

Forefoot/Midfoot Plating System

# Surgical Technique



Acumed<sup>®</sup> is a global leader of innovative orthopaedic and medical solutions.

We are dedicated to developing products, service methods, and approaches that improve patient care.





### Acumed<sup>®</sup> Forefoot/Midfoot Plating System

Designed to address both reconstruction and acute fractures of the forefoot and midfoot, the Acumed Locking Forefoot/Midfoot Plating System offers indication-specific plates to help restore the anatomic geometry of the forefoot and midfoot.

The Forefoot/Midfoot Plating System fits conveniently in the Lower Extremity Modular System, which offers a broad range of implants and instrumentation for the foot and ankle.

By designing the Forefoot/Midfoot Plating System on the same platform as other Acumed foot and ankle systems, such as the Locking Ankle and Calcaneal Plate systems, the Forefoot/Midfoot System can be used with a modular tray lid for transportability.

#### Indications for use

Fractures, fusions, and osteotomies of the foot including:

- Proximal metatarsal osteotomies
- Osteotomies associated with hallux valgus correction
- Fractures associated with Lisfranc injuries

	Definition
Warning	Indicates critical information about a potential serious outcome to the patient or the user.
Caution	Indicates instructions that must be followed in order to ensure the proper use of the device.
Note	Indicates information requiring special attention.

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### System Features Plate Family

**Multiple Plate Options** offer surgeons choices in forefoot/midfoot plating from an expanding line of MTP, TMT, and Osteotomy Plates.

**Precontoured Plates** are designed to match the anatomy of the patient. Based on multiple cadaveric and clinical trials, the MTP Plates are precontoured with both 4 degrees and 9 degrees of dorsiflexion and 10 degrees of lateral translation to help restore the functional angle of the MTP joint after fusion.

Blue plates are left specific, green plates are right specific, turquoise plates are neither right nor left specific.



#### Plate options include:

#### Metatarsophalangeal (MTP) Plates (available in both 4° and 9° dorsiflexion)

- Standard MTP Plate
- Dorsal MTP Plate
- MTP Revision PlatePetite MTP Plate (Available
- in 4° dorsiflexion only)

MTP/MPJ Combo MTP/MPJ Combo Fusion, Left Fusion, Right (70-0036) (70-0037) Dorsal MTP Dorsal MTP Fusion Fusion, Right (70-0012) MTP Revision (70-0013) MTP Revision Fusion, Left Fusion, Right (70-0018) (70-0019)

**MPJ Petite** (70-032X) MTP/MPJ Combo (70-010X)

MTP Revision (70-014X) **Dorsal MTP** 

(70-014X)

## System Features [continued]

Forefoot and Midfoot Plates



#### **Osteotomy Plates**

- Osteotomy Plate
- Osteotomy Plate With Compression Slot



Locking Proximal MT Wedge, Left (70-00XX)

Locking Proximal MT Wedge, Right (70-00XX)

4-Hole

Locking 1st (70-0008)

### **Tarsometatarsal (TMT) Plates**

- ► First Ray TMT Plate
- Second/Third Ray TMT Plate
- Lapidus Plate
- Extended First Ray TMT Plate
- Extended Second/Third Ray TMT Plate
- Extended Lapidus Plate

5-Hole Locking 1st (70-0007)





8-Hole Locking 1st (70-0049)

7-Hole 7-Hole Locking 1st Locking (70-0050) 2nd & 3rd (70-0051)

4-Hole

Locking 2nd & 3rd (70-0009)

# System Features [continued]

### Acumed Small Joint Reamer System

Acumed's Small Joint Reamer System provides a solution for creating congruent bone surfaces in the IP and DIP joints of the toes and fingers prior to fusion procedures with Acumed's plates, Acutrak 2<sup>®</sup> Screws, and other methods of fixation.









**16 mm MTP Reamer Convex** (80-0570)



**18 mm MTP Reamer Concave** (80-0571)



20 mm MTP Reamer Concave (80-0573)



**22 mm MTP Reamer Concave** (80-0575)





20 mm MTP Reamer Convex (80-0574)



**22 mm MTP Reamer Convex** (80-0576)

AO-style quick-release attachment

Sharp cutting flutes to create congruent bone surface for fusions

Features

Cannulated

- Cannulated to facilitate accurate reaming
- Reamer gauges assist with accurate sizing
- 16–22 mm Convex and Concave Reamers

# System Features [continued]

### **Screw Options**

#### Metatarsophalangeal (MTP) Plates, Tarsometatarsal (TMT) Plates, Osteotomy Plates

**Locking and Nonlocking Screws** provide surgeons with the choice of 3.0 or 3.5 mm hexalobe screws and 4.0 mm cancellous screws. The associated drills, locking drill guides, and drivers for use with these hexalobe screws are listed in the surgical techniques.

**Note:** The system can also be used with Acumed 2.7 mm hex or 3.5 mm hex screws. If using optional screw sizes, please see reference chart to the right.

Screw Size & Driver	Quick Release Drill	
2.7 mm hex HPC-0025 (short)	2.0 mm 80-0386 or HT-2502 (long)	
3.5 mm hex HPC-0025 (short)	2.8 mm 80-0387 or HT-2502 (long)	
Locking Drill Guide		
2.7 mm hex	80-0385	
3.5 mm hex	80-0384	

System Screws



3.0 mm Locking Hexalobe Screw 8 mm–26 mm (30-02XX)



3.5 mm Locking Hexalobe Screw 8 mm–26 mm (30-02XX)



3.0 mm Nonlocking Hexalobe Screw 8 mm–26 mm (30-03XX)



3.5 mm Nonlocking Hexalobe Screw 8 mm–26 mm (30-02XX)



**4.0 mm Cancellous (Hex) Screw 12 mm–60 mm** (CA-4XXX)

#### **Optional Cortical (Hex) Screws**



2.7 mm Locking Cortical (Hex) Screw 8 mm–65 mm (COL-2XXX)



