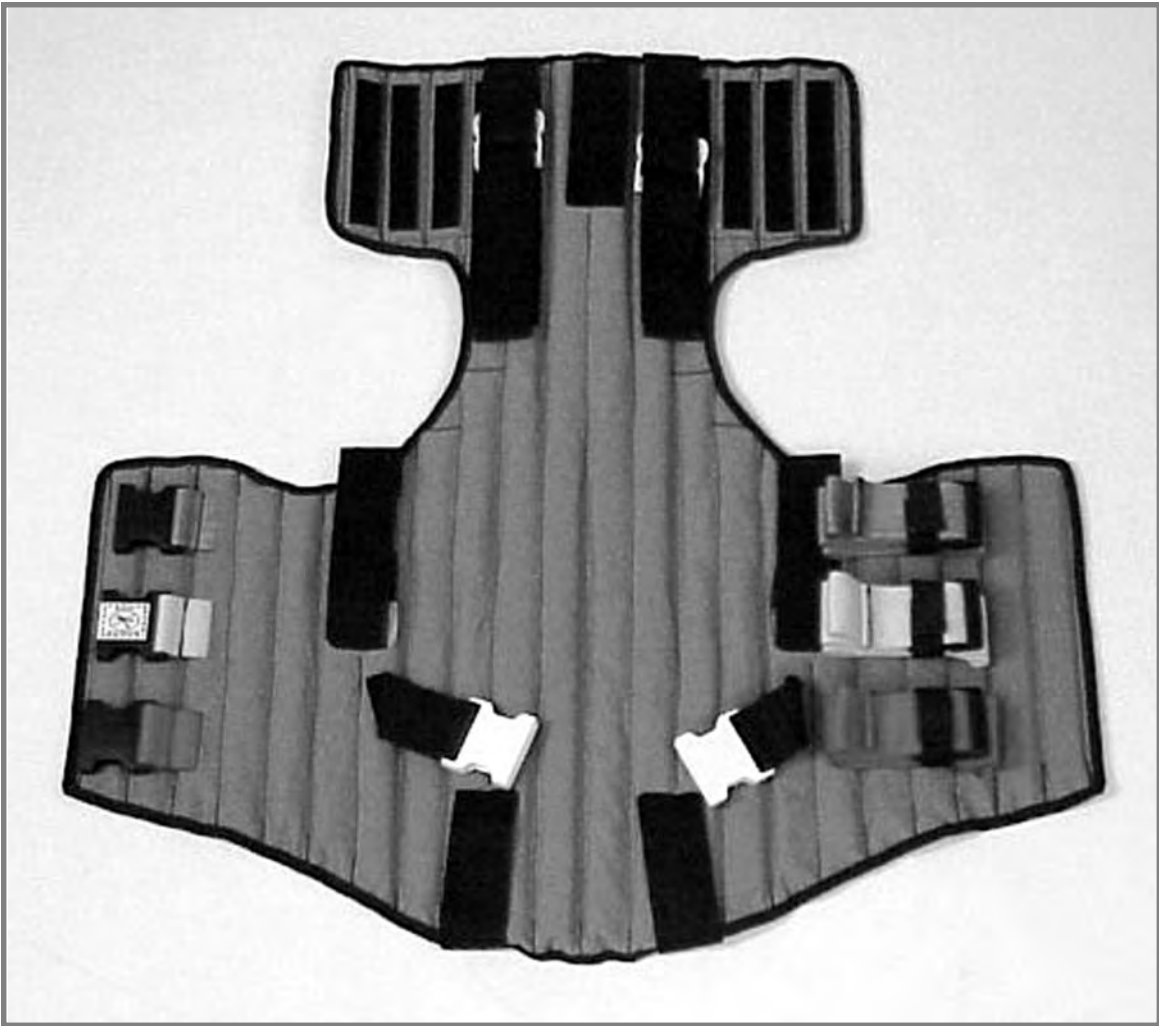




FERNO

When it's critical.™

Users' Manual



Model 125
KED

April 2001

Pub. No. 234-1754-02

Disclaimer

This manual contains general instructions for the use, operation and care of this product. The instructions are not all-inclusive. Safe and proper use of this product is solely at the discretion of the user. Safety information is included as a service to the user. All other safety measures taken by the user should be within and under consideration of applicable regulations. It is recommended that training on the proper use of this product be provided before using this product in an actual situation.

Retain this manual for future reference. Include it with the product in the event of transfer to new users. Additional free copies are available upon request from Customer Service.

Proprietary Notice

The information disclosed in this manual is the property of Ferno-Washington, Inc., Wilmington, Ohio, USA. Ferno-Washington, Inc. reserves all patent rights, proprietary design rights, manufacturing rights, reproduction use rights, and sales use rights thereto, and to any article disclosed therein except to the extent those rights are expressly granted to others or where not applicable to vendor proprietary parts.

Instructional Material Provided with the KED:

Model 125 KED Users' Manual 234-1754

© Copyright Ferno-Washington, Inc. All Rights Reserved.

Ferno-Washington, Inc.
70 Weil Way
Wilmington, OH 45177-9371
U.S.A.

Telephone (U.S.A. and Canada) 800.733.3766
Telephone (Worldwide) 937-382-1451
Fax (United States) 937.382.1191
Fax (Outside U.S.A.) 937-382-6569
Internet www.ferno.com

TABLE OF CONTENTS

Section	Page	Section	Page
1 - Safety Information	5	6 - Adapting the KED in Special Situations	25-27
1.1 Warning	5	6.1 General Guidelines	25
1.2 Important	5	6.2 Adapting the KED for a Pregnant Patient	25
1.3 Be Aware	5	6.3 Adapting the KED for a Pediatric Patient	26
1.4 Bloodborne Disease Notice	5	6.4 Adapting the KED for an Angulated Neck	26
2 - Operator Skills and Training	6	6.5 Adapting the KED for Use With Monitoring Systems	26
2.1 Skills	6	6.6 Adapting the KED for Use as a Splint	27
2.2 Training	6	6.7 Using the KED with an Anti-Shock Garment	27
3 - About the KED	7-8	7 - Storing the KED	28-31
3.1 Model KED Description	7	7.1 Storing the KED Properly	28
3.2 General Specifications	7	8 - Maintaining the KED	31
3.3 Components	8	8.1 Maintenance Schedule	31
4 - About the KED Features	9-14	8.2 Cleaning and Disinfecting the KED	31
4.1 Quick-Release Buckle	9	8.3 Inspecting the KED	31
4.2 Shortening the Securing Straps	9	9 - Limited Warranty	32
4.3 Lengthening the Securing Straps	10	10 - Customer Service	32
4.4 Releasing the Securing Straps	10	Training Record	33
4.5 Torso Straps	11	Maintenance Record	34
4.6 Leg Straps	12	Notes	35
4.7 Adjusta-Pad	13		
4.8 Lifting Handles	13		
4.9 Head Straps	14		
5 - Using the KED	15-24		
5.1 Before Placing the KED in Service	15		
5.2 General Guidelines for Use	15		
5.3 Applying the Cervical Collar	16		
5.4 Removing the KED from the Carrying Case	16		
5.5 Placing the KED Behind the Patient	17		
5.6 Wrapping and Positioning the KED	18		
5.7 Fastening the Torso Straps	19		
5.8 Applying the Leg Straps	20		
5.9 Securing the Patient's Head	21		
5.10 Buckling the Top Strap and Making Final Strap Adjustments	22		
5.11 Transferring the Patient to the Long Spine Board	23		

