

# SEFRS®

Sager Emergency Fracture Response System

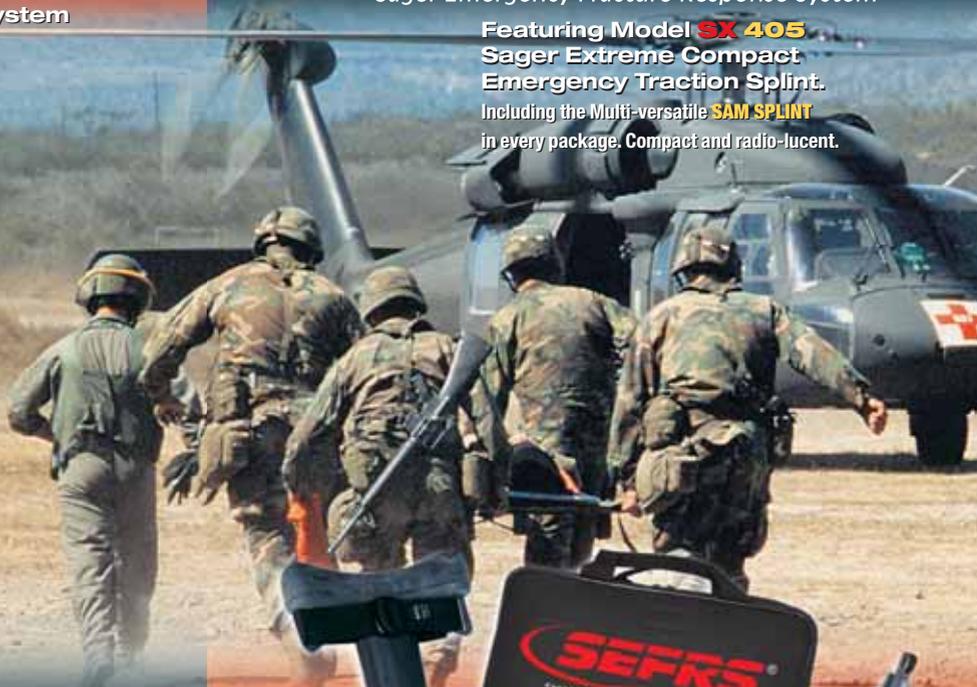
## The **SX 405** The Complete Fracture Response System



# SEFRS®

Sager Emergency Fracture Response System

Featuring Model **SX 405**  
Sager Extreme Compact  
Emergency Traction Splint.  
Including the Multi-versatile **SAM SPLINT**  
in every package. Compact and radio-lucent.



## MINTO™

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[www.sagersplints.com](http://www.sagersplints.com)

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## The Complete Fracture Response System

The **SX405** Sager Emergency Fracture Response System has been anatomically and medically engineered to accommodate First Responder treatment with a fast, easy, fail-safe compact traction device, a **SX405 Adaptor™** (for treatment of most fracture types), Extender Shafts, as well as the multi-versatile SAM Splints. Combined, these three items set the stage for today's extreme rescue environments.

Exceptional value, safety, performance, traction and immobilization. Exact documentation of traction force applied and required.

**Extreme environment capabilities:** Designed for use in extreme military environments, as well as rugged, harsh, mountain rescue and urban environments.

## Features and Benefits of the **SX405** Emergency Traction Splint

- Indicated for treatment in proximal third and mid-shaft femoral fractures. As such, has a much broader range of application and use than other traction devices.
- From field to hospital: The **SX405** when applied, is radio lucent to all areas of a femoral fracture. Radio lucent design enables Xrays, MRI and CATSCANS to be taken without removing the splint.
- Compact, robust and light weight – easily stored or carried in most backpacks. Folds into a 14" x 11" x 5" carry case.
- Universal: fits adult or child (5th to 99th percentile of patients). One splint has the capacity to treat four different patient types.
- Treats unilateral or bilateral fractures.
- Rapid assembly. The **SX405** unfolds and is ready to apply in under 15 seconds.
- Rapid one-person application (can be applied in under 2.5 minutes). Frees other attendants for other patients or procedures.
- Reduces further trauma and pain.
- Promotes rapid recovery with fewer complications.
- Applied in any position (patient can be nursed in any position).
- Straight in-line traction. Alignment, traction and counter-traction is the same as that provided to patients in operating room theatres undergoing orthopedic surgical reductions and splinting. As with surgical procedures, Sagers' application of traction avoids point pressure on the sciatic nerve and related vascular structures – in the critical proximal third of femoral fractures. By design, Sager splints do not have a half-ring posteriorly: this eliminates any pressure on the sciatic nerve and most importantly eliminates the angulation of the fracture site, which occurs with most ischial pad splints.
- Can be applied under or over Shock Trousers.
- Stays within the body silhouette. Does not extend beyond the feet of an adult. Eliminates transport complications in helicopters, fixed wing, and van type ambulances. If the patient fits in a stokes basket – the Sager fits!
- Super durable composite plastic construction – years of use – practically indestructible.