3.5 mm Locking Cortical (Hex) Screw 6 mm–65 mm (COL-3XXX)



2.7 mm (Nonlocking) Cortical (Hex) Screw 8 mm–65 mm (CO-27XX)



3.5 mm (Nonlocking) Cortical (Hex) Screw 6 mm–65 mm (CO-3XXX)

### Instrument Overview



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### Instrument Overview [continued]



3.5 mm Cortical Screw Bone Tap (MS-LTT35)





**Cortical and Cancellous Screw** Countersink (PL-2080)





-



8 mm Hohmann Retractor

(PL-CL05)



Plate Bender, Large

(PL-2045)

15 mm Hohmann Retractor (MS-46827)



Sharp Hook (PL-CL06)



**Small Pointed Reduction** Forceps (OW-1200)



Needle Nose Pliers, 5.5"

(MS-48245)



Periosteal Elevator, 7.25" (MS-46211)

**Bone Reduction Forceps with** Points, 5 Broad (MS-47135)



8" Bone Reduction Forceps (MS-1280)



Bone Reduction Forceps, 5.25" (MS-45300)



**Reduction Forceps With** Serrated Jaw (PL-CL04)



**Inge Retractor Without Teeth** (80-0472)



**Plate Holder Assembly** (PL-2030)



Large Cannulated Quick Release Driver Handle (MS-3200)

# Surgical Technique Overview



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Compression of Fusion Site



Insertion of Remaining Screws



Postoperative Protocol



# Surgical Technique Overview [continued]





# Small Joint Reamer System Surgical Technique

Figure 1



#### Joint Opening

Open the joint and fully release the ligaments.



### Distal Fragment Reaming

Insert the .062" x 6" Guide Wire (WS-1607ST) antegrade down the central axis of the distal phalanx. After placing the appropriate MTP Reamer, Convex (80-057X) over the Guide Wire, use power to ream the distal fragment until the proximal end is denuded of cartilage.

.062" x 6" Guide Wire (WS-1607ST)



# Small Joint Reamer System Surgical Technique [continued]

### Proximal Phalanx Reaming

Insert the second .062" x 6" Guide Wire (WS-1607ST) retrograde up the proximal phalanx. Insertion should begin at the central axis and travel at the desired angle of flexion. Ream the proximal phalanx over the guide wire using the MTP Reamer, Concave (80-05XX). Choose the same-size concave reamer as the size of the Reamer, Convex (80-057X) used in Step 2. Ream until the distal end of the phalanx is denuded of cartilage.



#### Plate or Screw Fixation Fit the phalanges together in the desired flexion and fix with an Acumed MTP Plate (70-0XXX) or with an Acutrak 2<sup>®</sup> Headless Compression Screw (AT2-5XX) For

Acutrak 2<sup>®</sup> Headless Compression Screw (AT2-5XX). For more information about Acutrak 2, see the Surgical Technique (SPF00-02) or contact your authorized Acumed distributor.





.062" x 6" Guide Wire (WS-1607ST)





MTP Reamer, Convex (80-057X)



Acumed MTP Plate (70-0XXX) Figure 4

# Locking MTP Plate Surgical Technique

Figure 1



#### **Bone Preparation**

Prepare the bone surfaces for the preferred fusion position. Mark both sides of the joint to establish rotational alignment and flatten the dorsal surface of both the metatarsal and proximal phalanx.

Note: The MTP Plates are precontoured with either 4 degrees or 9 degrees of dorsiflexion and 10 degrees of lateral translation.



### Metatarsal and Phalangeal Preparation

Use Acumed's cannulated Small Joint Reamer System MTP Reamer, Concave/Convex (80-05XX) to denude the cartilage down to the bleeding subchondral bone to maximize the surface contact between the metatarsal head and the proximal phalanx. Alternatively, a burr or rongeur can be used.



#### Plate Placement and Positioning

Select the appropriate Locking MTP Plate (70-0XXX) for either the left or right foot and procedure type. Secure the plate to the metatarsal with a Plate Tack (PL-PTACK) driven through the most proximal hole.

Note: The MTP Plates are precontoured to match the anatomy. If bending is required to match the patient's specific anatomy or other factors, use the plate benders provided (PL-2040 and PL-2045) and bend in one direction only.

Caution: Do not bend the plate more than once or bend across the locking holes.

Small Joint Reamer System (80-05XX)







Plate Tack (PL-PTACK)



Plate Bender (PL-2040)



Plate Bender, (PL-2045)

# Locking MTP Plate Surgical Technique [continued]

#### **Initial Screw Placement**

Place the selected Hexalobe Locking Drill Guide (80-0668 or 80-0622) into the distal hole of the plate and drill through both cortices. Use the Depth Gauge 6–65 mm (80-0623) to determine screw length. Choose the appropriate size screw and insert into the bone. A nonlocking screw can be used to pull the plate to the bone.

#### Note:

- Select the screw diameter based upon the patient's anatomy. The 2.3 mm Quick Release Drill (80-0627) is used for the 3.0 mm Nonlocking Hexalobe Screws (30-03XX), and the 2.8 mm Quick Release Drill (80-0387) is used for the 3.5 mm Nonlocking Hexalobe Screws (30-02XX) and 4.0 mm screws.
- 2. The system can also be used with Acumed 2.7 mm hex or hexalobe or 3.5 mm hex screws. If using optional screw sizes, see the reference chart on page 2.



## Compression of Fusion Site

Place the gold end of the Offset Drill Guide (PL-2095) into the plate's compression slot with the arrow on the guide pointing toward the fusion site. Drill and measure for screw length. Insert the appropriate-size nonlocking screw to apply 1 mm of compression to the fusion site.

