Chapter 3

Aerial/Ground Recovery Equipment

This chapter discusses the types of aerial/ground, recovery/evacuation kits and equipment used to conduct downed aircraft recovery. It describes the Aerial Recovery Kit (ARK), Interim-Unit Maintenance Aerial Recovery Kit (I-UMARK), Unit Maintenance Aerial Recovery Kit (UMARK), and Helicopter Recovery Kit (HERK). It defines their purpose, use, technical characteristics, and limitations. It includes before-use preparations and after-use inspections and packaging. For additional information, refer to each recovery kit manual.

AERIAL RECOVERY KIT

PURPOSE AND USE

3-1. The ARK (NSN 1670-00-264-8941, PN 1670EG109A) contains the equipment required to prepare, rig, and recover selected aircraft. The three prime-mover helicopters are the UH-1 Huey, UH-60 Black Hawk, and CH-47 Chinook.

TECHNICAL CHARACTERISTICS

3-2. The kit components are packed in a bisection, watertight aluminum container. The container is about 28.0 x 30.25 x 76.5 inches (Fig. 3-1). For external transport, six lift grips, three on each side of the container assembly, are provided for use as tie-down or suspension points. For internal transport, skid-type feet are provided to help in positioning the container either inside an aircraft or on the ground.

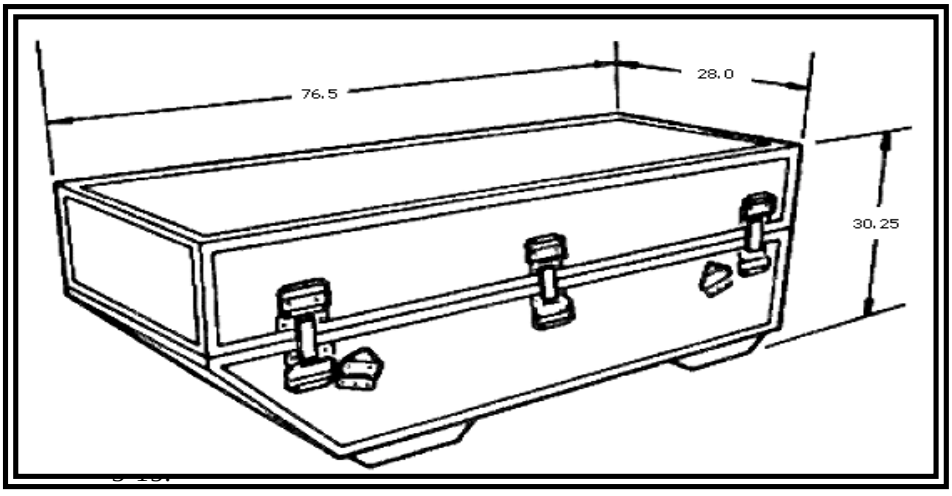

Figure 3-1. Aerial Recovery Kit Container (Part No. 1760EG120)

3-3.The container has separable top and bottom sections. Each section has compartments to house the kit components so that they are easily accessable and identifiable. Component part numbers are stenciled inside the container compartments for easy recognition and selection of components as required. Figure 3-2 shows component locations in each of these sections.

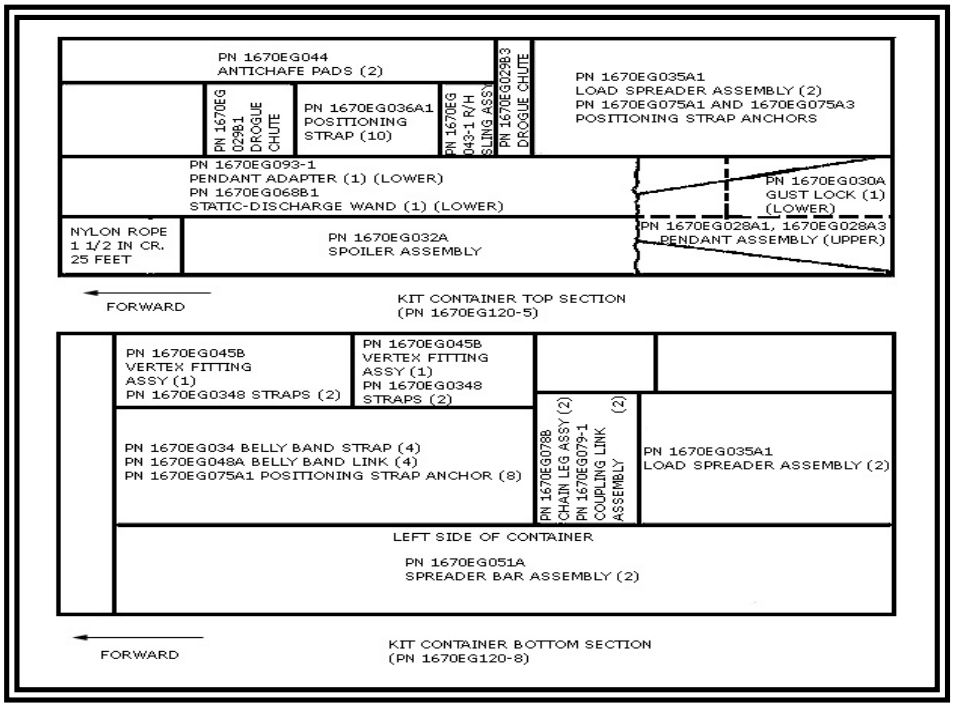

Figure 3-2. Stowage Diagram

NOTE. TM 55-1670-251-20&P has more information on the ARK.

TRANSPORTABILITY

3-4. The ARK is air transportable either as an internal or external load.

Internal Load

3-5. A UH-1H, UH-60, or CH-47 helicopter normally carries the kit The aircraft also carries the recovery crew. Six people are required to lift the kit (as a complete unit) into the helicopter. Standard tie-down procedures are used to attach the tie-down straps to the kit handles and to lift the kit as required. Off-loading the kit at the recovery site also requires six people if the entire kit is to be used.

External Load

3-6. If desired, the ARK also may be transported in a 5,000-pound-capacity cargo net, NSN 1670-01-058-3811.

NOTE: If a cargo net is not available, several of the kit components can be used to sling the kit container (Fig. 3-3).

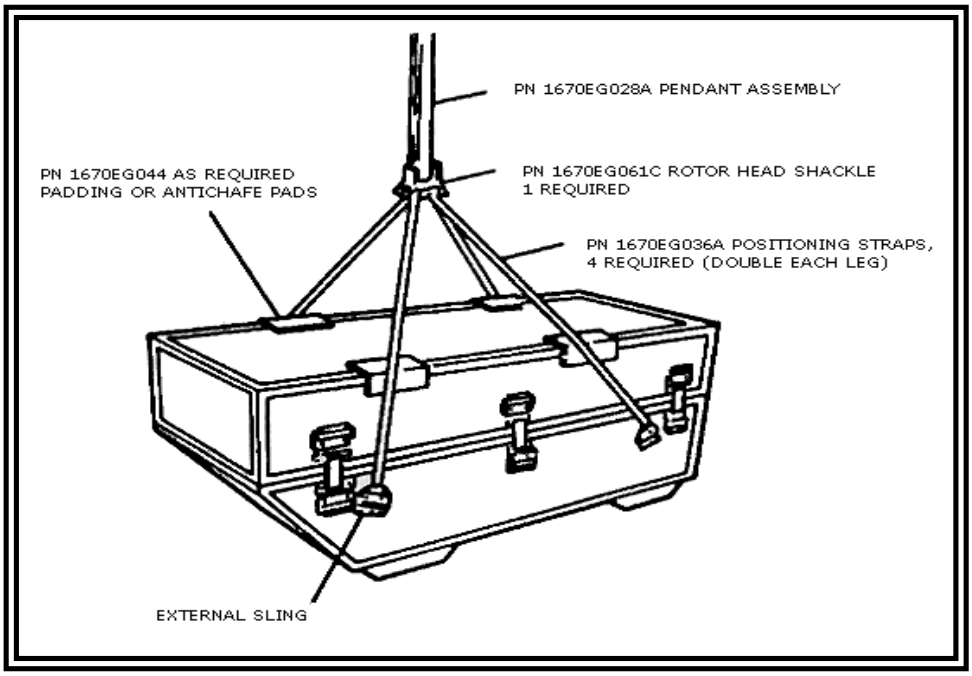

Figure 3-3. Improvised External Rigging of the Kit Container

3-7. Before rigging, the connecting latches between the container halves should be checked to verify that they are attached and secure.

3-8. The kit assembly may be transported as an external sling load. If so, a small recovery crew may be assigned, as only two people are required to prepare the kit for transport. However, before reducing the number of personnel, factors such as the type of aircraft to be recovered, the type of terrain, and the extent of damage to the disabled aircraft must be considered.

LIFT LIMITATIONS OF CRITICAL COMPONENTS

3-9. When the rigging configuration is like that discussed in this manual, the critical components of the aerial recovery kit can sustain loads of 21,600 pounds. When the configuration is significantly different, capability expectations should be reduced by 10 percent (down to 19,440 pounds). This reduction allows for additional aerodynamic drag.

DESCRIPTION OF MAJOR COMPONENTS

3-10. Major components of the ARK are discussed below.

Antichafe Pad (PN 1670EG044)

3-11. The antichafe pad (Fig. 3-4) is used to maintain the spacing of, and to afford padding to, the bellyband strap assemblies in areas where they would normally contact the fuselage of the slung aircraft. These pads minimize the risk of abrasion to the bellybands and damage to the aircraft being recovered.

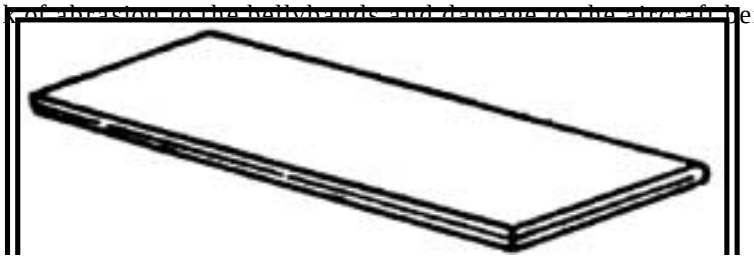

Figure 3-4. Antichafe Pad

Kit Container (PN 1670EG120)

3-12. The container (Fig. 3-1) is required for storage of the kit components. It is designed to be suitable for internal and external aircraft transport and for manual handling. It also protects its contents from adverse environmental conditions.

Coupling Link Assembly (PN 1670EG079-1)

3-13. The coupling link assembly (Fig. 3-5) is used to connect the bellyband assembly to the spreader bar pendant assembly on the rotor head shackle.

Figure 3-5. Coupling Link Assembly

Drogue Chutes (PNs 1670EG029B1 and 1670EG029B3)

1-14. 3-14. Drogue chutes (Fig. 3-6) are provided to maintain the directional stability of slung aircraft. The smaller chute (60-in diameter) (PN 1670EG029B3) is used on most aircraft; the larger chute (156-in diameter) (PN 1670EG029B1) is required on the larger and inherently unstable type of aircraft. Swivel attachments prevent the chutes from winding up because of rotor downwash.

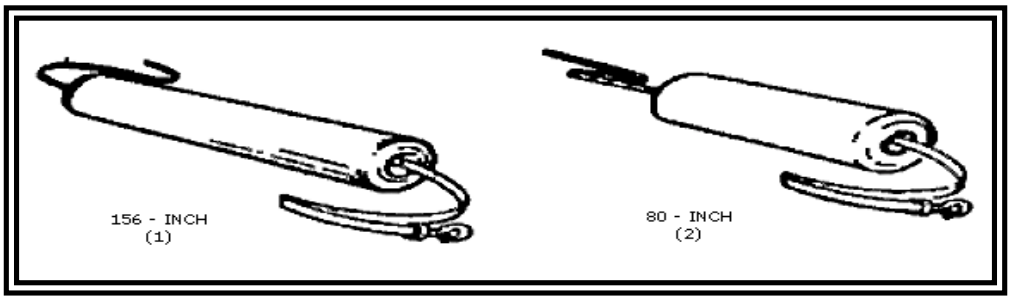

Figure 3-6. Drogue Chutes

Gust Lock Assembly (PN 1670EG030A)

3-15. Gust locks (Fig. 3-7) are used to secure the control surface and to prevent motions of ailerons, rudder, elevator, and so forth.

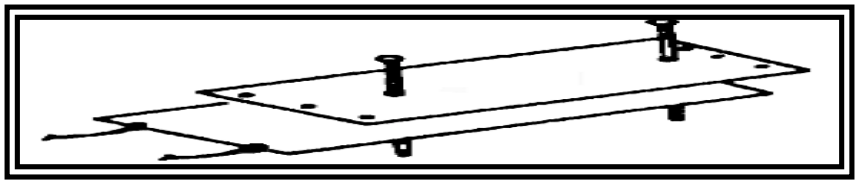

Figure 3-7. Gust Lock Assembly

Load Spreader Assembly (PN 1670EG035A1)

3-16. Load spreaders (Fig. 3-8) are required for those aircraft where structural frame members do not coincide with the required bellyband rigging stations. They reduce the risk of more structural damage to the recovered aircraft by distributing the bellyband loads over a large area.

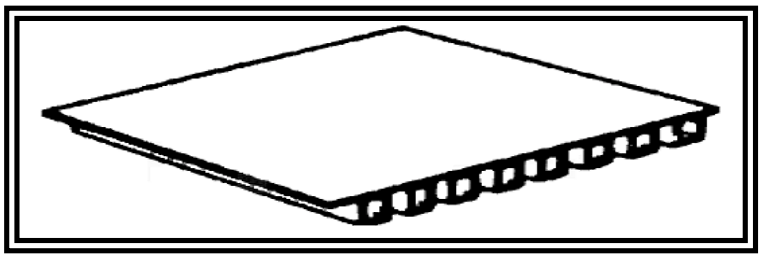

Figure 3-8. Load Spreader Assembly

Reach Pendant, 25,000-lb. Capacity (PN BOS-14-K7)

3-17. A 5-foot-long nylon rope loop is enclosed in a rigid pipe to increase the lift helicopter to load clearance for safe hookup. The pendant adapter (Fig. 3-9) is attached to the pendant assembly and the carrier cargo hook. It allows the ground crew member to engage those cargo hooks, which are rigidly attached to the carrier aircraft (for example, UH-lH and CH-47A).

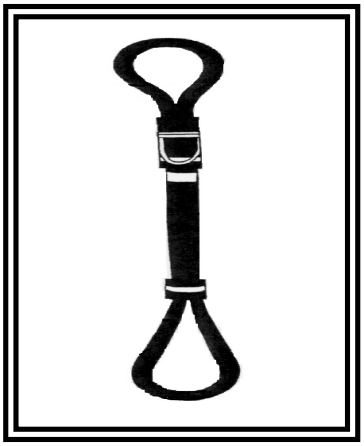

Figure 3-9. Reach Pendant, 25,000-lb. Capacity

Pendant Assemblies (PNs 1670EG028A1 and 1670EG028A3)

3-18. Pendant assemblies (Fig. 3-10) are used primarily to lengthen the distance from the cargo hook of CH-47, UH-60, and UH-1 prime movers to the slung load.

