TRIGEN ™META-NAIL™ Tibial Nail System
Surgical Technique

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Nota Bene
The technique description herein is made available to the healthcare professional to illustrate the authors' suggested treatment for the uncomplicated procedure. In the final analysis, the preferred treatment is that which addresses the needs of the patient.
Indications

The TRIGEN "META-NAIL" Tibial Nail is indicated for fractures of the proximal and distal third of the tibia, including the shaft, stable and unstable fractures, non-unions, mal-unions, and for the prophylactic nailing of impending pathological fractures.
TRIGEN™ META-NAIL™ Tibial Nail Specifications

<table>
<thead>
<tr>
<th>Specifications</th>
<th>TRIGEN META-NAIL Tibia (8.5mm)</th>
<th>TRIGEN META-NAIL Tibia (10, 11.5 &amp; 13mm)</th>
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<tbody>
<tr>
<td>Material</td>
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<td>Ti6Al4V</td>
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<tr>
<td>Diameter</td>
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<td>10, 11.5 &amp; 13mm</td>
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<td>Lengths</td>
<td>16-50cm*</td>
<td>16-50cm*</td>
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<td>Nail Color</td>
<td>Grey</td>
<td>gold</td>
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<td>Cross Section</td>
<td>Round</td>
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<tr>
<td>Proximal Diameter (driving end)</td>
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<td>12mm (10, 11.5 dia.)</td>
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<tr>
<td>Distal Diameter (non-driving end)</td>
<td>8.5mm</td>
<td>10, 11.5 &amp; 13mm</td>
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<td>Guide Bolt Thread</td>
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<td>5/16-24 UNF</td>
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<td>Screw Diameter</td>
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<td>Screw Lengths</td>
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<td>Hex Size</td>
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<td>Alternative Hex Drivers</td>
<td>RT Femoral &amp; Recon 7.0mm Cannulated Screw PERI-LOC™ Locking Screw</td>
<td>RT Femoral &amp; Recon 7.0mm Cannulated Screw PERI-LOC™ Locking Screw</td>
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<td>Alternative Modes</td>
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</tr>
</tbody>
</table>

**Proximal Locking (Driving End)**

- **Static Lock Locations/Orientations:**
  - 12mm/45°: Screw Locked w/META-NAIL Cap
  - 23mm/45°: Threaded w/bushing
  - 30mm/25°: Threaded
  - 40mm/25°: Threaded

- **Static Locking Hole Dimensions:**
  - Threaded 4.3mm minor dia.
  - Threaded 4.7mm major dia.
  - Threaded 4.5mm minor dia.
  - Threaded 5.3mm major dia.

- **Compression/Dynamic Slot Location:**
  - 10mm
  - 10mm

- **Compression/Dynamic Slot Diameter/Length:**
  - 4.7mm/7mm
  - 5.3mm/7mm

- **Degree of Proximal Bend (Herzog):**
  - 10°
  - 10°

- **Proximal Bend Location:**
  - 27mm
  - 27mm

**Distal Locking (Non-Driving End)**

- **Static Lock Locations/Orientations:**
  - 25mm/ML
  - 25mm/AP
  - 5mm/ML (Threaded)

- **Static Locking Hole Dimensions:**
  - 4.7mm**
  - 5.3mm**

- **Degree of Distal Bend:**
  - 2°
  - 2°

- **Distal Bend Location:**
  - 60mm
  - 60mm

*Set does not include all sizes; Outlier sizes may be special order only.

**Most distal hole threaded.

NOTE: These views are not to scale and should be used as a pictorial representation only.
Surgical Technique

Patient Positioning

Position the patient supine on a radiolucent table with the unaffected limb extended away from the affected limb. Alternatively, a fracture table may be used with a pin inserted through the calcaneus to place the leg in traction. Flex the affected limb 80-90° and check for length and rotation by comparison to the unaffected limb.

Use a bolster or radiolucent triangle to maintain limb position. Rotate the C-Arm to ensure optimal AP and lateral visualization of the entire tibia. A distraction device may also be applied to obtain and/or maintain traction.
Instruments for Opening the Proximal Tibia

3.2mm Tip Threaded Guide Wire  
Cat. No. 7163-1690

12.5mm Entry Reamer  
Cat. No. 7163-1115

Honeycomb  
Cat. No. 7167-4075

Entry Portal Tube  
Cat. No. 7167-4060

Entry Portal Handle  
Cat. No. 7167-4092

Mini Connector  
Cat. No. 7163-1186

T-Handle  
Cat. No. 7167-4076

3.2mm T-Handle Trocar  
Cat. No. 7167-4074

Cannulated Awl  
Cat. No. 7167-4000
Incision and Entry Point

Assemble the Honeycomb (7167-4075), Entry Handle (7167-4092) and Entry Tube (7167-4060). The pieces will lock in place securely at either 0° or 180°.

