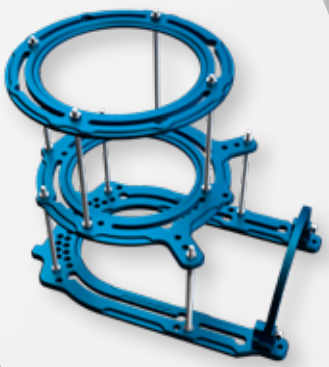
SALVATION™ 2

Limb Salvage System



SURGICAL TECHNIQUE

WRIGHT™

FOCUSED EXCELLENCE

Contents

Wright recognizes that proper surgical procedures and techniques are the responsibility of the medical professional. The following guidelines are furnished for information purposes only. Each surgeon must evaluate the appropriateness of the procedures based on his or her personal medical training, experience, and patient condition. Prior to use of the system, the surgeon should refer to the product Instructions For Use package insert for additional warnings, precautions, indications, contraindications and adverse effects. Instructions For Use package inserts are also available by contacting the manufacturer. Contact information can be found on the back of this surgical technique and the Instructions For Use package inserts are available on wright.com under the link for Prescribing Information.

Please contact your local Wright representative for product availability.

Introduction

chapter 1

The SALVATION™ 2 External Fixation System is designed to address fractures, nonunions, and complex foot and ankle deformities including Charcot neuroarthropathy. The system relies on proven techniques utilizing tensioned thin wires, half-pins, and rings. The SALVATION 2 External Fixation System incorporates many new features to assist with proper frame positioning and increases frame application efficiency. The slotted ring design allows for frame components to be attached quickly and easily, while minimizing the need to assemble small, threaded components together.

The system includes components to assist in positioning the foot and lower leg within the frame and maintain appropriate position throughout the surgery. In addition, the Wire Guide allows for precise placement of the wire on the ring to minimize the need for additional connection components and decrease additional surgical steps.

The SALVATION 2 External Fixation System may be used for definitive treatment as the sole fixation device, or used in conjunction with the SALVATION Beams and Bolts or the SALVATION 3Di Midfoot Plating System.

Intended Use

chapter 2

Indications for Use

- Fusions of the foot including:
  - Triple arthrodesis
  - Isolated hindfoot arthrodesis
  - Midfoot arthrodesis
  - Joints involved include tibiotalar, subtalar, talonavicular, calcaneocuboid, pantalar, tibio-talo-calcaneus, naviculocuneiform, metatarsal cuneiform (First, second, third – e.g. Lapidus, TMT), and metatarsal cuboid
- Treatment of fractures including:
  - Treatment of Lis Franc fracture/dislocations in diabetic and Charcot neuropathy patient
  - Fractures and/or comminuted fractures (open or closed) of the calcaneus, talus, cuboid, navicular, cuneiforms, and/or metatarsals (including Jones fractures), ankle, and distal tibia
  - Additional fixation adjunct to internal fixation of the distal tibia, calcaneus, talus, navicular, cuboid, cuneiforms, and/or metatarsals in patients with significant comorbidities (i.e. diabetes) that may preclude use of isolated internal fixation
- Reconstruction of deformities including:
  - Neuropathic deformities
  - Charcot reconstruction with or without corrective osteotomies
  - Diabetic Charcot Reconstruction
  - Prevention and treatment of contracture of joints and tendons in equinus
- Treatment of infected unions, nonunions, or malunions
- Offloading and or immobilization of ulcers and or wounds of the foot or ankle
- Stabilization associated with tendon or ligament surgeries. Tendon lengthening, repairs and transfers both deep and or superficial around the foot and ankle including posterior tibial, tibialis anterior, flexor digitorum longus, achilles, flexor hallucis longus, peroneus brevis, peroneus longus, extensor hallucis longus, and extensor digitorum longus
- Tumor and neoplasm resection and reconstruction
- Stabilization associated with rotation flaps, free flaps, muscle flaps, advancement flaps, fasciocutaneous flap, split thickness skin grafting, and biological graft alternatives
- Pseudoarthrosis or non-unions of long bones, limb lengthening by epiphyseal or metaphyseal distraction osteogenesis including bone transport
- Correction of bony or soft tissue deformities
- Correction of segmental or nonsegmental bony or soft tissue defects
- Use on long bones including the tibia and fibula
- Use with or without IM nail in the ankle in Charcot patients

Device Description

chapter 3

The SALVATION 2 External Fixation System features four preassembled frame options. Dimensions of the frames are as follows:

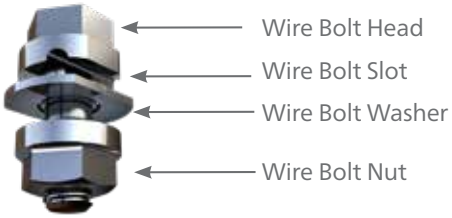
SALVATION 160mm Frame	
Proximal ring internal diameter	160mm
Distal tibial ring internal diameter	140mm
Foot ring internal diameter	140mm
SALVATION 180mm Frame	
Proximal ring internal diameter	180mm
Distal tibial ring internal diameter	160mm
Foot ring internal diameter	160mm
SALVATION 200mm Frame	
Proximal ring internal diameter	200mm
Distal tibial ring internal diameter	180mm
Foot ring internal diameter	180mm
SALVATION 220mm Frame	
Proximal ring internal diameter	220mm
Distal tibial ring internal diameter	200mm
Foot ring internal diameter	200mm

The frame can be configured and locked with the front ring in the Up or Down position. Different front ring positioning options may facilitate fixation options or allow for better visibility when using fluoroscopy.

Frame with Front Ring in the Down Position

Frame with Front Ring in the Up Position

The Wire Bolts and the Wire Posts in the system are preassembled, with the nut in place. In most situations, this will eliminate the need to assemble these small components.