Illustrations

Components	8	Figure 31 - Wrapping the Head Flaps with Padding in Place	21
Figure 1 - Fastening the Buckle	9	Figure 32 - Head Straps Applied	21
Figure 2 - Unfastening the Buckle	9	Figure 33 - The KED, Applied	22
Figure 3 - Removing Excess Slack from Strap	9	Figure 34 - Patient Pivoted with Back Toward Inside of Vehicle	23
Figure 4 - Feed and Pull Tightening Technique	9	Figure 35 - Lifting the Patient to Position the Long Spine Board	23
Figure 5 - Loosening a Buckled Strap	10	Figure 36 - Placing Patient and Long Spine Board on Ambulance Cot	24
Figure 6 - Lengthening a Free Strap	10	Figure 37- Loosening Top (Green) Torso Strap for Patient Comfort	24
Figure 7 - Releasing a Torso Strap from Its Fastener	10	Figure 38 - Positioning Torso Straps Beneath Breasts/Above Abdomen	25
Figure 8 - Torso Straps (As Folded for Storage)	11	Figure 39 - Two-Strap Configuration	25
Figure 9 - Middle Strap Fastened	11	Figure 40 - Three-Strap Configuration	25
Figure 10 - Middle and Bottom Straps Fastened	11	Figure 41 - Applying the KED to a Child	26
Figure 11 - Leg Strap Applied in Criss-Cross Configuration	12	Figure 42 - Applying the KED to an Angulated Neck ..	26
Figure 12 - Back View of Leg Straps Correctly Positioned Close to the Body Midline	12	Figure 43 - Adapting the KED for Use with a Monitoring System	26
Figure 13 - Positioning the Adjusta-Pad	13	Figure 44 - Stabilizing the Hip and/or Femur	27
Figure 14 - KED Lifting Handles	13	Figure 45 - Stabilizing the Pelvis	27
Figure 15-A and 15-B - Exposing Center Pad Rubber ..	14	Figure 46 - Using the KED with an Anti-Shock Garment	27
Figure 16 - Head Straps in Place	14	Figure 47 - Turning the Buckle Under	28
Figure 17 - Applying the WizLoc™ Cervical Collar	16	Figure 48 - Making the First Fold	28
Figure 18 - Removing the KED From Its Carrying Case	16	Figure 49 - Folding Accordion Style	28
Figure 19 - Sliding the KED at an Angle	17	Figure 50 - Securing the Strap	28
Figure 20 - Centering the KED	17	Figure 51 - Wrapping the Leg Straps	29
Figure 21-A and 21-B - Releasing a Leg Strap	17	Figure 52 - Securing the Folded Strap in the Fastener	29
Figure 22- Wrapping the Torso Flaps Around the Patient	18	Figure 53 - Positioning the Adjusta-Pad and Head Straps	30
Figure 23 - Moving the Patient Back into the KED	18	Figure 54 - Folding the Torso Flap	30
Figure 24 - Releasing a Torso Strap	19	Figure 55 - Rolling the KED	30
Figure 25 - Middle Strap Fastened	19	Figure 56 - Ready for the Carrying Case	30
Figure 26 - Middle and Bottom Straps Fastened	19	Maintenance Schedule	31
Figure 27 - Passing a Leg Strap Beneath the Patient's Leg	20	Lot Number Location	32
Figure 28 - Back View of Leg Straps When Properly Positioned	20		
Figure 29 - Leg Straps in Criss-Cross Configuration	20		
Figure 30 - Placing the Padding	21		

1 - SAFETY INFORMATION

1.1 Warning

The following warnings appear in this manual.

WARNING

Untrained operators can cause injury or be injured. Permit only trained personnel to apply the KED.

Improper use of the KED can cause injury. Use the KED only for the purpose described in this manual.

Improper application of the KED can cause injury. Apply the KED only as described in this manual.

An unattended patient can be injured. Stay with the patient at all times.

An unrestrained patient can fall off the spine board or cot and be injured. Use restraints to secure the patient on the spine board and cot.

Attaching other equipment or items to the KED can cause injury. Do not attach equipment or items of any kind to the KED.

Improper maintenance can cause injury. Maintain the KED only as described in this manual.

1.2 Important

Boxes like the one below emphasize important information.

Important

To prevent pressure on the groin when using the same-side configuration, correctly position the leg straps to lay straight down from their anchoring points on the KED.

1.3 Be Aware

Boxes like the one below serve as reminders.

Be Aware

Positioning the patient as fully as possible against the KED minimizes the need for padding between the patient's head and the KED. But be aware that some patients may not be able to sit fully back into the KED.

1.4 Bloodborne Disease Notice

OSHA (Occupational Safety and Health Administration) requires employers to protect workers from workplace exposure to bloodborne diseases such as HIV-1 and hepatitis. To reduce the risk of exposure when using the KED, follow the disinfecting and cleaning instructions in this manual.

For more information, visit www.osha.gov on the Internet or write to:

U.S. Department of Labor, OSHA
Office of Public Affairs, Room N-3647
200 Constitution Ave., NW
Washington, DC 20210

2 - OPERATOR SKILLS AND TRAINING

2.1 Skills

Operators using the KED need:

- a working knowledge of emergency patient-handling procedures.
- the ability to assist the patient.
- a complete understanding of the procedures described in this manual.

2.2 Training

Trainees need to:

- follow a training program designed by their training officer.
- read this manual.
- practice with the KED before using it in regular service.
- be tested on their understanding of the KED.
- record their training information.

WARNING

Untrained operators can cause injury or be injured. Permit only trained personnel to apply the KED.

3 - ABOUT THE KED


3.1 Model 125 KED Description

The Model 125 KED (Kendrick Extrication Device, referred to as the KED in this manual) is an emergency patient-handling device designed to aid in the immobilization and short transfer movement of patients with suspected spinal/cervical injuries or fracture.

The KED is designed for use by a minimum of two trained operators. Additional help may be preferred or needed.

KED features include:

- Color-coded, sewn-in securing straps
- Wraparound head flaps
- Wraparound torso flaps
- Head straps
- Adjusta-Pad™ for padding
- Integrated carrying handles
- Carrying case
- Radiographic translucence

 WARNING
<p>Improper use of the KED can cause injury. Use the KED only for the purpose described in this manual.</p>

3.2 General Specifications

Length

Opened Flat	33 in (83 cm)
Rolled, in Case	35 in (90 cm)

Width

Opened Flat	32 in (80 cm)
Rolled, in Case	11 in (27 cm)

Thickness

Opened Flat	1 in (3 cm)
Rolled, in Case	6 in (14 cm)

Weight* 7 lb 11 oz (3 kg)

Load Limit..... 500 lb (227 kg)

* Weight includes restraints, pad, head straps, and carrying case.