A 2cm incision is made in-line with the intramedullary canal. This may be patellar splitting, medial or lateral parapatellar in its orientation.

The entry point is located just medial to the lateral tibial eminence in the AP view, and in-line with the anterior cortex and intramedullary canal in the lateral.
Entry Portal Acquisition

Attach a 3.2mm Tip Threaded Guide Wire (7163-1690) to the drill via the Mini Connector (7163-1186) and insert into the proximal tibia to a depth of 4-6cm. The Entry Portal instrumentation serves as a soft tissue protector.

In the instance of suboptimal Guide Wire insertion, rotate the Honeycomb within the Entry Tube to the desired location and insert another 3.2mm Tip Threaded Guide Wire. Avoid over-insertion of the Guide Wire as this can establish a false trajectory and lead to fracture malalignment.
Surgical Technique (continued)

Entry Portal

After definitive Guide Wire placement, remove the Honeycomb from the Entry Tube along with any additionally inserted Guide Wires and attach the 12.5mm Entry Reamer (7163-1116) to power. Advance over the Guide Wire through the Entry Tube to a depth of 4-6cm. Maintain alignment so as to avoid penetration of the posterior cortex.

Check position via radiographic imaging and then remove the 12.5mm Entry Reamer and 3.2mm Tip Threaded Guide Wire.

Alternative Technique:

Entry Portal

Attach the T-Handle (7167-4076) to the Cannulated Awl (7167-4000) and insert into the proximal tibia to a depth of 4-6cm. Introduce the 3.2mm T-Handle Trocar (7167-4074) into the back of the assembly prior to insertion in order to prevent awl slippage and accumulation of cortical bone within the cannulation.
Instruments for Fracture Reduction & Reaming

- **Entry Portal Tube**
  Cat. No. 7167-4060

- **Ruler**
  Cat. No. 7167-4079

- **T-Handle**
  Cat. No. 7167-4076

- **Reamer Heads**
  Cat. No. 7111-8231-8246

- **Entry Portal Handle**
  Cat. No. 7167-4092

- **Gripper**
  Cat. No. 7167-4080

- **Obturator**
  Cat. No. 7167-4078

- **Flexible Reamer Shaft**
  Cat. No. 7111-8200

- **Reducer**
  Cat. No. 7167-4077

- **3.0mm x 1000mm Ball Tip Guide Rod**
  Cat. No. 7163-3526
Surgical Technique (continued)

Fracture Reduction

Insert the back end of the 3.0mm Ball Tip Guide Rod (7163-1626) into the front of the Gripper (7167-4080) and gently close the trigger-grip. Connect the Reducer and Reducer Connector (7167-4077) so that the words “Slot Orientation” are in line with the opening at the tip. Complete the assembly by connecting it to the T-Handle.

Note: If blocking screws are desired at this point in the procedure, refer to the blocking screw technique section (pp 22-28).

Advance the Reducer into the intramedullary canal and use the curved tip to direct the 3.0mm Ball Tip Guide Rod past the fracture into the region of the distal epiphyseal scar. The Guide Rod should be center-center in the AP and lateral views.

Reducer Removal

Once the Guide Rod is at the desired depth, detach the Gripper and remove the Reducer from the tibial canal. Slide the Obturator (7167-4078) into the back of the T-Handle during extraction in order to maintain Guide Rod position within the canal.
Implant Measurement

After Reducer removal, re-confirm Guide Rod placement within the distal tibia and slide the Ruler (7167-4079) over the Guide Rod to the desired depth. The metal tip of the Ruler denotes the driving end of the META-NAIL™ Tibial Nail.

Confirm Guide Rod position in the window at the opposite end of the Ruler as shown in order to ensure accurate implant measurement. Push down on the top of Ruler until contact is made with the 3.0mm Ball Tip Guide Rod. Implant length is read from the exposed calibrations at the end of the Ruler.

Note: Confirm fracture reduction so as not to underestimate correct implant length. Reference the fibula for accurate fracture distraction or compression.