Wire Post

Pin Cubes are available to allow for half-pin fixation. The Pin Cubes are also preassembled.

NOTE: Pin Cube available for 5mm (1, 2, 3, and 4 hole).

3-hole Pin Cube

1-hole Pin Cube

Rings feature a unique slotted design to facilitate positioning and attachment of fixation elements.

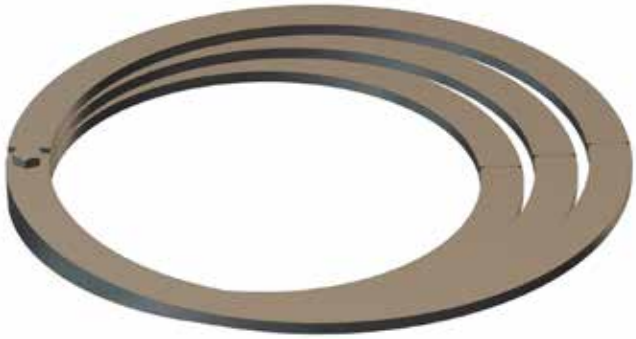
The SALVATION 2 External Fixation System offers 2mm Smooth and Olive Wires. The Wire Washer is available to be used with the Olive Wire when needed in patients with poor quality bone.

Preoperative Planning

chapter 4

The proper size fixator should be ordered after considering patient anatomy. Templates are available for preoperative measurements to determine appropriate ring diameters. Prior to surgery, the surgeon should consider the following while planning:

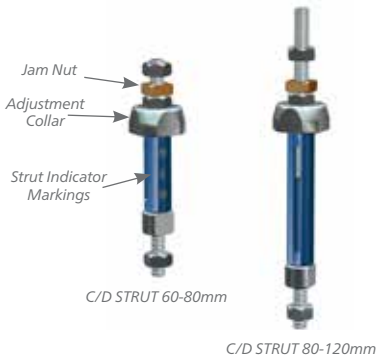
- Diameter and length of the lower leg
- Foot width and length



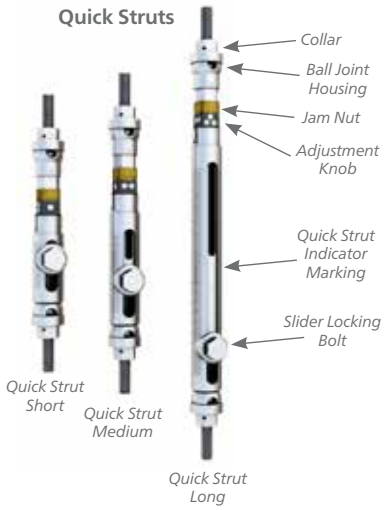
Ring Sizing Template (SEF02500)

Surgical Technique

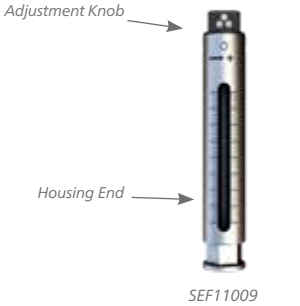
Compression/Distraction Struts



Quick Struts



Linear Distractor



Sizing and Adjusting the Frame

The SALVATION 2 External Fixation System offers frames in four sizes – 160mm, 180mm, 200mm, and 220mm. The appropriate frame size can be selected by utilizing the Sizing Template (SEF02500). Be sure to allow for the proper soft tissue clearance around the leg. Frame height can be adjusted in several ways. The distance between the foot ring and the distal tibial ring may be adjusted by utilizing the four Compression/Distraction (C/D) Struts, Quick Struts, Linear Distractors or Threaded Rods.

For Compression/Distraction Strut

Frame height can be adjusted in several ways. The distance between the foot ring and the distal tibial ring may be adjusted by utilizing the four Compression/Distraction (C/D) Struts or threaded rods. The C/D Struts can be lengthened or shortened by turning the adjustment collar on the C/D Strut. One revolution of the collar will result in approximately 1mm of adjustment. The C/D Struts should be adjusted together to prevent binding of the frame. Once the appropriate distance between the rings is achieved, the gold jam nut can be tightened to abut the adjustment collar to lock it in the desired position.

For Quick Strut

In some instances polyaxial Quick Struts may be used to connect rings. These struts allow for multiple planes of angulation as well as compression/distraction capabilities. Quick struts are connected to the rings using SALVATION 10mm Nuts. Using a 10mm wrench to hold the collar of the Quick Strut, use another 10mm wrench to tighten the SALVATION 10mm Nut. Once the collar on either end of the strut is tightened, the angulation of the strut is secured in place. Tighten the jam nut against the ball joint housing to achieve final locking. Manual compression/distraction of the Quick Strut is accomplished when the slider locking bolt is loose. Once the desired Quick Strut position is achieved, secure the strut in place using a 10mm wrench to tighten the slider locking bolt. Gradual compression/distraction can be achieved using the adjustment knob. One rotation of the adjustment knob corresponds to approximately 1mm of compression/distraction. Markings on the Adjustment Knob can be used to help estimate the adjustments.

For Linear Distractors

The distance between the foot ring and the distal tibial ring may be adjusted by utilizing four Linear Distractors (SEF11009). To apply the Linear Distractors, apply the housing end on to desired hole and tighten to frame using a SALVATION 10mm Bolt. Then, select the desired length threaded bar and insert into the adjustment knob. A SALVATION 10mm nut should be used on both sides of the element that the threaded bar is attached to. The Linear Distractor can be lengthened or shortened by turning the adjustment knob on the Linear Distractor. One full revolution of the adjustment knob will result in approximately 1mm of adjustment. The Linear Distractos should be adjusted together to prevent binding of the frame.