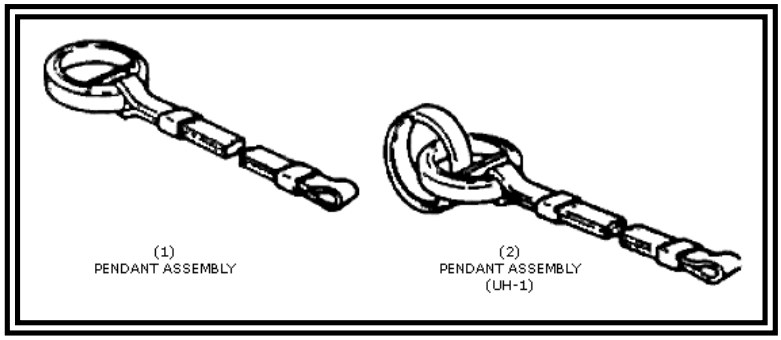

Figure 3-10. Pendant Assemblies

Positioning Strap (PN 1670EG036A1)

3-19. The positioning strap (Fig. 3-11) is used to prevent slipping of the bellybands (fore, aft, and laterally) from their required rigging locations on an aircraft fuselage.

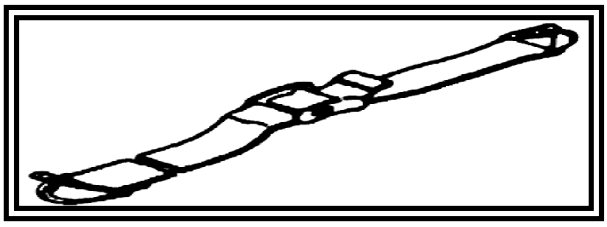

Figure 3-11. Positioning Strap

Static-Discharge Wand (PN 1670EG068Bl)

3-20. The static-discharge wand (Fig. 3-12) is used to bleed and ground the static charge from the hovering recovery prime-mover helicopter. This allows safe handling of the cargo hook during hookup of the sling assembly.

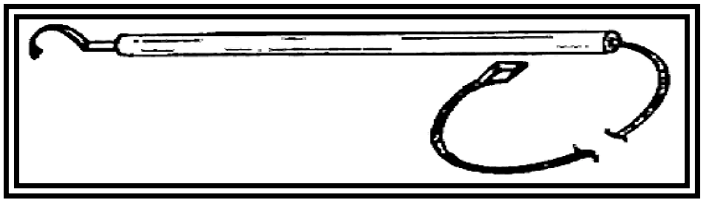

Figure 3-12. Static-Discharge Wand

Bellyband Sling Assembly (PN 1670EG057A1)

3-21. Bellyband assemblies (Fig. 3-13) are used to cradle the downed aircraft. This eliminates the need for hard point attachments for the sling system. Adjustable chain leg assemblies (PN 1670EG078B) are provided for one bellyband assembly to provide a way to change its length relative to the other band assembly so as to achieve appropriate attitude correction of the recovered aircraft.

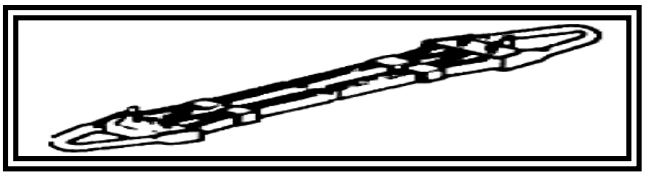

Figure 3-13. Bellyband Sling Assembly

Rotor Head Sling Assembly (PN 1670EG043-1)

3-22. The rotor head sling (Fig. 3-14) is used with the pendant assembly to facilitate rotor head slinging of light helicopters: an alternate method to bellyband rigging.

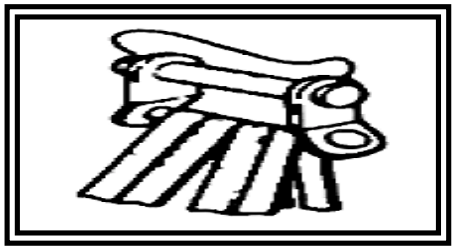

Figure 3-14. Rotor Head Sling Arrangement

Spoiler Assembly (PN 1670EG032A)

3-23. Spoilers are required to destroy undesirable lifting tendencies of the suspended fixed-wing aircraft during forward flight (Fig. 3-15). Spoilers serve an important function in preventing the slung aircraft from “flying” into the recovery helicopter.

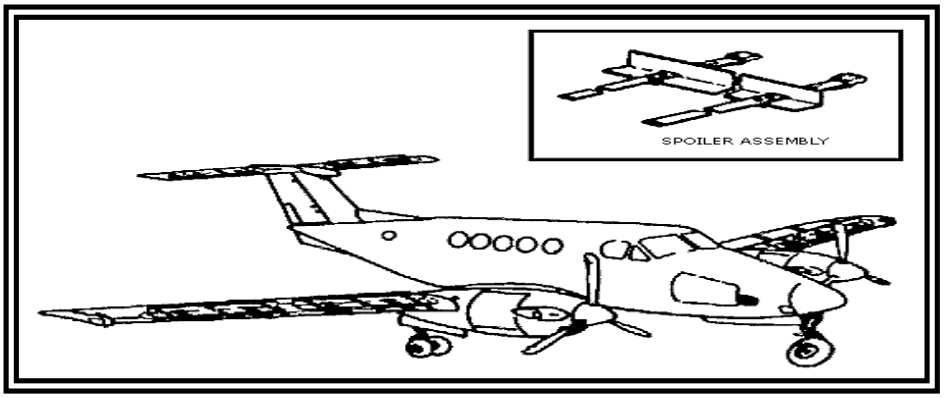

Figure 3-15. Spoilers Installed on Damaged Fixed-Wing Aircraft

Spreader Bar Arrangement (PN 1670EG060B1)

3-24. The spreader bar (Fig. 3-16) is used with the pendant and sling assemblies. It has two functions depending upon its orientation to the recoverable aircraft. On larger aircraft such as the CH-47, the spreader bar arrangement is positioned across the fuselage. This reduces the crushing effect of the bellybands on the fuselage by maintaining a fixed distance. This distance is equal to about the width of the fuselage, between the two connecting ends of the bellyband assembly. For smaller aircraft, particularly fixed-wing, the spreader bar is aligned with the centerline of the fuselage. This orientation allows for relocation of the vertex fitting on the spreader bar arrangement to correct for attitude changes of the recovered aircraft. Also, the relative angle between the fore and aft bellybands is reduced.

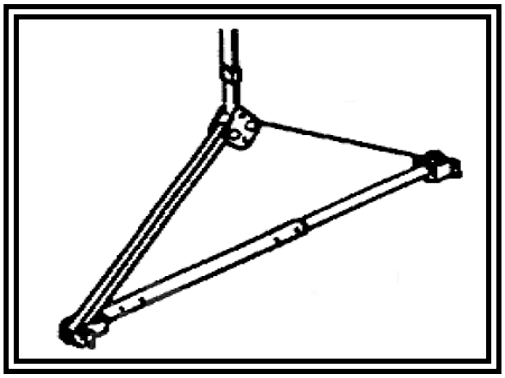

Figure 3-16. Spreader Bar Arrangement

Positioning Strap Anchors (PNs 1670EG075A1 and 1670EG075A3)

3-25. Positioning strap anchors (Fig. 3-17) provide a way to change the webbing from two strap assemblies of three bands each to three equivalent assemblies of two bands each. The antichafe pad, to prevent abrasion of the webbing and to afford a more uniform loading between the bellyband and the airframe, then covers the three strap legs.

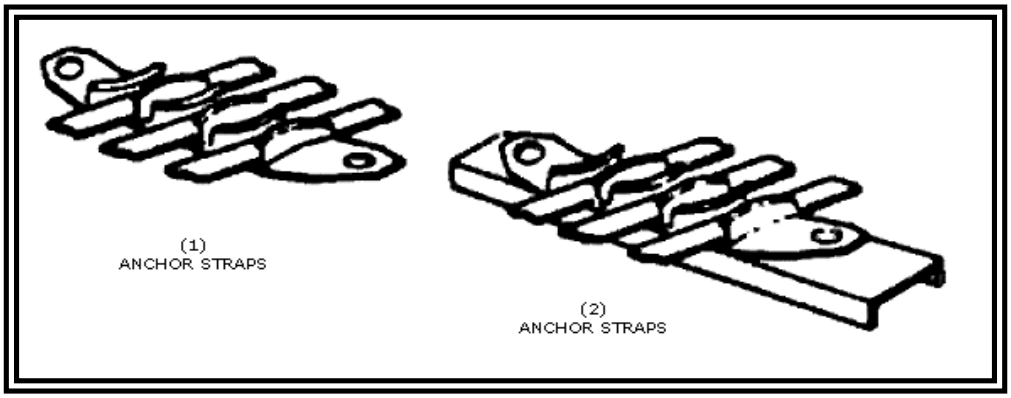

Figure 3-17. Positioning Strap Anchors

BEFORE-USE PREPARATIONS

3-26. Normally, not all of the suspension components and equipment in the ARK are required to recover a particular aircraft. The kit components and equipment not required for a given recovery mission could be removed from the kit and left at the storage site. However, these components must be replaced in the kit after completion of the mission.

AFTER-USE INSPECTIONS AND PACKING

3-27. All recovery equipment should be dried, cleaned, and inspected before repackaging it in the container. Refer to TM 55-1670-251-20&P.

INTERIM-UNIT MAINTENANCE AERIAL RECOVERY KIT

WARNING

The I-UMARK is primarily intended to recover an aircraft that has made a forced landing, is upright, and has no obvious damage to the rotor head, transmission, transmission mounts, or serious structural damage to the tail boom assembly. If damage of this nature has occurred, the aircraft will have to be recovered with ARK (PN1670EG120 and NSN 1670-00-264-8941).

WARNING

Recovery of the aircraft according to the instructions in this document may cause damage to the main rotor blades and rotor head of the recovered aircraft. Post-recovery inspection criteria have not yet been developed. Therefore, the inspection criteria for blade strike and hard landing cited in the applicable aviation unit intermediate aircraft maintenance Instructions for those aircraft should be used to ascertain further airworthiness. If any doubt exists, the rotor components should be replaced.

NOTE: Components should be used only according to the procedures contained herein. The recommended recovery airspeeds and maneuvers should not be exceeded.

PURPOSE AND USE

3-28. The I-UMARK, PN 81996-20090123, contains the equipment required to pre-rig, rig, and recover selected US Army helicopters.

TECHNICAL CHARACTERISTICS

3-29. The kit components are packed in a watertight, aluminum air mobile shipping and storage container. The container has the inside dimensions of

45 x 40 x 20 inches. For man transportability, six large-bail lifting handles around the sides of the container assembly are provided. These can also be used as tie-down points for internal helicopter transport.

NOTE: Ground crew equipment, such as shockproof gloves, goggles, earplugs, static discharge wand, radios, etc., are not provided as a part of the I-UMARK hardware. Wrenches for assembling I-UMARK components are included in the kit.

3-30. The container has separable top and bottom sections. The long lift sling is wrapped in the largest loop possible around the inside of the container. The OH-58D spreader bar assembly is disassembled and placed in the center of the container. The remaining slings and components are placed in the container to best optimize space and hold the components in place. An inventory card with component nomenclature, part number, and NSN (if applicable) is secured inside the lid of each kit. A copy of the operating procedure is included in each kit (Fig. 3-18).

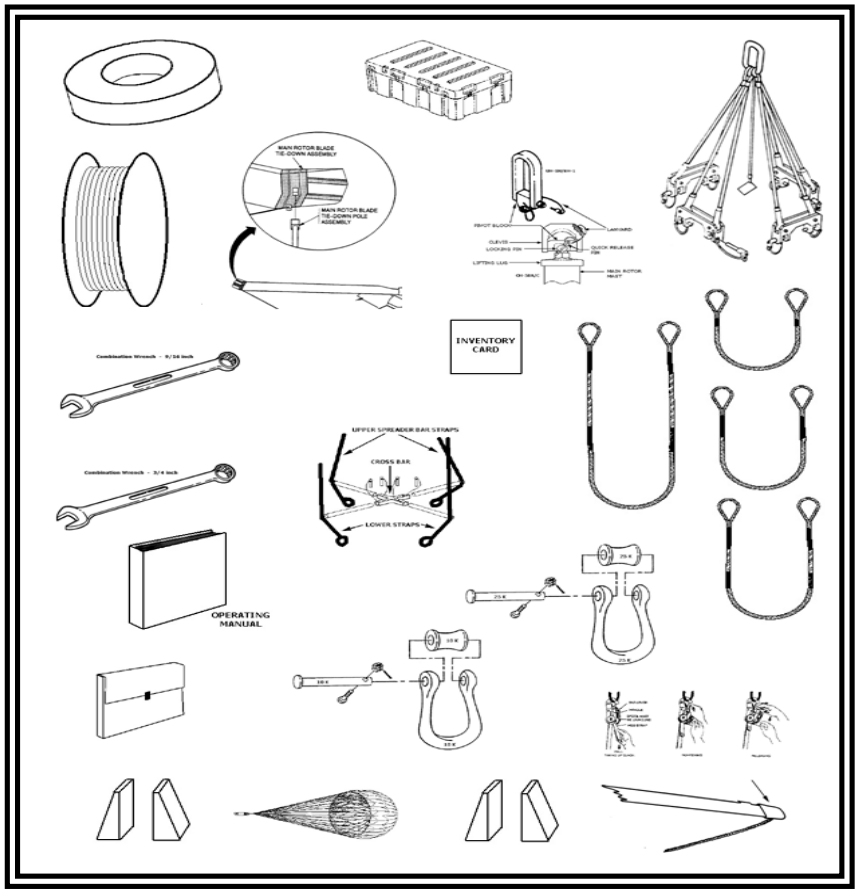

Figure 3-18. I-UMARK Recovery Kit

TRANSPORTABILITY

3-31. The I-UMARK is air transportable either as an internal or external load (in a net).

Internal Load

3-32. A UH-1H, UH-60, or CH-47 helicopter normally carries the kit. This helicopter also carries the recovery crew. Six people are required to lift the kit (as a complete unit) into the helicopter. Standard tie-down procedures are used to attach the tie-down straps to the kit handles and to lift the kit as required. Off-loading the kit at the recovery site also requires six people if the entire kit is to be used.

External Load

3-33. If desired, the aerial recovery kit may also be transported in a 5000-pound-capacity cargo net, NSN 1670-01-058-3811.

WARNING
Do not use the I-UMARK lifting handles as external sling load attachment points.

3-34. Before rigging, the connecting latches between the container halves should be checked to verify that they are attached and secure.

3-35. If the kit assembly is transported as an external sling load, a small recovery crew may be assigned, as only two people are required to prepare the kit for transport. However, before reducing the number of personnel, factors such as the type of aircraft to be recovered, the type of terrain, and the extent of damage to the disabled aircraft must be considered.