Note: Confirm that the Ruler opens easily. Adjust the thumb-wheel connection at the end to allow for free movement.
Unreamed Technique

Radiographic templating is used to determine nail size. The appropriate diameter implant will provide translational fill within the isthmus of the intramedullary canal. Generally, selection of a nail approximately 1-1.5mm less than the narrowest canal measurement on the Lateral radiograph assists in avoiding implant incarceration during insertion.

Note: The 7.6mm diameter of the Reducer provides an initial “sound” for determining canal width in small diameter tibias.
Reamed Technique

Radiographic templating and intra-operative measurement will determine nail size. Beginning with the 9.0mm Front Cutting Reamer Head (7111-8231) and Flexible Reamer Shaft (7111-8200), ream the intramedullary canal sequentially in half millimeter increments to a size 1-1.5mm larger than the selected nail size.

Ensure Guide Rod placement during reaming by inserting the Obturator into the back of the Reamer unit during retraction. Continue to confirm Guide Rod placement in the distal tibia throughout reaming. Periodically move the reamer back and forth in the canal to clear debris from the cutting flutes.
Surgical Technique (continued)

Instruments for Nail Assembly & Insertion

- **Guide Bolt Wrench**
  Cat. No. 7163-1140

- **META-NAIL Drill Guide**
  Cat. No. 7165-4502

- **META-NAIL Extension Drill Guide**
  Cat. No. 7165-4503

- **Extension Guide Bolt**
  Cat. No. 7165-4505

- **Short Impactor**
  Cat. No. 7165-4521

- **T-Handle**
  Cat. No. 7167-4076

- **META-NAIL™ Anterior Drop**
  Cat. No. 7165-4501

- **9.0mm Drill Sleeve**
  Cat. No. 7163-1152

- **4.0mm Drill Sleeve**
  Cat. No. 7167-4083

- **4.0mm Long Pilot Drill**
  Cat. No. 7163-1110

- **Guide Bolt Long**
  Cat. No. 7165-4506

- **Impactor**
  Cat. No. 7167-4081

- **Slotted Hammer**
  Cat. No. 7167-4082

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* 4.0mm Long Pilot Drill (7163-1110) is interchangeable with 4.0mm AO Long Drill (7163-1121)
Nail Assembly

Attach the META-NAIL™ Drill Guide (7165-4502) to the nail with the Guide Bolt Long (7165-4506) and tighten with the Guide Bolt Wrench (7163-1140) and T-Handle. The nail is correctly aligned when:

1. The line on the insertion barrel matches the line of the nail
2. The “A” on the nail matches the “A” on the insertion barrel
3. The apex of the nail’s proximal Herzog Bend faces posterior and the Drill Guide is oriented anterior

The bevel on the front of the nail marks the connection to the Drill Guide and can be seen in the lateral view as a means for determining proximal insertion depth.

Note: It is recommended to use the standard Drill Guide and Guide Bolt Long for compression or dynamic locking as the longer insertion barrel facilitates countersinking of the nail.

Note: The assembly and insertion of the grey 8.5mm diameter META-NAIL Tibial Nail follows the same technique as the 10mm, 11.5mm and 13mm diameter nails.

Attach the Anterior Drop (7165-4501) to the Drill Guide and verify targeting accuracy by inserting a gold 9.0mm Drill Sleeve (7163-1152) and silver 4.0mm Drill Sleeve (7167-4083) into the Drop and passing a 4.0mm Long Pilot Drill (7163-1110)* through the assembly. An incorrectly attached nail will not target.

* 4.0mm Long Pilot Drill (7163-1110) is interchangeable with 4.0mm AO Long Drill (7163-1121)
Nail Insertion

Remove the Anterior Drop and attach the Impactor (7167-4081) to the Drill Guide. Orient the Drill Guide assembly in the AP position and advance the nail over the Guide Rod by light blows from the Slotted Hammer (7167-4082) to the desired depth.

Additional reaming of the intramedullary canal may be indicated if excessive force is required to insert the nail.

Verify fracture reduction as the nail crosses the fracture site paying close attention to rotation, length, alignment, distraction and/or shortening. Check final nail position in both the AP and lateral views for correct alignment.

For proximal interlocking with the leg in extension use the Extension Drill Guide (7165-4503) and Extension Guide Bolt (7165-4505). The long insertion barrel of the standard Drill Guide may impinge upon the distal femoral condyles and prevent nail interlocking with the tibia in full extension.
Check Nail Depth

Proximal
In the lateral view, confirm nail position by observing the notch present at the nail/Drill Guide junction. Each gauge on the insertion barrel represents a 10mm depth interval. If compression or dynamic locking is desired, it is recommended to countersink the nail approximately 10mm in order to avoid implant prominence.