Sizing and Adjusting the Frame

The 30mm, 60mm, and 80mm Hexagonal Spacers are available for multiple ring connection options.

30mm Spacer 60mm Spacer 80mm Spacer

The frame height may also be adjusted utilizing traditional threaded rods, 60mm-400mm in place of the Compression/Distraction Struts, Linear Distractors, or the Quick Struts. Additional rings are available for frame modifications as desired. These rings options include the following:

- Slotted Rings - Full Ring, 5/8 Ring, Half Ring, and 1/8 Ring
- Tab Rings - Full Rings, 5/8 Tab Rings, and Half Tab Rings
- Hind Foot Rings (Hole & Slotted)
- Foot Rings (Hole & Slotted)

Furthermore, the SALVATION 2 In-Line Hinge, Extension Plates, and L-Brackets, are also available for use.

Frame and Patient Positioning

The patient is placed supine, and the frame is placed over the affected limb. The patient's leg may be positioned within the frame utilizing the Leg Positioner (SEF99601) and the Side Leg/Foot Support (SEF99602). **FIGURE 1**

FIGURE 1

Leg Positioner (SEF99601)

Side Leg/ Foot Support (SEF99602)

Ensure proper soft tissue clearance when positioning the leg within the frame. As a general rule, "two fingersbreadths" of clearance should be maintained between the leg and the frame to allow for swelling. **FIGURE 2** Fundamental external fixation principles require the rings to be positioned orthogonal or perpendicular to the long axis of the tibia. The foot ring is usually positioned at the same level as the foot to facilitate placing wires through the bones of the foot and connecting them to the foot ring. The foot should be maintained in a neutral position. The Leg Positioner is attached outside the frame posteriorly after placing the frame over the limb. The Leg Positioner can be adjusted to ensure proper soft tissue clearance, and to ensure that the rings are perpendicular to the long axis of the tibia. The Foot Positioners

are utilized to help ensure proper leg and foot position. These supports can be connected to the rings on the lateral and medial side of the leg or foot, adjusted as necessary, and then locked into place. A VELCRO® Strap is also available to assist with proper leg positioning. By utilizing the Support and the Positioners, the proper leg and frame position should be maintained throughout the surgery. The positioners are removed upon completion of the surgery. **FIGURE 3**

FIGURE 2 Foot Supports in place to maintain foot position.

FIGURE 3 Final leg position maintained with Leg Positioner in place.

Utilizing the Ring Slot

The SALVATION 2 External Fixation System features a new slotted ring design that allows fixation hardware to be mounted onto a ring without the traditional exercise of threading small nuts onto threaded connectors. **FIGURE 4** The nuts are preloaded onto the Wire Bolts and Wire Posts to speed frame application. The Wire Bolt or Wire Post is inserted into the ring slot opening(s), and then translated around the ring via the ring slot. The Wire Bolts feature a preloaded nut and washer. **FIGURE 5** As the bolt is positioned into the ring slot, the washer is positioned on the same side of the ring as the head of the bolt. The nut is positioned on the opposite side of the ring, away from the head of the bolt or post. **FIGURE 6**

FIGURE 4 Wire Bolt inserted into the ring slot.

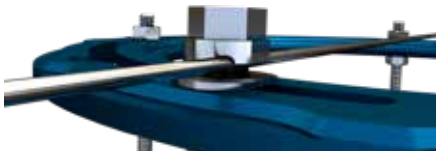


FIGURE 5 Wire Bolt in position to capture the Wire.

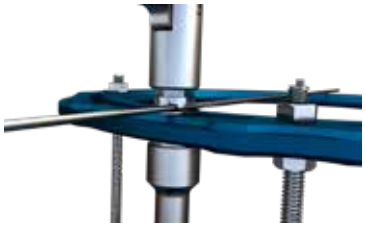


FIGURE 6 Wire being tightened once the Wire Bolt is positioned.

Wire Bolts and Wire Posts can be positioned on the underside of the ring if desired. **FIGURE 7, 8, & 9**

FIGURE 7 Wire Bolt inserted into the ring slot.

FIGURE 8 Wire Bolt in position to capture the Wire.

FIGURE 9 Wire being tightened once the Wire Bolt is positioned.

If using a Wire Bolt to capture a wire on the ring, slide the bolt into place, positioning the wire in the Wire Bolt slot. **FIGURE 10** The Wire Bolt is marked with an indicator to communicate the orientation of the Wire Bolt slot. Position the wire inside the Wire Bolt slot, then lock the wire and bolt into place into place using a 10mm Flex Wrench (SEF90211). **FIGURE 11**

FIGURE 10 Wire bolt marking indicates slot position.

FIGURE 11

Flex Wrench (SEF90211)

If utilizing a Wire Bolt Post to capture a wire that is offset from the ring, position the post in the ring slot, similar to the Wire Bolt, and tighten to the ring utilizing the 10mm Flex Wrench. The wire is placed within the adjustable clamp on the post and tightened while taking care to not bend the wire.

Using A Bushing

Wire or Pin fixation may be desired in the "tear drop" portion of a slot. To properly use this section of the slot, place a Bushing (SEF33400) in the "tear drop" so that the Bushing's collar is on the same side of the ring as the wire or pin. Then, remove the nut from the preassembled fixation component (i.e. wire bolt). Place the fixation component through bushing. Use a Flange Nut (SEF33001) to attach the fixation component and bushing to the ring. **FIGURES 12 & 13**

Bushing (SEF33400)

Flange Nut (SEF33001)

FIGURE 12

FIGURE 13

Wire Technique

Transosseous wires may be inserted directly through the skin in a percutaneous manner. Be sure to place wires through sites where the skin appears healthy. **FIGURE 14** When using an olive (stopper) wire, a small 3mm to 4mm incision is made in the skin to allow the olive to rest directly against the bone. Wires are inserted under power. **FIGURE 15** In poor quality bone, Wire Washers are available to be used with olive wires to increase the area of wire to bone engagement as needed.