LIFT LIMITATIONS OF CRITICAL COMPONENTS

3-36. When the rigging configuration is similar to that discussed in this manual, the critical components of the I-UMARK can sustain loads of 22,000 pounds. When the configuration is significantly different, capability expectations should be reduced by 10 percent (down to 19,800 pounds) to allow for additional aerodynamic drag.

DESCRIPTION OF MAJOR COMPONENTS

3-37. Major components of the I-UMARK are discussed below.

Shipping Container (PN 259300 Mod B)

3-38. The shipping container (Fig. 3-19) is a watertight, aluminum air mobile shipping and storage container. The container has the inside dimensions of 45 x 40 x 20 inches. For man transportability, six large-bail lifting handles around the sides of the container assembly are provided. These can also be used for use as tie-down points for internal helicopter transport. The container has separable top and bottom sections.

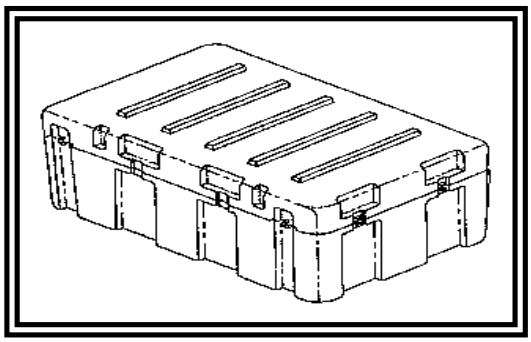

Figure 3-19. Shipping Container

Lift Sling, 100 foot (PN LR7), Lift Sling, 70 foot (PN PRS7E070), Lift Sling, 65 foot (PN PRS7E065), Lift Sling, 30 foot (PN PRS5E030), Lift Sling, 17 foot (PN PRS2E017), Lift Sling, 8 foot (PN PRS2E008)

3-39. Polyester roundslings (Fig. 3-20) are made with a continuous load-bearing core, which is fully enclosed, in a woven protective cover.The endless "round" loop is then formed into an eye and eye configuration. With the I-UMARK an oversized cover is used, which is sewn together, except for the ends, for the eyes. Polyester wear pads are sown into the end loops. A sliding wear pad is added between the eyes. Roundslings were selected for this application because they have no hard eye, like the helicopter sling. They can be snaked through restricted areas of the helicopter main rotor hubs for optimum attachment location. The unwoven load-bearing core conforms to the lifting member. It is protected from cuts or abrasion by the polyester cover and the nylon wear pad. Polyester roundslings have about one-half the stretch of nylon webbing or nylon rope. All the I-UMARK lifting slings are colored orange, as an indicator of the special cover design with a single label to indicate capacity. They may be used in a choked, vertical (pin-to-pin), or basket hitch configurations. Polyester roundslings are used to rig the helicopter for recovery and as long-line pendants to obtain separation between the lift and recovered helicopters.

Aircraft Cargo Tie-down Strap, 5K (PN GBU-1/B)

3-40. A 20-foot, 1 ¾ inch nylon strap has a hook at one end and a hook end ratchet buckle at the other end (Fig. 3-21). This assembly has a 5,000-pound-minimum breaking strength (Department of Transportation (DOT) rating of 1,670 lb.). The strap is used to provide an adjustable length lifting line for tail boom lift and attitude adjustment.

Apex Fitting Assembly, 10K (PN 38850-00004-045)

3-41. The apex assembly (Fig. 3-22) is a 10,000-pound-capacity helicopter external cargo sling. This large clevis is used to connect roundslings to each other, a reach pendant, or to the lift helicopter. The 10K apex is made of aluminum.

Apex Fitting Assembly, 25K (PN 38850-00004-046)

3-42. The apex assembly (Fig. 3-23) is a 25,000-pound-capacity helicopter external cargo sling. This large clevis is used to connect roundslings to each

other, a reach pendant, or to the lift helicopter. The 25K apex is made of alloy steel.

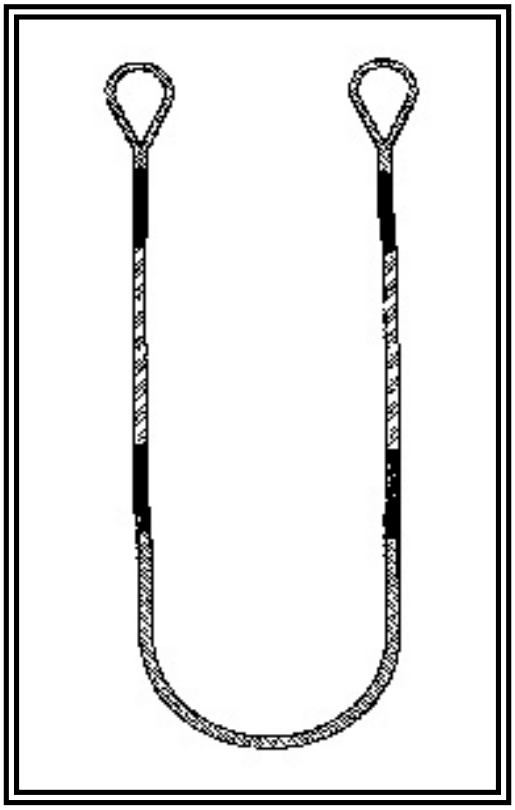

Figure 3-20. Lift Sling, 100 Foot; Lift Sling, 70 Foot; Lift Sling, 65 Foot; Lift Sling, 30 Foot; Lift Sling, 17 Foot; Lift Sling, 8 Foot

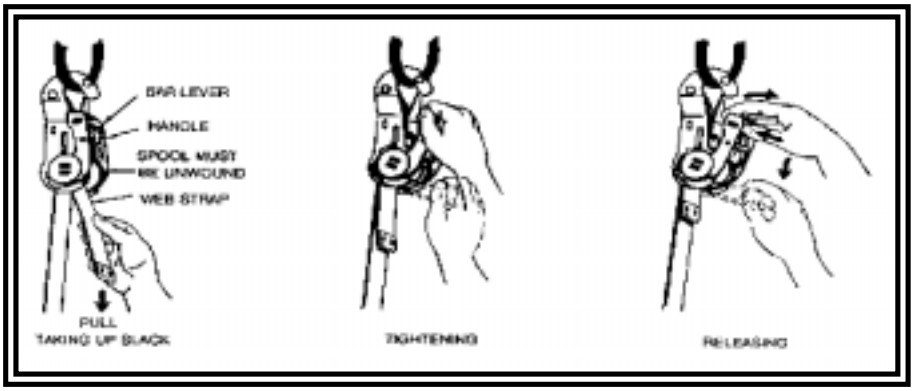

Figure 3-21. Aircraft Cargo Tie-down Strap, 5K

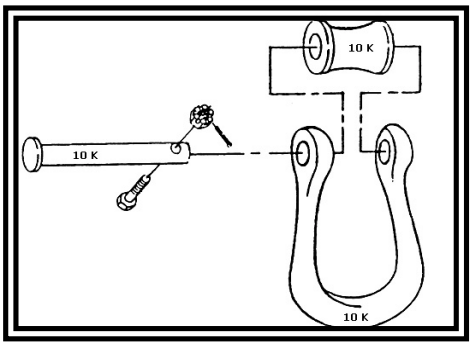

Figure 3-22. Apex Fitting Assembly, 10K

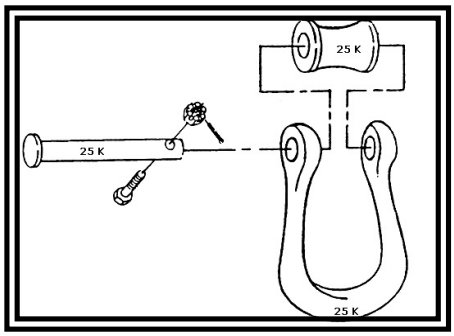

Figure 3-23. Apex Fitting Assembly, 25K

Blade Tie-down Sleeve, UH-60 Lock Assembly, Blade Main Rotor Tie-Down (PN 70700-20369-41), AH-64 (PN 7-262110002-601)

3-43. Nylon strap assemblies (Fig. 3-24) are installed at end of the main rotor blades. Securing lines are attached to these assemblies for tie-down for recovery.

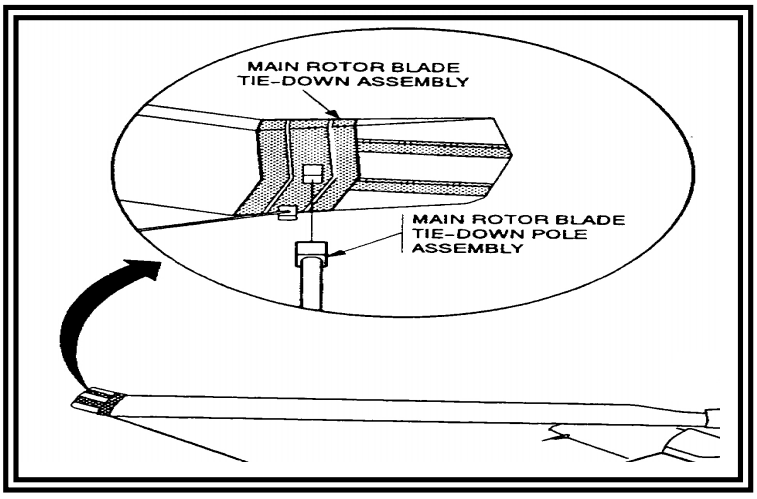

Figure 3-24. Blade Tie-down Sleeve, UH-60/AH-64

Blade Tie-down Sleeve, OH-58D (PN 406-070-300-101)

3-44. Nylon strap assemblies (Fig. 3-25) are installed at end of the main rotor blades. To these assemblies, securing lines are attached for tie-down for recovery.

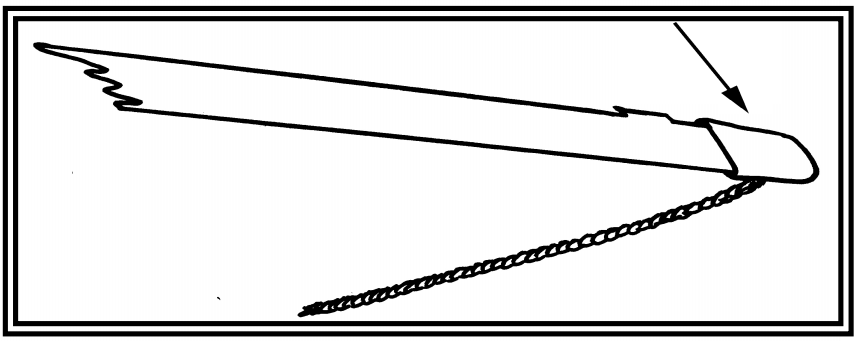

Figure 3-25. Blade Tie-down Sleeve, OH-58D

Air Vehicle Recovery Sling, AH-64 (PN 262110009-601)

3-45. A steel cables sling (Fig. 3-26) attaches to 8 lifting lugs on the AH-64. This sling has been eliminated from more recent I-UMARK when procedures were approved to lift the AH-64 using polyester roundslings choked around the legs of the main rotor hub, similar to the UH-60 rigging.

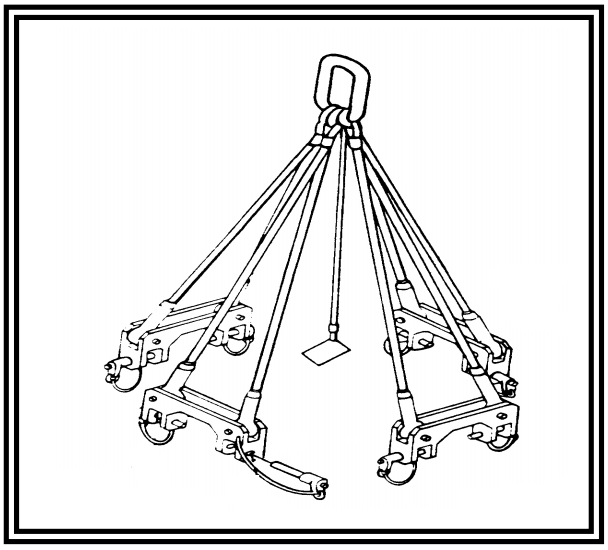

Figure 3-26. Air Vehicle Recovery Sling, AH-64

OH-58D Hoisting Sling Assembly (PN T101284-107)

3-46. This is the standard Bell nylon webbing hoisting sling (Fig. 3-27), except that the cross spreader bar is replaced with a bar especially designed to take the dynamic loads associated with aerial recovery.

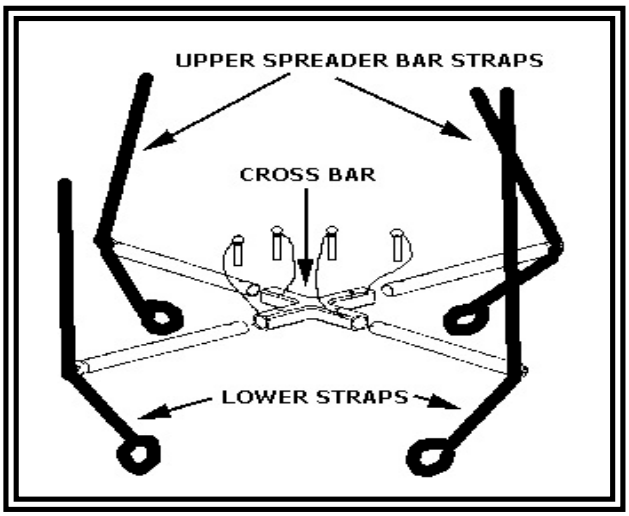

Figure 3-27. OH-58D Hoisting Sling Assembly

Securing Line (PN MIL-R-30500)

3-47. Polyester rope (Fig. 3-28) is used to tie-down main rotor blades.

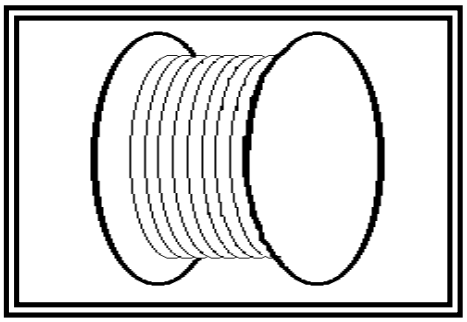

Figure 3-28. Securing Line

Pressure Sensitive Tape, Roll (PN A-A-1586)

3-48. Standard tape (Fig. 3-29) is used to secure lines to prevent snagging before lift-off.

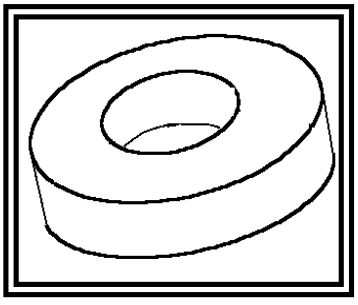

Figure 3-29. Pressure Sensitive Tape, Roll

Drogue Chute (PN 1670EG029B3)

3-49. A specially designed parachute (Fig. 3-30) attaches to the tail wheel of selected helicopters to improve the in-flight stability during recovery. Same as the small drogue chute used in the old ARK.