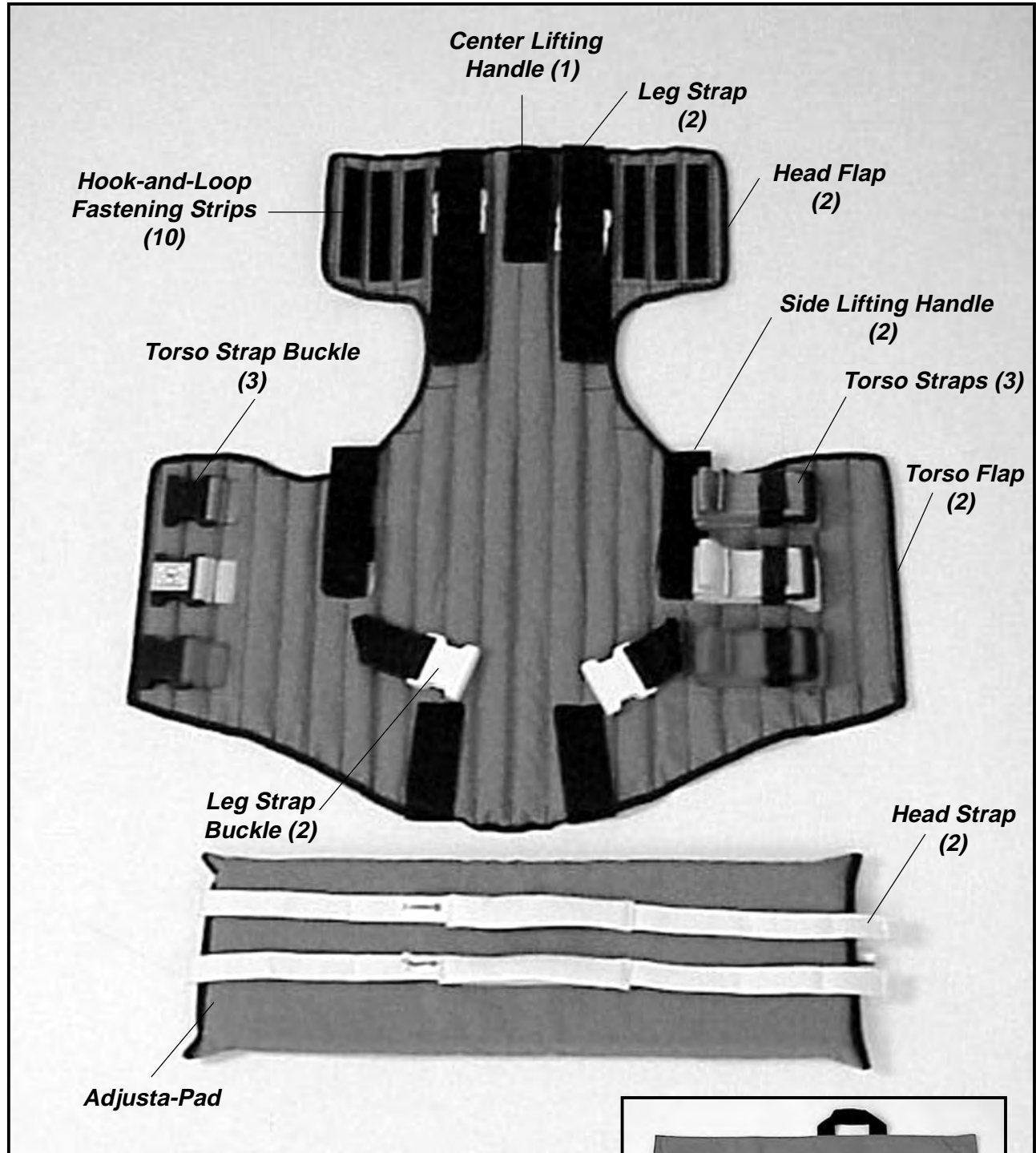
General specifications are rounded to the nearest whole number. Metric conversions are calculated before rounding the English measurements. For detailed specifications, contact Ferno Customer Service (page 32) or your Ferno distributor. Ferno reserves the right to change specifications without notice.

LOAD LIMIT



Inspect the KED if the Load Limit has been exceeded (see *Inspecting the KED*, Page 31).

3.3 Components (Outside View with Straps in Storage Configuration)



Carrying Case
(not to scale)

4 - ABOUT THE KED FEATURES

4.1 Quick-Release Buckles

KED buckles are snap-lock and quick-release. Torso-strap buckles are black. Leg-strap buckles are white.

FASTENING THE BUCKLES

To fasten a buckle, push the slide into the receiver until it locks into place (Figure 1). A distinctive “click” signals that the slide is properly placed in the receiver.

To unfasten a buckle, press the slide tabs to release the slide, then pull the slide out of the receiver slot (Figure 2).

4.2 Shortening the Securing Straps

Buckled torso and leg straps are shortened in two stages, first removing excess slack and then snugging or tightening the straps. Use the techniques described below to shorten the straps.

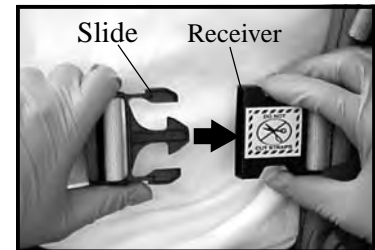
REMOVING EXCESS SLACK

When a torso strap is released from its storage position there is a large amount of slack. After fastening the buckle, quickly remove **most** of the slack by turning the buckle up, away from the KED, with one hand while you pull the hemmed end of the strap with the other hand (Figure 3). **Shorten the strap only until you feel the slightest tension.**

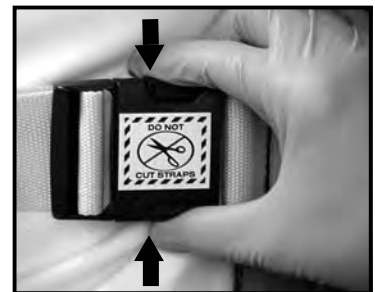
SNUGGING OR TIGHTENING THE STRAP

To prevent twisting or jostling the patient’s torso when snugging or tightening the strap, use the feed-and-pull tightening technique below:

1. Grasp the portion of the strap that lays across the patient’s torso and create a little slack in the strap (Figure 4).
2. Feed the slack into the buckle with one hand and pull it through the buckle with the other hand (Figure 4). Repeat until the strap is snug or tight.



**Figure 1 -
Fastening
the Buckle**



**Figure 2 -
Unfastening
the Buckle**



**Figure 3 -
Removing
Excess Slack
from the Strap**



**Figure 4 - Feed-and-Pull
Tightening Technique**

4.3 Securing Straps - Lengthening

The technique used for lengthening a strap depends on whether the strap has been buckled.

LENGTHENING A BUCKLED STRAP

To loosen or lengthen a buckled strap, feed excess strap into the buckle with one hand as you raise the buckle at an angle to the KED with the other hand (Figure 5).

LENGTHENING A FREE STRAP

To lengthen a free strap, hold the slide at an angle to the strap with one hand and pull the strap backward through the buckle slide with the other hand (Figure 6).

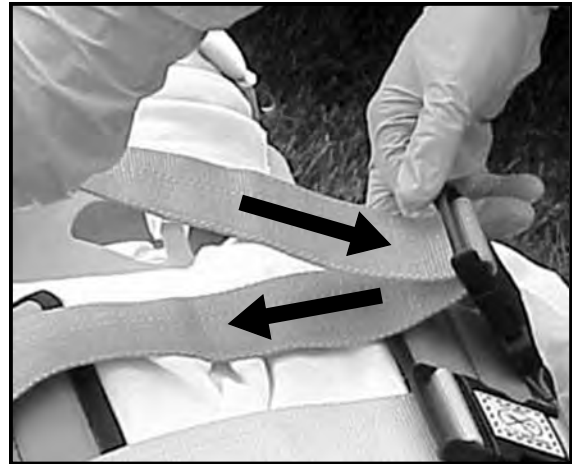


Figure 5 - Loosening a Buckled Strap

4.4 Securing Straps - Releasing

If torso and leg straps have been properly configured for storage, they can be released quickly and without tangles when they are needed. For instructions on configuring the straps for storage, see *Storing the KED*, pages 28 and 29.

TORSO STRAPS

Simply grasp the sides of the buckle (Figure 7) and firmly pull it from the fastener.

LEG STRAPS

If you are going to use the leg straps, leave them in the storage configuration until the KED has been placed behind the patient but not wrapped and fastened.

Free the straps from the hook-and-loop fastener, slide them from behind the patient, and lay them with the buckles within your reach.

If you are not going to use the leg straps, leave them attached in the storage configuration, where they will not interfere with applying the KED.

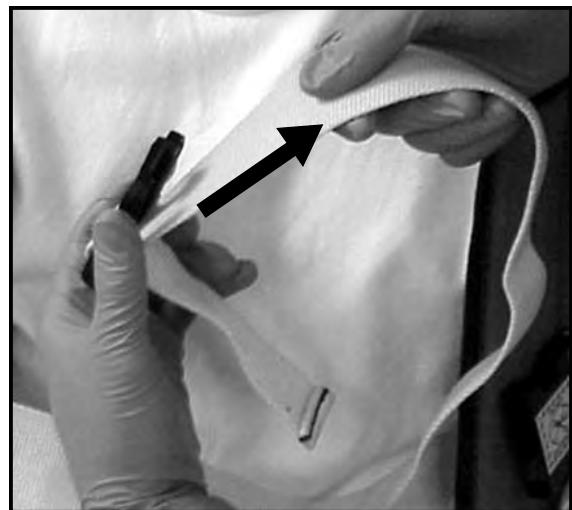


Figure 6 - Lengthening a Free Strap

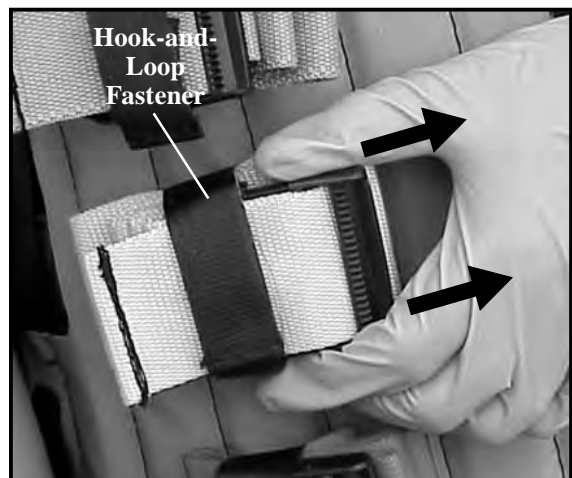


Figure 7 - Releasing a Torso Strap From Its Fastener

4.5 Torso Straps

The KED is constructed with three torso straps: top, middle, and lower. The straps are color coded for easy matching of left and right pieces (Figure 8).

