The Centronail
Titanium Universal
Femoral Nailing System
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Orthofix wishes to thank the following surgeons for their contribution to the development of the technique:

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FEATURES AND BENEFITS

Titanium nail and locking screws
Allows MRI investigation, if necessary

14 mm proximal diameter

9-12 mm distal diameter
9 mm is solid

One design for Left and Right femur

Antegrade and retrograde insertion

275-475 mm (25 mm increments)

Radius of curve 2500 mm
Proximal locking

Three possible configurations:

Transverse

Recon

Oblique

14 degree anteversion
Locking screws

**TITANIUM STANDARD LOCKING SCREWS**
- 6.8 mm thread diameter
- 4.8 mm shaft diameter

*Smooth diameter, unthreaded shaft:* maximises fatigue strength
*Reverse thread on screw head:* easy screw removal.
*Conical tip:* helps insertion.

**TITANIUM REVISION LOCKING SCREWS**
- 8 mm thread diameter
- Better purchase in poor quality bone
- 4.8 mm shaft diameter

**TITANIUM CONDYLAR COMPRESSION SCREWS**
- 4.8 mm diameter

*Cannulated:* easy placement of condylar washer and nut over a K-wire.
*Cloverleaf washer design:* adapts to contour of bone surface and permits excellent compression.

**TITANIUM RECON/OBLIQUE SCREWS**
- 6.5-5.7 mm thread diameter
- 6.5 mm shaft diameter

*Solid:* maximises fatigue strength.
*Reverse thread on screw head:* easy screw removal.
INDICATIONS

**Transverse**  
Diaphyseal fractures

**Recon**  
Neck and diaphyseal fractures  
Petrochanteric fractures  
Subtrochanteric fractures

**Oblique**  
Subtrochanteric fractures  
Shaft fractures

Retrograde insertion is indicated in patients:
- obese
- pregnant
- with proximal femoral implants or total hip joints
- polytraumatized
- with bilateral femoral shaft fractures
**EQUIPMENT REQUIRED**

**Centronail Titanium Femoral Intramedullary Nails**

- Ø 9 L 275 mm Solid 99-T739275
- Ø 9 L 300 mm Solid 99-T739300
- Ø 9 L 325 mm Solid 99-T739325
- Ø 9 L 350 mm Solid 99-T739350
- Ø 9 L 375 mm Solid 99-T739375
- Ø 9 L 400 mm Solid 99-T739400
- Ø 9 L 425 mm Solid 99-T739425
- Ø 10 L 275 mm Cannulated 99-T730275
- Ø 10 L 300 mm Cannulated 99-T730300
- Ø 10 L 325 mm Cannulated 99-T730325
- Ø 10 L 350 mm Cannulated 99-T730350
- Ø 10 L 375 mm Cannulated 99-T730375
- Ø 10 L 400 mm Cannulated 99-T730400
- Ø 10 L 425 mm Cannulated 99-T730425
- Ø 11 L 325 mm Cannulated 99-T731325
- Ø 11 L 350 mm Cannulated 99-T731350
- Ø 11 L 375 mm Cannulated 99-T731375
- Ø 11 L 400 mm Cannulated 99-T731400
- Ø 11 L 425 mm Cannulated 99-T731425
- Ø 11 L 450 mm Cannulated 99-T731450
- Ø 11 L 475 mm Cannulated 99-T731475
- Ø 12 L 325 mm Cannulated 99-T732325
- Ø 12 L 350 mm Cannulated 99-T732350
- Ø 12 L 375 mm Cannulated 99-T732375
- Ø 12 L 400 mm Cannulated 99-T732400
- Ø 12 L 425 mm Cannulated 99-T732425
- Ø 12 L 450 mm Cannulated 99-T732450
- Ø 12 L 475 mm Cannulated 99-T732475

**End Caps**

- L 0 mm 99-T730000
- L 10 mm 99-T730010
- L 20 mm 99-T730020

**Cleaning, disinfection, sterilisation and maintenance of instrumentation**

Orthofix supplies the Centronail Titanium Universal Femoral Nail, locking screws and end caps in a STERILE package, while the instruments are supplied NON-STERILE. Please check the sterility of each device on the product label.