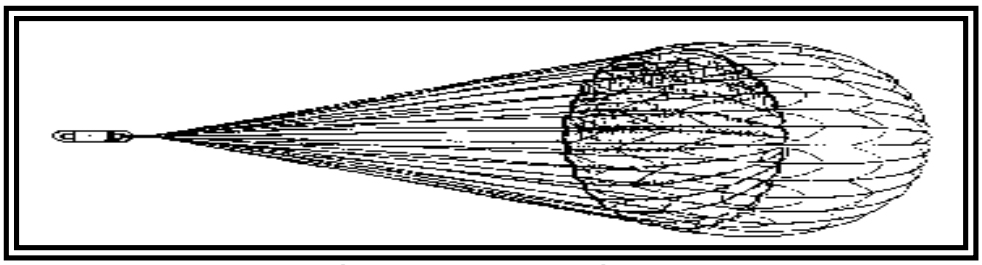

Figure 3-30. Drogue Chute

Lifting Clevis Assembly, UH-1/AH-1/OH-58A/C (PN 204-011-178)

3-50. The primary lift attachment for the AH-1/UH-1 and later OH-58A/C helicopters (Fig. 3-31) is the lifting clevis assembly.

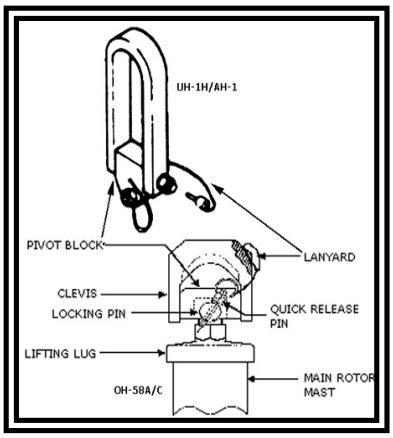

Figure 3-31. Lifting Clevis Assembly, UH-1/AH-1/OH-58A/C

Combination Wrench, 9/16 inch (PN GGG-W-636)

3-51. Standard open-end and box-end wrenches (Fig. 3-32) are used to secure the lift bolts on the UH-1/AH-1 lifting clevis assembly and the safety bolt on the apex fitting assembly.

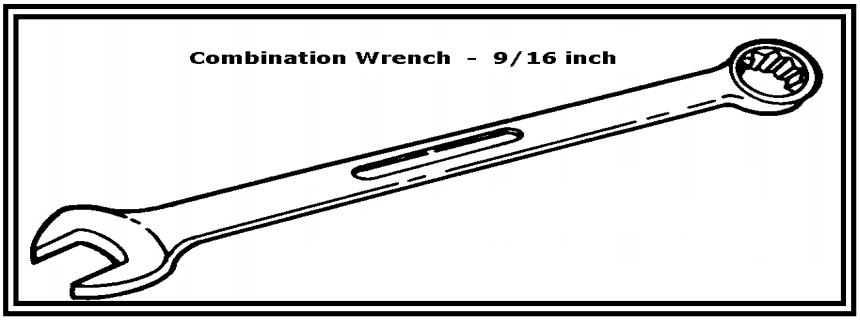

Figure 3-32. Combination Wrench, 9/16 inch

Combination Wrench, 3/4 inch (PN GGG-W-636)

3-52. Standard open-end and box-end wrenches (Fig. 3-33) are used to secure the lift bolts on the UH-1/AH-1 lifting clevis assembly and the safety bolt on the apex fitting assembly.

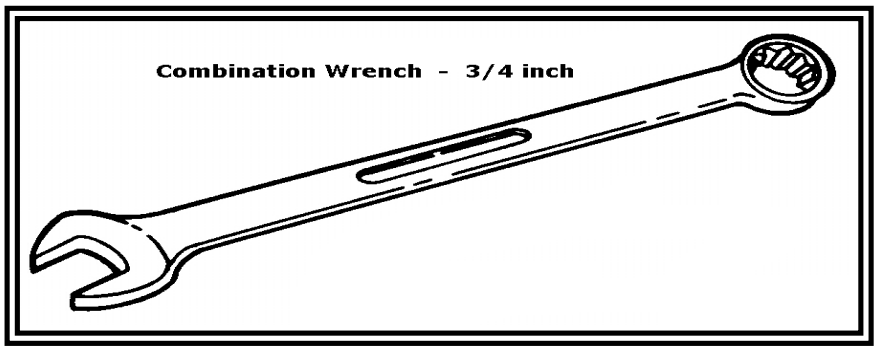

Figure 3-33. Combination Wrench, 3/4 inch

I-UMARK Tool Pouch (NSN 5140-00-329-4306)

3-53. This pouch (Fig. 3-34) holds the above tools.

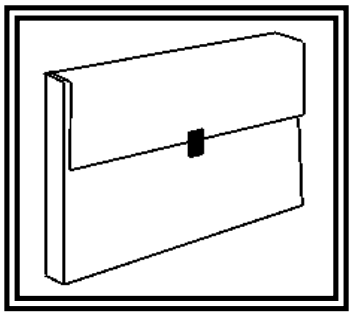

Figure 3-34. I-UMARK Tool Pouch

I-UMARK Inventory Card (PN 1670EG20090IC)

3-54. This inventory card (Fig. 3-35) provides a listing of these components with part numbers and NSNs when available. (No new NSNs were obtained for I-UMARK components. NSNs were obtained for all HERK polyester roundslings and only already stocked items when used to make up the listing of components.)

Figure 3-35. I-UMARK Inventory Card

Wooden Wedge, OH-58A/C (Fabricate – PN 1670EG20090W2)

3-55. A tapered wood block (Fig. 3-36) is inserted next to the rotor mast to prevent mast bumping on Bell rotors during recovery. Fabricate tapered wood block, 5 inches long, 4-1/4 inch thick, 7/8 inches wide at one end and ¼ inch wide at the other end.

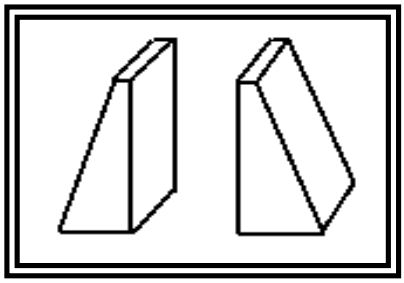

Figure 3-36. Wooden Wedge, OH-58A/C

Wooden Wedge, AH-1 (Fabricate – PN 1670EG20090W1)

3-56. A tapered wood block (Fig. 3-37) is inserted next to rotor mast to prevent mast bumping on Bell rotors during recovery. Fabricate tapered wood block, 5-3/8 inches long, 1-1/2 inches thick, 1-3/4 inches wide on one end to 1 inch wide on the other end.

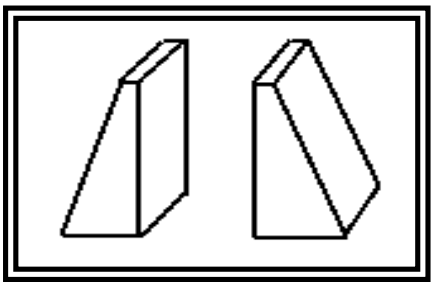

Figure 3-37. Wooden Wedge, AH-1

Manual, Operating

3-57. This technical publication (Fig. 3-38) contains description, technical data, procedures, inspections criteria, and procurement data on the I-UMARK kit and components.

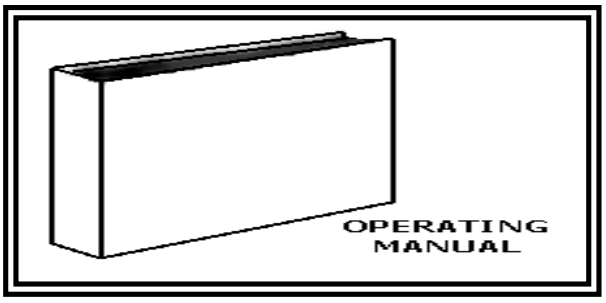

Figure 3-38. Manual, Operating

BEFORE-USE PREPARATIONS

3-58. Normally, not all of the suspension components and equipment in the recovery kit are required to recover a particular aircraft. The kit components and equipment not required for a given recovery mission could be removed from the kit and left at the storage site. However, these components must be replaced in the kit after completion of the mission.

AFTER-USE INSPECTIONS AND PACKING

3-59. After a recovery mission has been completed, the I-UMARK equipment must be returned to a ready for issue (RFI) condition.

3-60. All recovery equipment should be dried, cleaned, and inspected before repackaging it in the container. TM 55-1670-251-20&P, Organizational Maintenance Manual (Including Repair Parts and Special Tools List) for Aerial Recovery Kit, PN 167EG109A (NSN 1670-00-264-8941), describes how to care for and inspect the ARK components contained in the I-UMARK.

3-61. After completion of the cleaning and inspection for damage, all components of the I-UMARK should be replaced in the I-UMARK container in a neat and orderly fashion. Any component damaged must be replaced. The container should then be secured and stored for a subsequent recovery mission.

UNIT MAINTENANCE AERIAL RECOVERY KIT

PURPOSE AND USE

3-62. The unit maintenance aerial recovery kit (UMARK) is a system of slings, tie-downs, stabilizing equipment, and interconnecting hardware that can be assembled in multiple configurations to effect the safe aerial recovery of disabled or damaged helicopters. Helicopter damage may include, but is not limited to:

- The destruction of the main rotor head.
- The main rotor shaft or mast bent, broken, or loose in the transmission.
- The main transmission case cracked, broken, loose, or separated from the airframe.
- Damage to the tail boom to such an extent that it is not suitable as a lifting point.
- Bending or buckling of the airframe so as to create aerodynamic instabilities that could result in additional damage during the recovery flight.
- Engine(s) severely damaged or separated from the airframe.

3-63. UMARK is designed to allow three ground personnel to rig a disabled helicopter for aerial recovery in less than 15 minutes. An exception to this time frame would be the aerial recovery of a CH-47 helicopter, which requires the installation of components from two UMARK kits. The disabled or

damaged helicopters are not required to be stripped of components, defueled, disarmed, or have any additional maintenance actions performed on them before aerial recovery.

3-64. Personnel wearing combat, mission-oriented protective posture-4 (MOPP-4), or cold weather protective gear can install UMARK under all environmental conditions, day or night (using artificial illumination or night vision equipment). It can be transported internally by the UH-1 helicopter or on larger utility/cargo aircraft. It can be transported on the ground by the commercial utility cargo vehicle (CUCV) and larger vehicles.

3-65. Table 3-1 lists the recovery aircraft models, disabled aircraft models, and maximum allowable recovery weights. In general, the UH-60 series helicopters can be used to recover helicopters weighing less than 8,000 pounds (3,636 kilograms). The CH-47 series helicopters can be used to recover helicopters weighing less than 25,000 pounds (11,363 kilograms). These weights will vary with mission distance, weather conditions, and aircraft configuration.

Table 3-1. Recovery/Disabled Aircraft Models and Maximum Allowable Recovery Weights

Disabled Aircraft	Maximum Recovered Wt. Lb (Kg)	Recovery Aircraft		
		CH-47C/D	UH-60	UH-1
AH-64	20,000 (9,090)	X		
AH-64 Longbow	20,000 (9,090)	X		
CH-47	26,000 (11,818)	X		
UH-60	14,000 (6,364)	X		
AH-1 (All Army Models)	8,000 (2,727)	X		
UH-1 (All Army Models)	6,000 (2,727)	X	X	X
OH-58D	5,500 (2,500)	X	X	X
OH-58A/C	3,000 (1,364)	X	X	X

TECHNICAL CHARACTERISTICS

3-66. The UMARK components (Fig. 3-39) are packaged in three watertight, NBC contamination survivable containers. Each container is equipped with recessed latches, hinges, handgrips, and a pressure relief valve. Ribs molded into the top and bottom of each container interlock for stacking. When packed with UMARK equipment, two personnel using the recessed handgrips can carry each container. The handgrips can also be used as tie-down points during transportation.

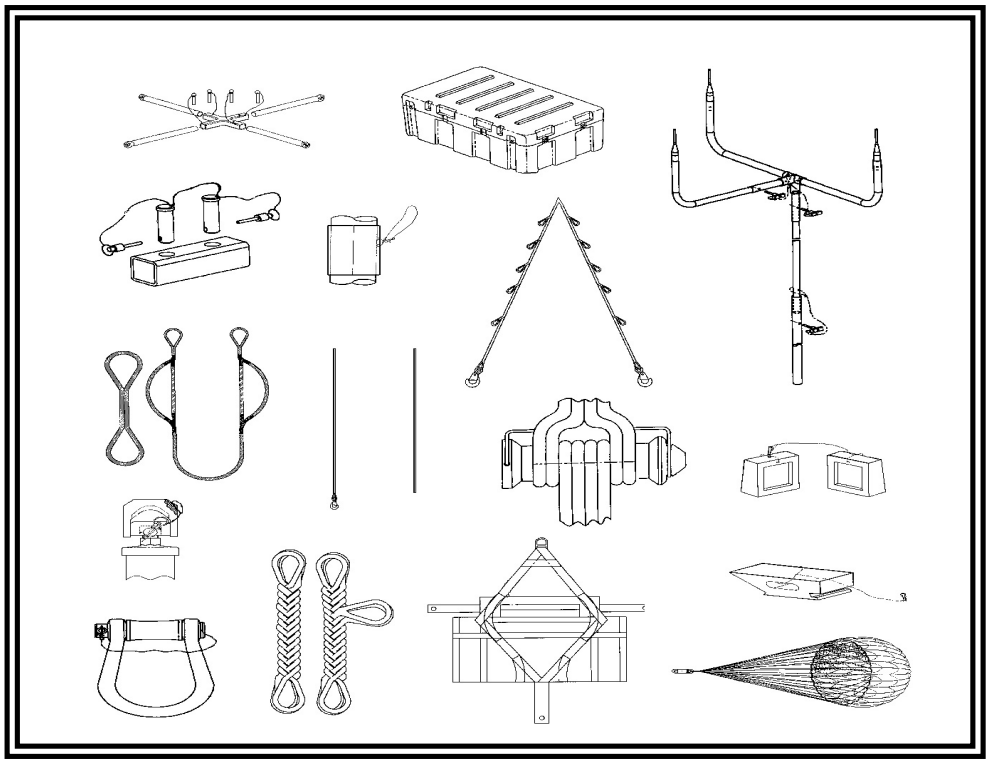

Figure 3-39. UMARK Recovery Kit

3-67. The following components are included in each UMARK:

- Thirteen lightweight slings.
- Three heavyweight slings.
- Three box link assemblies.
- Three sling link assemblies.
- One cross bar assembly.
- One lifting clevis assembly.
- One shackle assembly.
- Four blade sleeve assemblies.
- Four adjustable length tie-down assemblies.
- Five fixed length tie-down assemblies.
- One sight wedge assembly for use on the OH-58D helicopter.
- Two mast wedges (One mast wedge is used on the OH-58D helicopter; the second mast wedge is used on the AH-1 helicopter).
- One square wedges for use on the UH-1 helicopter.
- One blade pole assembly.
- Two CH-47 hook thimbles.
- Three shipping containers.
- One drogue parachute.

TRANSPORTABILITY

3-68. The UMARK is air transportable as either an internal or external load (in a net).