**Note:** For hard bone, 2.7 mm and 3.5 mm Bone Taps (MS-LTT27 and MS-LTT35) are recommended.

Figure 5





Guide 6–65 mm (80-0668) 2.8 mm Quick

Locking Drill

2.8 mm Hexalobe

2.8 mm Quick Release Drill (80-0387)



3.5 mmNonlocking Hexalobe Screws (30-02XX)

2.3 mm Locking

Drill Guide

6-65 mm

(80-0622)

**Depth Gauge** 6–65 mm (80-0623)

(PL-2095)

Offset Drill Guide



Quick Drill 7)



Nonlocking Hexalobe Screws (30-03XX)

3.5 mm Cortical Screw Bone Tap (MS-LTT35)

(80-0627)

2.7 mm Cortical Screw Bone Tap (MS-LTT27)

# Locking MTP Plate Surgical Technique [continued]

Figure 6



### Insertion of Remaining Screws

Place the selected Hexalobe Locking Drill Guide (80-0668 or 80-0622) into the distal medial and lateral holes and drill. Measure and insert locking screws. Remove the plate tack from the most proximal hole and use the same screw insertion process. The nonlocking screw in the distal hole may be replaced with a locking screw at the surgeon's discretion.

Figure 7



Postoperative Protocol Protect the foot with a postoperative shoe and dressing. Allow the patient to proceed with weight-bearing activities as determined by the surgeon.



#### Optional: Implant Removal Instructions

To remove the implants, use the appropriate driver to remove the screws. For the 2.7 mm Hex Screws and 4.0 mm Cancellous Screws, use the 2.5 mm Quick Release Hex Driver (HPC-0025). For the 3.0 mm and 3.5 mm Hexalobe screws, use the T15 Stick Fit Hexalobe Driver (80-0760).

2.8 mm Hexalobe Locking Drill Guide 6–65 mm (80-0668)





2.5 mm Quick Release Hex Driver (HPC-0025)



T15 Stick Fit Hexalobe Driver (80-0760)

# Locking Osteotomy Plate Surgical Technique

### Hallux Valgus Correction

Use the proximal osteotomy of the first metatarsal in conjunction with a distal soft tissue correction of the hallux valgus deformity. It is usually indicated when the first metatarsal and second metatarsal angle is greater than 15 degrees!

#### First Metatarsal Osteotomy Exposure

Expose the osteotomy site through a dorsal incision 1.5" to 2" in length over the dorsum of the base of the first metatarsal. Take care to preserve the extensor tendons and small cutaneous nerves and vessels in this area. Open the periosteum over the base of the first metatarsal, elevate, and identify the first metatarsal joint.

#### **Osteotomy Procedure**

Position the osteotomy approximately 1 cm distal to the first tarsometatarsal (TMT) joint and make slightly oblique from perpendicular to allow more room for the placement of the proximal screws. Position the concavity of the osteotomy facing towards the first TMT joint.

#### Angle Correction

Decrease the angle between the first and second metatarsal with the aid of a retractor. Place the retractor laterally over the proximal fragment, pulling the distal end of the proximal fragment into a more medial position while applying lateral compression across the distal fragment of the first metatarsal. Then maintain the corrected position of the first metatarsal with K-wire fixation. Place a .062" x 6" K-wire (WS-1607ST) across the proximal fragment into the medial and intermediate cuneiform. Place a second K-wire from the head of the first metatarsal into the second metatarsal. Provisional K-wire fixation allows the plate and screws to be attached without having to remanipulate the osteotomy.

#### Plate Placement and Positioning

Place the Locking Proximal MT Wedge Plate (70-0XXX) over the osteotomy site and secure with a Plate Tack (PL-PTACK) through the proximal lateral hole.

**Note:** The plates are precontoured to match the anatomy. If bending is required to match the patient's specific anatomy or other factors, use the plate benders provided (PL-2040 and PL-2045) and bend in one direction only.

**Caution:** Do not bend the plate more than once or bend across the locking holes..

 American Orthopaedic Foot & Ankle Society website. http://www.aofas.org/ PRC/conditions/Pages/Conditions/Hallux-Valgus.aspx. Accessed July 24, 2017.







.062" x 6" ST Guide Wire (WS-1607ST) Also used as a K-wire



Locking Proximal MT Wedge Plate (70-0XXX) Plate Tack (PL-PTACK)



r

# Locking Osteotomy Plate Surgical Technique [continued]

Figure 1





#### Figure 2

#### Initial Screw Placement

Place the selected Hexalobe Locking Drill Guide (80-0668 or 80-0622) into the proximal medial hole and drill through both cortices. If screw angulation is desired, a standard Drill Guide (PL-2118 or PL-2196) can be used to tilt the drill up to 10 degrees.

**Caution:** Locking screws cannot be used if an angled hole is drilled because the plate and screw head threads won't match. Use the Depth Gauge 6–65 mm (80-0623) to determine the screw length and insert the screw.

#### Note:

- Select the screw diameter based upon the patient's anatomy. The 2.8 mm Quick Release Drill (80-0387) is provided for the 3.5 mm hexalobe and 4.0 mm screws. The 2.3 mm Quick Release Drill (80-0627) is used for the 3.0 mm hexalobe screws.
- The system can also be used with Acumed 2.7 mm hex or hexalobe or 3.5 mm hex screws. If using optional screw sizes, see the reference chart on page 2.

#### **Optional Compression of Osteotomy Site**

Without using the drill guide, place the drill at the distal end of the most distal screw hole. As the nonlocking screw head makes contact with the plate, the distal fragment will be drawn toward the proximal fragment, causing minor interfragmental compression. Otherwise, place the selected locking drill guide into the most distal screw hole and use the same screw insertion process.

**Note:** For hard bone, 2.7 mm and 3.5 mm Bone Taps (MS-LTT27 and MS-LTT35) are recommended.



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# Locking Osteotomy Plate Surgical Technique [continued]

**Insert Remaining Plate Screws** Place the selected Hexalobe Locking Drill Guide (80-0622 or 80-0668) into the second-most distal hole and drill. Measure and insert the locking screws. Remove the Plate Tack (PL-PTACK) from the proximal lateral hole and use the same screw insertion process.





**Postoperative Protocol** 

Protect the foot with a post-op shoe and dressing. Allow the patient to proceed with weight-bearing activities as determined by the surgeon.