The surgeon must check that the package has not been damaged and has not expired. The sterilised instruments used during the operation may be cleaned, disinfected and re-sterilised in an autoclave, as described in the instructions for use PQ TNS-s that accompany the product. If the package is damaged, or if there are doubts about its sterility, the implant may be re-sterilised in an autoclave, using a validated sterilisation protocol. The instruments are supplied in a non-sterile state and therefore must be cleaned before use, as described for new products. The whole cleaning, disinfection and sterilisation cycle must be followed before each use, as described in the instructions for use PQ TNS-s.

NB: Disassemble all instruments for thorough cleaning and disinfection prior to sterilization.
### OPERATIVE TECHNIQUE

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OPERATIVE TECHNIQUE

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10) Locking Nut 173032
11) Impactor 173071
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13) K-Wire 2 mm 173287
14) Spacer 9 mm 173052
15) Spacer 10 mm 173053
16) Spacer 11 mm 173054
17) Spacer 12 mm 173055
18) Stabilizing Rod 173031
19) Guide Wire Exchange Tube 173353
20) Locking Screw Extractor 17652
21) Hammer 173380
22) AP Arm Connector 173170
23) AP Arm 173180
24) Femoral Reamer Sleeve 173230
25) Awl 173260
26) XWire d. 2x400 mm 80122
27) Reduction Tool Handle 173264
28) Reduction Tool 173265
29) Ruler 173275
30) Ruler Support 173276
31) AP Centering Jig 173185

GENERAL INSTRUMENTS BOX

STERILE PACKAGED INSTRUMENTS

Cannulated Drill Bit 6 mm 99-173285
Guide Wire with olive d. 3x980 mm 99-173281
Guide Wire without olive d. 2.5x980 mm 99-176281
1) Cannulated Screw Driver 173320
2) Sliding Hammer 173370
3) Extractor Handle 170035
4) Femoral Nail Extractor 17391
5) Locking Screw Extractor 17652
6) Tibial Nail Extractor 174220
7) Humeral Nail Extractor 178390
Whenever possible, femoral fractures should be stabilized within the first 24 hours following injury, provided the patient’s condition will allow it. Do not start surgery unless the fracture is well reduced.

ANTEGRADE INSERTION

Fracture reduction and patient positioning
All nail insertions in acute cases should be performed using a traction table or a reduction device. This serves not only to reduce the fracture, but also permits free access to the greater trochanter. The patient is positioned supine on the traction table. Access is improved by inclining the trunk towards the uninjured side by about 25°. The position of the trunk is secured by supports mounted on the side of the operating table. The uninjured limb is positioned on a gynecological leg rest to allow the Image Intensifier free access to the whole of the fractured femur. The Image Intensifier should have free access to the entire femur in both planes.
Fracture reduction in the sagittal plane with the “PORD” device

Any posterior sagging at the fracture site should now be corrected and maintained using the dedicated Posterior Reduction Device (PORD™). This device is easily attached to most fracture tables.

1. Slide the Clark Attachment on to the side rail of the fracture table. Insert the vertical post of the Box Bracket into the Clark Attachment from beneath and tighten the clamp on the post so that the bracket is held securely.

2. Assemble the PORD™ device in the following way: Slide the Horizontal Bar through the Box Bracket with its curved portion facing the fracture table. This curved section is designed to allow for unobstructed multiple plane imaging using the C-arm of the Image Intensifier.

3. The Screw Jack of the Limb Support should be positioned in the housing at the end of the horizontal bar, with the nut under the radiolucent support. Turning the nut clockwise will then raise the support.
The Limb Support is positioned beneath that portion of the fracture which requires elevating. The correct position of the support is confirmed on the AP view (the shadow of the support can be seen). Using the lateral view, the limb support is raised by turning the nut (a) clockwise until exact posterior reduction has been achieved. The position of the Support is now maintained by tightening the Lug Screw on the housing (b - see image below). There is tendency for the Limb Support to rotate when its position is being adjusted, due to the conical cross-section of the thigh. It should therefore be held firmly during this procedure, and while tightening the Lug Screw.

The PORD device will now remain in position throughout surgery. It can be draped and therefore does not require sterilization. It may be cleaned following surgery using a detergent solution and dried thoroughly.
**Entry Portal**

The patient is prepped and draped in the normal manner. A skin incision of about 2-3 cm is made proximal to the greater trochanter.

The entry point should be in line with the medullary canal. Depending on the individual anatomy this may be in the piriform fossa or on the apex of the greater trochanter.

NB: The point of insertion should never be too medial, in order to avoid injury to the Circumflex Femoral Artery.