FIGURE 14

FIGURE 15

Once the wire is through both cortices, the wire can be tapped through the skin on the opposite side manually, or advanced using the oscillating feature of the hand-held power equipment. Tapping the wire manually or oscillating the wire may help prevent "wrapping" soft tissue as the wire penetrates the soft tissue. When placing any percutaneous fixation, always be mindful of anatomic safe zones. If a wire causes tension or tenting of the skin, this tension should be released with a small incision. Utilization of flouroscopy may be helpful in determining the exact anatomic position.

Wires can be placed directly on the ring, or they can be placed off of the ring and attached to the ring utilizing a Wire Post. **FIGURES 16 & 17**

NOTE: The wire should rest between the head of the bolt and the rectangular cleated washer.

FIGURE 16 Wire post inserted into the ring slot.

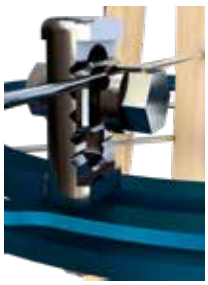


FIGURE 17 Wire Post in final position to capture the Wire.

Take care to build up to the wire with hardware if it is off of the ring. Never bend the wire to the ring. To place wires directly onto the ring, utilize the Wire Guide (SEF92550) to assist with proper wire placement. Place the wire guide directly onto the ring, making sure that the flat surface of the guide has good contact with the flat surface of the ring. **FIGURE 18**

Wire Guide SEF92550

FIGURE 18

Place the 2mm wire through the guide utilizing the driver, taking care not to bend the wire during insertion. **FIGURES 19 & 20**

FIGURE 19

FIGURE 20

The Wire Guide will accommodate both Smooth and Olive Wires. Once a wire is through both cortices, the tip of the Wire Guide hinges open, and the wire is then advanced to its final position. Wires may be placed on top or on the bottom of the ring, as desired. **FIGURES 21 & 22**

FIGURE 21

FIGURE 22

The tip of the wire guide is pushed forward by the olive and hinges forward as shown to accommodate 2mm Olive Wires.

Bone fragments may be manipulated utilizing arched wire techniques, allowing for compression across arthrodesis or osteotomy sites. A transosseous wire is placed through the bone on one side of the arthrodesis or osteotomy site. Wire Bolts or Wire Posts are positioned on the ring away from the wire, in the direction of the desired compression, and connected to the ring. The distance between the wire ends and the Bolt or Post is about one centimeter (one "scallop" on the foot ring.) The wire is then bent or "arched" towards the Bolts or Posts and connected to the Bolts or Posts. **FIGURE 23**

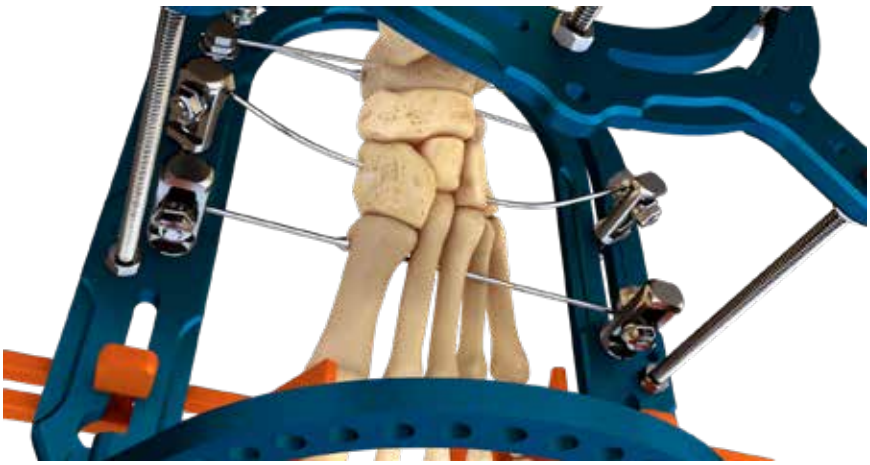


FIGURE 23

Both sides are loosely connected to allow for tensioning. Tension the wire, compressing the bone in the desired direction, and then tighten the remaining Bolt or Post to hold the tension and compression. Release the Tensioner by opening the Tensioner handles. Refer to the next section for more information on proper wire tensioning. **FIGURE 24**

FIGURE 24

NOTE: If using an Olive Wire, make sure to connect the olive side of the wire securely and tension from the opposite side.

Once the frame is complete, place a Wire Sponge at the wire – skin interface over each wire site and secure in place with a Sponge Clip (SEF820PK). The Sponge Clip will accommodate both wires and Half Pins, and is attached from the side. The Sponge Clip can be placed with the flat end towards the skin **FIGURE 25** for wires and pins that are more perpendicular, or it can be placed with the angled end towards the skin for wires and pins that are more oblique. **FIGURE 26**

Sponge Clip SEF820PK

FIGURE 25 Half Pin with Sponge and Sponge Clip in place.

FIGURE 26 Wire with Sponge and Sponge Clip in place.

Tensioning the Wires

Tensioning of transosseous thin wires is necessary to achieve appropriate frame rigidity. When utilizing olive (stopper) wires, tension should be pulled from the opposite side of the olive. By utilizing arched wire concepts, bone segments can be manipulated to apply compression across arthrodesis sites. The technique described below explains the method for tensioning wires individually. If desired, two wires may be tensioned at the same time to better control bony segments as needed. There are two Tensioners in the instrumentation kit for this purpose.