Distal
In the AP and lateral views, confirm that the nail has been inserted to the desired depth. Distal third tibia fractures require at least three locking screws to maintain stability, so optimal insertion depth is essential. Remove the Guide Rod once the nail has been fully seated and attach the Anterior Drop.

Note: Following nail insertion, confirm that the nail and Drill Guide are securely connected as hammering can loosen the Guide Bolt.
Surgical Technique (continued)

Instruments for Standard, Dynamic & Compression Locking

- **4.0mm Long Pilot Drill** (Cat. No. 7163-1110) is interchangeable with 4.0mm AO Long Drill (7163-1121)
- **4.0mm Short Drill** (Cat. No. 7163-1117) is interchangeable with 4.0mm AO Short Drill (7163-1123)
- **META-NAIL™ Anterior Drop** (Cat. No. 7165-4501)
- **Mini Connector** (Cat. No. 7163-1186)
- **T-Handle** (Cat. No. 7167-4076)
- **Nail Cap Set Screw** (Cat. No. 7165-6000)
- **Medium Hexdriver** (Cat. No. 7163-1166)
- **Screwdriver Release** (Cat. No. 7167-4084)
- **Medium Hexdriver** (Cat. No. 7163-1166)
- **Disposable Compression Driver** (Cat. No. 7165-4517)
- **4.0mm Short Drill** (Cat. No. 7163-1117)
- **Screw Depth Gauge** (Cat. No. 7163-1189)

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* 4.0mm Long Pilot Drill (7163-1110) is interchangeable with 4.0mm AO Long Drill (7163-1121)
** 4.0mm Short Drill (7163-1117) is interchangeable with 4.0mm AO Short Drill (7163-1123)
Locking Screw Measurement
There are three (3) methods:
1. Gold 9.0mm Drill Sleeve, silver 4.0mm Drill Sleeve and 4.0mm Long Pilot Drill*
2. Screw Depth Gauge (7163-1189)
3. Screw Length Sleeve (7167-4085) and 4.0mm Short Drill (7163-1117)**

Locking Screw Insertion
Proximal locking options include three (3) statically locked threaded holes and one (1) slot that allows for both fracture compression and/or dynamization. These are targeted through the orange and blue color-coded holes on the Anterior Drop.

Distal locking options include three (3) statically locked holes, two (2) ML and one (1) AP. The most distal ML hole is threaded for additional stability.

Gold 5.0mm locking screws are compatible with 10mm, 11.5mm and 13mm diameter nails and grey 4.5mm locking screws with 8.5mm diameter nails.

Note: Do not use the 4.0mm Short Step Drill (7164-1123) when drilling for a grey 4.5mm locking screw. Its diameter transitions from 4.0mm to 4.7mm and will drill too large a hole in the near cortex. This may compromise locking screw purchase.

* 4.0mm Long Pilot Drill (7163-1110) is interchangeable with 4.0mm AO Long Drill (7163-1121)
** 4.0mm Short Drill (7163-1117) is interchangeable with 4.0mm AO Short Drill (7163-1123)
Surgical Technique (continued)

Proximal Locking: Static
Make a small incision at the site of screw entry and insert the gold 9.0mm Drill Sleeve and silver 4.0mm Drill Sleeve through the static slot on the Anterior Drop down to bone. Drill both cortices with the 4.0mm Long Pilot Drill*.

Measure for screw length using either the calibrations on the 4.0mm Long Pilot Drill* or by removing the 4.0mm Drill Sleeve and using the Screw Depth Gauge. Attach the appropriate length screw to the end of the Medium Hexdriver (7163-1066) and insert through the gold 9.0mm Drill Sleeve on power until the laser etched ring on the Hexdriver reaches the back of the Drill Sleeve. Attach the T-Handle to the Hexdriver and tighten the screw by hand.

Proximal Locking: Dynamic
With the nail countersunk approximately 10mm, make a small incision at the site of screw entry and insert the gold 9.0mm Drill Sleeve and silver 4.0mm Drill Sleeve through the dynamic slot on the Anterior Drop down to bone. Drill both cortices with the 4.0mm Long Pilot Drill*. Screw measurement and insertion follows the previously described technique.

