APPENDIX I

HIGH PERFORMANCE UTILITY HOIST, FOREST PENETRATOR, AND FLOTATION DEVICE FOR STOKES LITTER

Section I. HIGH PERFORMANCE UTILITY HOIST

I-1. General

a. The high performance hoist is intended for use to assist helicopter rescue operations when a landing is not possible. This hoist is mounted internally, but may be mounted externally on the UH-60 helicopter. It is a two-speed hoist, post mounted in the cabin on the right side of the aircraft. The hoist has 256 feet of cable and a maximum lift capacity of 300 pounds at 250-feet per minute (fpm) (fast) and 600 pounds at 125 fpm (slow).

b. The high performance hoist is used in conjunction with the following equipment (dis cussed in Chapter 11):

- Forest penetrator (Section VIII).
- SKED litter (Section IX).
- Rescue (Stokes) litter (Section X).
- Poleless semirigid litter (Section XI).
- Survivor sling (horse collar) (Section XII).

c. There is a high degree of risk involved in a hoist rescue operation. It should, therefore, only be used when no other options are available. The patient to be hoisted should be placed in the area with the least amount of hazards (obstructions) to lessen the risks involved to both the patient and the aircrew. To ensure safe and efficient patient evacuation, ground personnel must precisely follow the crew's instructions.

d. The number of patients extracted at any one site depends on—

- Aircraft weight.
- Outside temperature.
- Altitude.
- Wind and weather conditions.
- Medical evacuation configuration kit for the aircraft.

e. Since a hoist is not routinely maintained on the air ambulance, it must be requested in the special equipment portion of the initial evacuation request and installed prior to takeoff.

I-2. Configuration

a. The hoist system consists of modular components (Figure I-1), which are electrically driven and controlled. A speed mode switch provides a selection of either slow speed (0-125 fpm) or fast speed (0-250 fpm). This switch is located on the back of the rescue hoist control panel assembly on the hoist support assembly. The hoist motor provides a selection from 125 or 250 fpm reel-in and reel-out drive of a 256-foot hoist cable. This motor is mounted on top of the pole. A fail safe mechanism limits the induced loading weight to the hoist to 1,200 pounds at all times. A circulating fan, which runs continuously, cools the hoist motor.

b. A rotary actuator is provided for swinging the boom in and out of the cabin door. The hoist is operated by means of a control pendant or by controls on the right-hand cyclic stick. The pilot's hoist control switch provides for boom positioning and reeling the rescue hoist cable up or down. The pilot's control mechanism has priority over the hoist operator's controls; however, the pilot has only a fixed, full-speed capability. The hoist operator's controls are located on the hoist control pendant (Figure I-2) and provide the following switches:

- A speed knob that is self-centering and provides variable speed control for reeling the cable up or down.

