

ACUMED®

**POLARUS**  
MODULAR SHOULDER  
SYSTEM

**Surgical Technique**

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## INTRODUCTION

Displaced fractures of the proximal humerus present the surgeon with one of the more difficult challenges in fracture surgery. Prosthetic replacement in three and four-part fractures has frequently led to poor functional outcomes despite adequate fixation and healing of the prosthetic-tuberosity construct. Functional failures in these cases may be related to failure to reproduce the normal anatomical relationships of the proximal humerus during reconstruction. Common errors include failure to restore proper height and retroversion. The geometry of first and second generation prostheses made it difficult to reproduce the anatomic gleno-humeral relationship and subsequently accurate restoration of the relationship of the tuberosities to the articular surface. The **Polarus Modular Shoulder System** has been designed to allow the surgeon to consistently and accurately reproduce the normal proximal humeral anatomy.



*Severely displaced four-part fracture/dislocation of the proximal humerus associated with multiple injuries.*



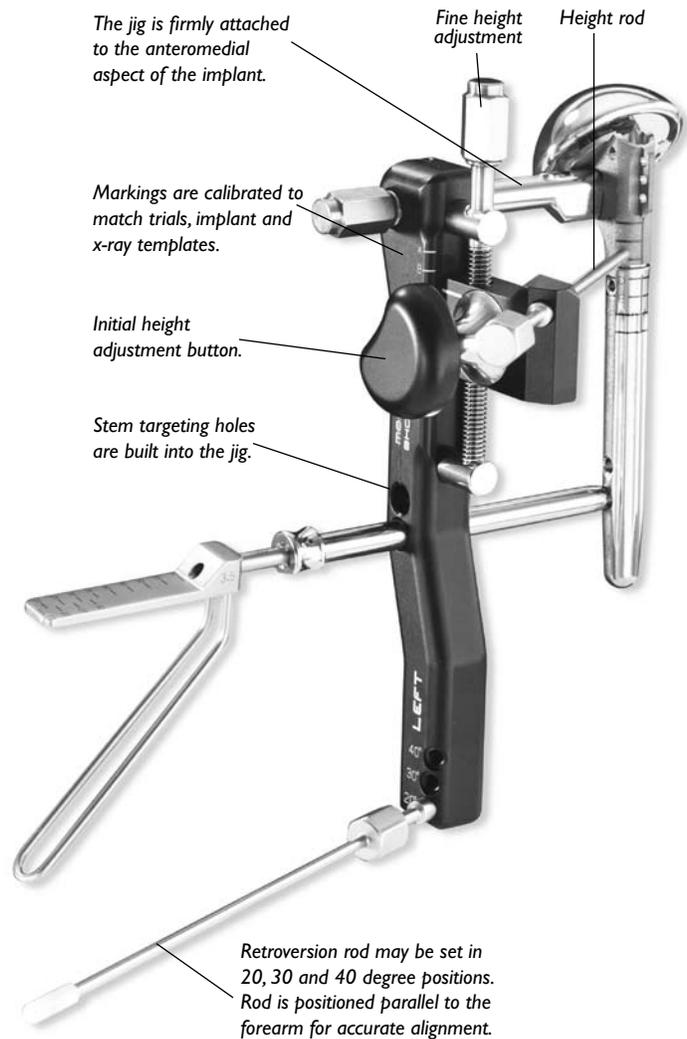
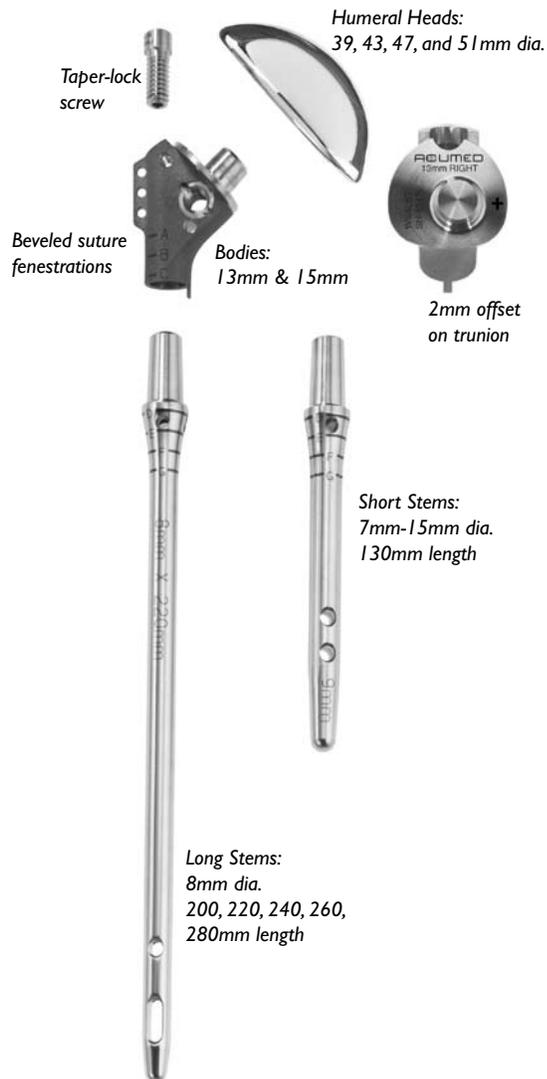
*Polarus Modular Shoulder*