When wrapping the KED torso flaps around the patient, fasten the middle (yellow) strap first, then the bottom (red) strap. Do not fasten the top (green) strap until just before you are ready to transfer the patient to a long spine board.

THE MIDDLE STRAP

The middle (yellow) strap is the first strap to be fastened (Figure 9).

When fastening the strap initially, snug it until there is space for 2 or 3 fingers laid flat between the strap and the patient's torso. You will tighten the strap just before transferring the patient to a spine board.

The middle strap evenly secures the greatest possible area of the KED, providing the greatest patient stability while you finish applying the KED.

If the rescue situation or the patient's condition requires that you remove the patient from the vehicle sooner than anticipated, the stability provided by the KED with only the middle strap fastened, and properly tightened, may be preferable to using no supporting equipment. Follow your medical advisor's guidelines on this issue.

THE BOTTOM STRAP

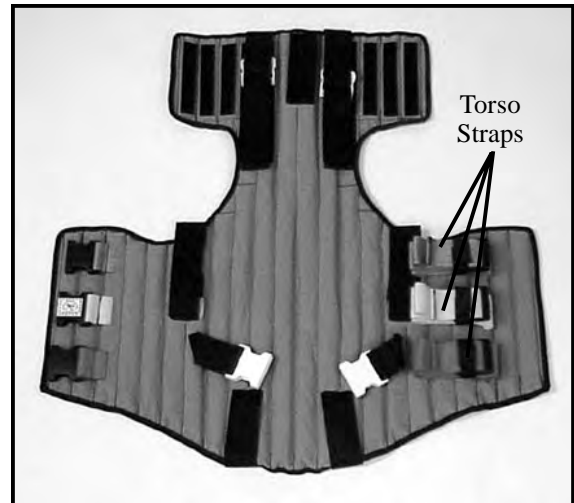
The bottom (red) strap is the second strap fastened (Figure 10).

When fastening the strap initially, snug it until there is space for 2 or 3 fingers laid flat between the strap and the patient's torso. You will tighten the strap just before transferring the patient to a spine board.

THE TOP STRAP

Do not fasten the top (green) strap at this time.

Leave the top strap unfastened until you are ready to transfer the patient to the long spine board. This allows the patient to breathe more freely while you finish applying the KED.



**Figure 8 - Torso Straps
(As Folded for Storage)**



Figure 9 - Middle Strap Fastened



**Figure 10 - Middle and Bottom Straps
Fastened**

4.6 Leg Straps

The leg straps secure the pelvis to the lower portion of the KED to stabilize the lower lumbar area.

Follow your medical advisor's guidelines concerning the use of leg straps.

The KED leg straps can be fastened in a "criss-cross" configuration or a "same-side" configuration, depending on the patient's condition.

The leg straps are most commonly used "criss-cross" style (Figure 11). For this configuration, pass the straps under the patient's legs and buckle the left strap at the right side of the KED and the right strap at the left side of the KED (see *Applying the Leg Straps*, Page 20, for complete instructions).

If groin injury is suspected, you can use the straps in the "same-side" configuration to reduce pressure on the groin area. Pass the straps under the legs and buckle the left strap at the left side of the KED and the right strap at the right side of the KED.

Whether using the "criss-cross" or "same-side" configuration, you must position the straps as close as possible to the body's midline. When buckled straps are correctly positioned, they run **straight down** from their anchoring points on back of the KED (Figure 12) before passing beneath the buttocks.

Note: Positioning the straps correctly for the "same-side" configuration requires a more focused effort because the tendency during this application is to place the straps away from the midline.



Figure 11 - Leg Strap Applied In "Criss-Cross" Configuration

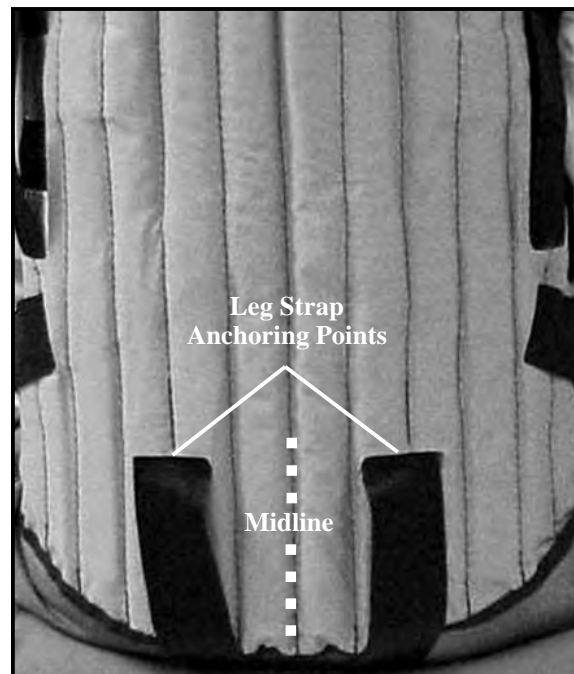


Figure 12 - Back View of Leg Straps When Correctly Positioned Close to the Body Midline

Important

To prevent pressure on the groin when using the same-side configuration, take care to correctly position the leg straps close to the body midline.

4.7 Adjusta-Pad

The foam-filled Adjusta-Pad can be used to fill the gap that may exist between the KED and any of these areas: head, cervical collar (or neck, if no collar is used), shoulders.

The patient's medical condition, body structure, and head shape determine the need for padding. Most patients, when properly positioned in the KED, will not need padding but when you do use it, follow your medical advisor's guidelines.

If you need to apply the Adjusta-Pad:

1. Determine whether to use the pad single thickness or folded.
2. Slide the pad between the KED and the patient (Figure 13). Depending on the patient's injuries, body structure, and head shape, the pad may be positioned behind the head only, behind the head and neck area, or behind head, neck area, and the tops of the shoulders.

Always take care to pad without hyperextending or flexing the patient's neck.

3. Secure the patient's head with the head straps (see *Head Straps*, page 14).

Note: *The Adjusta-Pad may also be used as a splint pad.*

4.8 Lifting Handles

The KED is constructed with three lifting handles (Figure 14). Use the handles when adjusting the KED's vertical position on the patient and during extrication.

The top lift handle serves as an extension of the leg straps and offers a firm hold for vertical lift or horizontal pull to get the patient in position to extricate.

During extrication, the handles provide a firm hold on the patient/KED as a single unit, minimizing chances of losing control or dropping the patient during extrication.

The two side handles provide the firmest holds for extrication.



Figure 13 - Positioning the Adjusta-Pad

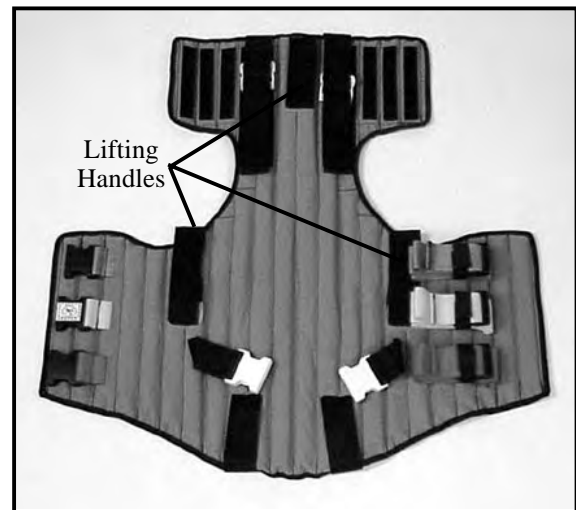


Figure 14 - KED Lifting Handles

4.9 Head Straps

Two identical head straps are provided to secure the KED head flaps in place. They can also be used to secure the KED when using it as a splint.