Internal Load

3-69. A UH-1H, UH-60, or CH-47 helicopter normally carries the kit. The helicopter also carries the recovery crew. Two people are required to lift the kit (as a complete unit) into the helicopter. Standard tie-down procedures are used to attach the tie-down straps to the kit handles and to lift the kit as required. Off-loading the kit at the recovery site also requires two people if the entire kit is to be used.

External Load

3-70. If desired, the aerial recovery kit may also be transported in a 5000-pound-capacity cargo net, NSN 1670-01-058-3811.

3-71. Before rigging, the connecting latches between the container halves should be checked to verify that they are attached and secure.

3-72. If the kit assembly is transported as an external sling load, a small recovery crew may be assigned, as only two people are required to prepare the kit for transport. However, before reducing the number of personnel, factors such as the type of aircraft to be recovered, the type of terrain, and the extent of damage to the disabled aircraft must be considered.

LIFT LIMITATIONS OF CRITICAL COMPONENTS

3-73. When the rigging configuration is like that discussed in this manual, the critical components of the UMARK can sustain loads of 22,000 pounds. When the configuration is significantly different, capability expectations should be reduced by 10 percent (down to 19,800 pounds) to allow for additional aerodynamic drag.

DESCRIPTION OF MAJOR COMPONENTS

Lightweight Sling Assembly (PN 94D519-001, -003, -005)

3-74. The lightweight slings (Fig. 3-40) are constructed of synthetic braided materials. Two lightweight sling configurations, in five color-coded lengths, are included in UMARK (Table 3-2). All lightweight slings are small in diameter and equipped with a sling hook eye at each end. The bodies of the green/black slings also are equipped with a 25-inch-long elastic cord. The cord is used to maintain tension on the slings during OH-58D and AH-64 Longbow recovery operations with the cross bar assembly.

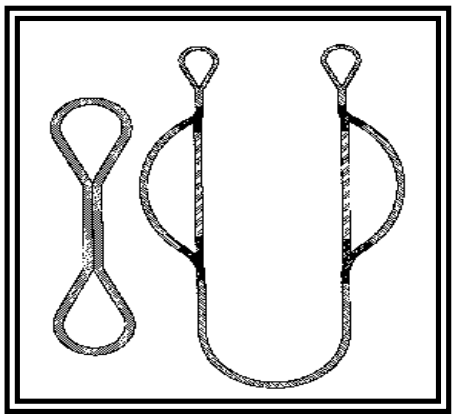

Figure 3-40. Lightweight Sling Assembly

Table 3-2. Identification Chart for Each Lightweight Sling Assembly

Color Code	Length	Quantity
Black/White	10 feet (120 in.)	1
Green/White	12.5 feet (150 in.)	4
Yellow/White	12.75 feet (153 in.)	4
Red/White	17.33 feet (208 in.)	2
Blue/White	30 feet (360 in.)	2

Heavyweight Sling Assembly (PN 94H520-001)

3-75. The heavyweight slings (Fig. 3-41) are constructed of synthetic braided materials. All three heavyweight slings included in UMARK are of large diameter and color-coded with black and white stripes. Each sling is 30 feet (360 in.) in length. The heavyweight slings are all equipped with two large-diameter hook eyes on the top end and one large-diameter hook eye on the bottom end. Besides having the same large-diameter hook eyes, one sling also is equipped with two bridle eyes about 7 feet (84 in.) from the top end.

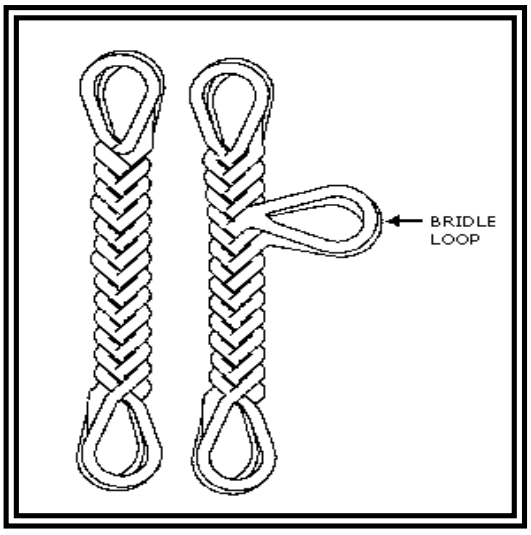

Figure 3-41. Heavyweight Sling Assembly

Box Link Assembly (PN 94C524-001)

3-76. A box link assembly (Fig. 3-42) is used to connect two slings in series configuration. Components of a box link assembly include the box link housing, two box link pins, and two quick release pins. Two holes, corresponding to the diameter of the box link pins, are drilled on the top and bottom of the box link housing. The two box link pins and the two quick release pins are interconnected by wire rope.

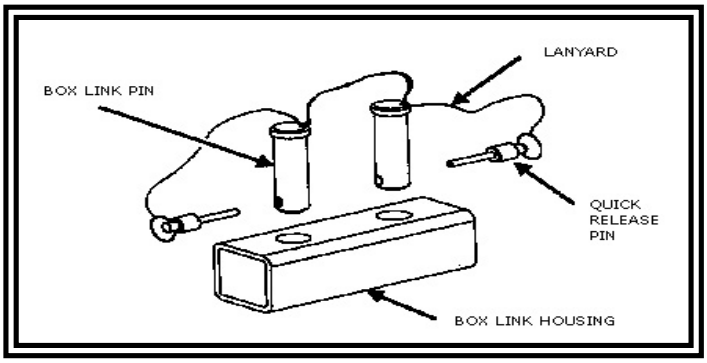

Figure 3-42. Box Link Assembly

Sling Link Assembly (PN 94D523-001)

3-77. A sling link assembly (Fig. 3-43) is used to connect four slings in a series-parallel configuration. Components of the sling link assembly include a sling link pin with attached spring lock.

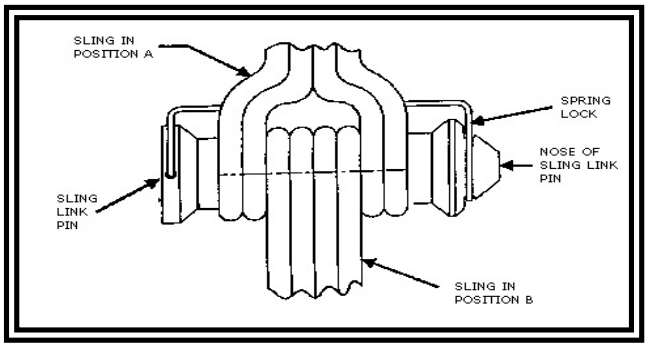

Figure 3-43. Sling Link Assembly

Cross Bar Assembly (PN 94H501-001)

3-78. The cross bar assembly (Fig. 3-44) is used to provide a load path around the AH-64 Longbow radar antenna or the OH-58D mast-mounted sight. The cross bar assembly consists of a cross bar housing, four tube assemblies, and four quick release lock pins.

3-79. The metal cross bar housing is X-shaped with four arms positions 90-degrees apart. Each arm of the cross bar housing has a hole bored through the top and bottom surfaces. The bottom of the cross bar housing is fitted with a foam fitting, which centers the cross bar housing on the radar antenna or sight and protects the antenna or sight during transportation of the

aircraft. The foam also allows for assembly of the cross bar on the antenna or sight.

3-80. Each tube assembly is fitted with a lug fitting on the outboard end. The lug fitting is equipped with a spring lock. A hole is bored through the inboard end of each tube assembly. Quick release pins are used to connect the tube assemblies to the cross bar housing.

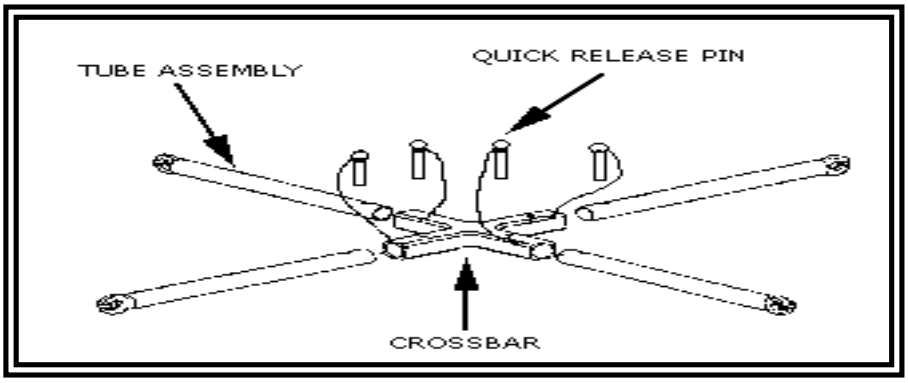

Figure 3-44. Cross Bar Assembly

Lifting Clevis Assembly (PN 94D509-001)

3-81. During AH-1, UH-1, and OH-58A/C helicopter recovery operations, the lifting clevis assembly (Fig. 3-45) replaces slings as the primary attachment devices to the main rotor assembly of the disabled helicopter. Components of the lifting clevis assembly include a clevis subassembly, a locking pin, and a quick release pin.

3-82. The clevis subassembly consists of a clevis, two clevis pins, and a pivot block. The clevis pins are used to attach the clevis to the pivot block. The pivot block acts as a universal joint allowing movement in both fore-and-aft and side-to-side directions. The locking pin is used to attach lifting clevis assembly to the helicopter hub nut lug. The quick release lock pin is used to secure the locking pin into position. Wire ropes are used to attach the locking pin and quick release pin to the clevis subassembly.

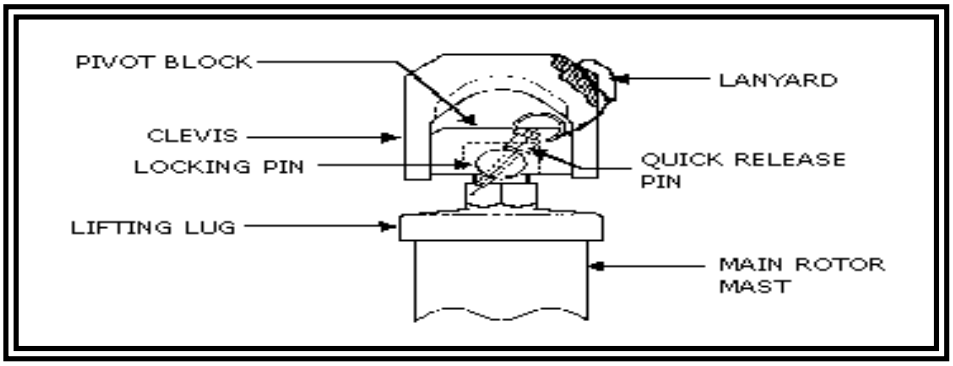

Figure 3-45. Lifting Clevis Assembly

Shackle Assembly (PN 94D514-001)

3-83. The shackle assembly (Fig. 3-46) is used to connect two or three slings in a series-parallel configuration. Components of the shackle assembly include a clevis, a clevis pin, a sling spacer, and a quick release pin. The clevis pin and quick release pin are interconnected by wire rope.

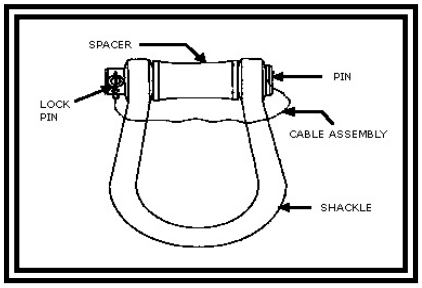

Figure 3-46. Shackle Assembly

Blade Sleeve Assemblies (PN 94J516-001)

3-84. The main rotor blades (Fig. 3-47) of a disabled helicopter may be intact. If so, the blades must be secured to prevent them from flexing during transportation. Excessive upward and downward deflection of the blades due to aerodynamic loading could result in damage to the blades and/or rotor assembly. In addition, downward deflection of the disabled helicopter main rotor blades will limit airspeed of the recovery helicopter. Installation of blade sleeves with tie-down will prevent the upward and downward deflection of the main rotor blades during transportation. The blade sleeve assembly included in the UMARK is designed for multiple aircraft configurations. It is constructed of fabric with attached straps and metal rings.

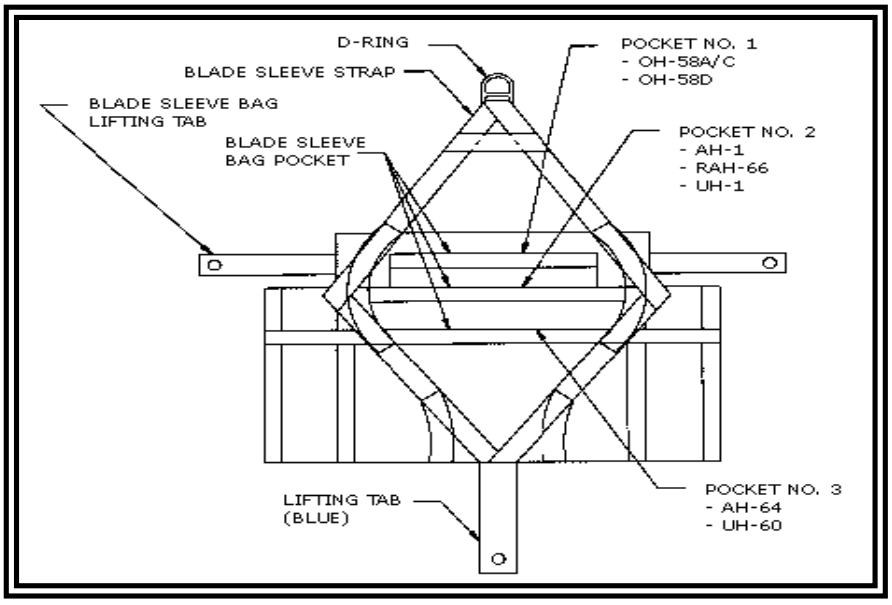

Figure 3-47. Blade Sleeve Assemblies

Blade Pole Assembly (PN 94J531-001)

3-85. The blade pole assembly (Fig. 3-48) included in the UMARK is constructed of 1-inch in diameter aluminum tubing. Matching and aligning the poles with its color-coded stripes and inserting the three attached quick release pins can assemble the blade pole assembly.