## Quantifiable, Dynamic Traction

- Sager Emergency Traction Splints are the only traction splint available on the world market today that continuously shows the exact amount of traction being applied. The quantifiable feature (Sagers' traction handle/scale) enables First Responders to set and document the traction force applied. Traction is measurable in both pounds and kilograms. Besides being **Quantifiable**, the traction is **Dynamic**. The dynamic function permits the traction to decrease as the spasm releases.
- No fear of over-traction and the complications associated with excess traction.
- You always have the correct amount of safe traction.

## Features and Benefits of the **SX405** Fracture Response System

- Super durable composite plastic construction – radio lucent design enables X-rays to be taken without removing the splint.
- Universal; will treat any fracture. You always have the right equipment for any type of fracture, any size of patient.
- Enables splinting in position found – no movement of fractures means less injury and pain.
- Rapid assembly, rapid application – assembles in under 15 seconds, application on fracture in less than 2 minutes. Fast rescue, less pain.
- Splints within the body silhouette – no protruberances outside of silhouette. Makes extrication from confined space of wreckage easier, less time consuming and with fewer complications.
- Engineered for comfort and safety – splint padding consists of closed cell foam – does not absorb fluids, easily cleaned and decontaminated.
- Wide range of Tensor Cravats – 3 widths, 16 lengths – ensures universal fit.
- Cost effective immobilization – Tensor Cravats can be disposed or cleaned and reused.
- Superior Performance – removable shoulder strap does double duty – can be used and applied as a sling for upper limb injuries or used as a convenient shoulder strap to carry compact case.
- Secure cravat packaging allows instant size identification and application in wind and rain, saving time and confusion when selecting appropriate cravats for various applications.
- Includes (Optional) Security Cravats: for use on small subset of patients who may be agitated, struggling, or uncooperative due to drug use or brain injury.
- Floats! All components of **SEFRS** – with the exception of the **SX405 Adaptor™** float – (the **Adaptor™** floats when used in conjunction with main components).

## SAM Splints

- Universal – ensures wide range of splinting on wide range of patients and injuries. Treats fractured fingers, neck injuries, upper limb, lower limb, and ankles. Can be used separately or in-conjunction with the **SX405** Sager Emergency Fracture Response System – ensuring the optimum in treatment standards.
- SAM Splints are made from malleable aluminum with closed cell foam padding. These splints do not absorb fluids, or stick to wounds. Radio-lucent design enables X-rays.

*See parts and accessories at the end of this brochure*

## Model SX405 Sager compact bilateral emergency traction splint

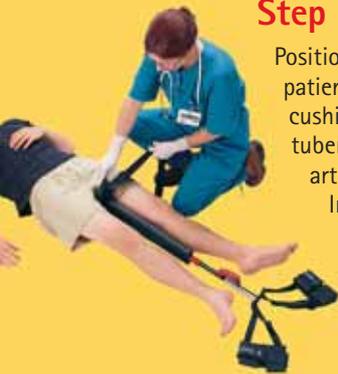


### Step 1 ▶ Position

Position the Sager **sx405** between the patient's legs, resting the ischial perineal cushion (the saddle) against the ischial tuberosity, with the shortest end of the articulating base towards the ground.