In proximal third fractures the proximal fragment may be flexed and abducted. Direct manipulation of this fragment may be necessary with a suitable percutaneous instrument such as a Steinmann pin, before the correct entry point becomes accessible. Possible rotational malalignment must be considered. The outline of the lesser trochanter should be compared with that of the opposite side, and the two cortical fragments should have a similar shape with no step between them.

Make the entry point with the Awl (173260). The Guide Wire with Olive (99-173281) is inserted through the awl down the medullary canal, until its tip sits in the subchondral bone exactly on the roof of the intercondylar notch, midway between the femoral condyles. **Use image intensification when passing the fracture.**

If it is not possible to pass the guide wire into the distal fragment, the Reduction Tool (173265) can be used with its Handle (173264) to manipulate the proximal fragment. Before it can be used, the proximal fragment must be reamed to 10 mm.
If the fracture is proximal there is some risk of symptomatic fat embolism during reaming, especially if the patient has other injuries. Consider venting the distal canal with a 6 mm drill bit to decompress it during reaming, positioning the vent at or near the expected tip of the nail. A cannula should be inserted to aid expression of the medullary contents, and the patency of this cannula should be checked during reaming.

The Awl is removed and the Femoral Reamer Sleeve (173230) inserted over the guide wire down to the bone and positioned over the medullary canal, checking the position in two planes with the Image Intensifier.

The Cannulated Rigid Reamer (173270) is inserted through the Reamer Sleeve over the guide wire to create the initial entry portal into the medullary canal, until the step reaches the top of the Sleeve. The portal now matches the diameter (14 mm) of the proximal 70 mm wider part of the nail. The Reamer is then removed.
Reaming
Ream to a width 1.5-2.0 mm greater than the proposed nail. Always ream in 0.5 mm increments once cortical bone has been reached, and avoid excessive pressure. If the reamer is not advancing, remove it and clear away the bone debris. Remove the Reamer Sleeve.
Measurement of Nail Length

Ensure that the tip of the guide wire is at the level desired for the end of the nail. The tip of the Ruler Support (173276) is engaged over the guide wire and positioned in the entry portal. Attach the Ruler (173275) to the Ruler Support with the correct side for guide length facing forwards (normally the 980 mm guide wire is used for femoral and tibial nailing, and the 800 mm guide wire used for the humerus).

The correct nail length is read at the proximal tip of the guide wire. Please note, that if different guide wire lengths are used, the difference must be deducted for shorter guide wires or added for longer guide wires to the measured length.
The Exchange Tube (17353) is inserted into the reamed femur over the guide wire, checking that it extends past the fracture. The olive tipped guide wire is removed, and the plain 2.5x980 mm guide wire (99-176281) inserted, checking that the tip is central in the distal femoral canal.

**Nail Insertion**

Insert the Locking Rod (173110) into the back of the Handle (173100) and the nail of correct diameter and length into the nail support. Check that the wings are engaged in the nail correctly so that the nail curvature corresponds to the curvature of the femur to be treated (LEFT or RIGHT) and tighten the locking rod using the Impactor (173071) inserted in the holes in the Rod. Before inserting the nail it is important to check the alignment between the distal holes in the nail and the distal arm, as shown in the inset.

Insert the nail over the guide wire.

If hammering is needed to insert the nail, attach the Insertion Knob (173115) to the Handle.

Hammering should always be gentle.

Do not persist if the nail is not advancing.

Remove it and ream some more.

**DO NOT HAMMER THE HANDLE ITSELF. THE GUIDE WIRE MUST NOW BE REMOVED.**
Transverse Proximal Screws

**Proximal Locking**
Attach the Universal Femur (UF) Proximal Arm (173120) to the Handle by the short end. Tighten Knob firmly.
If standard proximal locking is to be used, it is possible to do the distal locking first (see next page). If Recon locking is required proximally, this must be done first (see page 28).

Add the Transverse Jig (173130) with the writing “TRANSVERSE” facing upwards. Make a stab incision at the level of one of the two holes in the guide bar and extend it down to the bone with blunt dissection. Screw the Trocar (173212) into the Screw Guide (173211) and insert them through the hole in the Jig, down to the bone. Unscrew the Trocar and push the Screw Guide until it is sitting flush against the bone surface. Lock the Screw Guide into position.