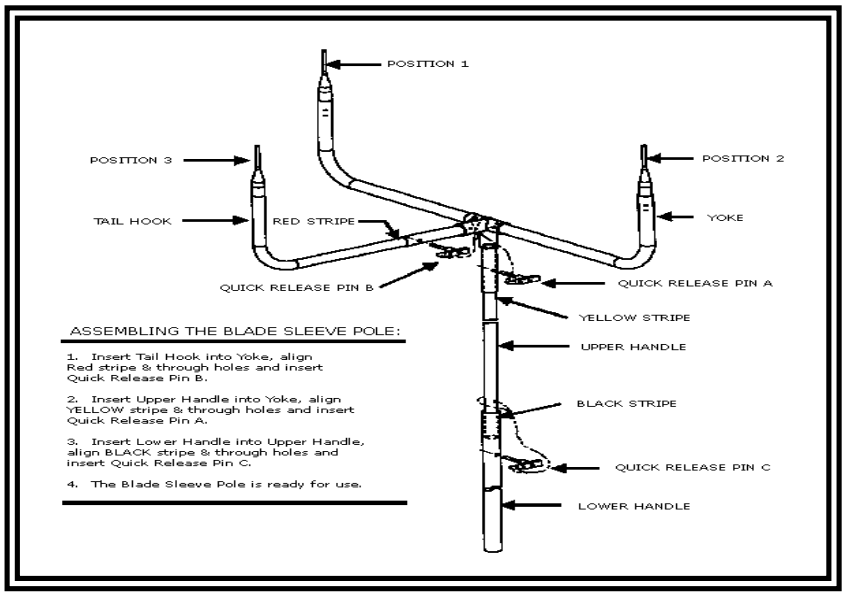

Figure 3-48. Blade Sleeve Pole Assembly

Fixed-Length Tie-down Assemblies (PN 94C522-001, -011)

3-86. The fixed-length, tie-down assemblies (Fig. 3-49) included in UMARK are constructed of synthetic braided material, they are 40 feet (480 in.) in length. Two configurations are provided. Four of the tie-downs have a fused top end and a sling hook eye with attached snap hook at the bottom. A single tie-down has fused ends at both the top and bottom ends.

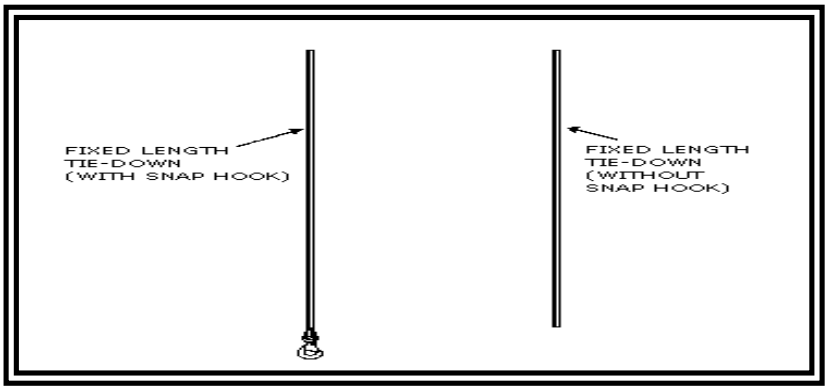

Figure 3-49. Fixed-Length, Tie-down Assemblies

Adjustable Length Tie-down Rope Assemblies (PN 94H521-001)

3-87. The adjustable tie-down assemblies (Fig. 3-50), included in UMARK, are constructed of synthetic braided material; they are 51.66 feet (620 in.) in length. Each tie-down is equipped with a sling hook eye on the top end and a sling hook eye with attached snap hook at the bottom end. Adjustability is obtained by using one of the sling hook eyes positioned slings the body of the tie-down assembly. A 10-foot (120 in.) sling extension is also provided.

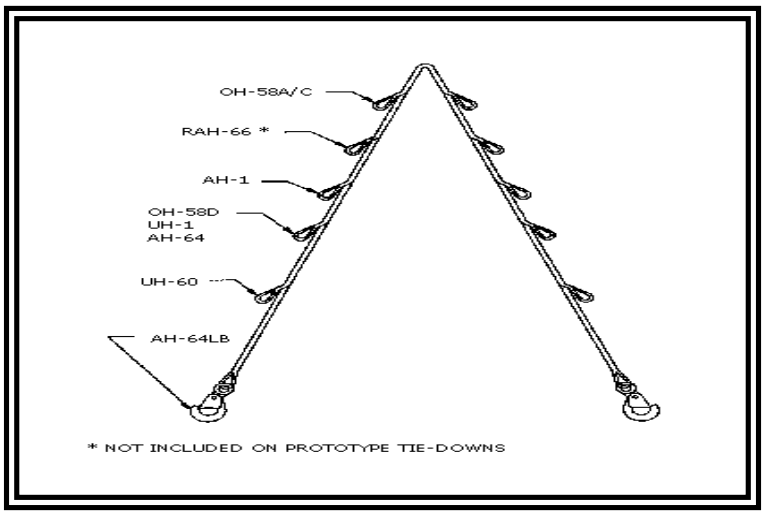

Figure 3-50. Adjustable Length Tie-down Rope Assemblies

OH-58D Sight Wedge Assembly (PN 94D527-001)

3-88. The OH-58D sight wedge (Fig. 3-51) is used to stabilize the mast-mounted sight during transportation of the disabled helicopter and to stabilize the sight during assembly of the cross bar. The sight wedge is constructed of neoprene rubber. It is equipped with a wire rope with an attached spring steel wire snap. The snap is used to secure the sight wedge into position.

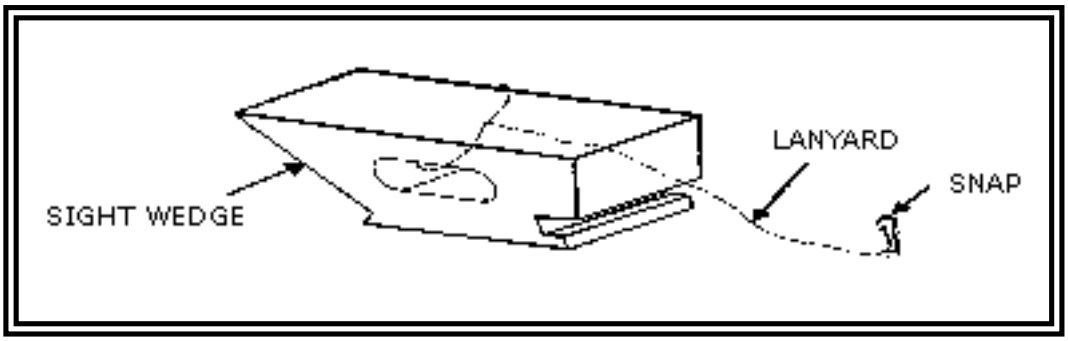

Figure 3-51. OH-58D Sight Wedge

AH-1/OH-58A/C Mast Wedges (PN 94D529-1, 94D530-1)

3-89. The AH-1 and OH-58A/C mast wedges (Fig. 3-52) are circular silicone rubber tubes. They are used to position and secure the disabled helicopter mast during transportation. Two sizes are included in UMARK. The large-diameter mast wedge is used to secure the AH-1 mast; the small-diameter mast wedge is used to secure the OH-58A/C masts. Each mast wedge is equipped with a wire rope on one side and a spring steel snap ring attached with wire rope on the opposite side. This secures the mast wedge to the mast and main rotor and prevents tilting of the main rotor during transportation.

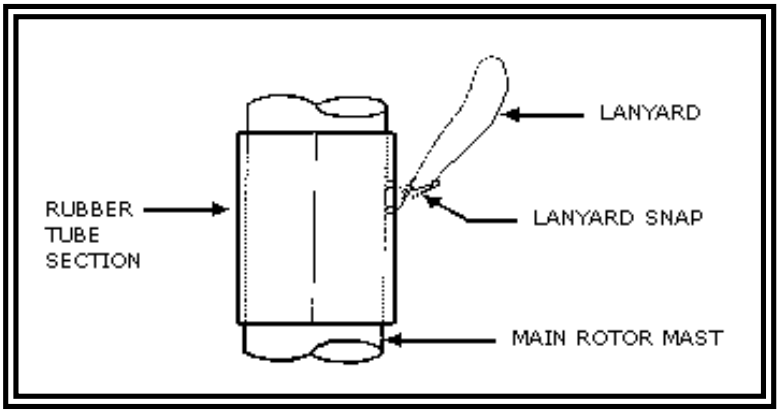

Figure 3-52. AH-1/OH-58A/C Mast Wedges

UH-1 Square Wedge Assembly (PN 94D528-001)

3-90. The UH-1 square wedges (Fig. 3-53) are installed on the main rotor stops to prevent tilting of the main rotor during transportation of the disabled helicopter. The wedges are constructed of synthetic rubber. One wedge is equipped with a wire rope with a spring steel snap ring attached. The second wedge is equipped with a wire rope only. The snap ring and wire rope are used to position and secure the square wedges.

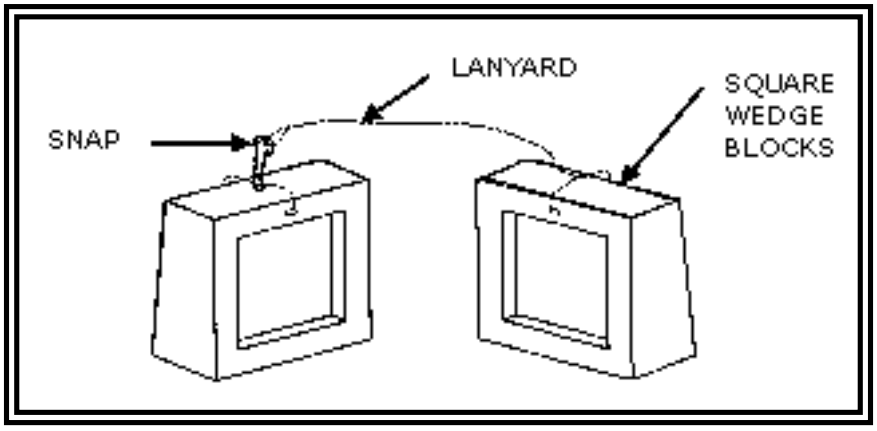

Figure 3-53. UH-1 Square Wedges

Shipping Containers (PN 21-4021-0804)

3-91. The UMARK components (Fig. 3-54) are packaged in three watertight, NBC contamination survivable containers. Each container is equipped with recessed latches, hinges, handgrips, and a pressure relief valve. Ribs molded into the top and bottom of each container interlock for stacking. When packed with UMARK equipment, two personnel using the recessed handgrips can carry each container. The handgrips can also be used as tie-down points during transportation.

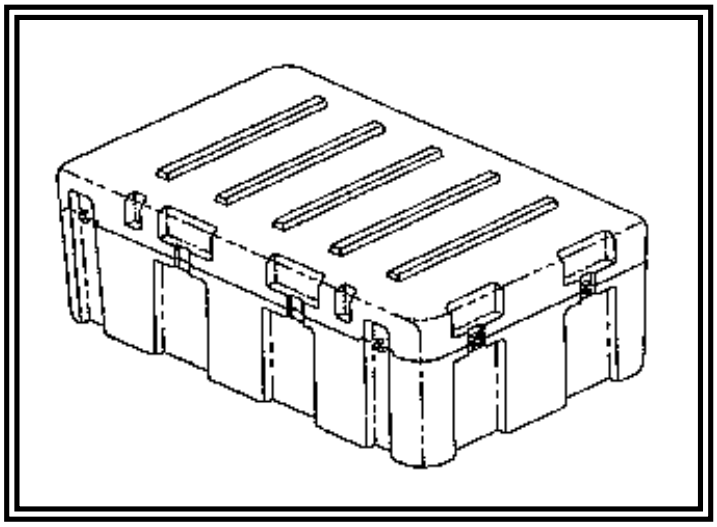

Figure 3-54. Shipping Containers

Drogue Parachute (PN 1670EG029B3)

3-92. A drogue parachute (Fig. 3-55) is included in UMARK. The drogue parachute must be deployed during recovery operations to maintain aerodynamic stability. The drogue parachute also must be deployed when recovering and heavily damaged helicopter when either the vertical or horizontal stabilizer is broken off.

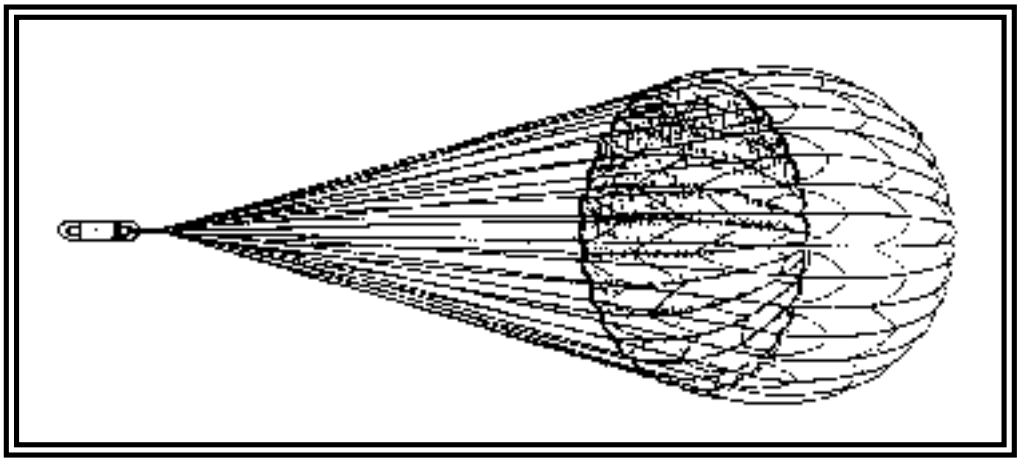

Figure 3-55. Drogue Parachute

CH-47 Hook Thimble (PN 94C533-001)

3-93. The hook thimble (Fig. 3-56) will be installed on the CH-47 cargo hook. The ultimate load is 100,000 pounds before failure. The proof load is 40,000 pounds with no permanent deflection of visible damage. The hook thimble is used with 5- to 10-foot sling (PN 94H520-001).

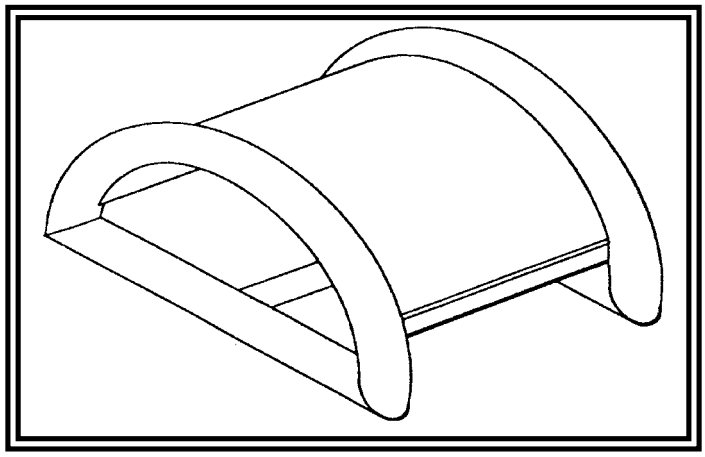

Figure 3-56. CH-47 Hook Thimble

BEFORE-USE PREPARATIONS

3-94. Normally, not all of the suspension components and equipment in the recovery kit are required to recover a particular aircraft. The kit components and equipment not required for a given recovery mission could be removed from the kit and left at the storage site. However, these components must be replaced in the kit after completion of the mission.

AFTER-USE INSPECTIONS AND PACKING

3-95. After a recovery mission has been completed, the UMARK equipment must be returned to a ready for issue (RFI) condition.

3-96. All recovery equipment should be dried, cleaned, and inspected before repackaging it in the container.

3-97. After completion of the cleaning and inspection for damage, all components of the UMARK should be replaced in the UMARK container in a neat and orderly fashion. Any component damaged must be replaced. The container should then be secured and stored for a subsequent recovery mission.

