420B	57”	1.45	78”	1.98
4453	57”	1.45	78”	1.98
5566	62”	1.57	84”	2.13
680K	63”	1.60	84	2.13
6578	67”	1.70	90”	2.29
7590	73”	1.85	96”	2.44
HL4000	75”	1.90	96”	2.44
HL5000	80”	2.03	110”	2.80
HL7600	95”	2.41	120”	3.05
HL9800	106”	2.70	120”	3.05

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 expands the bucket shell and its internal fiberglass battens outward, increasing the bucket’s volume. The greater the pressure, the more volume the bucket holds. In other words:

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

If more adjustment is required, the cinch strap should be used.

Cinch Strap

The cinch strap, located inside the bucket on models 6072-4453 and outside on models 5566-9800, allows the pilot to reduce the volume of the bucket to a pre-set position. The cinch strap is marked with percentage settings that denote several load levels. The cinch strap allows you to reduce the volume of the bucket to lower levels than by straight lifting speed alone.

Use of the 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). It is important to note that the top of the bucket is always the spill line. The moment that the bucket breaks the surface of the water, it is ready to fly.

Important Note

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 of variable fill action on the Bambi bucket.

Caution

Do not tighten the cinch strap past the smallest load marking. Overtightening can damage the bucket shell or prevent the valve from dumping.

Caution

The lowest fill setting for all models is 70%. Always check the cinch strap to determine the correct setting. Otherwise, over tightening of the cinch strap could damage the bucket.

Caution

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

High Elevation Operations

In some areas, fire conditions require the reduction of bucket loads to accommodate weight restrictions caused by high elevation operations. In these circumstances, a smaller bucket or the use of a Bambi bucket with an Aqualanche valve or a Torrentula valve should be considered.

Using the Firesock


Attaching a Firesock to a Bambi bucket.

The Firesock, when attached to the bottom of a Bambi bucket, makes the bucket a more effective tool by increasing the aeration of the foam when using a Sacksafoam injection system. The Firesock breaks down water droplets (thereby increasing the exposed surface area) when using straight water. This simple design allows for improved coverage and increased drop accuracy as well as wider and longer drop patterns. To use your Firesock, simply attach the quick connect links onto the bottom chain and it's ready for action.

When finished using it, make sure to:

- Inspect the Firesock for damage and make repairs.
- Clean the Firesock using fresh water.
- Store the Firesock, attached to the Bambi bucket, ensuring both are dry.

The Firesock is included with new Bambi buckets (9011 models and above) at no extra charge.

Dumping the Bucket

Introduction

To dump water from the bucket, 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.

Important Note

When dumping the larger buckets (models 2024 and up), you may notice that the dump valve does not fully return after release. The valve will return as soon as the bucket is immersed again in water. To ensure this, when filling, hit the dump switch again when the suspension lines are slack and before lifting out.

Dump Pattern

The dump pattern is affected by height and airspeed. It is most concentrated at lower altitudes 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

Ensure that ground personnel are clear from the dumping zone. Failure to do so could result in serious personal injury.

Dump Speed

Make dumps at slower speeds before progressing to faster dumps to get familiar with the flight characteristics, while dumping, from your particular helicopter.

Landing

The recommended landing procedure allows 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. At height, this could damage the control head. Land as normal and then detach the control head or hover at approximately two feet and then release the head.

Caution

If the control head has experienced a severe impact, it is necessary to visually examine the top square lug 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 lug.

The bottom suspension lugs should be examined for damage as well.

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

Caution

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. If any control head damage has occurred, the Bambi bucket should not be flown.

Section 5: Packing and Storage

Packing and Storing

Packing the Bucket

1. Collapse the IDS by pushing the hub into the bucket.

2. Grab the control head and pull the suspension lines taut. Tape the lines together in two bunches.

3. Insert the operations manual and control head into the storage bag.

4. Gather the suspension lines into a coil and stow inside the bucket. Place the control head outside of the bucket to prevent the possibility of the lines tangling.

5. Avoid any sharp folds along the base of the shell as this protects the shell from delamination which can occur if the Bambi bucket is stored for a long period of time.

6. Place the control head bag on top of the collapsed bucket.

7. Roll the bucket into a bundle and wrap with the straps supplied.

8. Take the carrying bag and drape it over the bucket.

9. Roll the bucket over and insert the bucket and Firesock into the bag.

The Bambi bucket carrying bag 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 for rapid deployment when required.

Section 6: Specifications and Parts

Capacity and Weight Specifications

Bambi Model	Capacity			Gross Weight		Empty Weight	
	IMP Gal	USG Gal	Liters	lb	kg	lb	kg
6072	60	72	270	670	300	70	32
8096	80	96	360	880	400	83	38
8096S	80	96	360	880	400	81	37
9011	90	110	410	980	450	83	38
1012	100	120	460	1100	490	85	39
1012S	100	120	460	1100	490	83	38
1214	120	140	550	1300	580	85	39
1214S	120	140	550	1300	580	83	38
1518	150	180	680	1600	720	89	40
1821	180	210	820	1900	860	91	41
2024	200	240	910	2100	970	130	60
2024S	200	240	910	2100	970	130	58
2226	220	260	1000	2300	1100	140	64
2226S	220	260	1000	2300	1100	140	63
2732	270	320	1200	2800	1300	150	68
2732S	270	320	1200	2800	1300	150	67
320C	270	320	1200	2800	1300	140	64
3542	350	420	1600	3700	1700	150	68
420B	350	420	1600	3700	1700	140	64
4453	440	530	2000	4600	2100	180	82
5566	550	660	2500	5800	2600	250	110
680K	570	680	2600	5900	2700	230	100
6578	650	780	3000	6800	3100	320	150
7590	750	900	3400	7900	3600	360	160
HL4000	880	1100	4000	9200	4200	380	170
HL5000	1100	1300	5000	11000	5200	400	180
HL7600	1700	2000	7600	17000	7800	460	210
HL9800	2200	2600	9800	22000	10000	530	240

Note: Capacities and weights are accurate to within 5%. Specifications subject to change. Check original control head nameplate.

Caution

The selection of a Bambi bucket model for a specific aircraft is dependent on many factors including aircraft weight, fuel weight, operation elevation and atmospheric conditions.

The helicopter operator must select a bucket model which is appropriate for their specific situation.

The operator must also ensure that the bucket selected does not pose a tail rotor strike hazard.

Section 7: 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 shown 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, 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 accordance with the operations 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.