To remove the implants, use the appropriate driver to remove the screws. For the 2.7 mm Hex Screws and 4.0 mm Cancellous Screws, use the 2.5 mm Quick Release Hex Driver (HPC-0025). For the 3.0 mm and 3.5 mm Hexalobe screws, use the T15 Stick Fit Hexalobe Driver (80-0760).



2.3 mm Locking **Drill Guide** 6–65 mm (80-0622)



2.8 mm Hexalobe Locking Drill Guide 6–65 mm (80-0668)

Plate Tack (PL-PTACK)





T15 Stick Fit Hexalobe Driver (80-0760)

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# Locking TMT Plate Arthrodesis Surgical Technique

#### Douglas N. Beaman, MD

Figure 1



#### Exposure

Expose the first TMT joint through a medial incision. Carry dissection down to expose the anterior tibialis tendon, which is protected. A portion of the tendon may need to be elevated from the medial cuneiform and metatarsal; however, this should be minimized. Expose the joint medially, then dorsally and plantarly, carefully avoiding the extensor hallucis longus tendon at the dorsal aspect of the joint.

**Note:** Image intensification is recommended during this procedure to confirm reduction and placement of hardware.



#### TMT Joint Preparation

Gain access to the first TMT joint and perform joint preparation in the standard fashion with thorough removal of all articular cartilage and preparation of the subchondral bone. Confirm the correct positioning of the metatarsal and cuneiform. Then provisionally fix the joints involved with K-wires placed superiorly and inferiorly to allow for the plate.

**Note:** If interfragmentary lag screw fixation is desired to supplement the plate, it should be placed first. It is typically oriented from the plantar aspect of the metatarsal base proximally into the medial cuneiform, as the plate sits dorsomedially. A lag screw may also be fixated through the plate's slot.

### Locking TMT Plate Arthrodesis Surgical Technique [continued]

Plate Placement and Positioning Apply the Locking TMT Plate (70-000X) to the dorsal medial aspect of the TMT joint and secure with a Plate Tack (PL-PTACK) or .062" x 6" K-wire (WS-1607ST) through the distal K-wire hole.

Note: The TMT plates are precontoured to match the anatomy. If bending is required to match the patient's specific anatomy or other factors, use the plate benders provided (PL-2040 and PL-2045) and bend in one direction only.

Caution: Do not bend the plate more than once or bend across the locking holes.



### **Initial Screw Placement**

Insert the screw; the initial screw should be nonlocking and is typically placed in the distal cuneiform hole as shown. According to the surgeon's preference, the screw can be placed across one, two, or all three cuneiforms for stability. Use the Depth Gauge 6-65 mm (80-0623) to determine screw length. Choose the appropriate-size screw and insert the screw into the bone.

#### Note:

- 1. Select the screw diameter based upon the patient's bone size. The 2.8 mm Quick Release Drill (80-0387) is provided for the 3.5 mm hexalobe and 4.0 mm screws. If a lag screw is used through the plate, it should be placed first and placed through the oval metatarsal hole.
- 2. The system can also be used with Acumed 2.7 mm hex or hexalobe or 3.5 mm hex screws. If using optional screw sizes, see the reference chart on page 2.





Plate Bender, Large (PL-2045)

Locking TMT

(70-00XX)

Plate



Depth Gauge 6 -65 mm (80-0623)

Plate Tack (PL-PTACK)



Plate Bender (PL-2040)

2.8 mm Quick Release Drill (80-0387)

### Locking TMT Plate Arthrodesis Surgical Technique [continued]





### **Compress Fusion Site**

Place the gold end of the Offset Drill Guide (PL-2095) into the plate's compression slot with the arrow on the guide pointing toward the fusion site.

Drill and measure for screw length. Insert the appropriatesize nonlocking screw to apply 1 mm of compression to the fusion site.



### **Insert Remaining Screws**

Remove the Plate Tack (PL-PTACK) from the distal K-wire hole. Place the selected Hexalobe Locking Drill Guide (80-0668 or 80-0622) into the distal metatarsal hole and drill if a locking screw is desired. Measure and insert locking screws. Follow the same process for the proximal cuneiform hole. After irrigation, close the wound.

Note: For additional fixation, a longer screw may be used to cross into the other cuneiforms. This may also stabilize intercuneiform fusions.

**Postoperative Protocol** Protect the foot with a post-op shoe and dressing. Allow the patient to proceed with weight-bearing activities as determined by the surgeon.



#### Optional: Implant Removal Instructions

To remove the implants, use the appropriate driver to remove the screws. For the 2.7 mm Hex Screws and 4.0 mm Cancellous Screws, use the 2.5 mm Quick Release Hex Driver (HPC-0025). For the 3.0 mm and 3.5 mm Hexalobe screws. use the T15 Stick Fit Hexalobe Driver (80-0760).

Offset Drill Guide (PL-2095)





2.3 mm Locking **Drill Guide** 6–65 mm (80-0622)

Plate Tack

(PL-PTACK)



2.5 mm Quick Release Hex Driver (HPC-0025)



T15 Stick Fit Hexalobe Driver (80-0760)

# Locking TMT Plate Trauma Surgical Technique

#### Douglas N. Beaman, MD

#### Exposure

Expose the first TMT joint through a medial incision. Carry dissection down to expose the anterior tibialis tendon, which is protected. A portion of the tendon may need to be elevated from the medial cuneiform and metatarsal; however, this should be minimized. Expose the joint medially, then dorsally and plantarly, carefully avoiding the extensor hallucis longus tendon at the dorsal aspect of the joint.

**Note:** Image intensification is recommended during this procedure to confirm reduction and placement of hardware.





#### TMT Joint Preparation

Reduce the joint by aligning anatomic landmarks and fix provisionally with .045" x 6" K-wires (WS-1106ST) placed superiorly and inferiorly across the joint to allow room for the plate.

**Note:** Definitive fracture stabilization of intra-articular fragments can be performed with interfragmentary screw fixation.