# DESIGN RATIONALE

The **Polarus Modular Shoulder** implant design is based on extensive study of the normal morphology of the proximal humerus. In addition, the system is designed to make the surgical procedure technically more straightforward and reproducible.

The **Polarus Modular Shoulder System** incorporates several features that make it possible for the surgeon to restore proximal humeral anatomy:

1. Calibrated humeral implants, targeting jig and templates allow accurate height restoration and templating from radiographs of the opposite arm.
2. Adjustable and reproducible retroversion using the targeting jig.
3. Adjustable posterior and medial offset of the humeral head.
4. Medial fenestration in the neck of the prosthesis for better fixation of the tuberosities.
5. Interlocking feature allows for secure fixation in cementless applications.
6. Variable stem lengths enable the surgeon to reconstruct complex fractures involving the humeral shaft.
7. Minimal gap between the head and body allows greater contact area between the head and glenoid for greater stability.
8. Low volume of the grit blasted proximal humeral body decreases the need for bone removal from the tuberosities, enhancing fixation and healing potential.





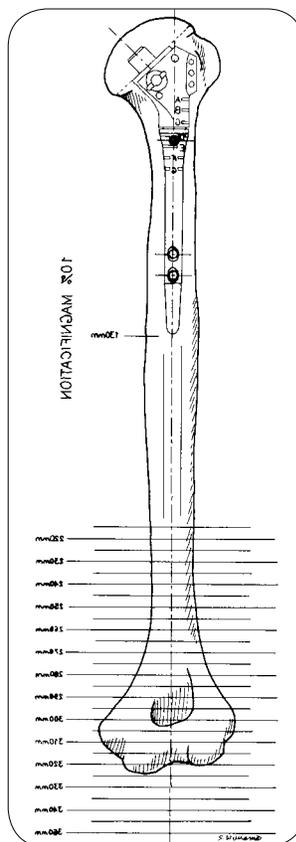
## Preoperative planning

The indications for the use of the **Polarus Modular Shoulder System** are 1) four-part fractures and fracture dislocations 2) head-splitting fractures and 3) some three-part fractures in older patients with osteoporotic bone.

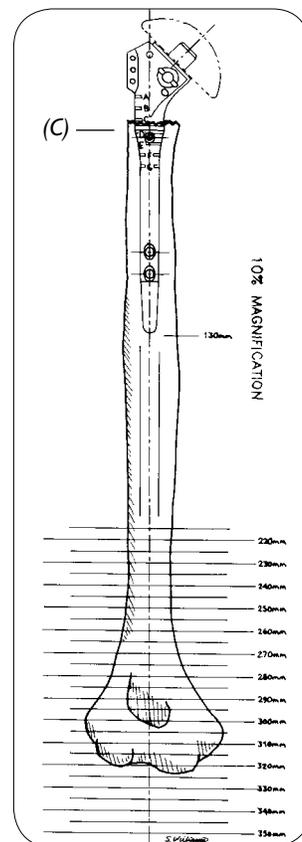
To determine whether or not the **Polarus Modular Shoulder System** is the best treatment, a trauma series of x-rays is taken. This includes an A/P view of the scapula, a lateral view and an axillary view.

If an implant is selected, the goals are to achieve adequate range of motion, eliminate patient discomfort and promote bony union.