In the case of a unilateral fracture, the splint should be placed in the perineum on the side of the injury. In bilateral fractures, excluding pelvic trauma, the side with the greatest degree of injury should

be the side of placement. Apply the abductor bridle (thigh strap) around the upper thigh of the fractured limb. Push the ischial perineal cushion gently down while at the same time pulling the thigh strap laterally under the patient's thigh. This will seat the lower end of the cushion comfortably against the ischial tuberosity. Tighten the thigh strap lightly. Lift the spring clip to extend the inner shaft on the **sx405** until the crossbar rests adjacent to the patient's heels.



### Step 2 ▶ Set



Note the absence or presence of distal pulses, check for sensation. Position the malleolar harness (ankle harness) beneath the heel(s) and just above the ankle(s). Fold down the number of comfort cushions needed to engage the ankle above the medial and lateral malleoli. Using the attached hook and loop straps wrap the ankle harness around the ankle to secure snugly. Pull control tabs to engage the ankle harness tightly against the crossbar. Apply **Quantifiable Dynamic Traction**. Grasp the padded shaft of the **sx405** with one hand and the red traction handle with the other; gently extend the inner shaft until the desired amount of traction is recorded on the traction scale. It is suggested to use 10% of the patient's body weight per fractured femur up to 7kg (15 pounds) for each leg. If bilateral fractures are present – the maximum amount would be 14kg (30 pounds). At the hollow of the knees, gently slide the large tensor cravat through and sizer it upwards to the thigh, repeating with the smaller cravats to minimize lower and mid-limb movement.

### Step 3 ▶ Secure



Adjust the abductor bridle (thigh strap) at the upper thigh making sure it is not too tight, but snug and secure, then firmly secure the tensor cravats. Apply the pedal pinion (figure 8 strap) around the feet to prevent rotation. Note the absence or presence of distal pulses, check for sensation. Patient is now ready for transport.

**Warning:** All Operators should receive full and proper initial/refresher instruction sessions from a qualified person on detailed use of this equipment and regarding the particular situations in which it should be used.

### Multiple Fractures

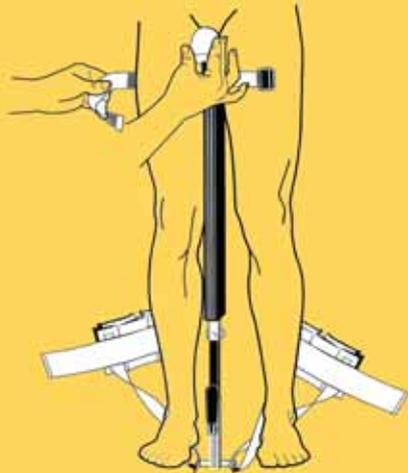
If a patient has multiple fractures, femur as well as tibia-fibula fractures, use of the Sager is recommended. In the case of ankle fractures along with a femur fracture, an air splint should be placed over the ankle with the Sager malleolar harness (ankle harness) applied over the air splint. This method was developed by innovative Paramedics to provide traction with alignment and immobilization of all fractures<sup>1</sup>.

<sup>1</sup> Please defer to federal, state, and/or local protocol for definitive analysis and guidelines.

The **SX405** has been designed for rapid one person assembly and application when used as a traction splint. The splint can be assembled and applied in under 2.5 minutes. To assemble the splint, simply unfold and secure into place. The **SX405's** unique semi-attached design ensures that no major parts will be lost or incorrectly assembled.



- 1** Remove and unfold the outer shaft assembly.
- 2** Remove, unfold and lock the inner shaft assembly.
- 3** Insert inner shaft assembly into the outer shaft assembly. Splint is ready to apply.