HELICOPTER RECOVERY KIT

PURPOSE AND USE

3-98. The HERK (Fig. 3-57) contains the equipment required to pre-rig, rig, and recover selected US Army helicopters.

TECHNICAL CHARACTERISTICS

3-99. The kit components are packed in a watertight, polyethylene, air mobile shipping and storage container. The container has the dimensions of 33-inch long x 21-inch wide x 22-inch high.

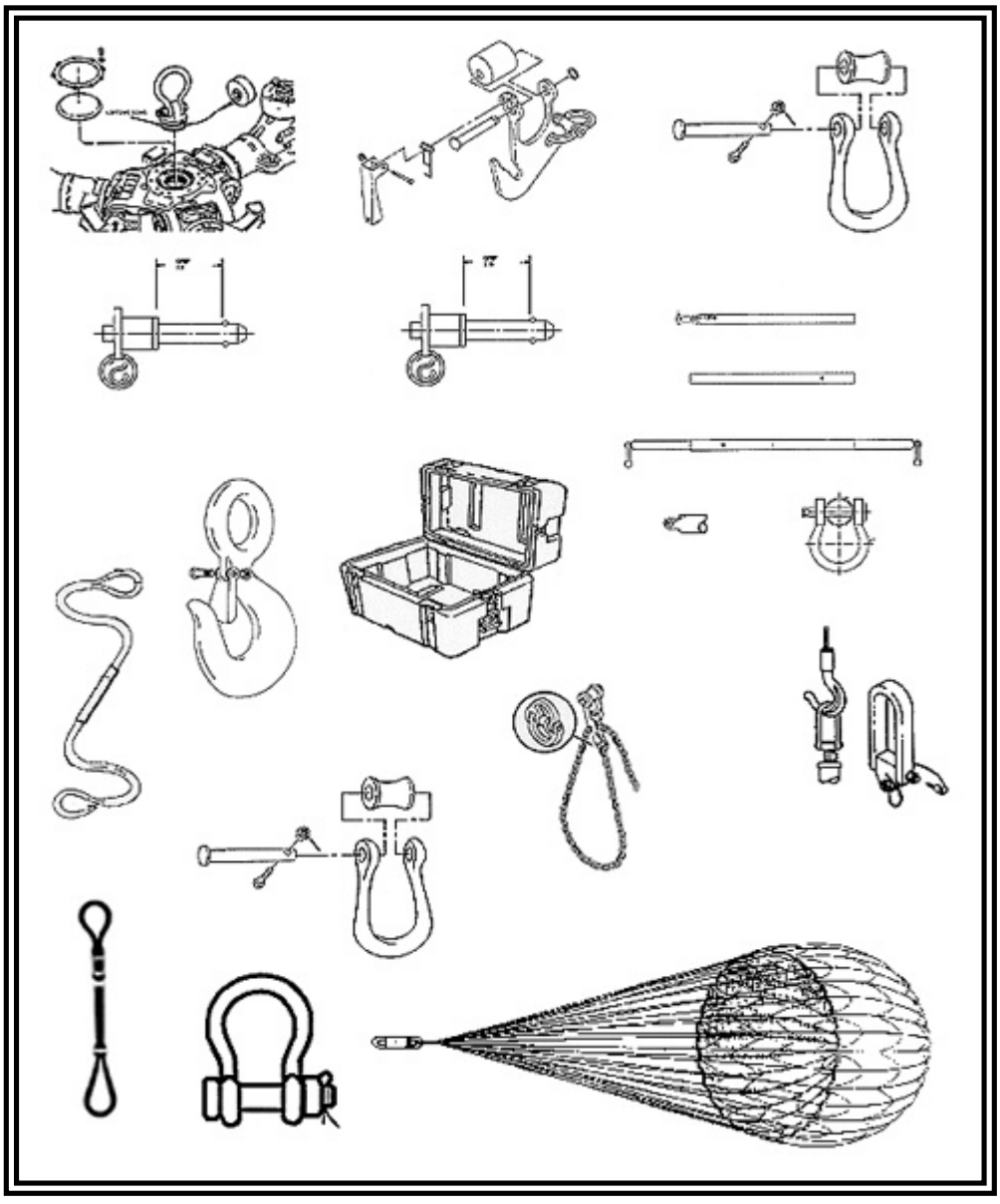

Figure 3-57. HERK Recovery Kit

TRANSPORTABILITY

3-100. The HERK is air transportable as either an internal or external load (in a net).

Internal Load

3-101. A UH-1H, UH-60, or CH-47 helicopter, which also carries the recovery crew, carries the kit. Two people are required to lift the kit (as a complete unit) into the helicopter. Standard tie-down procedures are used to attach the tie-down straps to the kit handles and to lift the kit as required. Off-loading the kit at the recovery site also requires two people if the entire kit is to be used.

External Load

3-102. If desired, the aerial recovery kit may also be transported in a 5000-pound-capacity cargo net, NSN 1670-01-058-3811.

3-103. Before rigging, the connecting latches between the container halves should be checked to verify that they are attached and secure.

3-104. The kit assembly may be transported as an external sling load. If this occurs, a small recovery crew may be assigned, as only two people are required to prepare the kit for transport. However, before reducing the number of personnel, factors such as the type of aircraft to be recovered, the type of terrain, and the extent of damage to the disabled aircraft must be considered.

LIFT LIMITATIONS OF CRITICAL COMPONENTS

3-105. When the rigging configuration is like that discussed in this manual, the critical components of the HERK can sustain loads of 22,000 pounds. When the configuration is significantly different, capability expectations should be reduced by 10 percent (down to 19,800 lb.) to allow for additional aerodynamic drag.

DESCRIPTION OF MAJOR COMPONENTS

3-106. Major components of the HERK are discussed below.

Case, Polyethylene (PN 5140-EG-090-001)

3-107. This case (Fig. 3-58) is the same as the basic case used to house the aviation foot locker (AFL), fielded with the new aircraft tool system (NATS). It has six carrying handles for 2- or 4-person carry. One or more of these cases can be used to provide waterproof storage and transport of those components needed for a specific recovery operation.

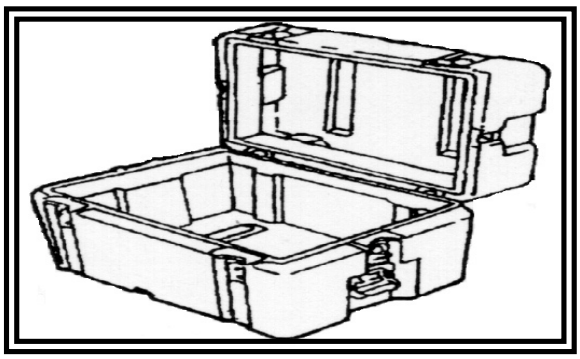

Figure 3-58. Case, Polyethylene

Polyester Roundsling (PN PRS2E008, PN PRS3E008, PN PRS2E017, PN PRS3E017, PN PRS5E030, PN PRS7E065, and PN PRS7E070)

3-108. A polyester roundsling (Fig. 3-59) is made with a continuous, load-bearing core, which is fully enclosed in a woven protective cover. With the I-UMARK and HERK, the endless "round" loop is formed into an eye and eye configuration by sowing a sleeve over center of the roundsling body. High-bulk nylon (Cordura) wear pads are sown into the end loops and a sliding wear pad is added between the eyes. Roundslings were selected for this application because they have no hard eye, like the helicopter sling, and can be snaked through restricted areas of the helicopter main rotor hubs for optimum attachment location. The unwoven, load-bearing core conforms to the lifting member and is protected from cuts or abrasion by the polyester cover and the nylon wear pad. Polyester roundslings have about one-half the stretch of nylon webbing or nylon rope. Polyester roundslings are color coded and labeled in two locations to indicate the capacity. They may be used in choked, vertical (pin-to-pin) or basket hitch configurations. Polyester roundslings are used to rig the helicopter for recovery and as long-line pendants to obtain separation between the lift and recovered helicopters.

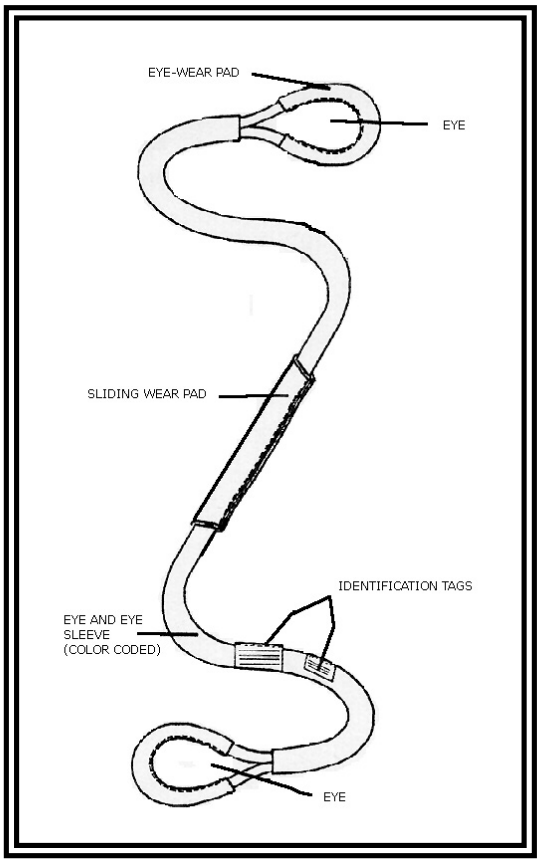

Figure 3-59. Polyester Roundsling (PN PRS2E008, PN PRS3E008, PN PRS2E017, PN PRS3E017, PN PRS5E030, PN PRS7E065, and PN PRS7E070)

Apex Assembly, 10K (PN 38850-00004-045)

3-109. The apex assembly (Fig. 3-60) is a 10,000-pound-capacity helicopter external cargo sling. This large clevis is used to connect roundslings to each other, a reach pendant, or to the lift helicopter. The 10K apex is made of aluminum.

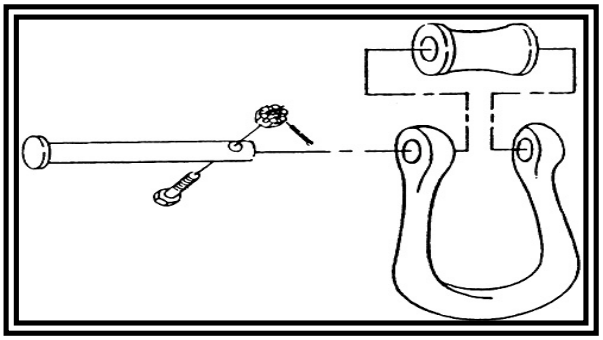

Figure 3-60. Apex Assembly

PIP Pin (PN MS17984C612) (Optional) (1.6-inch Grip)

3-110. PIP (push-in-pullout) pins (Fig. 3-61) are quick-disconnect pins used in place of nuts and bolts in applications requiring rapid attachment/installation. For helicopter hoisting and recovery operations, they may be used in place of the safety bolt to secure the apex load pin.

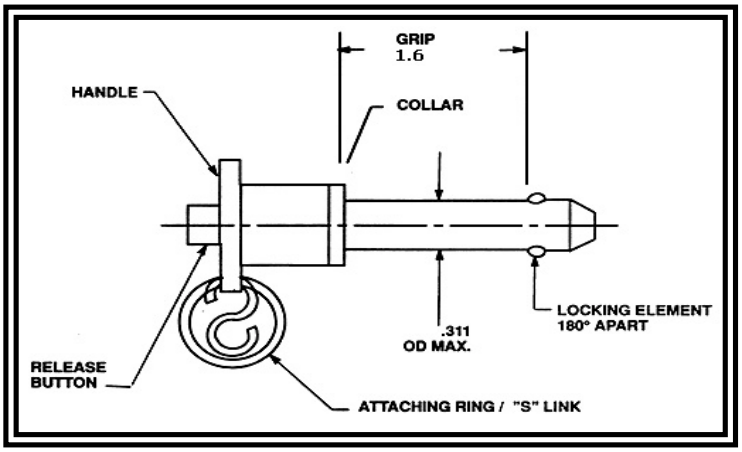

Figure 3-61. PIP Pin

Apex Assembly, 25K (PN 38850-0000-046)

3-111. The apex assembly (Fig. 3-62) is a 25,000-pound-capacity helicopter external cargo sling. This large clevis is used to connect roundslings to each other, a reach pendant, or to the lift helicopter. The 25K apex is made of alloy steel.

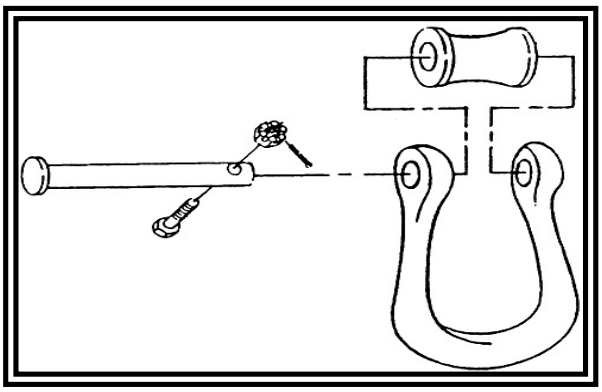

Figure 3-62. Apex Assembly

PIP Pin (PN MS17984C616) (Optional) (2.0-inch Grip)

3-112. PIP (push-in-pullout) pins (Fig. 3-63) are quick-disconnect pins used in place of nuts and bolts in applications requiring rapid attachment/installation. For helicopter hoisting and recovery operations, they may be used in place of the safety bolt to secure the apex load pin.

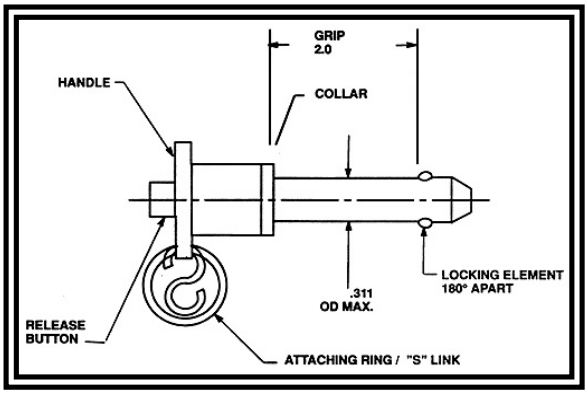

Figure 3-63. PIP Pin

Eye Hook (PN S-320A-11)

3-113. The eye hook (Fig. 3-64) is used for quick attachment of a roundsling to one or more additional roundslings. The pin of an apex assembly is attached to the eye of the hook. The HERK includes two eye hooks to expedite hoisting of UH-60s for vessel shipment.

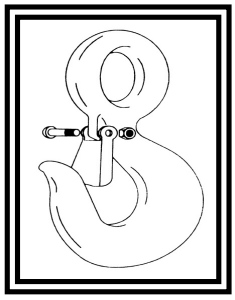

Figure 3-64. Eye Hook

Grabhook, 25K Sling (PN 38850-00011-046)

3-114. The grabhook assemblies (Fig. 3-65) also are from the 25,000-pound-capacity helicopter external cargo slings. A grabhook with an 8-foot length of chain is attached to one end of a roundsling to provide a quickly adjustable length leg. The two grabhook and chains are included in the HERK for use in vessel transport of UH-60 helicopters.