Critical to a good surgical outcome are establishing the height of the prosthesis, incorporating the proper amount of retroversion and assuring anatomic restoration of the tuberosities to each other as well as the humeral shaft.



uninjured humerus



injured humerus

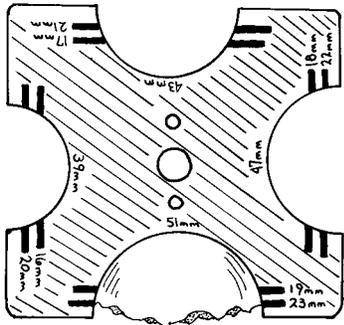
## Templating

There are two types of templates included for use with the **Polarus Modular Shoulder System**. The traditional templates were designed to estimate the size of the implant including the head, body and stem. The positioning template (shown above) was designed to estimate the starting height of the implant assembly.

To use the positioning template, a full-length **x-ray of the uninjured humerus** is needed. The template is placed on this x-ray aligning the head on the template with the articular surface of the x-ray. Moving distally on the template, the stem and the vertical reference line are centered over the canal. A distal landmark is selected, such as the olecranon fossa, and marked with a marking pen.

The template is then flipped over and placed on the **x-ray of the fracture**. The distal landmark, in this case the olecranon fossa, is located and the mark previously made is placed at this location. Moving proximally up the humerus, the template is centered over the canal. Once centered, the fracture line is located and the letter that corresponds to the fracture line is the estimated starting height. In this example, the estimated starting height will be (C). The reference lines of A to G are used on the trials, implants, targeting jig and templates.

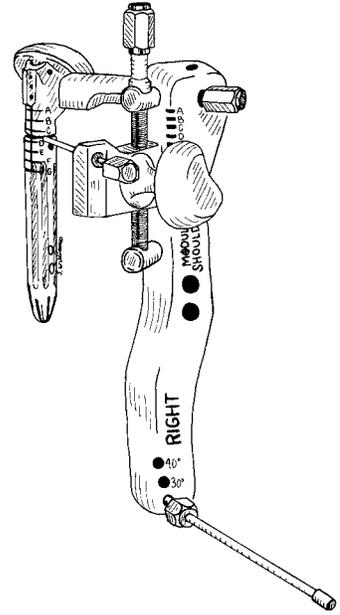
# TECHNIQUE OVERVIEW



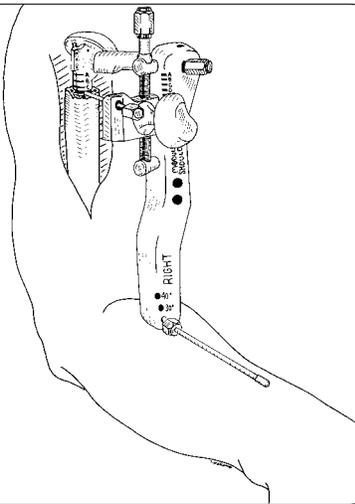
**STEP 1** Estimate head radius and thickness.



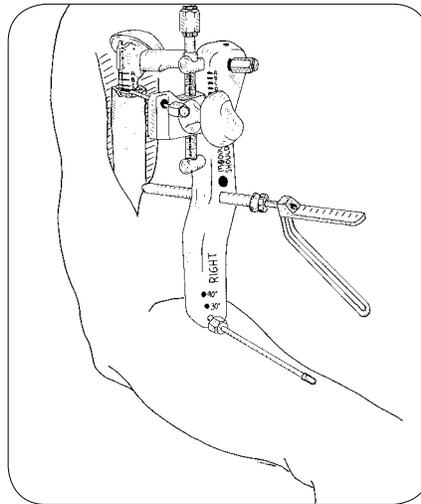
**STEP 2** Progressively ream to prepare the canal and establish the stem diameter.



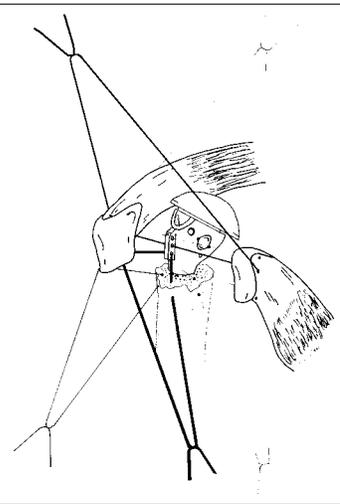
**STEP 3** Attach the implant or trial to the jig. Insert the stem into the humeral canal. Estimate and set the height of the implant using the height rod.