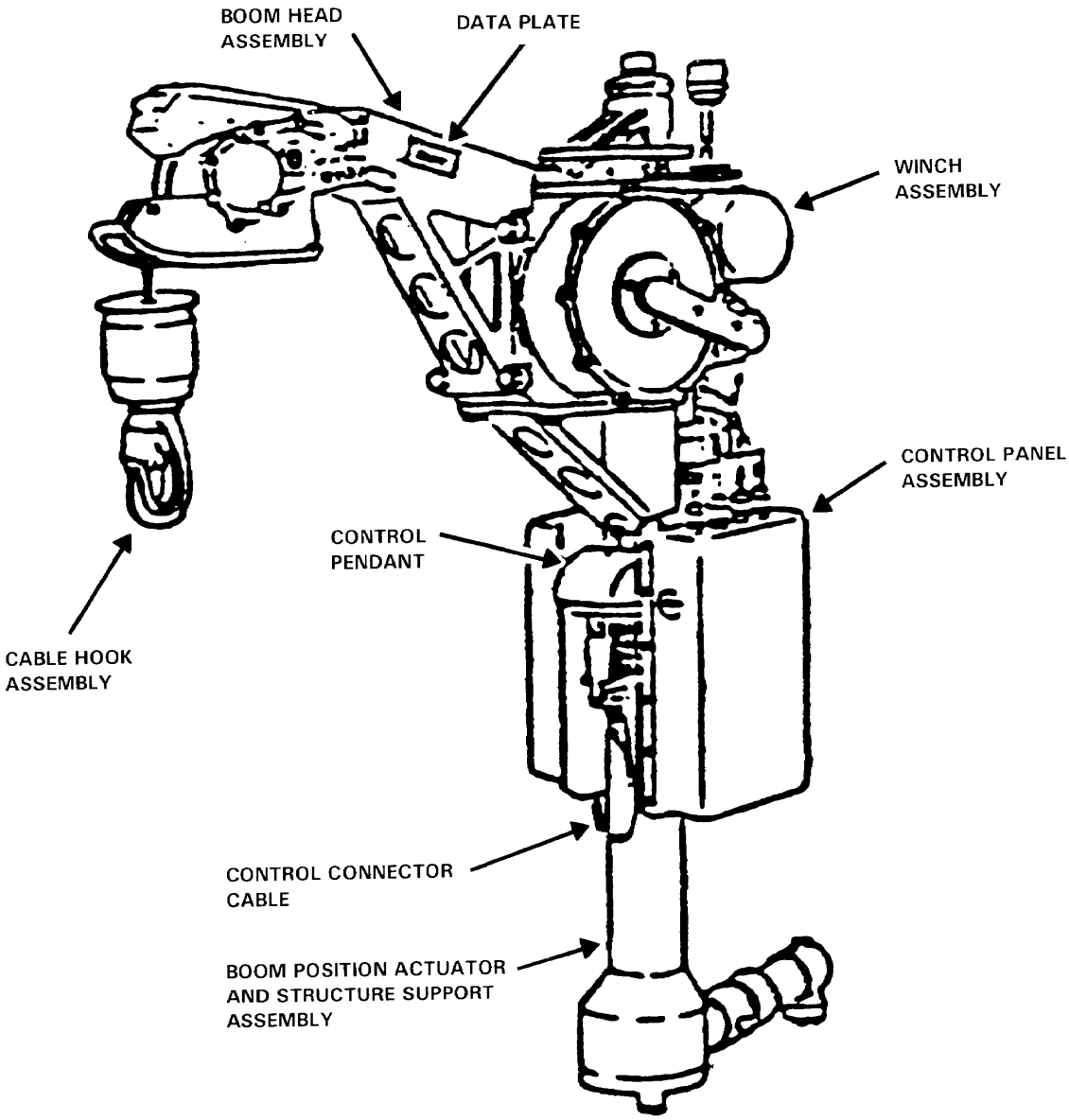


Figure I-1. The hoist system.

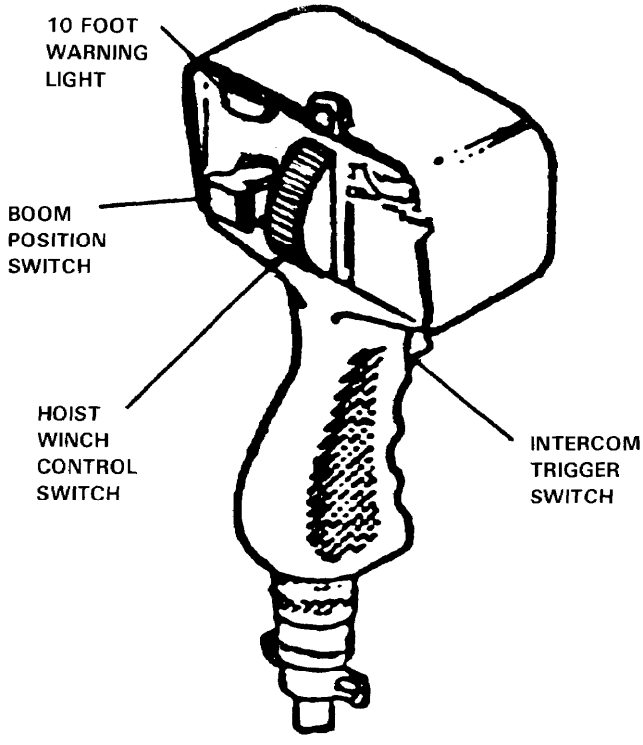


Figure I-2. Control pendant.

- A boom in and out switch and an intercom trigger switch that provide communications with the flight crew through the hoist operator's headset.

- A cable limit light and an overtemperature light.

c. The boom assembly includes a traction sheave, dual up-limit switches, and a cable guide. The installed boom head is designed to swivel 60 degrees about the boom cable axis and 30 degrees either side of center. In the event that the up-limit switch malfunctions the cable is protected from being overstressed by two cable deceleration switches and by the force absorbing capability built into the cable snubber and inertia dump of the wind assembly. One of the decelerating switches operates when the hook is 8 to 10 feet from full-up, and the other operates when the hook is 12 to 18 inches from full-up. A powered traction sheave assembly aids in lowering the hoist cable and prevents snarling of cable while being reeled out. The powered traction sheave assembly is mounted on the end of the hoist boom.

d. A cable-cutting assembly, employing a ballistic charge, provides a means of cutting the cable free of the helicopter in an emergency. The cutter is electrically activated by switches, protected by guards, located on the hoist control panel, and on the pilot's panel. The switches are sealed with breakaway wire.