#### Plate Placement and Positioning Apply the Locking TMT Plate (70-00XX) to the dorsal medial aspect of the TMT joint and secure with a Plate Tack (PL-PTACK) or .062" x 6" K-wire (WS-1607ST) through the distal K-wire hole.

**Note:** The TMT plates are pre-contoured to match the anatomy. If bending is required to match the patient's specific anatomy or other factors, use the plate benders provided (PL-2040 and PL-2045) and bend in one direction only.

**Caution:** Do not bend the plate more than once or bend across the locking holes.



.045" x 6" ST Guide Wire (WS-1106ST) Also used as a K-wire







Plate Bender (PL-2040)

Locking TMT

(70-00XX)

Plate



Plate Bender, Large (PL-2045) Figure 3

# Locking TMT Plate Trauma Surgical Technique [continued]

Figure 4



### **Initial Screw Placement**

Place the selected Hexalobe Locking Drill Guide (80-0668 or 80-0622) into the distal medial cuneiform hole and drill to engage either the second metatarsal bone or medial cuneiform. This may be placed in a lag fashion, depending on injury pattern. A separate incision may be needed to expose and reduce the second TMT joint or intercuneiform joints prior to placement of this first screw. Use the Depth Gauge 6–65 mm (80-0623) to determine screw length. Choose the appropriate screw and insert into the bone.

#### Note:

- Select the screw diameter based upon the patient's bone size and/or fracture pattern. The 2.8 mm Quick Release Drill (80-0387) is provided for the 3.5 mm hexalobe and the 4.0 mm screws. The 2.3 mm Quick Release Drill (80-0627) is used for the 3.0 mm hexalobe screws.
- 2. The system can also be used with Acumed 2.7 mm hex or hexalobe or 3.5 mm hex screws. If using optional screw sizes, see the reference chart on page 2.



#### Trauma Stabilization

Place the green end of the Offset Drill Guide (PL-2095) into the compression slot of the plate to drill the hole neutral. The second metatarsal bone can be engaged if necessary for additional stabilization. Use the depth gauge and insert the appropriate-size screw.

2.8 mm Hexalobe Locking Drill Guide 6–65 mm (80-0668)

**2.8 mm Quick** Release Drill (80-0387)



2.3 mm Quick Release Drill (80-0627)

**Depth Gauge** 6–65 mm (80-0623)

Offset Drill Guide (PL-2095)

# Locking TMT Plate Trauma Surgical Technique [continued]

### Insert Remaining Screws

Remove the Plate Tack (PL-PTACK) from the distal K-wire hole. If a locking screw is desired, place the selected Locking Drill Guide (80-038X) into the distal metatarsal hole and drill. Measure and insert the locking screws. Follow the same process for the proximal cuneiform hole. Locking or nonlocking screws may be used depending on the patient's anatomy and injury pattern. After irrigation, close the wound with a nylon suture or according to the surgeon's preference.

**Note:** For additional fixation, a longer screw may be used to cross into the other cuneiforms. This may also stabilize any intercuneiform disruptions.



Postoperative Protocol Protect the foot with a post-op shoe and dressing. Allow the patient to proceed with weight-bearing activities as determined by the surgeon.



To remove the implants, use the appropriate driver to remove the screws. For the 2.7 mm Hex Screws and 4.0 mm Cancellous Screws, use the 2.5 mm Quick Release Hex Driver (HPC-0025). For the 3.0 mm and 3.5 mm Hexalobe screws, use the T15 Stick Fit Hexalobe Driver (80-0760).









2.5 mm Quick Release Hex Driver (HPC-0025)



T15 Stick Fit Hexalobe Driver (80-0760)

# Locking Extended TMT Plate Trauma Surgical Technique

#### Douglas N. Beaman, MD

Figure 1



#### Exposure

Expose the first TMT joint by making a medial incision. Carry dissection down to expose the anterior tibialis tendon, which is protected. A portion of the tendon may need to be elevated from the medial cuneiform and metatarsal; however, this should be minimized. Expose the joint medially then dorsally and plantarly, carefully avoiding the extensor hallucis longus tendon at the dorsal aspect of the joint. The incision may be extended proximally and distally to expose fractures.

Note: Image intensification is recommended during this procedure to confirm reduction and placement of hardware.



### TMT Joint Preparation and Distal Fracture Stabilization

Reduce the joint by aligning anatomic landmarks and fix provisionally with .045" x 6" K-wires (WS-1106ST) placed superiorly and inferiorly across the joint to allow room for the plate. Reduce metatarsal fractures and provisionally stabilize with clamps and/or K-wires.

Note: Definitive fracture stabilization of intra-articular fragments can be performed with interfragmentary screw fixation. Distal extra-articular fractures may also be fixed with lag screws depending on the fracture pattern.



#### Plate Placement and Positioning

Apply the Locking TMT Plate (70-00XX) to the dorsal medial aspect of the TMT joint and secure with a Plate Tack (PL-PTACK) or .062" x 6" K-wire (WS-1607ST) through the distal K-wire hole.

Note: The TMT plates are pre-contoured to match the anatomy. If bending is required to match the patient's specific anatomy or other factors, use the plate benders provided (PL-2040 and PL-2045) and bend in one direction only.

Caution: Do not bend the plate more than once or bend across the locking holes.

.045" x 6" ST Guide Wire (WS-1106ST)





Also used as a K-wire



Locking TMT Plate

(70-00XX)

(PL-PTACK)

**Plate Tack** 

Plate Bender, Large (PL-2045)

### Locking Extended TMT Plate Trauma Surgical Technique [continued]

### **Initial Screw Placement**

Place the selected Hexalobe Locking Drill Guide (80-0622 or 80-0668) into the distal medial cuneiform hole and drill to engage the second metatarsal bone or medial cuneiform, depending on the injury pattern. A separate incision may be needed to expose and reduce the second TMT joint or intercuneiform joints prior to placement of this first screw, which may be placed in a lag fashion. Use the Depth Gauge 6-65 mm (80-0623) to determine the screw length. Choose the appropriate-size screw and insert into the bone.