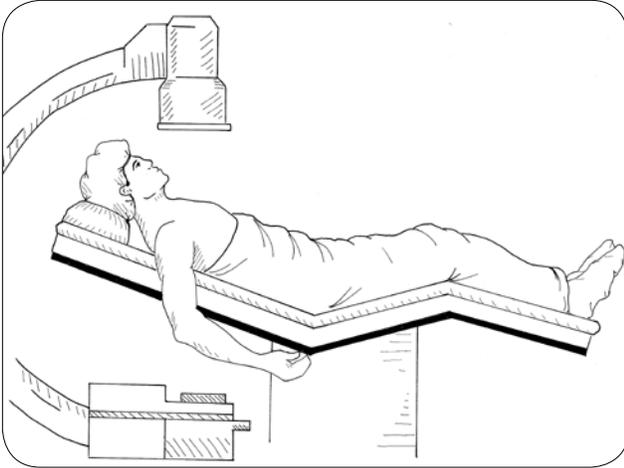
**STEP 4** Reduce the shoulder, and align the retroversion rod parallel to the forearm.



**STEP 5** Cement or interlock components.



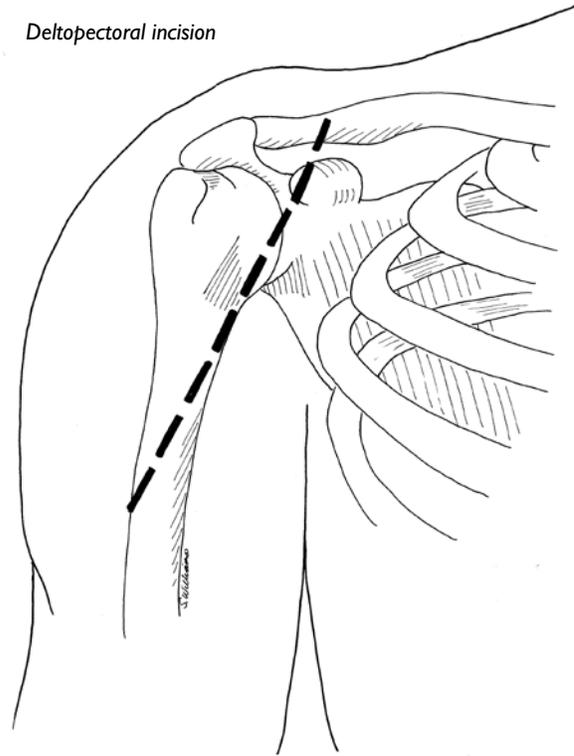
**STEP 6** Secure tuberosities to implant and shaft.



## Patient positioning

The patient is placed in the semi-Fowler or beach chair position. A headrest may be used to facilitate mobility of the arm and visualization using fluoroscopy. The arm should be draped free, and the patient positioned so that the arm is freely mobile, allowing extension off the side of the table. The C-arm is usually brought in from the same side, superiorly.

*Deltopectoral incision*

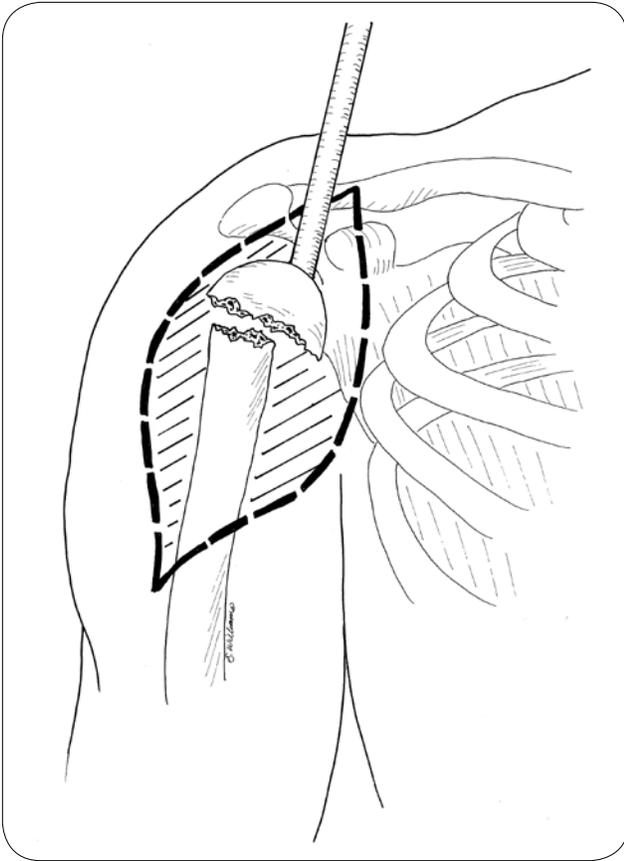


## Exposure

A deltopectoral incision is made from proximal to the coracoid process toward the deltoid insertion. Because of its numerous lateral branches, the cephalic vein is retracted laterally. The clavipectoral fascia is incised from the coraco-acromial ligament to the pectoralis major insertion, lateral to the conjoined tendon. Care should be taken to identify the axillary nerve in its position anterior to the subscapularis and medial to the conjoined tendon. The proximal one to two centimeters of the pectoralis major insertion may be divided to facilitate exposure if necessary.