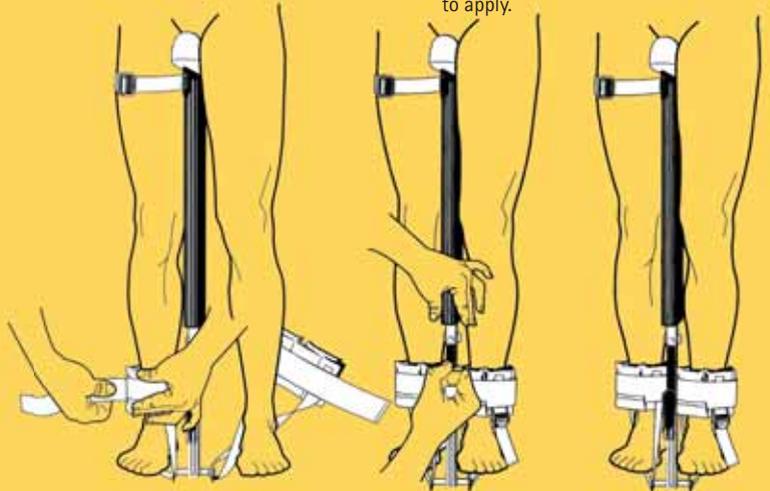


**Position:**

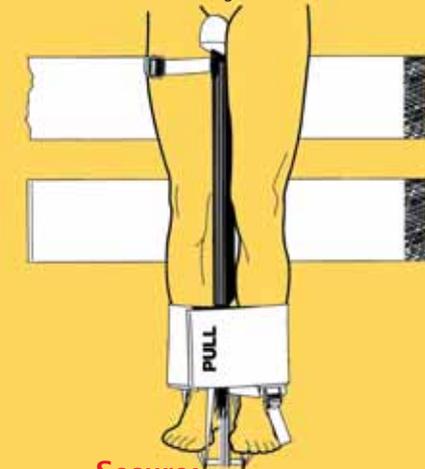
- a.** Position the Sager **SX405** between the patient's legs, resting the ischial perineal cushion (the saddle) against the ischial tuberosity, with the shortest end of the articulating base towards the ground.

**Set:**

- b.** Fold down the number of comfort cushions needed to engage the ankle above the medial and lateral malleoli.

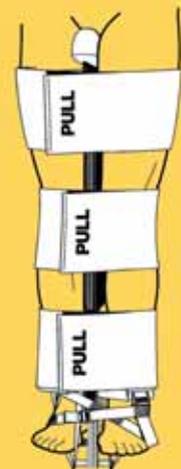
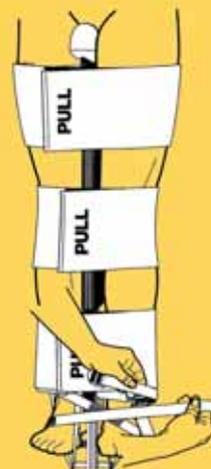
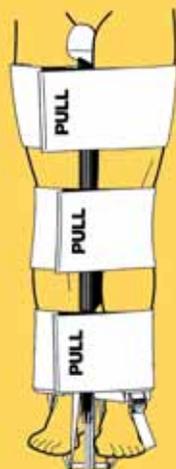


- c.** Using the attached hook and loop straps wrap the ankle harness around the ankle to secure snugly.
- d.** Pull control tabs to engage the ankle harness tightly against the crossbar. Apply **Quantifiable, Dynamic Traction**. Grasp the padded shaft of the **SX405** with one hand and the red traction handle with the other; gently extend the inner shaft until the desired amount of traction is recorded on the traction scale.



**Secure:**

- e.** Adjust the abductor bridle (thigh strap) at the upper thigh making sure it is not too tight, but snug and secure, then firmly secure the tensor cravats.



- f.** Apply the pedal pinion (figure 8 strap) around the feet to prevent rotation. Note the absence or presence of distal pulses, check for sensation. Patient is now ready for transport.

## How much traction should I apply?

Apply the amount of traction recommended by your medical consultant, or that required by protocol. For adults, the American Academy of Orthopedic Surgeons recommends gentle traction to a maximum of 7kg (15 pounds) per fractured femur (14kg (30 pounds) for a bilateral fracture)). A general rule of thumb is 10% of the patient's body weight per fractured femur. For example; if a patient weighing 45kg (100 pounds) has a single fracture, the appropriate amount of traction would be 4½kg (10 pounds). If that same person has a bilateral fracture, 9kg (20 pounds) would be estimated. The **SX405** Sager Splint is designed to register a maximum of 14kg (30 pounds) of traction. There are rare circumstances, such as patients who have highly developed muscles, where the initial traction of more than the maximum of 14kg (30 pounds) is required. This is easily accomplished by extending the splint shaft beyond the 14kg (30 pound) stop, increasing the traction beyond the maximum registered.