Before tensioning a wire, the Wire Bolts on the opposite side need to be firmly tightened utilizing the 10mm wrench. Hold the head of the Wire Bolt with one wrench and tighten the nut on the Wire Bolt. While tightening, care should be taken to ensure that the wire remains straight. **FIGURE 27**

FIGURE 27

With the olive (stopper) wires, the wire nut or post on the same side as the olive must be tightened first. Once the Wire Bolt on one side of the foot has been firmly tightened, the tensioner is applied over the wire on the opposite side of the foot, and positioned to contact the Wire Bolt. Tension is then applied to the wire by squeezing the Tensioner handles. **FIGURE 28**

FIGURE 28

The wire should be tensioned from 70kg to 110kg. Tension is assessed by reading where the force markings line up with the housing of the Tensioner. **FIGURE 29**

FIGURE 29 This illustration shows the Tensioner seated properly over the Ring and the Wire Bolt.

The Tensioner is held in place, maintaining tension, and the wire nut on the same side is tightened to the Wire Bolt. This will lock the wire under tension. The tensioning device is then released and removed. **FIGURE 30**

FIGURE 30

In instances where the Tensioner tip will not seat properly, connect the Tensioner Spacer (SEF90991) to the end of the Tensioner to assist with tensioning. **FIGURES 31 and 32**

FIGURE 31 Tensioner with Tensioner Spacer in place.

FIGURE 32 Tensioning a Wire that is off of the Ring.

Once wires are adequately tensioned, cut and curl wires or cut and cap wires to prevent unintentional injury.

Ensure all nuts and bolts are tightened and locked securely. Any areas of skin tenting from a wire should be released sharply with a knife.

Half Pin Technique

Half pins may be used as needed for additional fixation and stability. Insert the desired Pin Cube to the frame via the ring slot. Slide the cube to the desired position and orientation. Lock the cube into place utilizing the 10mm wrench. Insert the Drill Sleeve with Trocar (SEF95003) through the Pin Cube and tap with mallet to create indentation on the bone. Remove Trocar and use the appropriately sized Drill to predrill for the half pin. **FIGURE 33**

Tensioner Spacer SEF90991

Drill Sleeve and Trocar (SEF95003)

FIGURE 33

Drill through the drill sleeve until the drill has penetrated both cortices, taking care to avoid anatomic structures at risk on either side of the bone. It may be beneficial to irrigate the bone as the drill is being used to minimize heat generation. With the drill just through both cortices, stop the drill and hold the drill in place to measure for the appropriate half pin thread length. **FIGURE 34**

FIGURE 34

Withdraw the drill and drill sleeve. Attach the half pin to the Pin T-Handle (SEF90002). Place the pin through the cube and advance the pin into the pre-drilled hole. Ensure that the pin has achieved bicortical purchase. **FIGURE 35**

FIGURE 35

Pin T-Handle
SEF90002

Once the pin is in place, remove the Pin T-Handle and secure the pin in place with the set screw, utilizing the 3.5mm Hex Driver. **FIGURE 36**

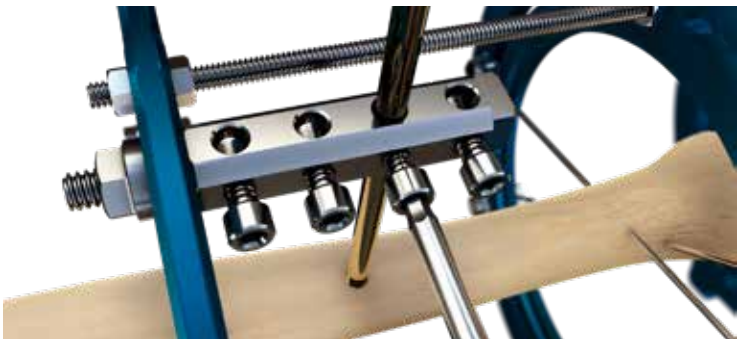


FIGURE 36

After the Half Pin is secured, it can be trimmed to length and capped with the 5mm Pin Cap. **FIGURE 37**

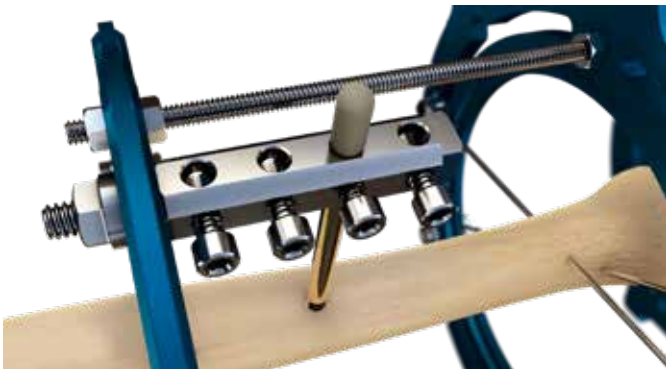


FIGURE 37

General Midfoot Fusion Technique

Perform osteotomies as needed to correct existing deformity and then properly align the foot. Utilize large K-Wires or Steinmann pins to provisionally hold the foot in the proper position during frame application.

Select the appropriate frame and place over the limb. Adjust the frame and utilize the Leg Positioner to properly align the leg in the frame. The Leg Positioner help to maintain the position of the leg in the frame throughout the case. Fixation hardware (Wire Bolts, Wire Posts, and/or Cubes) may be pre-loaded into ring slots prior to frame application. Place Slot Plug into both ends of each ring slot to retain hardware within the slot.