The tendon of the long head of the biceps is identified proximal to the pectoralis major and followed proximally through the rotator interval. In most four-part fractures, the bicipital groove is intact and remains attached to the greater tuberosity fragment.

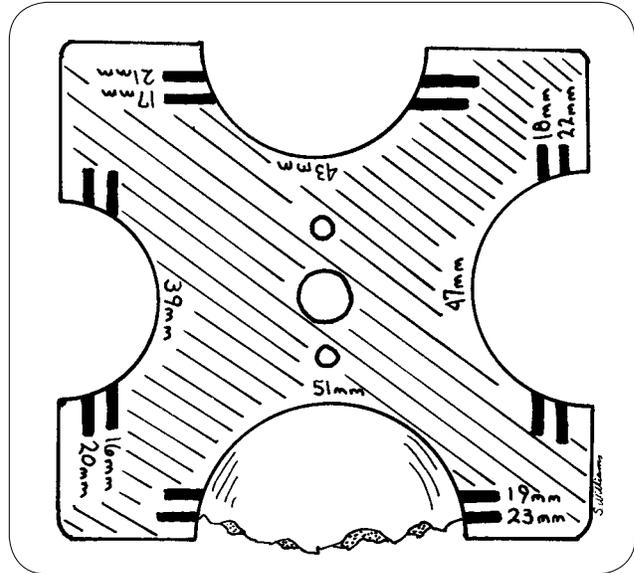
# HUMERAL HEAD EXCISION AND MEASUREMENT



## Humeral head excision

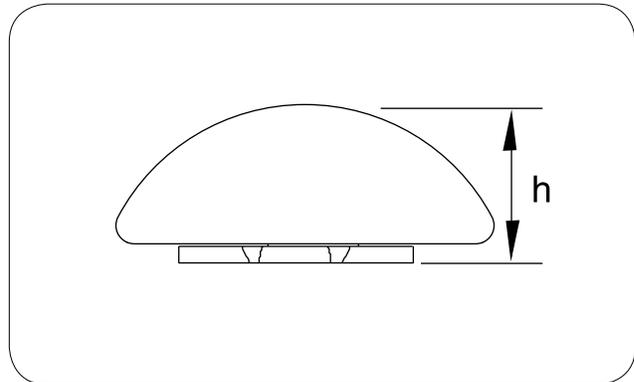
Once the fracture fragments have been identified, Number 5 non-absorbable sutures are passed around the lesser tuberosity and are used to retract the tuberosity anteromedially, exposing the humeral head. The humeral head is then removed and measured using the sizing gauge. The greater tuberosity is then mobilized and sutures placed around it for retraction and later fixation. The glenoid is then inspected and any fracture fragments removed.

By extending the arm and retracting the tuberosity fragments, the proximal humeral shaft is exposed and delivered out of the wound.