## Indications and contraindications for the use of traction splints on femoral fractures.

Sager splints are indicated for use on proximal third and mid-shaft femoral fractures.

All traction splints of any kind are contraindicated in the case of fractured pelvises unless the Medical Consultant indicates otherwise, or a MAST Trouser has been applied – in which case a Sager Splint can be applied over the MAST Trousers. Supracondylar fractures of the knee and ankles fractures are also contraindicated. The contraindications listed above are only intended as a basic reference tool. Please defer to federal, state, and/or local protocol for definitive analysis and guidelines.



**important:** To fold Traction Assembly, grasp Traction Tube with thumb against Hinged Tab. Push Hinged Tab, as you would to turn on a flashlight, while gently pulling the solid bar. When solid bar stops, then fold, keeping the bar and tube in alignment.

## Articulating Base and Cushion



Articulating Base and Cushion (the saddle) bends laterally for seating and exacting conformance to the ischial tuberosity. With a **SX405**, most perineal examinations and procedures can be performed with the splint in place – without compromising the comfort and safety of the patient. The **SX405's** well-padded shaft cushion provides additional comfort and stability.

## Shock Trousers



If shock trousers are used in cases of multiple trauma, Sager Splints may be used either over or under the shock garment to rapidly provide traction and alignment. The optimum in treatment is to apply the Sager Splint prior to the application of the trousers. In the case where trousers have already been applied, the splint may also be placed over the trousers with good results. If the splint is applied first, the patients' fractured femur is stabilized and it becomes simple to clothe the patient in shock trousers. The shaft of the splint is closely applied to the medial side of the thigh and the ischial perineal cushion is located so that it lies in the perineal opening of the garment. In addition, since the splint is applied closely to the leg, there is excellent contouring of the pressure bladder of the trouser around the shaft of the splint and over the leg. The possibility of tenting between the shock trouser and the splint shaft is so small that it becomes negligible.

## Comfort

How comfortable are Sager Splints against male and female genitalia? The ischial perineal cushion of the splint rests against the ischial tuberosity and with natural genital mobility the male genitalia can be checked and moved to ensure it is not under any pressure. During actual accident situations the clothing should be opened, cut and/or removed during the general assessment procedures. In practice trials, loose clothing should be worn to enable genital mobility. (Note: the structures used and pressed on are the same as sitting on a bicycle seat).



The **SX405 Adaptor**<sup>™</sup> has been designed for rapid one-person assembly and rapid one-person application. The unit can be assembled and applied in under 60 seconds. To assemble the unit, simply follow the easy steps illustrated on the following pages. The **SX405** has been designed to treat any fracture in the position found without patient movement or pain. Rapid two-person assembly and application.

**Packing sequence:**

Note easy visualization of the various sized cravats which are firmly secured to both sides of the hinged panel. Lift the hinged panel to access compact Sager, Sam Splints and Extender Shafts.

**SEFRS** unique design ensures virtually pain-free application.

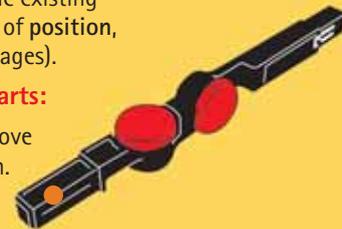
The **SEFRS Adaptor**<sup>™</sup> is lightly placed and centered over the fracture site and the arms aligned with each side of the fracture. Make sure that the arms of the **Adaptor**<sup>™</sup> are parallel to the bone – not the muscle silhouette of the limb. The **Adaptor**<sup>™</sup> is locked to retain the fracture configuration, then removed and attached to the padded splint shafts. **SEFRS** is an excellent device for extrication. When the splint is in place it remains within the silhouette of the injured limb; no extraneous parts to hang-up or impede when extricating patient.