I-3. Installation and Preflight Checks

a. Check for proper installation and security of the rescue hoist, ensuring that the vertical shaft for the ceiling attaching point is raised vertically to prevent the ceiling attaching device from disconnecting.

b. Check cargo hook for condition and security, and ensure that the explosive cartridge is installed.

c. Check oil level in hoist boom head.

d. Make sure rescue hoist power and rescue hoist cable cutter circuit breakers are in the **OUT** position.

e. Ensure that cable cutter switches (pilot and hoist operator) guards are down and secured.

f. Connect cable cutter.

g. Remove protective plastic sleeve at hood assembly.

h. Ensure that the rescue hoist control and rescue hoist power circuit breakers are installed. Blue power light and yellow caution light should be **ON** and the fan should be operating.

i. Rotate boom out and in using the boom switch, then out to test boom operation.

j. Rotate boom in and out using the hoist switch (pilot).

k. Reel cable out from boom head in line with the boom axis during the following test procedures. To avoid kinking the cable, care must be taken not to pull the cable taut around the cable guide/roller. Avoid damaging cable on rough surfaces.

l. Inspect the cable at the hook assembly before reeling the cable out to ensure that the 3- to 4-inch long protective plastic sleeve used during storage of the hoist has been removed.

CAUTION

It is important to inspect the boom sheave to ensure that the sleeve has not become entrapped as serious cable damage could result.

m. Place speed mode switch on **HIGH.**

n. Reel cable out using the hoist switch (pilot) until caution light is out on the control pendant (approximately 10 feet).

o. Reel in the cable using the hoist control switch (pilot) to ensure that cable speed slows when caution light comes on (approximately 10 feet).

p. Check the boom up limit switch actuator arm by pushing up on the arm while reeling in. Ensure that the hoist stops running when up-limit switches are actuated. With no load on the hoist, observe that the cable speed slows when hook is 12 to 18 inches from the full up position.

q. Repeat sequence *n* through *p* above on low speed.

r. Repeat sequence *n* through *p* with the hoist operator's control pendant. Check that cable speed can be regulated from 0 to 250 fpm when the cable is reeled out beyond the 10 foot caution limit.

s. Rotate boom to stowed position.

I-4. Prior to Takeoff Checks

a. Pull out, upon completion of preflight check, rescue hoist control, rescue hoist power, and rescue hoist cable cutter circuit breakers.

b. Ensure that the hoist operator is secure in the gunner's harness.

c. Open doors as required.

d. Move rescue hoist power, rescue hoist control, and cable cutter circuit to the **OUT** position.

NOTE

Refer to the applicable technical manual for instructions concerning inspections, assembly, disassembly, installation, and removal of high performance hoist.

I-5. Major Assemblages

Table I-1 contains a listing of the major assemblages of the high performance hoist. The table correponds to Figure I-3. Refer to the appropriate technical manual for further information.

Table I-1. Listing of Major Assemblages

INDEX	NOMENCLATURE
1	Control Connector Cable
2	Control Pendant Assembly
3	Clamp
4	Hook
5	Control Panel Assembly
6	Cable Hook Assembly
7	Boom Head Assembly
8	Limit Switch Cable
9	Upper Stanchion
10	Winch Assembly
11	Vertical Adjustment Detent
12	Quick Release Adapter
13	Input Power Cable Connector
14	Cable Cutter Harness
15	Winch Motor Cable
16	Boom Position Stanchion
17	Structure Support Assembly
18	Boom Head Cable
19	Pendant Control Cable
20	Boom Motor Cable
21	Input Power Cable
22	Reaction Arm Assembly
23	Quick Release Adapter
24	Release Assembly Pin
25	Release Assembly Pin
26	Quick Release Adapter
27	Boom
28	Cable Cutter
29	Carrier Lock Spring
30	Carrier Assembly
31	Carrier Assembly Retainer
32	Hook Assembly
33	Cap Seal
34	Retainers
35	Clamp
36	Air Duct Boot