Remove the Trocar and, using a 4.8 mm Drill Bit (173286) with the Drill Guide (173213) inserted into the Screw Guide, drill the first hole until the drill tip is against the second cortex. Use the Image Intensifier if there is any doubt about the position of the tip of the drill bit. The screw length required is read from the scale on the Drill Bit immediately above the top of the Drill Guide (see inset: if the position is between graduations, choose the longer value). Drill the second cortex. Insert the screw using the 3.5 mm Cannulated Screw Driver (173320) until the mark on the shaft of the screw driver reaches the top of the screw guide. One more full turn should be made to tighten the screw fully.

Repeat the procedure for the second proximal locking screw.
Distal Locking

Before proceeding with distal locking, check that there is no rotational deformity, and that there is no distraction of the fracture site. If the surgeon prefers, it is possible to use the freehand technique for distal locking. To use the mechanical distal targeting system, mount the UF Distal Arm (173161) (note text and arrows and tighten knob firmly) with the AP Arm Connector (173170) already in position, with the correct number corresponding to the length of the nail positioned in the middle of the Connector (see inset). The AP Arm is secured using two Locking Cams (173026).
Mount the AP Arm (173180) with the AP Centering Jig (173185). The hole in the centering jig has two targeting rings to enable it to be centred over the nail. The Image Intensifier is positioned over the Jig so that the two rings appear as one ring. If the rings are not central over the nail hole the Jig is moved medially or laterally until they are centered.
Insert the Stabilizing Sleeve (173201) through the hole in the Jig down to the skin anteriorly. Make a 20-25 mm incision and extend it down through the deep fascia. Split the muscles longitudinally down to the bone, and check that no soft tissues remain. Insert the Stabilizing Sleeve down to the bone, if necessary using small retractors to stop soft tissue impingement. Lock the Sleeve in place.

Insert the Cannulated Drill Bit 6 mm (99-173285) and the K-wire 2 mm (173287), and tap it with the Hammer (173380) and Impactor (173071), until it is flush with the top of the Cannulated Drill Bit. Drill the anterior cortex only.

NB: The Cannulated Drill Bit is SINGLE USE ONLY.
Remove the Cannulated Drill Bit, K-wire and Stabilizing Sleeve. Attach the T Handle (173350) to the Stabilizing Rod (173031) and insert it into the AP hole in the nail. Screw it in fully.

If there is difficulty in finding the hole in the nail with the AP Arm in place, it can be removed, so that a probing technique can be used to find the hole in the nail. This can often be done quickly by feel, but in case of difficulty it may be useful to use the Image Intensifier in an AP view to position the tip of the stabilizing rod over the hole in the nail. NB: Provided that the AP arm connector has been positioned over the correct length on the guide bar, it should only be necessary to move the stabilizing rod medio-laterally during this manoeuvre.

Once the AP hole has been found, remove the T Handle and insert the AP Arm over the Stabilizing Rod.

Screw the Locking Nut (173032) on the Stabilizing Rod. Attach the correct Spacer (173052-5) for the diameter (9-12 mm) of the nail with the nail diameter facing the surgeon and tighten the nut fully.
Screw the Trocar into the Screw Guide and insert them both into one of the two holes in the UF Distal Arm. Make a 15 mm stab incision where it touches the skin, and split the tissues down to the bone.

Push the Screw Guide and Trocar down to the bone. Unscrew the Trocar and push the screw Guide until it is sitting flush against the bone surface. Tighten it in place with the Locking Cam.

Remove the Trocar and screw the Drill Guide into the Screw Guide. Drill with the 4.8 mm Drill Bit as before. Stop at the second cortex and measure the screw length using the scale on the Drill Bit. Complete drilling, and insert the screw using the 3.5 mm Cannulated Screw Driver. Repeat the procedure for the second hole.
If a third distal screw is required in the AP direction, a revision locking screw must be used. Remove the Spacer and Stabilizing Rod with the T Handle. Insert a Screw Guide and Drill Guide. Insert the 4.8 mm Drill Bit down to the second cortex, measure the screw length as before. Drill the second cortex and insert a revision locking screw. Revision screws must be used in this location because the hole drilled for the Stabilizing Rod will not allow the standard screw thread to engage in the bone.
Removal of the Handle and Closure