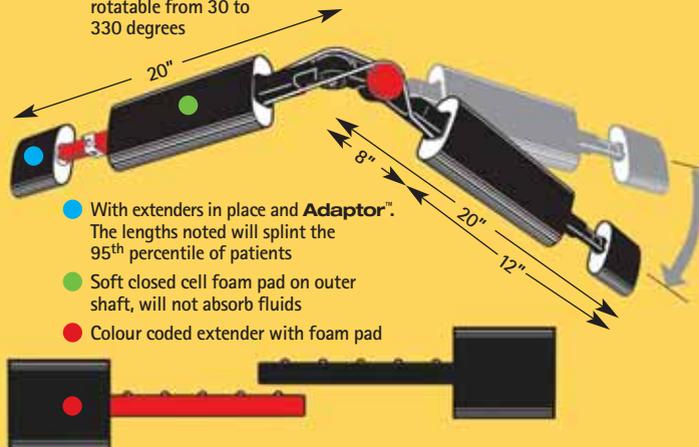
For fractured femurs follow the existing **SX405** application procedure of position, set and secure (see previous pages).

**Initial steps and index of parts:**

**1** Press button latch and remove the Ischial Perineal Cushion. Store the Ischial Perineal Cushion in the **SEFRS** case.



● Variable range **SEFRS Adaptor**<sup>™</sup> rotatable from 30 to 330 degrees

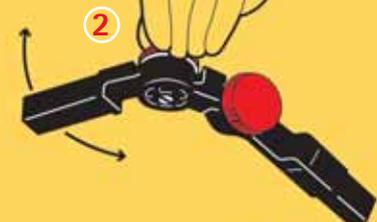


- With extenders in place and **Adaptor**<sup>™</sup>. The lengths noted will splint the 95<sup>th</sup> percentile of patients
- Soft closed cell foam pad on outer shaft, will not absorb fluids
- Colour coded extender with foam pad

**"Study principles rather than methods. A mind that grasps principles will devise its own methods."**

A. Bruce Gill, MD.

**Treatment of all other fractures without traction. Fractures can be splinted in the position found.**



2

Turn each of the red **Adaptor**<sup>™</sup> Knobs counter-clockwise to unlock each of the rotatable arms.



3

2 Unlock this knob. Range of **vertical** motion; 30° to 330°.

3 Unlock this knob. Range of **lateral** motion; 30° to 330°. note: One (1) full 360° rotation/turn of the knob is sufficient to make any adjustment you need.



4

4 Place the loose and malleable **Adaptor**<sup>™</sup> on the fracture as shown. Make sure the arms of the device lay parallel, centered and in-line with the arms of the proximal and distal parts of the fractured limb. Lock the **Adaptor**<sup>™</sup> arms by turning the knobs clockwise. Make sure teeth are aligned, then tighten.



5

5 Separate the two halves of the outer shaft as shown.



6

6 Insert the long arm of the **Adaptor**<sup>™</sup> into the large hole in the outer shaft as shown.



7

7 Insert the remaining arm of the **Adaptor**<sup>™</sup> into the other half of outershaft as shown.



8

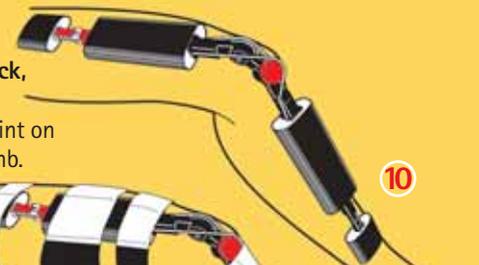
8 Hook the bungey cords over the knobs to move them out of the way.



9

9 Splint is now ready to apply to the fracture.

10 Depending on patient size, add Extender Shafts to extend the length of the splint: **red to red, black to black**, then place prepared splint on fractured limb.

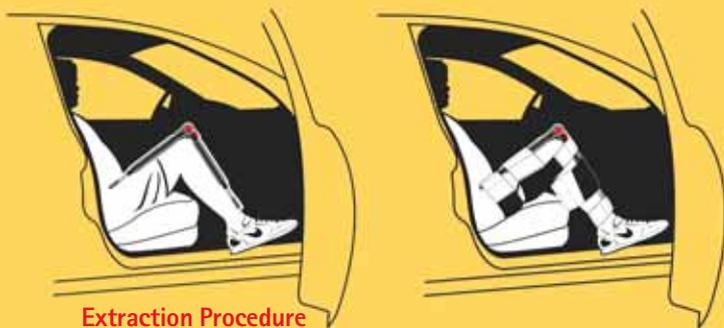


10

11 Apply tensor cravats as shown. Patient is now ready for extrication and transport.

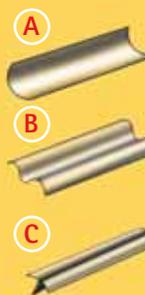


11



**Extraction Procedure**

- 1 After clearing obstruction with Jaws of Life; position of splint in preparation for extraction splinting of limb in position found.
- 2 If ankle is unstable, **SAM SPLINTS** can be used to immobilize with figure-of-eight strap.