#### Note:

- 1. Select the screw diameter based upon the patient's bone size and fracture pattern. The 2.8 mm x 5" Quick Release Drill (80-0387) is provided for the 3.5 mm hexalobe and the 4.0 mm screws.
- 2. The system can also be used with Acumed 2.7 mm hex or hexalobe or 3.5 mm hex screws. If using optional screw sizes, see the reference chart on page 2.

#### Trauma Stabilization

To drill the hole neutral, place the green end of the Offset Drill Guide (PL-2095) into the compression slot of the plate. Engage the second metatarsal bone if necessary for additional stabilization. Use the Depth Gauge 6-65 mm and insert the appropriate-size screw.

Remove the plate tack from the distal K-wire hole.

If a locking screw is desired, place the selected locking drill guide into the distal metatarsal hole and drill. Measure and insert the locking screws. Follow the same process for the proximal cuneiform hole. Locking or nonlocking screws may be used depending on the patient's anatomy and









injury pattern.



2.3 mm Locking

Drill Guide

6-65 mm

(80-0622)

(80-0387)

**Insert Screws** 



Guide 6-65 mm (80-0668) Offset Drill Guide

2.8 mm Hexalobe

Locking Drill

(PL-2095)

Depth Gauge 6-65 mm (80-0623)

# Locking Extended TMT Plate Trauma Surgical Technique [continued]

Figure 7



### **Distal Fracture Stabilization**

After the proximal screws on either side of the TMT joint have been installed, the distal metatarsal fracture alignment may be adjusted if necessary, and clamped to ensure proper plate alignment.



### Screw Placement on Distal End of Fracture

Place the selected Hexalobe Locking Drill Guide (80-0622 or 80-0668) into the desired screw location and drill through both cortices of the metatarsal. Measure and insert the appropriate-size screw. Place a locking or nonlocking initial screw depending on the fracture reduction/pattern and the plate position on bone.

Note: It may be possible to place a lag screw across the fracture and through the plate if the fracture pattern will allow.





# Locking Extended TMT Plate Trauma Surgical Technique [continued]

Insert Remaining Screws If a locking screw is desired, place the selected Locking Drill Guide (80-0622 or 80-0668) into the remaining holes and drill. Measure and insert remaining locking screws. After irrigation, close the wound.

**Note:** Depending on the proximity of the most distal plate hole to the metatarsophalangeal joint, it may be necessary to angle the screw away from the joint using the 2.8 mm/3.5 mm Thin Drill Guide (PL-2196) or the 2.3 mm/3.0 mm Narrow Drill Guide (80-1991) and an appropriate-size nonlocking screw.



**10** Postoperative Protocol Protect the foot with a post-op shoe and dressing. Allow the patient to proceed with weight-bearing activities as determined by the surgeon. Figure 10



# **11** Optional: Implant Removal Instructions

To remove the implants, use the appropriate driver to remove the screws. For the 2.7 mm Hex Screws and 4.0 mm Cancellous Screws, use the 2.5 mm Quick Release Hex Driver (HPC-0025). For the 3.0 mm and 3.5 mm Hexalobe screws, use the T15 Stick Fit Hexalobe Driver (80-0760).



**2.3 mm Locking** Drill Guide **6–65 mm** (80-0622)

2.3 mm/3.0 mm

Narrow Drill Guide (80-1991)



2.8 mm Hexalobe Locking Drill Guide 6–65 mm (80-0668)



2.8 mm/3.5 mm Thin Drill Guide (PL-2196)

T15 Stick Fit Hexalobe Driver (80-0760)

# Ordering Information

#### Tray Components

#### Forefoot/Midfoot Plates

<ul> <li>Locking Dorsal MTP Plate,</li> <li>4 Degrees, Left</li> </ul>	70-0141	<ul> <li>Locking Proximal MT Wedge Plate,</li> <li>0 Degrees, Left</li> </ul>	70-0323
<ul> <li>Locking Dorsal MTP Plate,</li> <li>4 Degrees, Right</li> </ul>	70-0142	<ul> <li>Locking Proximal MT Wedge Plate,</li> <li>0 Degrees, Right</li> </ul>	70-0324
3 Locking Dorsal MTP Fusion Plate, Left	70-0012	<sup>19</sup> 5-Hole Locking 1st TMT Plate	70-0007
4 Locking Dorsal MTP Fusion Plate, Right	70-0013	4-Hole Locking 1st TMT Plate	70-0008
<ul> <li>Locking MTP Revision Plate,</li> <li>4 Degrees, Left</li> </ul>	70-0143	4-Hole Locking 2nd & 3rd TMT Plate	70-0009
<ul> <li>Locking MTP Revision Plate,</li> <li>4 Degrees, Right</li> </ul>	70-0144	22 8-Hole Locking 1st TMT Plate	70-0049
<ul> <li>Locking MTP/MPJ Combo Plate</li> <li>4 Degrees, Left</li> </ul>	70-0109	<ul> <li>7-Hole Locking 1st</li> <li>TMT Plate</li> </ul>	70-0050
<ul> <li>Locking MTP/MPJ Combo Plate</li> <li>4 Degrees, Right</li> </ul>	70-0110	<ul> <li>7-Hole Locking 2nd &amp; 3rd</li> <li>TMT Plate</li> </ul>	70-0051
<ul> <li>Locking MPJ Petite Plate</li> <li>4 Degrees, Left</li> </ul>	70-0329	<ul><li>MTP Reamer Concave,</li><li>16 mm with QR</li></ul>	80-0569
<ul> <li>Locking MPJ Petite Plate</li> <li>4 Degrees, Right</li> </ul>	70-0330	<ul><li>MTP Reamer Convex,</li><li>16 mm with QR</li></ul>	80-0570
Locking MTP Revision     Fusion Plate, Left	70-0018	<ul><li>MTP Reamer Concave,</li><li>18 mm with QR</li></ul>	80-0571
12 Locking MTP Revision Fusion Plate, Right	70-0019	<ul><li>MTP Reamer Convex,</li><li>18 mm with QR</li></ul>	80-0572
Locking MTP/MPJ Combo Fusion Plate, Left	70-0036	<ul> <li>MTP Reamer Concave,</li> <li>20 mm with QR</li> </ul>	80-0573
Locking MTP/MPJ Combo Fusion Plate, Right	70-0037	MTP Reamer Convex, 20 mm with QR	80-0574
Locking Proximal MT Wedge Plate, Left	70-0010	<ul> <li>MTP Reamer Concave,</li> <li>22 mm with QR</li> </ul>	80-0575
Locking Proximal MT Wedge Plate, Right	70-0011	32 MTP Reamer Convex, 22 mm with QR	80-0576