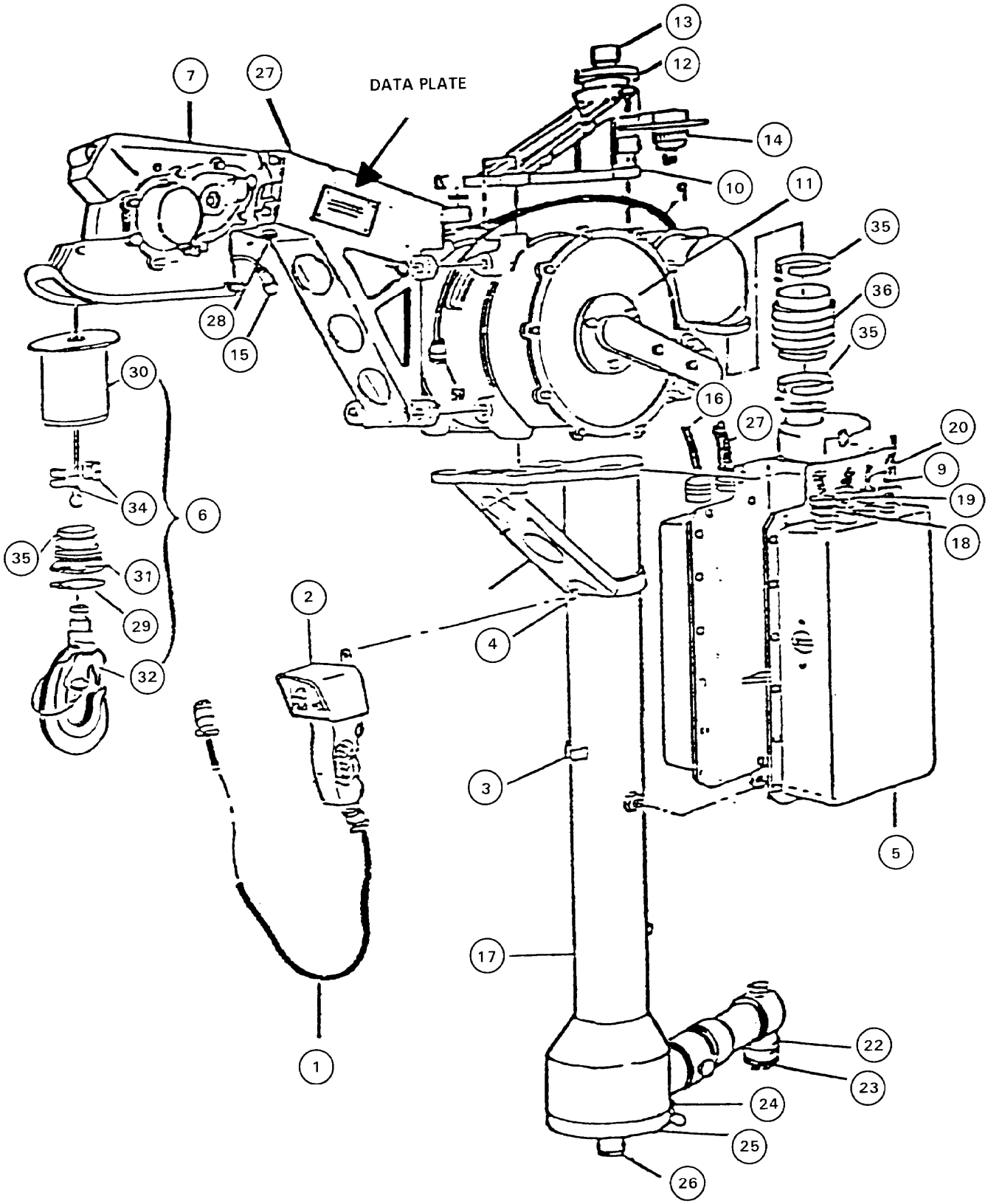


Figure I-3. Schematic of high performance hoist assemblages.

Section II. THE FOREST PENETRATOR

I-6. General

This section contains the illustrated parts list for the forest penetrator. The description and employment of this equipment is contained in Chapter 11, Section VIII.

I-7. Illustrated Parts List

Figure I-4 and Table I-2 list and illustrate the parts of the forest penetrator and flotation collar.