Before removing the Handle from the nail, check correct insertion of locking screws both in the AP and lateral planes. Remove the Handle and the Locking Rod and, using the 3.5 mm Cannulated Screw Driver, insert the nail end cap over a K-wire (99-T730000, 99-T730010, 99-T730020), choosing the correct length (0, 10, 20) to leave the top of the nail end cap flush with, or just above, the tip of the greater trochanter.
Oblique Proximal Screw

**Proximal Locking**

Attach the Oblique Jig (173140) to the Handle and lock it into position. Screw the Recon Trocar (173222) into the Recon Screw Guide (173221) (with two grooves) and insert them into the LEFT or RIGHT hole as appropriate. The correct hole will be anterior to the Handle. Push them down to the bone through a small stab incision. The Recon Screw Guide is rotated so that the "NAIL POSITION" profile and the marks on the Screw Guide show that the tip of the Screw Guide is correctly orientated to go flat against the bone. The Trocar must be unscrewed and the Screw Guide pushed until it is flush with the bone surface. Lock the Screw Guide in place. Remove the Trocar and screw the Recon Wire Guide (173223) into the Screw Guide. Insert the Threaded Wire 3x400 mm (173288) just through the second cortex. Measure the correct screw length with the Screw Scale (173301).
Remove the K-wire and Recon Wire Guide and screw in the Recon Drill Guide (173224). Drill with the Recon Drill Bit (173283), after positioning the Recon Drill Bit Stop (173295) on the drill scale at the level of the screw length measured.

Note: The Drill Bit should only pass just beyond the nail. It must not reach the second cortex, because this would prevent the screw from gripping the bone. Remove the Drill Guide and Drill Bit.

Insert the Recon/Oblique screw using the Long Screw Wrench (173304) and T Handle (173350).

NB: The hexagonal tip of the Long Screw Wrench has an helical design to grip the hexagonal recess of the screw, thus preventing it from falling. For this reason, once the screw has been inserted into the bone, the Wrench will be removed from the screw more easily if the surgeon while pulling on the Wrench rotates it anticlockwise of a quarter turn to disengage it from the screw.

**Distal Locking**
See “Distal Locking” under Transverse Proximal Screws above.
Recon Proximal Screws

**Proximal Locking**
Attach the UF Proximal Arm (173120) to the Handle and tighten the knob firmly.

Attach the Recon Jig (173150), screw the Recon Trocar (173222) (with two grooves) into the Recon Screw Guide and insert them both in either the LEFT or RIGHT DISTAL locking hole as appropriate (note that the correct holes in the jig will be posterior to the UF Proximal Arm, to allow for the femoral neck anteversion). Push them down to the bone. The Recon Screw Guide is rotated so that the “NAIL POSITION” profile and the marks on the Screw Guide show that the tip of the Screw Guide is correctly orientated to go flat against the bone. The Trocar must be unscrewed and the Screw Guide pushed until it is flush with the bone surface. Lock the Screw Guide in place.

Remove the Trocar and screw a standard 4.8 mm drill guide (173213) into the Screw Guide. Use a 4.8 mm drill bit to make the initial hole in the lateral wall of the femur. Start the power unit and advance the rotating drill bit gently until it has passed through just the first cortex. Remove the drill guide and screw the Recon Wire Guide into the Screw Guide. Insert the Threaded Wire 3x400 mm (173288) into the femoral head up to 1 cm from the articular surface. The wire should be 2-3 mm from the calcar, and in the centre of the head in the lateral view.

Leave the K-wire and Wire Guide in place. Screw the Recon Trocar into a second Recon screw guide and insert them into the **proximal** hole. Push them down to the bone and lock the Screw Guide in place as before. Remove the Trocar and screw a Recon Wire Guide into the Screw Guide. Insert the 3 mm K-wire into the femoral head up to 1 cm from the articular surface. Measure the correct length of both screws using the Screw Scale (173301).
Remove the K-wire and Wire Guide from the distal hole. Screw in the Recon Drill Guide (173224) and drill with the Recon Drill Bit (173283), after positioning the Recon Drill Bit Stop (173295) on the drill scale at the level of the screw length measured. Note: The Drill Bit should only reach just beyond the nail. It must not be inserted into the femoral head, because this would prevent the screws gripping the bone. Insert the correct length of Recon/Oblique screw using the Long Screw Wrench and T Handle until the mark on the Long Screw Wrench shaft reaches the top of the screw guide. Remove the wire and Wire Guide from the proximal hole, drill and insert a Recon/Oblique screw of correct length as above (usually this proximal screw is 1 cm shorter than the distal one).