APPLYING THE UPPER STRAP

1. Grasp the strap with both hands (Figure 15-A) and turn the center pad fully inside-out, exposing the rubber (Figure 15-B).
2. Center the pad at the patient's eyebrows with the rubber against the skin. Position the strap ends at a downward angle and secure them to the fastening strips on the KED head flaps (Figure 16).

Note: *Placing the strap ends at a downward angle minimizes the chance that the strap can slip upward on the forehead.*

APPLYING THE LOWER STRAP

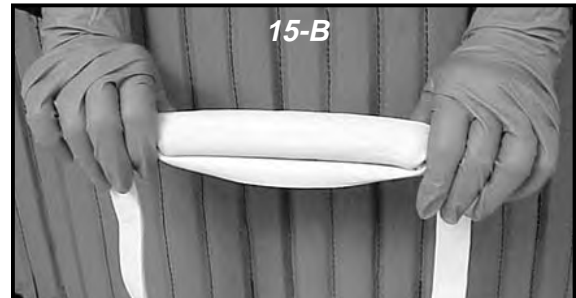
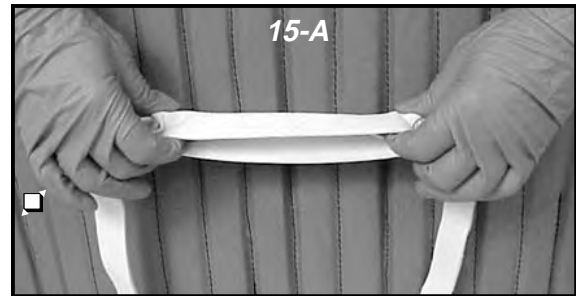
Two methods for applying the lower strap are provided below. There are alternate methods. Use and secure the strap according to your medical director's guidelines.

One method for applying the lower strap when using a rigid cervical collar is shown in Figure 16:

1. Place the strap against a rigid area beneath the "chin" of the cervical collar.
2. Position the strap ends horizontally, or just above the horizontal, and secure them to the fastening strips on the head flaps.

A method for applying the lower strap to the patient's chin area, with or without a cervical collar, would be:

1. Grasp the strap with both hands and turn the center pad fully inside-out, exposing the rubber.
2. Place the strap over the patient's chin or over the cervical collar chin area.
3. Position the strap ends horizontally and secure them to the fastening strips on the head flaps. Make sure the strap placement does not prevent the patient from opening his/her mouth.



Figures 15-A and 15-B - Exposing the Center Pad Rubber



Figure 16 - Head Straps in Place

5 - USING THE KED

5.1 Before Placing the KED in Service

- ❑ Personnel who will work with the KED need to read this manual and practice using the KED before placing it in service.
- ❑ Confirm that the KED operates properly. Carry out an inspection, following instructions in *Inspecting the KED*, page 31.

5.2 General Guidelines for Use

- This manual illustrates use of the KED in an ideal setting. Other, and sometimes unusual, settings and circumstances will occur in the field and the KED can be adapted to many of them. It is the responsibility of qualified Emergency Medical Service personnel to assess the patient's condition and determine the proper equipment and procedures to use.
- Follow your medical director's guidelines when using the KED.
- Optimum use of the KED includes one operator manually stabilizing the patient's head and neck, two operators applying the KED, and a fourth operator managing the long spine board.

In situations where there are only two or three trained operators available, one operator manually stabilizes the head and neck while the other(s) applies the KED.

- Follow standard emergency patient-handling procedures when using the KED.
- Maintain manual stabilization of the patient's head and neck until the patient is properly secured on a long spine board.
- After applying the KED and transferring the patient to the spine board, secure the patient to the spine board with restraints.
- Stay with the patient at all times.

WARNING

Improper application of the KED can cause injury. Apply the KED only as described in this manual.

WARNING

An unattended patient can be injured. Stay with the patient at all times.

5.3 Applying the Cervical Collar

Apply the cervical collar according to local protocols and the manufacturer's instructions.

Maintain manual stabilization of the patient's head and neck until the patient is properly secured on a long spine board.

In Figure 17, one operator holds the patient's head and neck in neutral alignment while the other operator applies Ferno's WizLoc cervical collar.



Figure 17 - Applying the WizLoc® Cervical Collar

5.4 Removing the KED from the Carrying Case

The KED carrying case is designed for quick removal of the KED, as follows:

1. Stand the carrying case containing the KED on end with the open end of the case facing upward.

Where the case meets the ground, there will be a left and right "dog ear" (Figure 18).

2. Place your foot on one of the "dog ears" to hold the case in place while you pull the KED out of the case (Figure 18)
3. Unroll the KED and lay the Adjusta-Pad and head straps aside.



Figure 18 - Removing the KED From Its Carrying Case

5.5 Placing the KED Behind the Patient

The instructions below allow operators to use the KED design features to their best advantage.

1. Check behind the patient for articles (wallet, belt, etc.) that could interfere with sliding the KED between the patient and the vehicle seat.
2. With the buckles toward the seat, grasp the KED at the top of the head flap and the top corner of the torso flap closest to the patient.
3. Tilt the KED at about a 45-degree angle and slide it behind the patient (Figure 19).

Note: Use the KED's vertical rigidity as an aid when sliding the KED behind the patient. Tilting the KED at a 45-degree angle provides a rigid leading edge to slip between the patient and seat, prevents the KED from rolling up, and allows the KED to clear the vehicle roofline.

4. The operator and assisting operator(s) work the KED down between the patient and the back of the seat and then into the vertical position (Figure 20). Work the KED far enough down to clear the vehicle roofline and be positioned behind the patient's head when the KED is tipped to the vertical.

Note: The third operator may move the patient forward just enough (i.e., a hand's thickness) to reduce friction so the KED slides smoothly between the patient and seat. To avoid jostling the patient's head, coordinate this effort with the operator stabilizing the head.

While the KED is moved to the vertical the operator holding the patient's head in alignment lifts his/her elbow slightly, providing clearance for the KED and taking care not to move the patient's head.

5. Use the lift handles to center the KED behind the patient.
6. If you are going to use the leg straps, remove them from the fastening strips at the top of the KED (Figure 21-A). Slide them clear of the KED and lay them within reach (Figure 21-B).



Figure 19 - Sliding the KED at an Angle



Figure 20 - Centering the KED



Figure 21-A Figure 21-B
Releasing a Leg Strap

5.6 Wrapping and Positioning the KED

1. Wrap both torso flaps around the patient's torso, lifting the patient's arms only as much as needed to slide the flaps beneath them. The top of the flaps should be just below the patient's armpits (Figure 22).
2. Use the lift handles to raise and adjust the KED until the top edges of the torso flaps press firmly into the armpit area. You can also use the lift handles to keep the KED in place until the straps can be buckled.

If using three operators, the two side operators lift the KED with the side straps.

Important

It is important to pull the KED up snugly under the armpits to make sure the patient's weight is suspended. This will reduce the possibility of the patient slipping downward later when he/she is lifted.

3. Before beginning to fasten the straps, make sure the patient is sitting back against the KED as fully as his/her body structure and condition allow.

To check and adjust the patient's position, the operator behind the patient holds the patient's head in alignment while a side operator gently presses on the patient's chest area just below the cervical collar (Figure 23).

Be Aware

Positioning the patient as fully as possible against the KED minimizes the need for padding between the patient's head and the KED. But be aware that some patients may not be able to sit fully back into the KED.



Figure 22 - Wrapping the Torso Flaps Around the Patient



Figure 23 - Moving the Patient Back Into the KED

5.7 Fastening the Torso Straps

After the KED is wrapped and properly positioned under the armpits, fasten the middle strap and then the bottom strap. Do not fasten the top (green) strap at this time.