Table I-2. Parts Listing

Item No.	National Stock Number	MFR Code	Part Number	Nomenclature
	4240-00-199-7353	84955	K26-1000-9	Seat, Rescue Forest Penetrator
1	4240-00-829-9824	84955	K26-1021-1	Cover Assembly
2	5306-00-869-8984	84955	K26-1009-11	Eye Bolt
3			MIL-S-22499	Washer, Laminated
4	5310-00-184-9001	88044	AN960PD416L	Washer
5	5310-00-807-1475	96096	MS21042-L4	Nut, Self-Locking
6	4240-00-179-6531	84955	K26-1020-1	Safety Strap
7	5315-00-059-0494	96906	MS24665-379	Cotter Pin
8	5306-00-151-1411	88044	AN4-25A	Bolt
9	5305-00-068-0522	96906	MS24621-45	Screw, Self-Tapping
10	5310-00-167-0753	88044	AN960PD10L	Washer
11		84955	K26-1001-1	Body Assembly
12	5310-00-187-2400	88044	AN960PD616	Washer
13	1670-00-832-4221	84955	K26-1008-11	Spring, Torsion
14	5365-00-160-9520	80205	NAS43DD6-94	Spacer
15	5340-00-875-1861	96906	MS22018-1	Hook, Snap
16	5360-00-832-4224	84955	K26-1019-11	Spring, Torsion
17	4240-00-832-4220	84955	K26-1018-11	Hook
18	5310-00-807-1477	80205	MS21042-L6	Nut, Self-Locking
19		84955	K26-1010-11	Stop
20		84955	K26-1083-1	Nose
21	5306-00-427-6797	88044	AN26-54A	Bolt
22	5310-00-807-1476	96906	MS21042-L5	Nut, Self-Locking
23	5310-00-184-8980	88044	AN960PD516L	Washer
24	4240-00-443-1076	84955	K26-1042-3	Seat
25	5306-00-427-6756	88044	AN25-54A	Bolt
26	5310-00-407-9566	88044	AN935-516	Washer
27	5306-00-720-8557	96906	MS200074-05-05	Bolt
28	5340-00-664-0399	61864	SS51045	Button, Plug
29	4240-00-936-2795	84955	K26-1017-1	Collar, Floatation

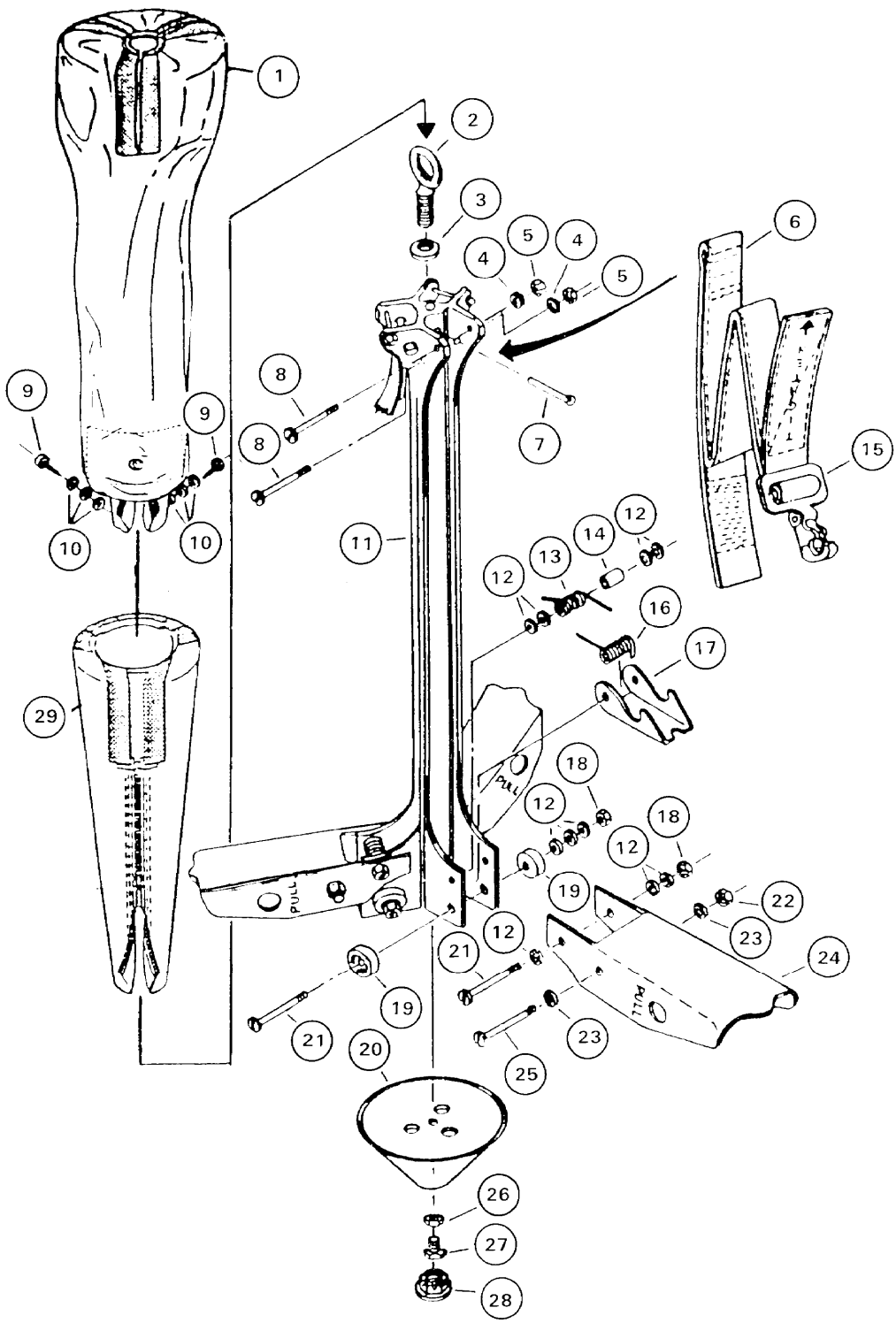


Figure I-4. Forest penetrator exploded view.