#### Tray Components

#### Instruments

6 mm–70 mm Depth Gauge, 2 mm Increments	MS-9022	1 2.8 mm Quick Release Drill	80-0387
2 2.0 mm/2.8 mm Thin Drill Guide	PL-2118	2.0 mm Quick Release Drill	80-0386
3 2.8 mm/3.5 mm Thin Drill Guide	PL-2196	13 Plate Tack	PL-PTACK
4 Offset Drill Guide	PL-2095	(14) .045" x 6" ST Guide Wire*	WS-1106ST
<ul> <li>5 2.0 mm Locking Drill Guide</li> <li>6-65 mm</li> </ul>	80-0385	15 .062" x 6" ST Guide Wire*	WS-1607ST
2.8 mm Locking Drill Guide 6–65 mm	80-0384	16 2.7 mm Cortical Screw Bone Tap	MS-LTT27
2.5 mm Solid, Quick Release, Driver Tip	HT-2502	<sup>17</sup> 3.5 mm Cortical Screw Bone Tap	MS-LTT35
8 2.5 mm Quick Release Hex Driver	HPC-0025	Cortical and Cancellous Screw Countersink	PL-2080
9 3.5 mm Screw Driver Sleeve	MS-SS35	19 Plate Bender	PL-2040
0 3.5 mm x 5" Quick Release Drill	MS-DC35	20 Plate Bender, Large	PL-2045

Additional Instruments			
2.3 mm/3.0 mm Narrow Drill Guide	80-1991	3.0 mm x 5" Quick Release Drill	80-1088
2.8 mm Hexalobe Locking Drill Guide 6-65 mm	80-0668	T15 Stick Fit Hexalobe Driver	80-0760
2.3 mm Hexalobe Locking Drill Guide 6-65 mm	80-0622	T15 6" Long Stick Fit Hexalobe Driver	80-1065
2.3 mm Quick Release Drill	80-0627	Depth Gauge 6-65 mm	80-0623

\*Also used as a K-wire



Tray Components			
Soft Tissue Instruments			
1 Inge Retractor, 6.5"	MS-48217	<ul> <li>Bone Reduction Forceps with Points,</li> <li>5 Broad</li> </ul>	MS-47135
2 Needle Nose Pliers, 5.5"	MS-48245	8 Bone Reduction Forceps, 5.25"	MS-45300
3 8 mm Hohmann Retractor	PL-CL05	9 Small Pointed Reduction Forceps	OW-1200
4 15 mm Hohmann Retractor	MS-46827	10 Periosteal Elevator, 7.25"	MS-46211
5 Sharp Hook	PL-CL06	11 Reduction Forceps With Serrated Jaw	PL-CL04
6 Freer Elevator, 7.5"	MS-57614	12 8" Bone Reduction Forceps	MS-1280



Optional Instruments			
Inge Retractor without Teeth	80-0472	Plate Holder Assembly	PL-2030
Large Cannulated Quick Release Driver Handle	MS-3200		

#### 3.0 mm Nonlocking Hexalobe Screws

3.0 mm x 8 mm Nonlocking Hexalobe Screw	30-0301	3.0 mm x 28 mm Nonlocking Hexalobe Screw	30-0311
3.0 mm x 10 mm Nonlocking Hexalobe Screw	30-0302	3.0 mm x 30 mm Nonlocking Hexalobe Screw	30-0312
3.0 mm x 12 mm Nonlocking Hexalobe Screw	30-0303	3.0 mm x 32 mm Nonlocking Hexalobe Screw	30-0313
3.0 mm x 14 mm Nonlocking Hexalobe Screw	30-0304	3.0 mm x 34 mm Nonlocking Hexalobe Screw	30-0314
3.0 mm x 16 mm Nonlocking Hexalobe Screw	30-0305	3.0 mm x 36 mm Nonlocking Hexalobe Screw	30-0315
3.0 mm x 18 mm Nonlocking Hexalobe Screw	30-0306	3.0 mm x 38 mm Nonlocking Hexalobe Screw	30-0316
3.0 mm x 20 mm Nonlocking Hexalobe Screw	30-0307	3.0 mm x 40 mm Nonlocking Hexalobe Screw	30-0317
3.0 mm x 22 mm Nonlocking Hexalobe Screw	30-0308	3.0 mm x 45 mm Nonlocking Hexalobe Screw	30-0318
3.0 mm x 24 mm Nonlocking Hexalobe Screw	30-0309	3.0 mm x 50 mm Nonlocking Hexalobe Screw	30-0319
3.0 mm x 26 mm Nonlocking Hexalobe Screw	30-0310	3.0 mm x 55 mm Nonlocking Hexalobe Screw	30-0320

#### 3.5 mm Nonlocking Hexalobe Screws.

3.5 mm x 8 mm Nonlocking Hexalobe Screw	30-0255
3.5 mm x 10 mm Nonlocking Hexalobe Screw	30-0256
3.5 mm x 12 mm Nonlocking Hexalobe Screw	30-0257
3.5 mm x 14 mm Nonlocking Hexalobe Screw	30-0258
3.5 mm x 16 mm Nonlocking Hexalobe Screw	30-0259
3.5 mm x 18 mm Nonlocking Hexalobe Screw	30-0260
3.5 mm x 20 mm Nonlocking Hexalobe Screw	30-0261
3.5 mm x 22 mm Nonlocking Hexalobe Screw	30-0262
3.5 mm x 24 mm Nonlocking Hexalobe Screw	30-0263
3.5 mm x 26 mm Nonlocking Hexalobe Screw	30-0264
3.5 mm x 28 mm Nonlocking Hexalobe Screw	30-0265