Typically, the first Smooth Wire is inserted off of the proximal ring, utilizing the Wire Guide transversely from medial to lateral in the tibia. The wire is then connected to the proximal tibial ring. The second wire is usually a transverse Smooth Wire or Olive Wire placed into the posterior calcaneus from medial to lateral. **FIGURE 38**

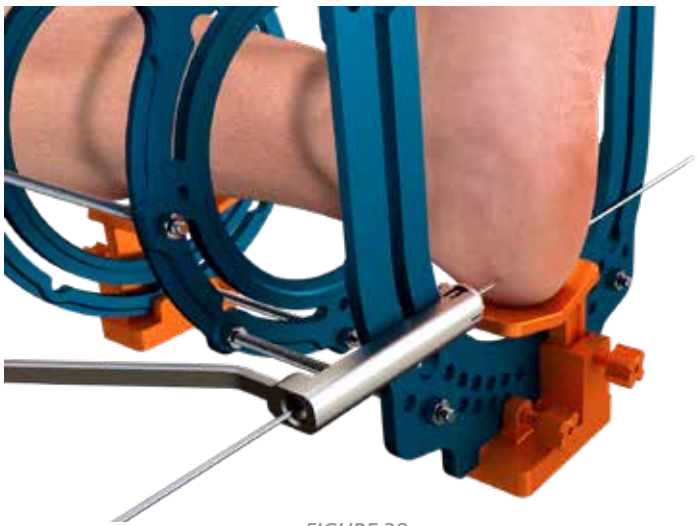


FIGURE 38

This wire is connected to the foot ring. Once a final check is made to ensure the proper frame position, both of these wires are tensioned and locked into place. **FIGURE 39**

FIGURE 39

NOTE: Some surgeons prefer to place the calcaneal wire first and the proximal tibial wire second.

Next, place an Olive Wire obliquely through the distal fibula and tibia posteriolateral to anteriomedial, making sure the olive rests against the fibula. This wire is connected to the distal tibial ring and tensioned. A Smooth Wire is then placed in a transverse position from medial to lateral in the distal tibia and attached to the distal tibial ring. Tension and secure this wire using the Wire Bolts. If desired, tension these two distal tibial wires simultaneously and then lock the Wire Bolts under tension to the distal tibial ring. **FIGURE 40**

FIGURE 40

A half pin is now placed off of the proximal ring into the anterior medial face of the tibia. Insert a Pin Cube into the ring slot from the underside of the proximal ring. Slide the Cube into position, such that a pin may be placed into the anterior medial face of the tibia. Secure the Cube into place, pre-drill through the desired hole through the Cube, and insert the appropriate half pin manually and secure the pin into place. It is very important that the pin achieves bi-cortical purchase to ensure appropriate pin stability. **FIGURE 41**

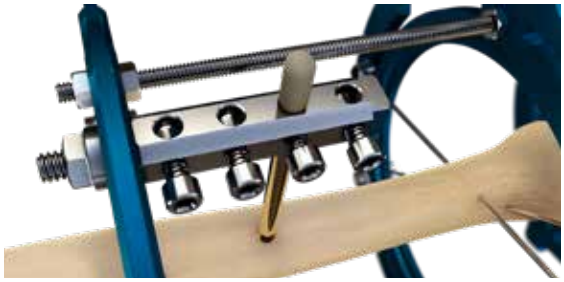


FIGURE 41

Place an Olive Wire into the calcaneus from a posterior medial direction. This wire should be approximately thirty to forty degrees off axis from the first calcaneal wire. Tension and lock the wire to the foot ring.

A midfoot wire is now placed to be used for compression across the Arthrodesis site using the arched wire technique. Place a Smooth Wire through the midfoot from medial to lateral, distal to the arthrodesis or osteotomy site.

Use fluoroscopy to ensure proper positioning of this wire. Apply compression across the midfoot utilizing arched wire technique and secure the wire in place maintaining compression.

Once compression is achieved, it is important to place one or two metatarsal wires to stabilize the forefoot. It may be preferred to utilize Olive Wires in the metatarsals for additional stability. One wire should be placed through the first and second (possibly the third) metatarsals. It may be desired to place a second wire through the lateral metatarsals for additional stability. Connect the wire to the foot ring using Wire Posts tension, and lock to the frame. **FIGURE 42**

FIGURE 42

NOTE: It may be beneficial to place additional wires in the tibia and foot for increased stability. Patient size, activity level, compliance, and overall health are factors to consider.

FIGURE 43 Tension can be applied from both sides to ensure even compression.

NOTE: End of surgery, tighten all construct connections securely.

A Rocker Plate is available to attach to the bottom of the Foot Ring if desired. This Rocker Plate (SEF02401) may be attached after the procedure. The Rocker Plate allows for the plantar aspect of the foot to be off-loaded, and the system features 30mm, 60mm, and 80mm Spacers to adjust the Rocker Plate offset when connecting. The Rocker Plate can be attached with or without spacers. **FIGURE 44**

FIGURE 44

Explant Information

Frame removal can be achieved with the following steps:

- Detach wires from the frame.
- Remove the leg and foot from the frame.
- Remove wires from the foot. Cut the wire on one side of the foot, close to the surface of the skin. Pull the wire from the other side, applying steady force, until the wire is removed. Note: When removing an Olive Wire (stopper wire), pull the wire from the same side as the olive.
- To remove the HA coated pins, attach a T-Handle to the pin. Advance the pin one quarter turn to loosen the pin bone interface. Back out the half pin.

If the removal of the implant is required due to revision or failure of the device, the surgeon should contact the manufacturer using the contact information located on the back cover of this surgical technique to receive instructions for returning the explanted device to the manufacturer for investigation.

Postoperative Care

Postoperative care is the responsibility of the medical professional.