Section III. FLOTATION DEVICE FOR STOKES LITTER

I-8. General

In water rescues a device must be employed to keep the litter afloat and to keep the head of the casualty out of the water.

I-9. Flotation Device

The flotation collar for the Stokes litter is similar to a US Coast Guard collar and is designed to support a patient in the water. It is recommended that units having an AO that includes bodies of water have flotation devices on hand for use with this litter.

a. Fabrication. To fabricate a flotation collar, complete the following steps:

(1) Cut one piece of nylon duck fabric 18-inches wide and 9-feet, 3-inches long.

(2) Cut one piece of nylon duck fabric 18-inches wide and 3-feet, 9-inches long.

(3) Cut four circular end pieces of nylon duck fabric 8 inches in diameter.

(4) Cut tabs in the four end pieces as shown in Figure I-5.

(5) Cut twelve pieces of 9/16-inch webbing 32-inches long and heat sear the ends.

(6) Sew ½-inch seams on the long sides of sleeves and 1 ½-inch seams on the short ends.

NOTE

All stitching is done with size E nylon thread. Stitch spacing is 8 to 10 stitches per inch.

(7) Using the strap stitch pattern shown in Figure I-6, sew lengths of nylon webbing onto nylon duck (Figure I-7) for the long sleeve, and as shown in Figure I-8 for the short sleeve.

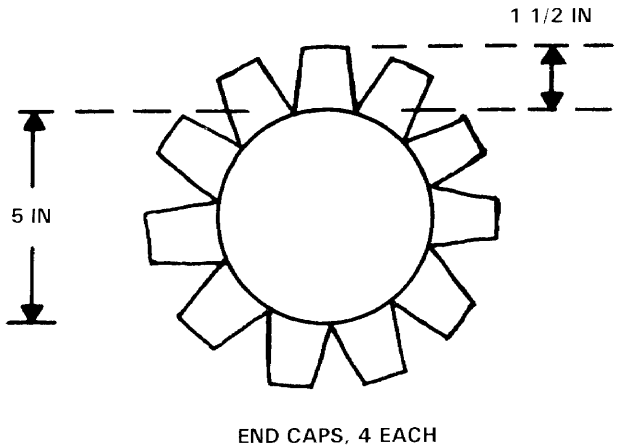


Figure I-5. End piece for flotation device.

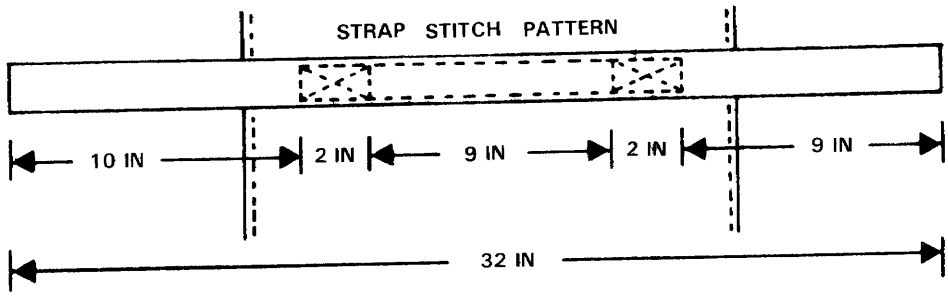


Figure I-6. Stitch pattern.