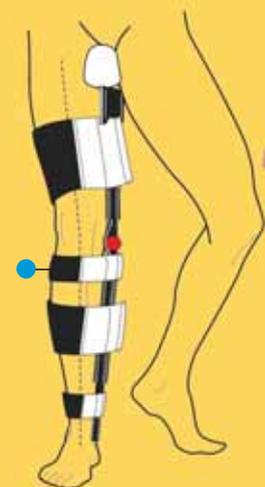
**SAM SPLINTS:**

- A** (The C-Curve): Curve the Sam<sup>®</sup> Splint length-wise to create a longitudinal bend which gives the splint strength.
- B** (The Reverse C-Curve); Curve the outside edges in the opposite direction to make it even stronger.
- C** (The T-Curve): Double the SAM Splint or create a T-Bend for extra strength.



**Straight Leg Knee Injury**

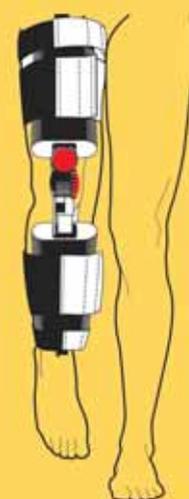
- 1 When splinting with Sager Emergency Response Fracture System (SEFRS) create a 6-10 degree valgus and lock into place on the distal half of the Splint.
- 2 This Tensor Cravat should be added.
  - Distal to the head of the Fibula
  - Normal 6-degrees valgus of the tibia/fibula at the knee joint

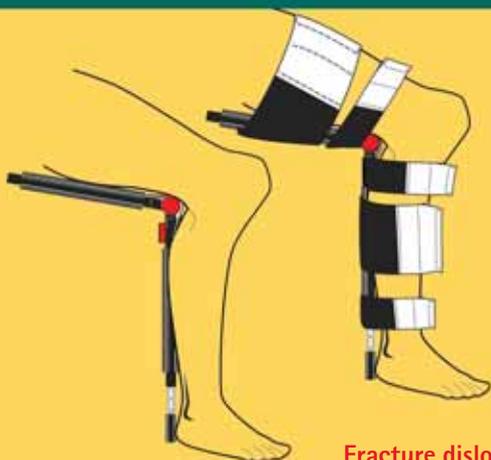


**Bent Knee Injury**

- 1 Anterior position of Splint for bent knee injuries.
- 2 Place Tensor Cravats as shown. Knee immobilized.

**!** A Traction splint is contraindicated in any knee injury. Proper leg splinting: Injuries at the knee should be splinted in position found. Attempt to straighten a bent knee is only indicated if pulses are absent and leg straightening is done without pain or resistance to movement.





**Fracture dislocation of the knee**

- 1 Splint position for fracture dislocation knee injury.
- 2 Place Tensor Cravats as shown. Knee immobilized.



**Alternate splint placement**

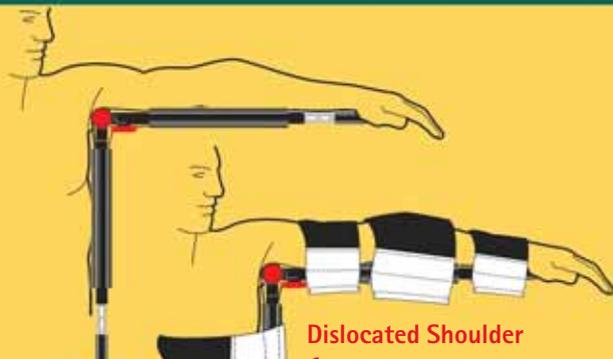


**Ankle Injury**

- 1 Splint position for ankle injury.
- 2 Place Tensor Cravats as shown. Ankle immobilized.