Ordering Information

SALVATION 2 External Fixation System Implants and Instruments

KITS

Part Number	Description
SEF2KIT1	SALVATION EX-FIX INSTRUMENT KIT 1
SEF2KITA	SALVATION EX-FIX IMPLANT KIT A
SEF7KITA	SALVATION RING SET TABBED
SEF8KITA	SALVATION RING SET SLOTTED
SEF9KITA	SALVATION STRUT KIT

Frame Assemblies

Part Number	Description
SEFA1160	SALVATION FRAME 160MM
SEFA1180	SALVATION FRAME 180MM
SEFA1200	SALVATION FRAME 200MM
SEFA2160	SALVATION FRAME 160MM ASSEMBLY
SEFA2180	SALVATION FRAME 180MM ASSEMBLY
SEFA2200	SALVATION FRAME 200MM ASSEMBLY
SEFA2220	SALVATION FRAME 220MM ASSEMBLY

Full Rings

Part Number	Description
SEF08140	SALVATION 140MM RING
SEF08160	SALVATION 160MM RING
SEF08180	SALVATION 180MM RING
SEF08200	SALVATION 200MM RING
SEF08220	SALVATION 220MM RING
SEF07140	SALVATION 140MM TAB RING
SEF07160	SALVATION 160MM TAB RING
SEF07180	SALVATION 180MM TAB RING
SEF07200	SALVATION 200MM TAB RING
SEF04220	SALVATION 220MM TAB RING

Distal Ring

Part Number	Description
SEF16140	SALVATION 140MM DISTAL RING
SEF16160	SALVATION 160MM DISTAL RING
SEF16180	SALVATION 180MM DISTAL RING
SEF16200	SALVATION 200MM DISTAL RING

1/8 Ring

Part Number	Description
SEF18221	SALVATION UNIVERSAL 1/8 RING
SEF18222	SALVATION UNIVERSAL 1/8 RING TAB

Foot Rings

Part Number	Description
SEF05140	SALVATION 140MM FOOT RING
SEF05160	SALVATION 160MM FOOT RING
SEF05180	SALVATION 180MM FOOT RING
SEF05200	SALVATION 200MM FOOT RING
SEF02140	SALVATION 140MM SHF RING
SEF02160	SALVATION 160MM SHF RING
SEF02180	SALVATION 180MM SHF RING
SEF11140	SALVATION 140MM HF RING HOLES
SEF11160	SALVATION 160MM HF RING HOLES
SEF11180	SALVATION 180MM HF RING HOLES
SEF09140	SALVATION 140MM TAB FOOT RING
SEF09160	SALVATION 160MM TAB FOOT RING
SEF09180	SALVATION 180MM TAB FOOT RING

Partial Rings

Part Number	Description
SEF07148	SALVATION 140MM TAB 5/8 RING
SEF07168	SALVATION 160MM TAB 5/8 RING
SEF07188	SALVATION 180MM TAB 5/8 RING
SEF07208	SALVATION 200MM TAB 5/8 RING
SEF07228	SALVATION 220MM TAB 5/8 RING
SEF58014	SALVATION 140MM 5/8 RING
SEF58016	SALVATION 160MM 5/8 RING
SEF58018	SALVATION 180MM 5/8 RING
SEF58020	SALVATION 200MM 5/8 RING
SEF58022	SALVATION 220MM 5/8 RING

Half Rings

Part Number	Description
SEF04140	SALVATION 140MM HALF RING
SEF04160	SALVATION 160MM HALF RING
SEF04180	SALVATION 180MM HALF RING
SEF04200	SALVATION 200MM HALF RING
SEF07145	SALVATION 140MM TAB HALF RING
SEF07165	SALVATION 160MM TAB HALF RING
SEF07185	SALVATION 180MM TAB HALF RING
SEF07205	SALVATION 200MM TAB HALF RING
SEF07225	SALVATION 220MM TAB HALF RING

Wire Bolts

Part Number	Description
SEF10001	SALVATION WIRE BOLT 2MM
SEF1011PK	SALVATION WIRE BOLT 2MM 6PK
EF1500PK	EZ FRAME WIRE BOLT PK /12
EF001500	EZ FRAME WIRE BOLT

Wire Posts

Part Number	Description
SEF00025	SALVATION SHORT WIRE POST
SEF00021	SALVATION TALL WIRE POST
RR10PF	FEMALE POST, 1 HOLE
RR10P	MALE POST, 1 HOLE
RR20PF	FEMALE POST, 2 HOLE
RR20P	MALE POST, 2 HOLE
RR30PF	FEMALE POST, 3 HOLE
RR30P	MALE POST, 3 HOLE
RR40PF	FEMALE POST, 4 HOLE
RR40P	MALE POST, 4 HOLE
EF1650PK	EZ FRAME POST 6HOLE PK/12
EF001650	EZ FRAME POST 6HOLE

Nuts

Part Number	Description
SEF33001	SALVATION FLANGE NUT 10MM
SEF33010	SALVATION NUT 10MM
RR1010	SQUARE NUT
RR1001	NUT 10 MM
RR1001PK	NUT, 10MM MULTI-PAK QTY. 20
EF1600PK	EZ FRAME WIRE NUT PK /12
EF001600	EZ FRAME WIRE NUT
EF002550	EZ FRAME QUICK NUT

Pin Cubes

Part Number	Description
SEF01001	SALVATION 5MM 1 HOLE CUBE
SEF01002	SALVATION 5MM 2 HOLE CUBE
SEF01003	SALVATION 5MM 3 HOLE CUBE
SEF01004	SALVATION 5MM 4 HOLE CUBE