To fasten the torso straps:

1. Remove the middle (yellow) strap from its holder by grasping the sides of the buckle and pulling the strap out of the holder (Figure 24).
2. Fasten the middle strap buckle (Figure 25).
3. Remove the bottom (red) strap from its holder and fasten the buckle (Figure 26).
4. Use the feed-and-pull tightening technique to snug both straps, leaving space for two or three fingers laid flat between the strap and the patient's chest.

You will fasten the top strap and tighten all other straps just before transferring the patient to a long spine board and the ambulance cot.

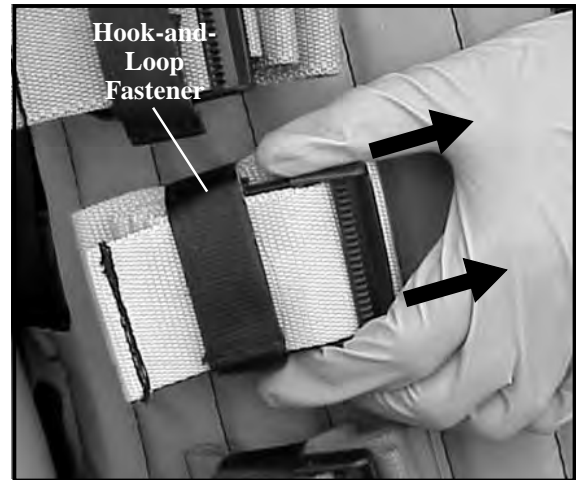


Figure 24 - Releasing a Torso Strap



Figure 25 - Middle Strap Fastened



Figure 26 - Middle and Bottom Straps Fastened

A MEMORY AID

Many EMTs remember the order for fastening straps by repeating this phrase:

“Money Buys Lots of Hot Toys.”

Money = Middle Strap

Buys = Bottom Strap

Lots of = Leg Straps

Hot = Head Straps

Toys = Top Strap

5.8 Applying the Leg Straps

To apply the leg straps:

1. Pass the leg straps between the leg and car seat (make use of a gap if there is one).
2. Using both hands, “see-saw” one strap into position under the patient’s leg and buttock (Figure 27).

Reach behind the patient and make sure the strap lays straight downward from its anchor point on the KED, as close as possible to the body midline (Figure 28).

3. Repeat steps 1 and 2 with the other leg strap.
4. If you are using the “criss-cross” configuration, cross the straps at the groin and buckle the straps opposite their sides of origin (Figure 29).

If you are using the “same-side” configuration, do not cross the straps at the groin. Buckle them on their sides of origin.

5. Snug both straps using the feed-and-pull tightening method (see *Snugging or Tightening the Strap*, page 9). Leave space for two or three fingers laid flat between the strap and the patient’s leg.

You will tighten the leg straps just before transferring the patient to the long spine board.

Be Aware

For suspected groin injury, the leg straps can be used in the “same-side” configuration or not used at all. Always follow your medical advisor’s recommendations for the use of leg straps.



Figure 27 - Placing a Leg Strap Beneath the Patient’s Leg

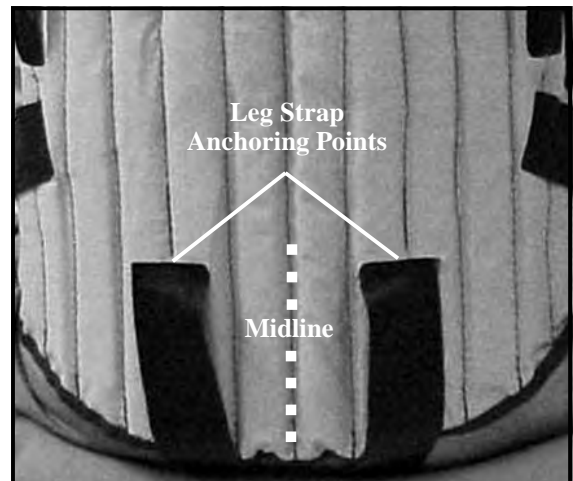


Figure 28 - Back View of Leg Straps When Properly Positioned



Figure 29 - Leg Straps in the “Criss-Cross” Configuration

5.9 Securing the Patient's Head

APPLYING PADDING

Be Aware

The patient's medical condition, body structure, and head shape determine the need for padding. Follow your medical advisor's guidelines for the use of padding.

1. Make sure the patient is still properly positioned against the KED. Adjust if necessary.
2. If there is a gap between the KED and the patient's head, the cervical collar, or the patient's shoulders, fill the gap with the Adjusta-Pad or rolled towels (Figure 30) taking care not to hyperextend or flex the patient's neck. (The Adjusta-Pad can be folded if additional thickness is needed.)

APPLYING THE HEAD FLAPS

One operator will hold the head and head flaps in place while another operator applies the head straps to secure and hold the patient's head against the KED and/or padding.

1. Wrap the head flaps around the patient's head (Figure 31).
2. Grasp a head strap with both hands and turn the center pad fully inside-out so the rubber will be against the patient's forehead (see *Head Straps*, page 14).
3. Position the strap at the patient's eyebrows and secure the strap to the head flap fastening strips at a downward angle (Figure 32). The angled placement minimizes the chance that the strap can slide upward on the forehead.
4. Place the second strap under or on the chin area of the cervical collar and position the strap ends as horizontally as possible. Secure the strap ends to the fastening strips on the head flaps (Figure 32). Take care not to apply the strap so snugly that the patient cannot open his/her mouth. For additional information, see *Head Straps*, page 14.



Figure 30 - Placing the Padding



Figure 31 - Wrapping the Head Flaps with Padding in Place



Figure 32 - Head Straps Applied

5.10 Buckling the Top Strap and Making Final Strap Adjustments

When the long spine board and ambulance cot are prepared and waiting, it is time to buckle the top strap and make final adjustments to the other straps.

The purpose of the adjustments is to make sure the KED is firmly in place from the lower spine to the head, and is positioned high up under the armpits to prevent movement during extrication.

Finish applying the KED as follows:

1. Remove the top (green) strap from its holder and buckle it. Tighten the strap to the chest using the feed-and-pull technique (see *Snugging or Tightening the Strap*, page 9).
2. Check and tighten the middle (yellow) strap.
3. Check and tighten the bottom (red) strap.
4. Check and tighten the leg straps.

The properly applied KED will look as illustrated in Figure 33.



Figure 33 - The KED, Applied

5.11 Transferring the Patient to the Long Spine Board

The technique described below for transferring the patient to the long spine board involves pivoting the patient with his/her back toward the midline of the vehicle. In many situations, this may be the most effective technique for preventing lower spine torque.

Alternative techniques have been developed and are in use. Follow your medical director's guidelines when choosing a technique.

GENERAL GUIDELINES

- The two operators pivoting and lifting the patient work from the same side of the vehicle.
- Pivot the patient so his/her back is **toward the midline (inside) of the vehicle**.

Be Aware

Make sure to maintain the patient's body angle and a straight midline as you pivot the patient to position his/her back toward the inside of the vehicle.

TRANSFERRING THE PATIENT TO THE LONG SPINE BOARD

1. Two operators grasp the side lift handles of the KED and pivot/tilt/lift the patient until his/her back is toward the inside of the vehicle (Figure 34).
2. Grasping the side handles of the KED and holding the patient under the knees, lift the knees enough to allow a third operator to slide the long spine board between the patient and the seat (Figure 35). Then lower the patient onto the spine board.

Note: Slide the head-end edge of the spine board as close as possible to the far side of the seat so the patient will become properly positioned on the board when you lift the knees.

Continued on Next Page



Figure 34- Patient Pivoted with Back Toward Inside of Vehicle



Figure 35 - Lifting the Patient To Position the Long Spine Board

3. Lift the spine board and patient out of the vehicle and place them on the ambulance cot (Figure 36).
4. Immediately loosen the top (green) torso strap (Figure 37) to allow the patient more chest expansion.