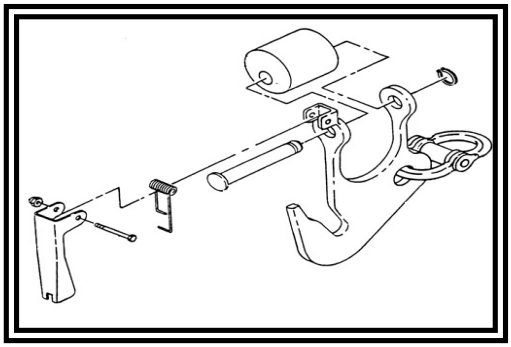

Figure 3-65. Grabhook, 25K Sling

Chain, 25K Sling (PN 38850-00053-102)

3-115. One end of this 8-foot length of steel alloy chain (Fig. 3-66) is attached to the grabhook with a coupling (Hammerlock) fitting. The other end is routed through a lift provision and secured back in the grabhook. The link count determines the length of the sling leg.

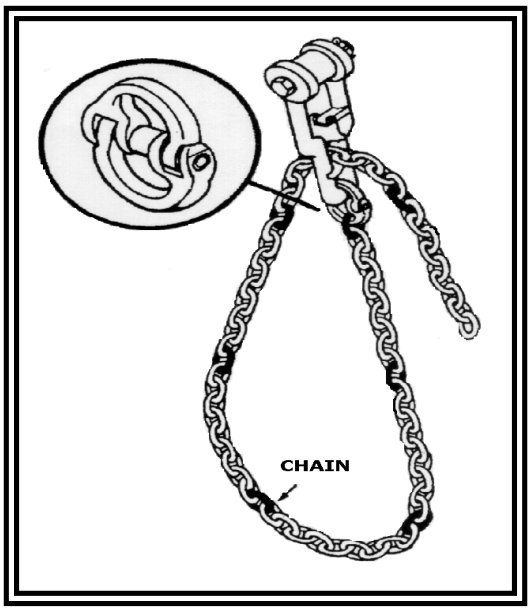

Figure 3-66. Chain, 25K Sling

Shackle, Anchor (PN 1019515 (75535))

3-116. An anchor shackle (Fig. 3-67) is a small clevis used to attach to a lift eye. The four anchor shackles are included in the HERK to allow attachment of polyester roundslings to the fuselage hard point on the CH-47.

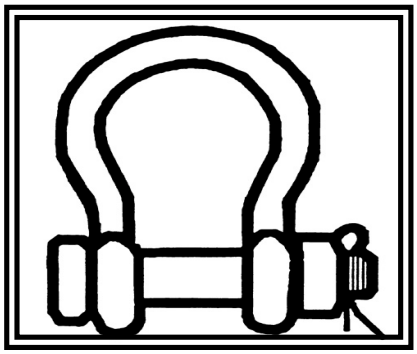

Figure 3-67. Shackle, Anchor

SUPPLEMENTAL ITEMS

SPREADER BAR (TM 1-1520-237-S, FIG. 7-6)

3-117. A 3-section, aluminum tube, two inner tubes and one outer tube, with 10K apex assemblies at each end (Fig. 3-68) is used to keep the lifting line from contacting the lifted helicopter. Principle use is vessel transport of the UH-60.

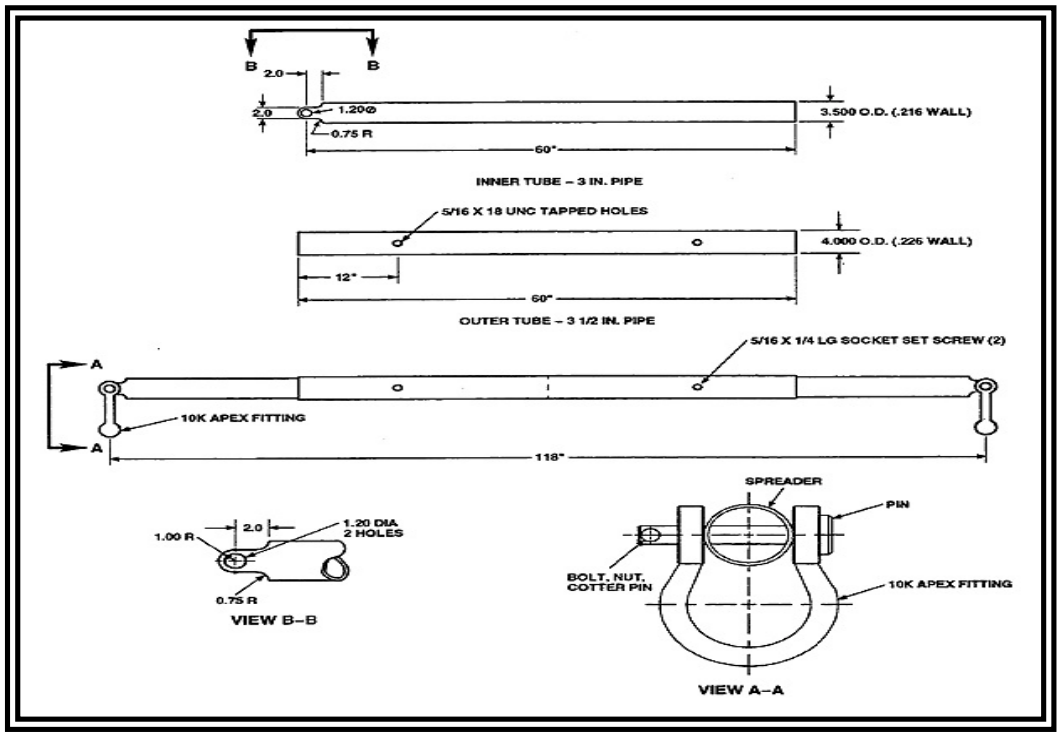

Figure 3-68. Spreader Bar

Lifting Clevis, AH-1/UH-1 (PN 204-011-178-1)

3-118. The primary lift attachment for the AH-1/UH-1 and later OH-58A/C helicopters is shown in Figure 3-69.

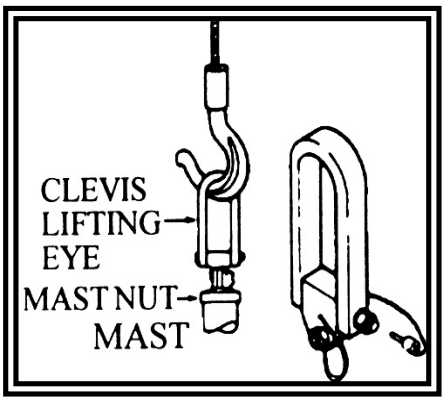

Figure 3-69. Lifting Clevis, AH-1/UH-1

Lifting Ring (PN 114E5909-8)

3-119. Rings (Fig. 3-70) are screwed into the rotor masts on the CH-47 for attachment of hoisting slings when transmission mounts are intact.

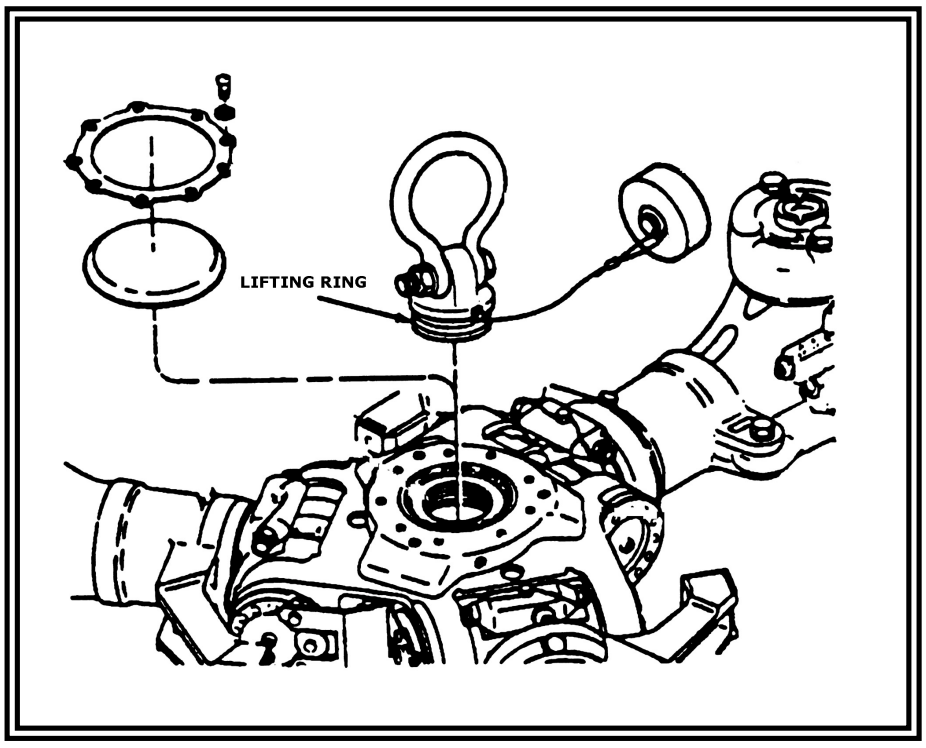

Figure 3-70. Lifting Ring

Reach Pendant, 25,000-lb. Capacity (PN BOS-14-K7)

3-120. A 5-foot-long, nylon rope loop (Fig. 3-71) is enclosed in a rigid pipe to increase the lift helicopter to load clearance for safe hookup.

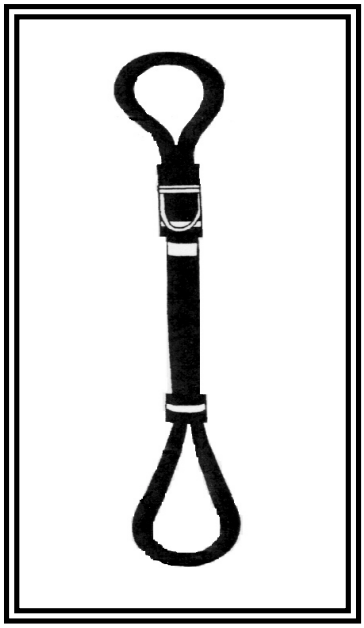

Figure 3-71. Reach Pendant, 25,000-lb. Capacity

Drogue Chute (PN 1670EG029B3)

3-121. A specially designed parachute (Fig. 3-72) attaches to the tail wheel of selected helicopters to improve the in-flight stability during recovery.

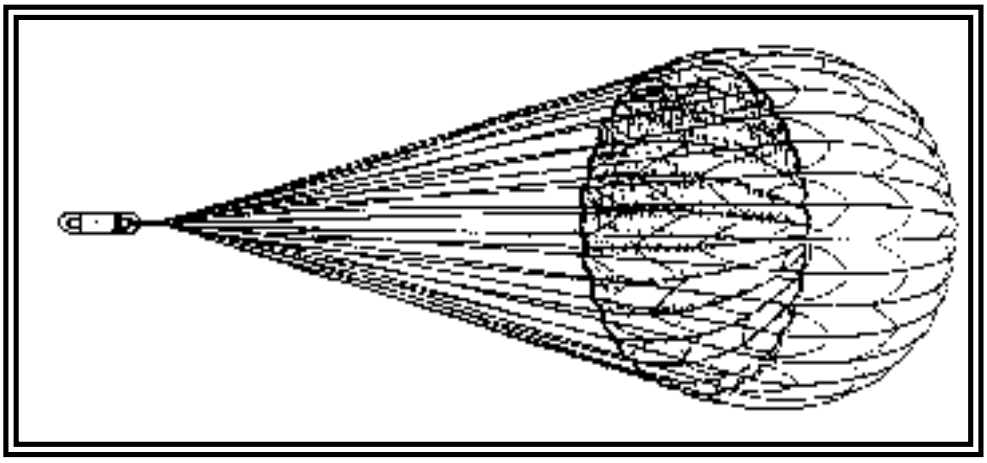

Figure 3-72. Drogue Chute

NOTES

NOTE: Vessel shipment of UH/EH/MH-60 using main rotor head rigging. Rigging instructions contained in TM 1-1520-237-S, Chapter 3, require spreader bar, eye hooks, and at least four additional roundslings be used to expedite lift-on/lift-off operations by pre-rigging the rotor head attachment.

NOTE: Vessel shipment of UH/EH/MH-60 using fuselage hard point rigging. Rigging instructions contained in TM 1-1520-237-S, Chapter 3, require two hoisting adapters; allow rapid attachment without personnel having to climb on the shrink-wrapped helicopter.

NOTE: Aerial recovery of H-60 and AH-64 using main rotor head rigging. Rigging instructions for the UH/EH-60 are contained in TM 1-1520-237-S, Chapter 9. Attach to the AH-64 using rigging procedures contained in the I-UMARK Operating Procedures, Revision A, 30 Nov 90. The mast-mounted assembly must be removed from the AH-64D.

NOTE: Aerial recovery of H-60 using main gear drag beam rigging. Rigging instructions are contained in TM 1-1520-237-S, Chapter 9; used if the main rotor head, transmission, or transmission mounts are damaged.

NOTE: Aerial recovery of H-60 using bellyband rigging. Rigging instructions are contained in TM 1-1520-237-S, Chapter 9; used if main rotor head, transmission, transmission mounts, and main landing gear are damaged.

NOTE: Aerial recovery of OH-58D. Rigging instructions are contained in TM 1-1520-248-S, Chapter 9. The mast-mounted sight must be removed.

NOTE: Aerial recovery of AH-1, UH-1, and OH-58C. Rigging instructions are contained in I-UMARK Operating Procedures, Revision A, 30 Nov 99; require lifting clevis described in the applicable aircraft shipping manual.

NOTE: Aerial recovery of CH-47 using rotor mast attachment. Rigging instructions contained in TM 1-1520-241-S, Chapter 8, require two hoisting adapters at forward and aft transmission vertical shafts. Reach pendant is used if lift CH-47 cannot land for hookup.

NOTE: Aerial recovery of CH-47 using fuselage hard points. Used in place of CH-47C Aircraft Maintenance Sling, P/N 114G1013-1, NSN 1730-00-071-1690, which is no longer produced. The reach pendant is used if lift CH-47 cannot land for hookup. Using roundslings as long-line pendants is optional. Use 10, 25K apexes to connect pendants to end, and to attach to lift helicopter.

BEFORE-USE PREPARATIONS

3-122. Normally, not all of the suspension components and equipment in the recovery kit are required to recover a particular aircraft. The kit components and equipment not required for a given recovery mission could be removed from the kit and left at the storage site. However, these components must be replaced in the kit after completion of the mission.

AFTER-USE INSPECTIONS AND PACKING

3-123. After a recovery mission has been completed, the HERK equipment must be returned to a ready for issue (RFI) condition.

3-124. All recovery equipment should be dried, cleaned, and inspected before repackaging it in the container.

3-125. After completion of the cleaning and inspection for damage, all components of the HERK should be replaced in the HERK container in a neat and orderly fashion. Any component damaged must be replaced. The container should then be secured and stored for a subsequent recovery mission.