**⚠** A Traction splint is contraindicated in any knee injury. Proper leg splinting: Injuries at the knee should be splinted in position found. Attempt to straighten a bent knee is only indicated if pulses are absent and leg straightening is done without pain or resistance to movement.



**Dislocated Shoulder**

- 1 Dislocation of shoulder splinted in position found.
- 2 Arm is immobilized.



**Fractured Elbow**

- Distal pad can be rotated to fit in palm of the hand.
- 1 Splint position for fractured elbow.
  - 2 Immobilized fractured elbow.



**Elbow Injury**

- 1 Elbow injury in position found and splinted.

**Forearm Injury**

- 1 Anterior view forearm injury.
- 2 Splinted forearm.



**Fractured Wrist or Forearm**

- 1 Immobilized wrist or forearm.



The **SX405 SEFRS Sager Emergency Response System** comes complete with all accessories required for use:

- ① One **SX405** Sager Extreme Compact Bilateral Emergency Traction Splint
- ② One Ischial Perineal Cushion (saddle)
- ③ One Abductor Bridle (thigh strap)
- ④ One Carry Case
- ⑤ One Pedal Pinion (figure eight strap)
- ⑥ Two Malleolar Harnesses (ankle harnesses)
- ⑦ One **SX405 SEFRS Adaptor™**
- ⑧ Two colour coded **SX405** Extender Shafts
- ⑨ Two 2"x8" Tensor Cravat
- Two 2"x10" Tensor Cravat
- Two 2"x18" Tensor Cravat
- Two 2"x24" Tensor Cravat
- ⑩ Two 4"x18" Tensor Cravat
- Two 4"x24" Tensor Cravat
- ⑪ Two 6"x18" Tensor Cravat
- One 6"x24" Tensor Cravat
- One 6"x32" Tensor Cravat

\*Combine cravats to increase length if needed (eg. use a 24" and 32" for full body wrap).

- ⑫ Red and Black End Caps
- ⑬ Shoulder Strap/Sling
- ⑭ Six Security Cravats

### SAM SPLINT

- ⑮ Two 36" C-Curve Sam Splints
- ⑯ Five Sam Finger Splints



**Caution:** This product contains Natural Rubber Latex, which may cause allergic reactions.



## Cleaning Instructions

Software Goods, Stainless Steel and **Adaptor™**: "Manu-Klenz"<sup>1</sup> (i.e.: Sodium Dodecylbenzine Sulfonate and Coconut Diethylthanolamide). Effective manual washing of heavily soiled washable surfaces, medical instruments, counters, glass and plastic surfaces.

**Directions:** 1 ounce Manu-Klenz to 1 gallon water.

**Stainless Steel:** 70% Alcohol solution or above instructions.

**Foam Rubber,  
Shaft and**

**Extender Pad:** "Precise"<sup>2</sup> Hospital Foam  
Cleanser/Disinfectant. (1, 2 or other  
comparable product).

**Adaptor™:** DO NOT DISASSEMBLE ADAPTOR TO  
CLEAN! Immerse in cleaning solution.  
Blow dry with high pressure.

## Guarantee:

Each **SX405** Sager Emergency Fracture Response System (**SEFRS**) has been tested and is guaranteed by Minto Research & Development, Inc. to be free of defects for a period of five years under normal usage.

 **Security Cravats:** NOTICE TO ALL SEFRS USERS. There is a small subset of patients who may be agitated or struggling and uncooperative due to drug use or brain injury. **These cravats can be used in special circumstances for tactical medical rescue situations.**

In the normal course of splinting a patient, first apply the regular stretchable cravats to secure the limb. **If there is a need to totally prevent any incidental movement due to extrication from a wreckage or struggling by the patient, apply the (non-stretchable) Security Cravats over the regular cravats to completely immobilize the patient. NOTE: It is vitally important to monitor patient circulation and sensation when Security Cravats are in place. There is a danger that these cravats can create a tourniquet effect and should be removed as early as possible or be loosened and tightened consistent with good blood circulation if there is a continuing need.**



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