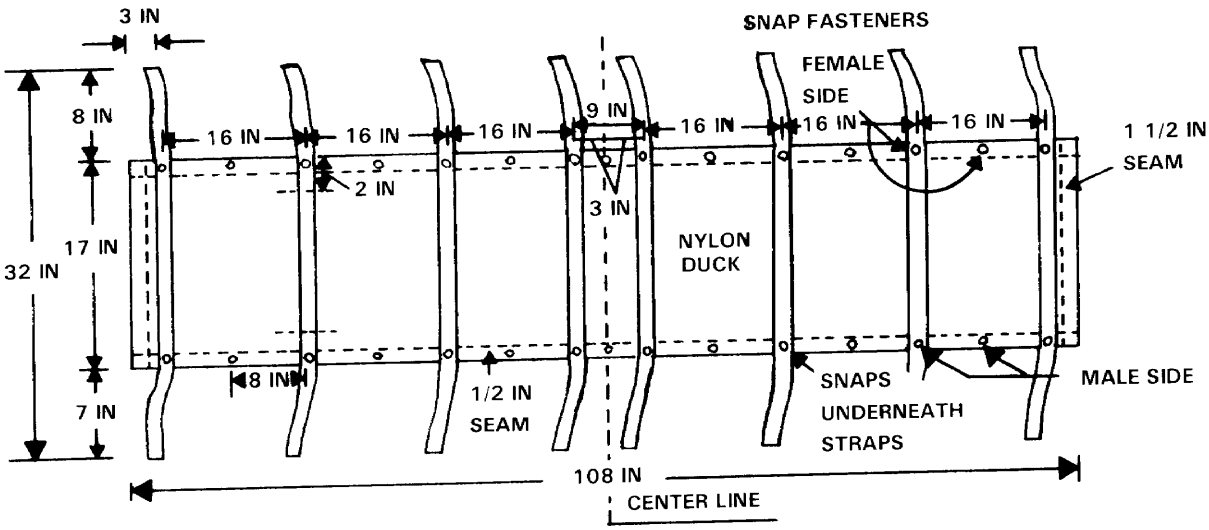


Figure I-7. Sew nylon webbing on long sleeve.

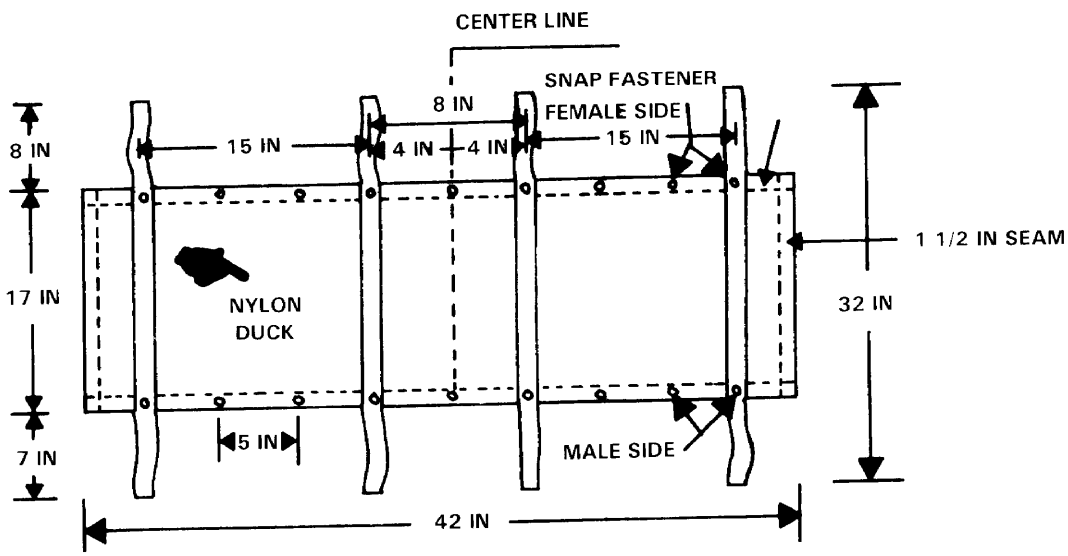


Figure I-8. Sew nylon webbing on short sleeve.

(8) Install snap fasteners as shown in Figures I-7 and I-8. Ensure snaps do not interfere with ties.

(9) Sew the circular end pieces to the inside of sleeve ends. Stitching follows the tab contours. Sew two rows of reinforcing stitching through all tabs. Where sleeve sides overlap at the end caps, sew several rows of reinforcing stitching.

(10) Cut one length of 5-inch diameter Ethafoam to 108 inches. Measure and cut wedges as shown in Figure I-9.

(11) Cut one length of 5-inch diameter Ethafoam to 42 inches. Then measure and cut out wedges as shown in Figure I-10.

(12) Insert the 5-inch diameter Ethafoam into sleeves ensuring that the cutout wedges are facing up and centered under snaps (Figure I-11). Snap sleeve edges together.