* 4.0mm Long Pilot Drill (7163-1110) is interchangeable with 4.0mm AO Long Drill (7163-1121)
Proximal Locking: Compression

There are two (2) methods:

1. With the nail countersunk approximately 10mm, lock the nail distally first (see below) to ensure effective compression and insert a screw through the proximal dynamic slot as previously described. Remove the gold 9.0mm Drill Sleeve and Medium Hexdriver. Attach the Compression Driver (7165-4517) to the T-Handle and insert the assembly through the Guide Bolt into the top of the nail until it contacts the most proximal 5.0mm locking screw. Turn the Compression Driver clockwise to drive the locking screw distally and compress the fracture up to 7mm.

2. Lock the nail distally, fully insert the dynamic locking screw as previously described and remove the Drill Guide/Anterior Drop assembly. Insert the Nail Cap Set Screw (7165-6000) into the top of the nail and advance with the Medium Hexdriver/T-Handle assembly until the fracture is compressed and the Nail Cap Set Screw has fully engaged the locking screw.

Distal Locking

Distal locking is typically approached from the medial side using a free hand technique. Confirm fracture reduction and align the C-Arm in either the AP or lateral position depending on which locking screw is to be inserted. Obtain a “perfect circle” image of the locking hole and use a blunt object to approximate the location of the locking hole by dimpling the skin.

Make a stab incision at the site, insert the 4.0mm Short Drill*, and drill both cortices. Measure for screw length using the Screw Depth Gauge. Alternatively, leave the 4.0mm Short Drill* in place, insert the Screw Length Sleeve down to bone, and read the exposed calibrations off the drill. Insert the appropriate length screw using the T-Handle/Hexdriver assembly.

* 4.0mm Short Drill (7163-1117) is interchangeable with 4.0mm AO Short Drill (7163-123)
Surgical Technique (continued)

Instruments for Blocking Screw Insertion

- 4.0mm Long Pilot Drill (7163-1110) is interchangeable with 4.0mm AO Long Drill (7163-1121)
- **Tibia Blocking Screw Attachment** Cat. No. 7165-4509
- **T-Handle** Cat. No. 7167-4076
  - 110mm T-Handle Awl Cat. No. 7165-4522
- **8.5mm/10.0mm Screw Cartridge** Cat. No. 7165-4511
- **11.5mm/13.0mm Screw Cartridge** Cat. No. 7165-4513
- **Offset Blocking Screw Cartridge** Cat. No. 7165-4514
- **Blocking Screw Alignment Pin** Cat. No. 7165-4523
- **4.0mm Long Pilot Drill*** Cat. No. 7163-1110
- **4.0mm Drill Sleeve** Cat. No. 7167-4083
- **9.0mm Drill Sleeve** Cat. No. 7163-1152
- **Medium Hexdriver** Cat. No. 7163-1066
- **Mini Connector** Cat. No. 7163-1286

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* 4.0mm Long Pilot Drill (7163-1110) is interchangeable with 4.0mm AO Long Drill (7163-1121)
Blocking Screw Technique: Incision & Entry Point

A 2cm incision is made in-line with the intramedullary canal. This may be patellar splitting, medial or lateral parapatellar in its orientation.

The entry point is located just medial to the lateral tibial eminence in the AP view and in-line with the anterior cortex and intramedullary canal in the lateral.

Entry Portal Acquisition

Insert the 11.0mm T-Handle Awl (7165-4522) manually to a depth just proximal to the fracture.

Note: When creating the initial entry point, pay close attention to the trajectory of the Awl and it's relationship to the anatomic axis of the tibia. Correct Awl trajectory in the proximal fragment must be established prior to alignment with the anatomic axis of the distal fragment. This will ensure accurate fracture reduction when the nail is inserted.
Surgical Technique (continued)

AP Blocking Screw Insertion

In order to prevent varus or valgus malalignment of the proximal fragment, blocking screws may be placed in the AP plane. Attach the Blocking Screw Device (7165-4515) to the 11.0mm T-Handle Awl and move it into the desired position in the AP plane.

Note: The Blocking Screw Alignment Pins (7165-4523) can be screwed into the three (3) threaded holes on the metal handle of the Blocking Screw Device to serve as external points of reference during fracture alignment.

Tighten the device to the Awl and insert the appropriate Blocking Screw Cartridge (7165-4511, 7165-4513, 7165-4514). Adjust the Cartridge proximally or distally within the Blocking Screw Device to determine blocking screw position.