Wires

Part Number	Description
SEF250PK	SALVATION 2MM OLIVE WIRE 6PK
SEF25000	SALVATION OLIVE WIRE 2MM
SEF200PK	SALVATION 2MM WIRE 6PK
SEF20000	SALVATION WIRE 2MM
EF2450PK	EZ FRAME TIN TIP OLIVE WIRE 2MM 6 / PK
EF2400PK	EZ FRAME TIN TIP WIRE 2MM PK / 6
EF002450	EZ FRAME OLIVE WIRE 2MM
EF002400	EZ FRAME WIRE 2MM

Bushing

Part Number	Description
SEF33400	SALVATION BUSHING

Fixation Pins

Part Number	Description
SEF525HA	SALVATION 5X25MM HALF PIN HA
SEF530HA	SALVATION 5X30MM HALF PIN HA
SEF535HA	SALVATION 5X35MM HALF PIN HA
SEF540HA	SALVATION 5X40MM HALF PIN HA
RR5025TN	SIDEKICK HALF PIN 5X25 TIN 180MM LONG
RR5030TN	SIDEKICK HALF PIN 5X30 TIN 180MM LONG
RR5035TN	SIDEKICK HALF PIN 5X35 TIN 180MM LONG
RR5040TN	SIDEKICK HALF PIN 5X40 TIN 180MM LONG
RR5050TN	SIDEKICK HALF PIN 5X50 TIN 180MM LONG

Bolts

Part Number	Description
RR4000	BOLT 40MM
RR3000	BOLT 30MM
RR2000PK	BOLT, 20MM MULTI-PAK QTY. 10
RR2000	BOLT 20 MM
RR1600PK	BOLT, 16MM MULTI-PAK QTY. 10
RR1600	BOLT 16 MM
RR1200PK	BOLT, 12MM MULTI-PAK QTY. 10
RR1200	BOLT 12 MM

Washers

Part Number	Description
SEF34000	SALVATION WIRE WASHER
SEF330PK	SALVATION D WASHER 6PK
SEF33000	SALVATION D WASHER
SEF301PK	SALVATION C WASHER 1MM 6PK
SEF30100	SALVATION C WASHER 1MM
SEF325PK	SALVATION C WASHER 2.5MM 6PK
SEF32500	SALVATION C WASHER 2.5MM
RR2501PK	WASHER, 2.5MM MULTI-PAK QTY. 20
RR2501	WASHER 2.5 MM
RR2401PK	WASHER 1.0MM MULTIPACK QTY. 20
RR2401	WASHER, 1.0MM
RR2201	CONICAL WASHER
RR2101	SLOTTED WASHER

Plates / Brackets

Part Number	Description
RR100PL	PLATE, 1 HOLE
RR200PL	PLATE, 2 HOLE
RR300PL	PLATE, 3 HOLE
RR400PL	PLATE, 4 HOLE
SEF11113	SALVATION L BRACKET
SEF11115	SALVATION L BRACKET LARGE
SEF11100	SALVATION EXTENSION PLATE
SEF11101	SALVATION EXTENSION LARGE

Spacers

Part Number	Description
SEF40030	SALVATION 30MM SPACER
SEF40060	SALVATION 60MM SPACER
SEF40080	SALVATION 80MM SPACER

Threaded Rod

Part Number	Description
RR0080TR	THREADED ROD, 80MM
RR0120TR	THREADED ROD, 120MM
RR0150TR	THREADED ROD, 150MM
RR0165TR	THREADED ROD, 165MM
RR0200TR	THREADED ROD, 200MM
RR0300TR	THREADED ROD, 300MM
RR0400TR	THREADED ROD, 400MM
SEF060TR	SALVATION 60MM THREADED ROD

Compression/Distraction Struts

Part Number	Description
SEF11001	SALVATION QUICK STRUT SHORT
SEF11002	SALVATION QUICK STRUT MEDIUM
SEF11003	SALVATION QUICK STRUT LONG
SEF06080	SALVATION C/D STRUT 60-80MM
SEF80120	SALVATION C/D STRUT 80-120MM
SEF11009	SALVATION LINEAR DISTRACTOR

Hinge

Part Number	Description
RR7500	SIDEKICK UNIVERSAL HINGE
SEF01008	SALVATION IN-LINE HINGE

Rocker Plates

Part Number	Description
SEF02401	SALVATION OPEN ROCKER PLATE

Caps / Covers

Part Number	Description
SEF802PK	SALVATION 2MM WIRE CAP 10PK
SEF805PK	SALVATION 5MM PIN CAP 4PK

Clips

Part Number	Description
SEF820PK	SALVATION SPONGE CLIP 20PK

Sizing Template

Part Number	Description
SEF02500	SALVATION SIZING TEMPLATE

Supports / Straps

Part Number	Description
SEF99400	SALVATION STRAP
SEF99601	SALVATION LEG POSITIONER STERILE
SEF99602	SALVATION FOOT POSITIONER STERILE

Plugs

Part Number	Description
SEF99603	SALVATION SLOT PLUG STERILE

Wrenches

Part Number	Description
SEF90211	SALVATION 10MM FLEX WRENCH
RR301090B	90 DEGREE WRENCH
RR3010	WRENCH 10 MM
RR700035	SIDEKICK HEX WRENCH 3.5MM
EFSR5002	CORETRACK HEX DRIVER 3.5 MM

Drill / Drill Sleeve

Part Number	Description
SEF95003	SALVATION DRILL SLEEVE W/ TROCAR
SEF83703	SALVATION 3.9MM DRILL 5MM PIN

General Instruments

Part Number	Description
SEF92550	SALVATION WIRE GUIDE
SEF90002	SALVATION PIN T-HANDLE
RR3034	PLIERS
RR3033	SIDEKICK PIN REMOVER
RR3031	SIDEKICK PIN CUTTER 4 - 6MM
49510005	CUTTER
SEF90991	SALVATION TENSIONER TIP EXT

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