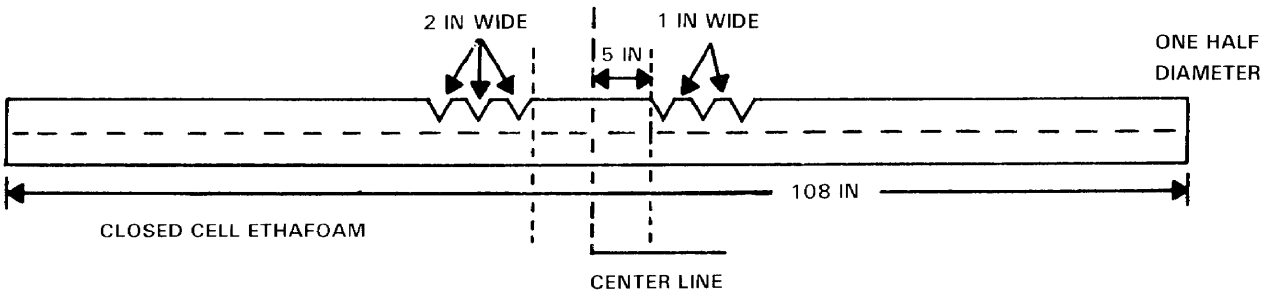


Figure I-9. Five-inch diameter Ethafoam— 108 inches long.

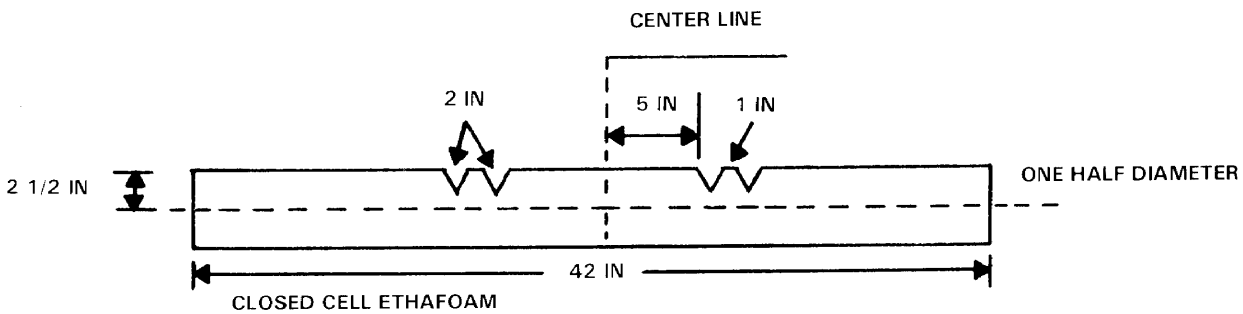
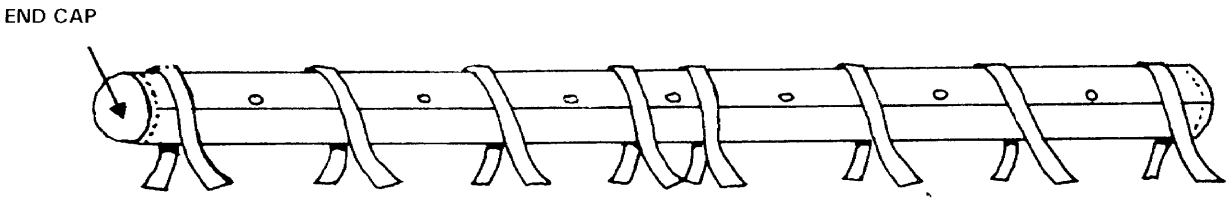


Figure I-10. Five-inch diameter Ethafoam— 42 inches long.



NOTE: COLLAR IS 5-INCHES IN DIAMETER, 108-INCHES LONG, AND IS FILLED WITH FLEXIBLE CLOSED CELL ETHAFOAM.

Figure I-11. Inserting Ethafoam in sleeves.

b. Installation. Position the 108 inch flotation collar around the outside of the head of the Stokes litter (Figure I-12). Align the ties to the inside of the center horizontal brace and secure with ties using square knots. Repeat this procedure with the 42-inch flotation collar at the foot end of the litter.

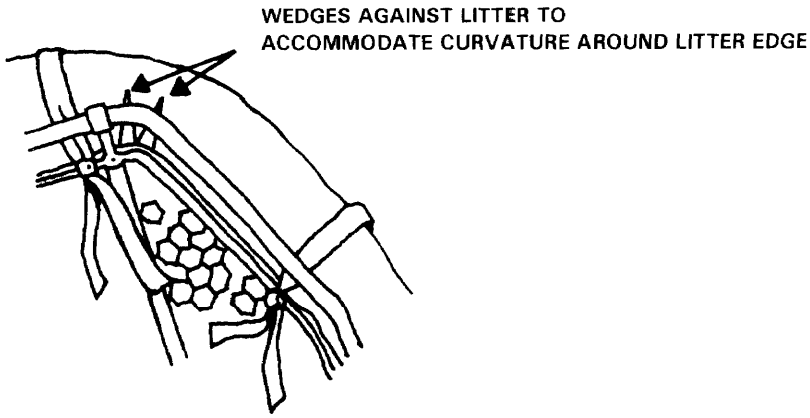


Figure I-12. Positioning flotation collar.