Insert the gold 9.0mm Drill Sleeve and silver 4.0mm Drill Sleeve into the desired cartridge hole and down to bone. Drill both cortices with the 4.0mm Long Pilot Drill*. Screw length is determined by reading the exposed drill bit calibrations or by removing the 4.0mm Drill Sleeve and measuring with the Screw Depth Gauge. Insert the screw with the Medium Hexdriver/T-Handle assembly until the screw engages the far cortex.

Note: Use caution during drilling and insertion of blocking screws in the AP plane. Plunging the drill bit past the posterior cortex or insertion of a screw that is too long may damage the neurovascular structures located posterior to the proximal tibia.

* 4.0mm Long Pilot Drill (7163-1110) is interchangeable with 4.0mm AO Long Drill (7163-1121)
Following implantation of the proximal blocking screw and fracture reduction, pass the 110mm T-Handle Awl into the distal fragment.
Re-position either the Blocking Screw Cartridge or the Awl as necessary and follow the previously described technique for blocking screw insertion.

ML Blocking Screw Insertion
In order to prevent anterior or posterior malalignment of the proximal fragment, blocking screws may also be placed in the ML plane. Attach the Blocking Screw Device to the 110mm T-Handle Awl and rotate it into the desired position in the ML plane.

Tighten the device to the Awl and insert the appropriate Blocking Screw Cartridge. Adjust the Cartridge proximally or distally within the Blocking Screw Device to determine blocking screw position. Blocking screw insertion follows the previously described technique.
Surgical Technique (continued)

Blocking Screw Insertion with Reducer

Blocking screw insertion can also be performed by attaching the Blocking Screw Device to the Reducer instead of the 11.0mm T-Handle Awl. Blocking screw insertion follows the previously described technique.

Final View: AP & ML Blocking Screw Insertion

Once blocking screw insertion is complete, remove the Blocking Screw Device from the 110mm T-Handle Awl or Reducer and obtain both AP and lateral radiographic images to confirm accurate placement.

The Awl or Reducer provides a good indication of the nail’s insertion trajectory based upon the location of the blocking screws. Following confirmation of proper screw placement, proceed with nail insertion following the META-NAIL"Tibial Nail insertion technique.
Stability Locking Screw Insertion

Following nail insertion and confirmation of fracture reduction, blocking screws can be placed on either side of the nail in the metaphyseal region for additional stability. Screws may be inserted in both the AP and ML planes.

With the nail inserted, attach the Tibia Blocking Screw Attachment (7165-4509) to the Anterior Drop (Triangle to Triangle for AP screws and Square to Square for ML screws). Follow the previously described technique for Cartridge positioning and blocking screw insertion.

Note: The AP blocking screws targeted through the two (2) holes built into the Anterior Drop cannot be used if the most inferior oblique proximal locking screw has been inserted.
Surgical Technique (continued)

Final View: Stability Blocking Screws

Once stability blocking screw insertion is complete, remove the Blocking Screw Attachment and Anterior Drop from the Drill Guide and obtain both AP and lateral radiographic images to confirm accurate placement.

TRIGEN™ Nail Cap Insertion: Optional

Remove the Drill Guide/ Anterior Drop assembly. Attach the selected Nail Cap to the Medium Hexdriver/T-Handle assembly and insert into the top of the nail until tight.

A Nail Cap cannot be used if a Nail Cap Set Screw is implanted or if a locking screw is inserted in the dynamic locking position. The tip of the Nail Cap will contact the locking screw and prevent complete engagement of the Nail Cap with the nail.

Note: If cross-threading occurs, rotate the Nail Cap counterclockwise until its threads line up with those of the nail. Proceed with insertion until tight.
Instruments for Implant Removal

* Additional Guide Rods listed on page 31
** The One Piece Impactor is located in the original TRIGEN Instrument Set (7163-1185)
*** The Disposable Nail Extractor (7163-1320) is interchangeable with the Large Nail Extractor (7163-1278) located in the original TRIGEN Instrument Set (7163-1326) and the HFN Instrument Set (7170-0001)

- 3.2mm Tip Threaded Guide Wire
  Cat. No. 7163-1690

- 12.5mm Entry Reamer
  Cat. No. 7163-1116

- Impactor
  Cat. No. 7167-4081

- One Piece Impactor**
  Cat. No. 7163-1185

- T-Handle
  Cat. No. 7167-4076

- Medium Hexdriver
  Cat. No. 7163-1066

- 3.0mm x 1000mm Ball Tip Guide Rod*
  Cat. No. 7163-1626

- Mini Connector
  Cat. No. 7163-1186

- Disposable Nail Extractor***
  Cat. No. 7163-1320

- Slotted Hammer
  Cat. No. 7167-4082
Surgical Technique (continued)

Nail Extraction: Optional

Standard Technique
Remove the Nail Cap or Nail Cap Set Screw if implanted and all of the distal locking screws with the Medium Hexdriver/T-Handle assembly. Remove all of the proximal locking screws except for one in the same manner.