Distal Locking
See “Distal Locking” under Transverse Proximal Screws above.
RETROGRADE INSERTION

Entry Portal
The patient is placed supine with the knee flexed at 50°. Make a 4-6 cm medial para-patellar incision and retract the patellar tendon and fat pad to the lateral side. With the Awl make the entry point in the intercondylar notch, in line with the long axis of the femoral shaft in both the AP and coronal planes, using Blumensaat’s line in the lateral view.

Insert the Guide Wire with Olive (99-173281) through the Awl into the proximal fragment, up to the level of the lesser trochanter. **Use image intensification when crossing the fracture.** Remove the Awl and slide the Femoral Reamer Sleeve (173230) over the Guide Wire.

Measurement of Nail Length
Ensure that the tip of the Guide Wire is at the level desired for the end of the nail. The Cannulated Rigid Reamer is used over the Guide Wire to ream the entry portal to match the shape of the distal part of the nail (14 mm). The Reamer is then removed.
The tip of the Ruler Support is engaged over the Guide Wire and positioned in the entry portal. Attach the Ruler to the Ruler support with the correct side for guide length facing forwards (normally the 980 mm guide wire is used for femoral and tibial nailing, and the 800 mm guide wire used for the humerus).

The correct nail length is read at the proximal tip of the guide wire. Please note, that if different guide wire lengths are used, the difference must be deducted for shorter guide wires or added for longer guide wires to the measured length.
Reaming
The Reamer is inserted through the Sleeve up to the stop. Ream the femoral canal with Flexible Reamers in 0.5 mm steps to 1.0 mm more than the proposed nail diameter.

NB: Short nails will require less reaming.
Nail Insertion
Insert the Locking Rod into the back of the Handle and the nail of correct diameter and length into the nail support. Check that the wings are engaged in the nail correctly so that the nail curvature corresponds to the curvature of the femur to be treated (LEFT or RIGHT FEMUR) and tighten the Locking Rod using the Impactor inserted in the holes on the rod.

Insert the nail over the Guide Wire. The distal end of the nail must be proximal to the surface of the intercondylar notch, to prevent the nail end protruding into the knee joint. If hammering is needed to insert the nail, attach the Insertion Knob to the Handle before inserting the nail over the wire. Hammering should always be gentle. Do not persist if the nail is not advancing. Remove it and ream some more.

DO NOT HAMMER THE HANDLE ITSELF. THE GUIDE WIRE MUST NOW BE REMOVED.
Distal Locking
Attach the UF Proximal Arm to the Handle and tighten the Knob firmly.

Add the Transverse Jig (173130) with the writing “TRANSVERSE” facing upwards. Check that the distal end of the nail is beneath the surface of the intercondylar notch. The grooves on the Handle indicate the end of the nail. Make a stab incision at the level of the most distal hole in the Jig and extend it down to the bone with blunt dissection. Insert a Screw Guide into the hole in the Jig and screw the Trocar into the Screw Guide.

Push them both down to the bone. Unscrew the Trocar and push the Screw Guide until it is sitting flush against the bone surface. **Lock the Screw Guide into position.**
OPERATIVE TECHNIQUE

Remove the Trocar and, using a 4.8 mm Drill Bit and Drill Guide inserted into the Screw Guide, drill the first hole down to the second cortex. Measure the correct screw length using the scale on the Drill Bit, and drill the second cortex. Insert the screw using the 3.5 mm Cannulated Screw Driver.

NB: If a compression screw is to be used, choose a screw one size shorter.

Repeat the procedure for the second distal locking screw.

Two more screws may be inserted through the transverse Jig.

NB: Condylar compression locking screws can be used in any of the 3 distal locking holes. The bone on the side where the nut is to go must be reamed to 6 mm for a depth of 20 mm with the cannulated 6 mm drill.
Proximal Locking
Before proceeding with proximal locking, check that there is no rotational deformity, and that there is no distraction of the fracture site. If the surgeon prefers, it is possible to use the freehand technique for proximal locking. To use the mechanical distal targeting system, mount the UF Distal Arm (note text and arrows) with the AP Arm Connector (173170) already in place, with the correct number corresponding to the length of the nail positioned in the middle of the connector. The AP Arm Connector is secured using the Locking Cams.
Mount the AP Arm with the AP Centering Jig. The hole in the Centering jig has two targeting rings to enable it to be centred over the nail. The Image Intensifier is positioned over the Jig so that the two rings appear as one ring. If the rings are not central over the nail hole the jig is moved medially or laterally until they are centered.
Insert the Stabilizing Sleeve through the hole in the Jig down to the skin anteriorly. Make a 20-25 mm incision at this point and extend it down to the deep fascia. Split the muscles longitudinally down to the bone, and check that no soft tissues remain.