3.5 mm x 30 mm Nonlocking Hexalobe Screw	30-0266
3.5 mm x 32 mm Nonlocking Hexalobe Screw	30-0267
3.5 mm x 34 mm Nonlocking Hexalobe Screw	30-0268
3.5 mm x 36 mm Nonlocking Hexalobe Screw	30-0269
3.5 mm x 38 mm Nonlocking Hexalobe Screw	30-0270
3.5 mm x 40 mm Nonlocking Hexalobe Screw	30-0271
3.5 mm x 45 mm Nonlocking Hexalobe Screw	30-0272
3.5 mm x 50 mm Nonlocking Hexalobe Screw	30-0273
3.5 mm x 55 mm Nonlocking Hexalobe Screw	30-0274
3.5 mm x 60 mm Nonlocking Hexalobe Screw	30-0275
3.5 mm x 65 mm Nonlocking Hexalobe Screw	30-0276

#### 3.0 mm x 8 mm Locking 3.0 mm x 28 mm Locking 30-0278 30-0288 Hexalobe Screw Hexalobe Screw 3.0 mm x 10 mm Locking 3.0 mm x 30 mm Locking 30-0279 30-0289 Hexalobe Screw Hexalobe Screw 3.0 mm x 12 mm Locking 3.0 mm x 32 mm Locking 30-0280 30-0290 Hexalobe Screw Hexalobe Screw 3.0 mm x 14 mm Locking 3.0 mm x 34 mm Locking 30-0281 30-0291 Hexalobe Screw Hexalobe Screw 3.0 mm x 16 mm Locking 3.0 mm x 36 mm Locking 30-0282 30-0292 Hexalobe Screw Hexalobe Screw 3.0 mm x 18 mm Locking 3.0 mm x 38 mm Locking 30-0283 30-0293 Hexalobe Screw Hexalobe Screw 3.0 mm x 20 mm Locking 3.0 mm x 40 mm Locking 30-0284 30-0294 Hexalobe Screw Hexalobe Screw 3.0 mm x 22 mm Locking 3.0 mm x 45 mm Locking 30-0285 30-0295 Hexalobe Screw Hexalobe Screw 3.0 mm x 24 mm Locking 3.0 mm x 50 mm Locking 30-0286 30-0296 Hexalobe Screw Hexalobe Screw 3.0 mm x 26 mm Locking 3.0 mm x 55 mm Locking 30-0287 30-0297 Hexalobe Screw Hexalobe Screw

### 3.5 mm Locking Hexalobe Screws

3.5 mm x 8 mm Locking Hexalobe Screw	30-0232
3.5 mm x 10 mm Locking Hexalobe Screw	30-0233
3.5 mm x 12 mm Locking Hexalobe Screw	30-0234
3.5 mm x 14 mm Locking Hexalobe Screw	30-0235
3.5 mm x 16 mm Locking Hexalobe Screw	30-0236
3.5 mm x 18 mm Locking Hexalobe Screw	30-0237
3.5 mm x 20 mm Locking Hexalobe Screw	30-0238
3.5 mm x 22 mm Locking Hexalobe Screw	30-0239
3.5 mm x 24 mm Locking Hexalobe Screw	30-0240
3.5 mm x 26 mm Locking Hexalobe Screw	30-0241
3.5 mm x 28 mm Locking Hexalobe Screw	30-0242

3.5 mm x 30 mm Locking Hexalobe Screw	30-0243
3.5 mm x 32 mm Locking Hexalobe Screw	30-0244
3.5 mm x 34 mm Locking Hexalobe Screw	30-0245
3.5 mm x 36 mm Locking Hexalobe Screw	30-0246
3.5 mm x 38 mm Locking Hexalobe Screw	30-0247
3.5 mm x 40 mm Locking Hexalobe Screw	30-0248
3.5 mm x 45 mm Locking Hexalobe Screw	30-0249
3.5 mm x 50 mm Locking Hexalobe Screw	30-0250
3.5 mm x 55 mm Locking Hexalobe Screw	30-0251
3.5 mm x 60 mm Locking Hexalobe Screw	30-0252

#### 4.0 mm Cancellous (Hex) Screws

1.0 IIIII Odiiooiiodo (IIOIi) (	0010115		
4.0 mm x 12 mm Cancellous (Hex) Screw	CA-4120	4.0 mm x 28 mm Cancellous (Hex) Screw	CA-4280
4.0 mm x 14 mm Cancellous (Hex) Screw	CA-4140	4.0 mm x 30 mm Cancellous (Hex) Screw	CA-4300
4.0 mm x 16 mm Cancellous (Hex) Screw	CA-4160	4.0 mm x 35 mm Cancellous (Hex) Screw	CA-4350
4.0 mm x 18 mm Cancellous (Hex) Screw	CA-4180	4.0 mm x 40 mm Cancellous (Hex) Screw	CA-4400
4.0 mm x 20 mm Cancellous (Hex) Screw	CA-4200	4.0 mm x 45 mm Cancellous (Hex) Screw	CA-4450
4.0 mm x 22 mm Cancellous (Hex) Screw	CA-4220	4.0 mm x 50 mm Cancellous (Hex) Screw	CA-4500
4.0 mm x 24 mm Cancellous (Hex) Screw	CA-4240	4.0 mm x 55 mm Cancellous (Hex) Screw	CA-4550
4.0 mm x 26 mm Cancellous (Hex) Screw	CA-4260	4.0 mm x 60 mm Cancellous (Hex) Screw	CA-4600

Notes:	

Notes:	



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