Thread the Impactor (7167-4081) or One Piece Impactor (7163-1185)* into the back of the Disposable Nail Extractor (7163-1320)** and then thread the assembly into the top of the nail. Remove the remaining proximal locking screw and then extract the nail with a back-slapping motion using the Slotted Hammer.

Percutaneous Technique
This technique assumes the absence of a Nail Cap or Nail Cap Set Screw. Remove all distal locking screws and all but one of the proximal locking screws as previously described. Under fluoroscopy, insert a 3.2mm Tip Threaded Guide Wire into the top of the nail on power or by hand. Make a 2cm incision around the pin and advance the 12.5mm Entry Reamer over the pin and into the top of the nail to remove any bony in-growth.

Thread the Impactor or One Piece Impactor* into the back of the Disposable Nail Extractor** and then thread the assembly into the top of the nail. Remove the remaining proximal locking screw and then extract the nail with a back-slapping motion.

Note: The tip of the Entry Reamer is straight for approximately 1cm before flaring out. It is this portion of the Entry Reamer that enters the top of the nail.

* The One Piece Impactor is located in the original TRIGEN® Instrument Set (7163-1326)
** The Disposable Nail Extractor (7163-1320) is interchangeable with the Large Nail Extractor located in the original TRIGEN Instrument Set (7163-1326) and the HFN(tm) Instrument Set (7170-0001)
An Alternative Method for Extraction

Guide Rod Jamming Technique

Advance the end of a 3.0mm Ball Tip Guide Rod through the end of the nail. Insert a 2.0mm Smooth Guide Rod (7111-8280) in the same manner. With both Guide Rods in place attach the Gripper to the end of the 3.0mm Ball Tip Guide Rod and pull it back so that it wedges the ball tip against the 2.0mm Smooth Guide Rod. Backslap against the Gripper with the Slotted Hammer to extract the nail.

Guide Rods

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<td>2.0mm x 900mm Smooth (RUSSELL-TAYLOR System)*</td>
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<td>7111-8202</td>
<td>3.0mm x 900mm Ball Tip (RUSSELL-TAYLOR System)*</td>
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<td>3.0mm x 1000mm Ball Tip (TRIGEN System)</td>
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Additional Removal Items

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* Available sterile packed. For nail removal only, do not use for nail insertion
** Located in RUSSELL-TAYLOR Extraction Kit (Set #7508) available through Loaners
**Catalog Information – Implants**

**TRIGEN™ Internal Captured Screws**

4.5mm and 5.0mm

Set No. 7163-1321

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**TRIGEN META-NAIL™ 8.5mm Tibial**

Set No. 7165-3002

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* Available through special order
## TRIGEN™ META-NAIL™ 11.5mm Tibial

Set No. 7165-3001

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* Available through special order
## TRIGEN "META-NAIL" 13mm Tibial

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* Available through special order

## Nail Cap Set Screw

Cat. No. 7165-6000

## TRIGEN Nail Caps

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</table>
Catalog Information – Instruments

TRIGEN™ META-NAIL™ Blocking Screw Instruments
Set No. 7165-4001

Blocking Screw Device
Cat. No. 7165-4515

Tibia Blocking Screw Attachment
Cat. No. 7165-4509

11.0mm T-Handle Awl
Cat. No. 7165-4522

8.5mm/10mm Blocking Screw Cartridge
Cat. No. 7165-4511

11.5mm/13mm Blocking Screw Cartridge
Cat. No. 7165-4513

Offset Blocking Screw Cartridge
Cat. No. 7165-4514

Blocking Screw Alignment Pin
Cat. No. 7165-4523

Retrograde Femoral Blocking Screw Attachment*
Cat. No. 7165-4508

Blocking Screw Instrument Case
Cat. No. 7165-4552

Blocking Screw Instrument Lid
Cat. No. 7165-4553

* Not used in META-NAIL tibial technique
TRIGEN™ META-NAIL™ Instruments
Set No. 7165-4002