Insert the Stabilizing Sleeve down to the bone, if necessary using small retractors to stop soft tissue impingement. Lock the sleeve in place. Insert the Cannulated Drill Bit 6 mm and the 2 mm K-wire, and tap it with the Hammer and the Impactor, until it is flush with the end of the Cannulated Drill Bit. Drill the anterior cortex.

NB: The Cannulated Drill Bit is SINGLE USE ONLY.
Remove the Cannulated Drill Bit, K-wire and Stabilizing Sleeve. Attach the T Handle to the Stabilizing Rod and insert it into the AP hole in the nail. Screw it in fully.

If there is difficulty in finding the hole in the nail with the AP Arm in place, it can be removed, so that a probing technique can be used to find the hole in the nail. This can often be done quickly by feel, but in case of difficulty it may be useful to use the Image Intensifier in an AP view to position the tip of the stabilizing rod over the hole in the nail. NB: Provided that the AP arm connector has been positioned over the correct length on the guide bar, it should only be necessary to move the stabilizing rod medio-laterally during this manoeuvre.

Once the AP hole has been found, remove the T Handle and insert the AP Arm over the Stabilizing Rod.

Screw the Locking Nut to the Stabilizing Rod. Attach the correct Spacer (173052-5) for the diameter (9-12 mm) of the nail with the nail diameter facing the surgeon and tighten the nut fully.
Screw the Trocar into the Screw Guide and insert them both into one of the two holes in the UF Distal Arm. Unscrew the Trocar and push the Screw Guide until it is flush against the bone. Tighten the Screw Guide with the Locking Cam. Remove the Trocar and screw in the Drill Guide.

Drill with the 4.8 mm Drill Bit as before. Stop at the second cortex and measure the screw length using the scale on the Drill Bit.

Complete drilling the second cortex, and insert the screw using the 3.5 mm Cannulated Screw Driver.

Repeat the procedure for the second hole.

If a third screw is required in the AP direction, a revision locking screw must be used. Remove the Spacer and Stabilizing Rod with the T Handle. Insert the Screw Guide and Drill Guide. Insert the 4.8 mm Drill Bit down to the second cortex, measure the screw length as before. Drill the second cortex, and insert the revision locking screw.

It should be noted that inserting a long nail, above the lesser trochanter into the trochanteric region of the femur, may result in excess local loading of the nail during weightbearing.

Therefore we recommend the use of both screws from the lateral side and, if required, the AP screw also. In this situation, weightbearing should be limited until callus is seen on the X-ray. Generally a retrograde nail should never be inserted above the lesser trochanter.
Removal of the Handle and Closure

Before removing the Handle from the nail, check correct insertion of locking screws both in the AP and lateral planes. Remove the Handle and the Locking Rod and, using the 3.5 mm Cannulated Screw Driver, insert the nail end cap over a Guide Wire (99-T730000, 99-T730010, 99-T730020), choosing the correct length (0, 10, 20).
NAIL REMOVAL

The Extraction Instruments Box is needed for nail removal. The nail end cap is cleaned of bony ingrowth including the hexagonal recess, and removed with the 3.5 mm Cannulated Screw Driver. If seating the Screw Driver is difficult, it may be useful to insert a 2 mm K-wire first, and pass the Screw Driver over it. The Femoral Nail Extractor (17391) is screwed fully into the nail. The locking screws are now all removed using the Locking Screw Extractor (17652) which is turned anti-clockwise to engage the reverse thread on the screw heads. The Extractor Handle (170035) is screwed onto the Sliding Hammer (173370) and attached to the Femoral Nail Extractor. The nail is then removed by reverse hammering.
CENTRONAIL OPERATIVE TECHNIQUES

CN-0701-OPT The Centronail Titanium Universal Femoral Nailing System
CN-0702-OPT The Centronail Titanium Tibial Nailing System
CN-0703-OPT The Centronail Titanium Supracondylar and Retrograde Nailing System
CN-0704-OPT The Centronail Titanium Humeral Nailing System