Note: *Keeping the remaining straps tightened provides stability for the patient during the starts, stops, and corners of the ambulance ride to the hospital.*

5. Tighten leg straps if necessary. Properly applied leg straps will loosen when the patient is placed supine on the spine board.
6. Apply a head immobilizer such as the Ferno Model 445.
7. Secure the patient on the spine board with the spine board restraints.
8. Secure the spine board on the cot with the cot restraints.

! WARNING

An unrestrained patient can fall off the spine board or cot and be injured. Use restraints to secure the patient on the spine board and the cot.



Figure 36 - Placing Patient and Long Spine Board on Ambulance Cot

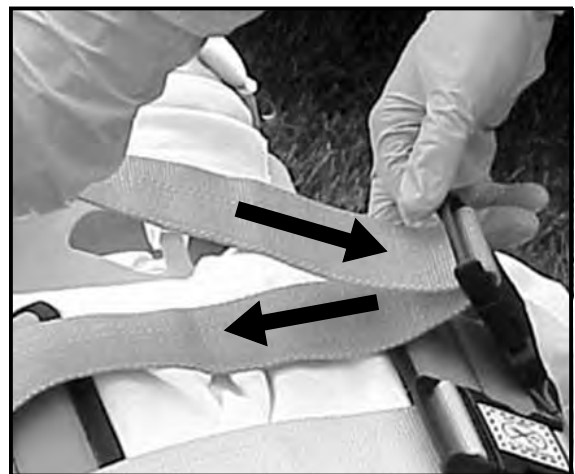


Figure 37 - Loosening Top (Green) Torso Strap for Patient Comfort

6 - ADAPTING THE KED IN SPECIAL SITUATIONS

6.1 General Guidelines

When necessary, the KED can be adapted for use in special situations and circumstances. Some possible adaptations are presented in this section. Follow your medical director’s guidelines for adapting the KED.

! WARNING

Attaching other equipment or items to the KED can cause injury. Do not attach equipment or items of any kind to the KED.

6.2 Adapting the KED for a Pregnant Patient

When applying the KED to a pregnant patient, fold two slats inward on each torso flap to leave the abdomen exposed.

Strap configuration will depend on the patient’s abdomen and breast size. Generally, straps can be positioned to lay beneath the breasts but above the abdomen (Figure 38). Two possible configurations are described in this subsection.



Figure 38 - Positioning Torso Straps Beneath Breasts/Above Abdomen

USING TWO STRAPS

Fasten the bottom strap in the middle buckle and the middle strap in the bottom buckle (Figure 39).



Figure 39 - Two-Strap Configuration

USING ALL THREE STRAPS

Fasten the middle strap in its own buckle. Fasten the bottom strap in the top buckle. Fasten the top strap in the bottom buckle (Figure 40).



Figure 40 - Three-Strap Configuration

6.3 Adapting the KED for a Pediatric Patient

The patient's size and condition determine how the KED can be adapted for a child.

In this example of one possible method, the child's legs are longer than the KED so the KED and child are placed on a long spine board.

A folded blanket is placed on the child so the torso flaps can be wrapped and fastened normally (Figure 41).



Figure 41 - Applying the KED to a Child

6.4 Adapting KED for an Angulated Neck

When it is not desirable to straighten the patient's neck, fold the head flaps inward. Position a rolled towel as needed, then place a head strap across the patient's forehead and secure the strap to the KED fastening strips (Figure 42).



Figure 42 - Applying the KED to an Angulated Neck

6.5 Adapting the KED for Use With Monitoring Systems

Folding two slats of each torso flap inward provides more chest exposure when needed. Loosening two of the three chest straps allows defibrillation without losing immobility (Figure 43).



Figure 43- Adapting the KED for Use with a Monitoring System

6.6 Adapting the KED for Use As a Splint

The KED can be used as a splint for pelvic stabilization and hip and/or femur stabilization. Two possible methods of adaptation are shown here.

HIP AND/OR FEMUR STABILIZATION

The KED and patient are placed on a long spine board with the head portion of the KED toward the foot end of the board.

The torso portion of the is KED positioned a little above the waist and centered (Figure 44). The torso flaps are secured around the patient and the head flaps are wrapped around the patient's injured leg and secured with the KED head straps (Figure 44).



Figure 44 - Stabilizing the Hip and/or Femur

PELVIC STABILIZATION

The KED and patient are placed on a long spine board with the head portion of the KED toward the foot end of the board.

The torso portion of the is KED positioned a little above the waist and centered. The torso flaps are secured around the patient's pelvic area and the head flaps are wrapped around both the patient's legs and secured with the KED head straps (Figure 45).



Figure 45 - Stabilizing the Pelvis

6.7 Using the KED With an Anti-Shock Garment

The KED will not interfere with, or limit the use of, a pneumatic anti-shock garment (Figure 46).



Figure 46 - Using the KED with an Anti-Shock Garment

7 - STORING THE KED

7.1 Storing the KED

If you properly prepare the KED before placing it in its carrying case you will be able to unpack and use it quickly and smoothly.

TORSO STRAPS

Fold each torso strap accordion fashion and secure it in its hook-and-loop fastener as follows:

1. Lengthen the strap until only three or four finger-widths of webbing have not passed backward through the buckle slide.
2. Turn the buckle under, flush against the webbing (Figure 47)
3. Make the first fold beneath the buckle (Figure 48) and continue folding the strap accordion fashion (Figure 49).
4. When all the webbing is folded, secure it in the hook-and-loop fastener (Figure 50).

Make sure to position the folded strap so the fastening strips wrap around it at the location of the buckle release tabs. This will enable you to pull the strap free without tangles, and have the buckle in your hand, in a single motion.

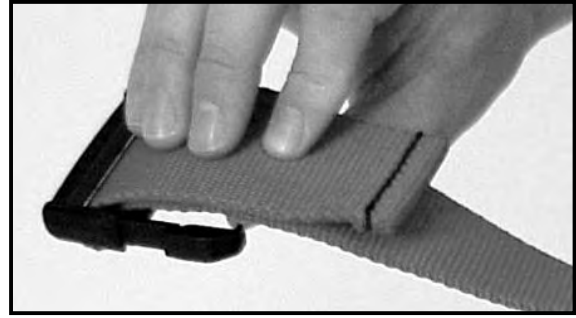


Figure 47 - Turning the Buckle Under



Figure 48 - Making the First Fold



Figure 49 - Folding Accordion Style



Figure 50 - Securing the Strap

LEG STRAPS

Storing the leg straps as described here will keep them out of the way while sliding the KED between the patient and the vehicle seat, yet readily available when you want to use them.

Leave the leg straps in their stored position in situations where you choose not to use them.

Store both leg straps as follows:

1. Lengthen the leg strap until about six inches of webbing have not passed backward through the buckle slide.
2. Beginning at the point where the strap is attached to the KED, fold the strap down around the bottom edge of the KED then up and around the inside of the KED (Figure 51).
3. Turn the buckle under to rest flush against the webbing and secure the strap in place by pressing its hook-and-loop fastening strip against a fastening strip on the outside of the KED (Figure 52)