META-NAIL Anterior Drop
Cat. No. 7165-4501

META-NAIL Drill Guide
Cat. No. 7165-4502

META-NAIL Extension Drill Guide
Cat. No. 7165-4503

Extension Guide Bolt (23mm)
Cat. No. 7165-4505

Guide Bolt Long (51mm)
Cat. No. 7165-4506

META-NAIL Instrument Case
Cat. No. 7165-4551

META-NAIL Instrument Lid
Cat. No. 7165-4550

Long Screw Length Sleeve
Cat. No. 7165-4520

Short Impactor
Cat. No. 7165-4521
Catalog Information – Instruments (continued)

Instruments used if you have TRIGEN™ Base
Set No. 7167-4012

Medium Hexdriver
Cat. No. 7163-1066

Short Hexdriver
Cat. No. 7163-1068

12.5mm Entry Reamer
Cat. No. 7163-1116

Guide Bolt Wrench
Cat. No. 7163-1140

9.0mm Drill Sleeve
Cat. No. 7163-1152

Multipurpose Driver
Cat. No. 7163-1161

Mini Connector
Cat. No. 7163-1286

Screw Depth Gauge
Cat. No. 7163-1189

Cannulated Awl
Cat. No. 7167-4000

Entry Portal Tube
Cat. No. 7167-4060

3.2mm T-Handle Trocar
Cat. No. 7167-4074

Honeycomb
Cat. No. 7167-4075

Flexible Reamer Shaft
Cat. No. 7111-8200

Reamer Heads
Cat. No. 7111-8231-8246
T-Handle  
Cat. No. 7167-4076

Reducer  
Cat. No. 7167-4077

Obturator  
Cat. No. 7167-4078

Ruler  
Cat. No. 7167-4079

Gripper  
Cat. No. 7167-4080

Impactor  
Cat. No. 7167-4081

Slotted Hammer  
Cat. No. 7167-4082

4.0mm Drill Sleeve  
Cat. No. 7167-4083

Screwdriver Release  
Cat. No. 7167-4084

Screw Length Sleeve  
Cat. No. 7167-4085

Entry Portal Handle  
Cat. No. 7167-4092
Catalog Information – Instruments (continued)

Instruments used if you have existing TRIGEN™ set
Set No. 7163-1326

**Medium Hexdriver**  
Cat. No. 7163-1066

**Short Hexdriver**  
Cat. No. 7163-1068

**Gripper**  
Cat. No. 7163-1100

**Entry Tool**  
Cat. No. 7163-1114

**12.5mm Entry Reamer**  
Cat. No. 7163-1116

**Obturator**  
Cat. No. 7163-1122

**Reducer**  
Cat. No. 7163-1124

**Ruler**  
Cat. No. 7163-1128

**Guide Bolt Wrench**  
Cat. No. 7163-1140

**Hammer**  
Cat. No. 7163-1150

**9.0mm Drill Sleeve**  
Cat. No. 7163-1152

**4.0mm Drill Sleeve**  
Cat. No. 7163-1156

**Multipurpose Driver**  
Cat. No. 7163-1161

**T-Handle**  
Cat. No. 7163-1172
Mini Connector  
Cat. No. 7163-1186

Screw Depth Gauge  
Cat. No. 7163-1189

Screw Driver Release Handle  
Cat. No. 7163-1208

One Piece Impactor  
Cat. No. 7163-1195

Flexible Reamer Shaft  
Cat. No. 7163-1192

Reamer Heads  
Cat. No. 7111-8231-8242

META-NAIL™ Disposables  
Set No. 7165-4003

4.0mm Long Pilot Drill*  
Cat. No. 7163-1110

4.0mm Short Drill**  
Cat. No. 7163-1117

3.0mm x 1000mm Ball Tip Guide Rod  
Cat. No. 7163-1526

3.2mm Tip Threaded Guide Wire  
Cat. No. 7163-1590

TRIGEN™ META-NAIL Disposable Compression Driver  
Cat. No. 7165-4517

Disposable Nail Extractor***  
Cat. No. 7163-1220

* 4.0mm Long Pilot Drill (7163-1110) is interchangeable with 4.0mm AO Long Drill (7163-1121)
** 4.0mm Short Drill (7163-1117) is interchangeable with 4.0mm AO Short Drill (7163-1123)
*** The Disposable Nail Extractor (7163-1220) is interchangeable with the Large Nail Extractor (7163-1278) located in the original TRIGEN Instrument Set (7163-1526) and the HFN™ Instrument Set (7170-0001)