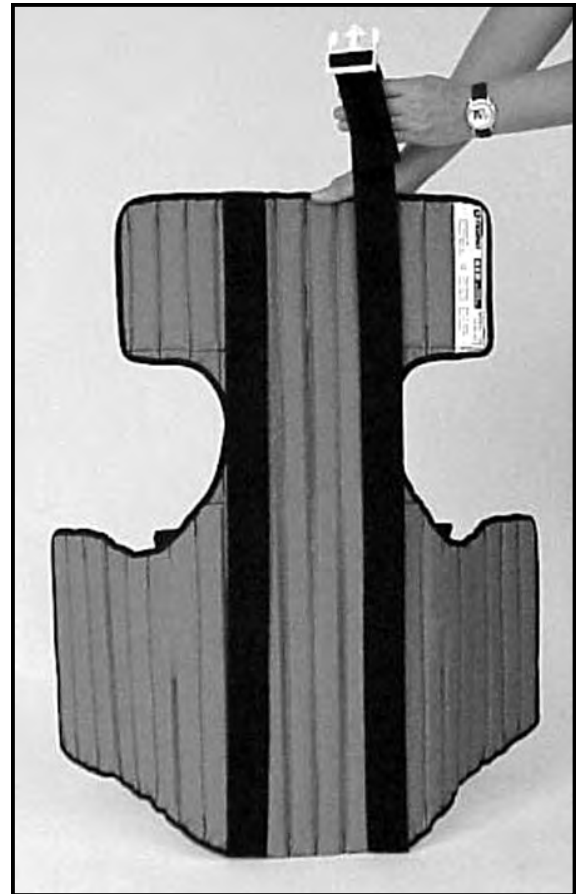


Figure 51 - Wrapping the Leg Straps

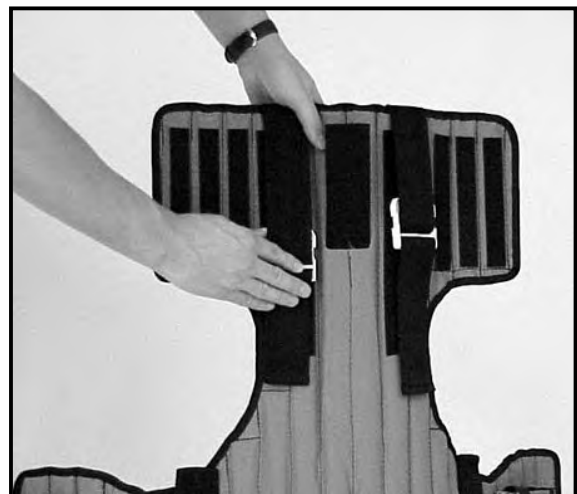


Figure 52 - Securing the Folded Strap in the Fastener

ADJUSTA-PAD

Lay the KED flat with the buckles facing upward. Place the Adjusta-Pad on the center of the KED, with one end of the pad at the bottom edge of the KED (Figure 53).

HEAD STRAPS

Press one end of each strap against the hook-and-loop fastening strips on the head area of the KED and lay the straps parallel with the Adjusta-Pad.

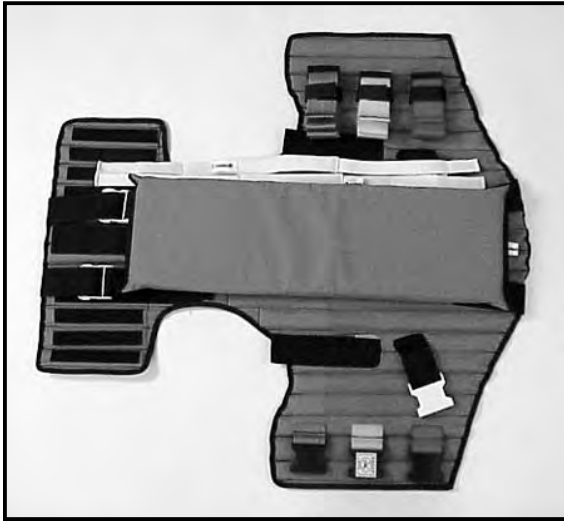


Figure 53 - Positioning the Adjusta-Pad And Head Straps

TORSO FLAPS

1. Fold the torso flap over the Adjusta-Pad, tucking the edge of the flap over the edge of the pad (Figure 54).
2. Roll the folded portion of the KED over the remaining torso flap (Figure 55) until the center portion of the inside of the KED is upward (Figure 56).
3. Grasp the KED to keep it rolled and slide it into the carrying case.



Figure 54 - Folding the Torso Flap



Figure 55 - Rolling the KED



Figure 56 - Ready for the Carrying Case

8 - MAINTAINING THE KED

8.1 Maintenance Schedule

The KED requires regular maintenance. Set up and follow a maintenance schedule. The following chart represents minimum maintenance.

	Each Use	As Needed	Each Month
Disinfecting (this page)	●		
Cleaning (this page)		●	
Inspecting (this page)		●	●

When using maintenance products, follow the manufacturers' directions and read the manufacturers' material safety data sheets.

Contact Ferno Customer Service to order Ferno disinfectants and cleaners (page 32).

WARNING

Improper maintenance can cause injury. Maintain the KED only as described in this manual.

8.2 Cleaning and Disinfecting the KED

1. Lay all pieces of the KED on a clean surface and rinse off with warm water.
2. Lightly scrub the KED and Adjusta-Pad with a mild soap solution and a medium bristle brush. Wash the head straps with the soap solution and a clean sponge.
3. Rinse all pieces with warm water.

4. To disinfect, apply a solution of 2% to 5% chlorine bleach and water.
5. Rinse all pieces with warm water.
6. Allow all pieces to dry completely before returning them to the carrying case.

Note: Drying time for the KED can vary from 2 to 36 hours, depending on temperature, humidity, and on how long the KED was exposed to water during use or during disinfecting and cleaning. (Moisture can be absorbed through the sewing holes, wetting the battens inside the KED).

Important

Storing a damp or wet KED in its carrying case will encourage the growth of mold. Do not return the KED to its carrying case until it is thoroughly dry.

8.3 Inspecting the KED

- Are all components present?
- Is all stitching secure?
- Are vertical battens (inside KED) solid and unbroken?
- Are torso and leg straps and lifting handles in good condition?
- Are all buckles free of visible damage and do they operate properly?
- Are head straps free of excessive wear and is their stitching secure?
- Is Adjusta-Pad in good condition?

9 - LIMITED WARRANTY

Limited Warranty Summary

Ferno-Washington, Inc. (Ferno), warrants the products we manufacture to be free from defects in material and workmanship for one year except as follows:

(A) Soft goods (webbing, vinyl, fabric, foam, etc.) are warranted for 90 days.

This limited warranty applies when you use and care for the product properly. If the product is not used and cared for properly, the warranty is void. The warranty period begins the day the product is shipped from Ferno or the day you receive it if you have proof of the delivery date. Shipping charges are not covered by the limited warranty. We are not liable for shipping damages or damages sustained through using the product.

Limited Warranty Obligation

If a product or part is proven to be defective, Ferno will repair or replace it. At our option, we will refund the product's purchase price. The purchaser accepts these terms in lieu of all damages.

This is a summary of the limited warranty. The actual terms and conditions of the limited warranty, and the limitations of liability and disclaimers, are available upon request by calling 800.733.3766 or 937.382.1451.

10 - CUSTOMER SERVICE

Customer service and product support are important aspects of each Ferno product.

For assistance with the KED, contact Ferno Customer Service or your Ferno distributor.

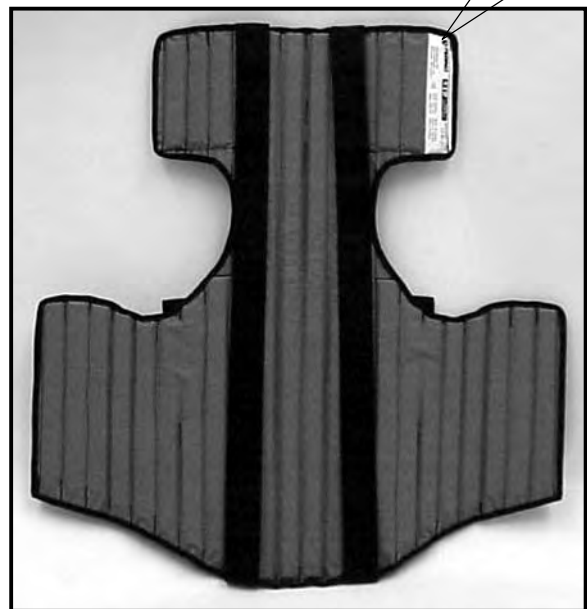
Please have the lot number of your KED available when calling, and include it in all written communications.

For additional free Users' Manuals call Ferno Customer Service at the numbers below, or contact your Ferno distributor.

Ferno-Washington, Inc.
70 Weil Way
Wilmington, OH 45177-9371
U.S.A.

Telephone (U.S.A. and Canada) 800.733.3766
Telephone (Worldwide) 937-382-1451
Fax (United States) 937.382.1191
Fax (Outside U.S.A.) 937-382-6569
Internet www.ferno.com

Lot Number _____



TRAINING RECORD

Date	Name	Training Method

MAINTENANCE RECORD		
Date	Maintenance Performed	By

NOTES