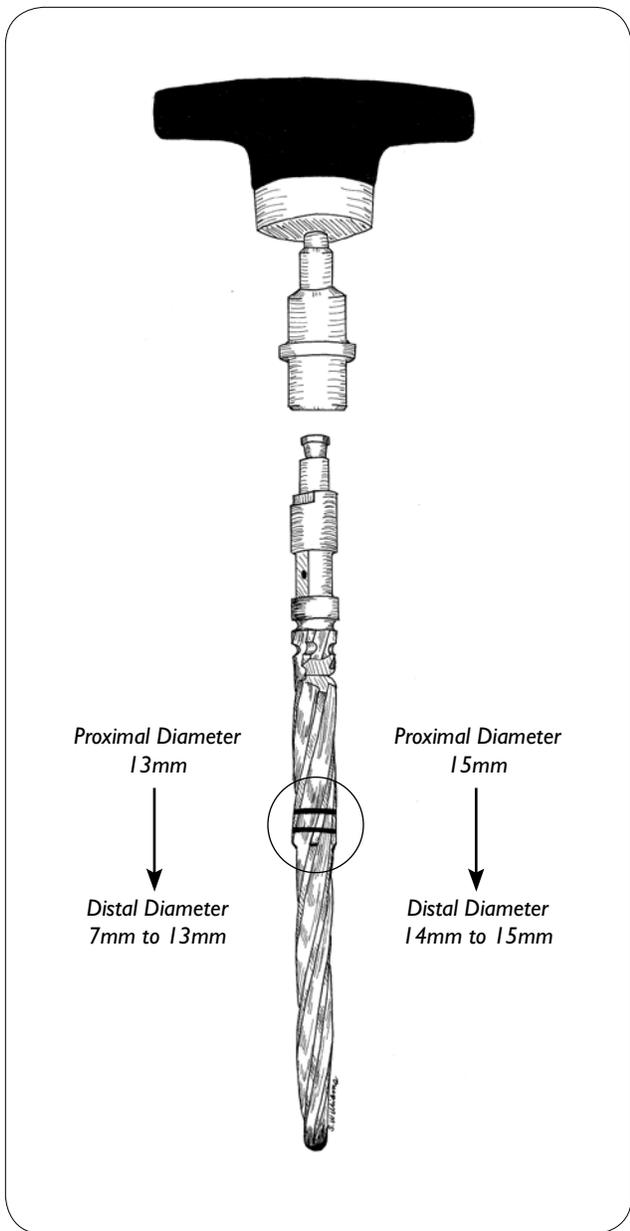


## Humeral head measurement

The excised humeral head is used to determine the appropriate size head implant. The **Polarus Modular Shoulder System** has eight different head sizes from which to choose. Each of the four diameters has two heights. Your options include 39/16, 39/20; 43/17, 43/21; 47/18, 47/22; 51/19, (51/23 Shown in illustration).

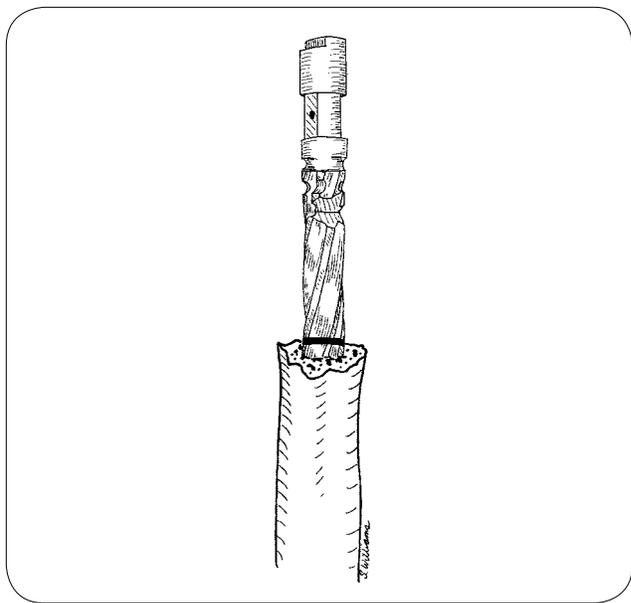


**NOTE:** The heights, or thicknesses, of the heads are measured from the top of the head to the underside of the body collar.



## Reamers

Reamers are available in diameters from 7mm to 15mm, in 1mm increments. The reamers attach to a ratcheting "T" handle for hand reaming.



## Reaming technique

The reamers have two laser marks just proximal to the diameter transition. These are meant to approximate the location of the fracture and serve only as a guide as to how deep to ream. The reamer is inserted between the first and second line. These lines are meant as a guide only as the surgeon will make the final depth determination at the time of surgery. **The reamers are very sharp so proper handling of them is advised.**

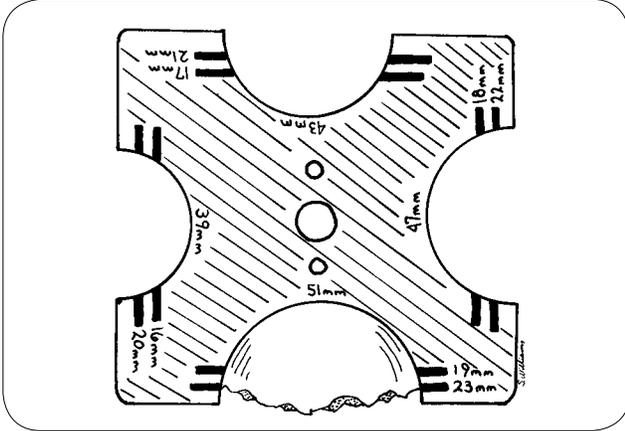
The first reamer selected will need to be at least 2-3mm smaller in diameter than the templated canal diameter. Some surgeons may want to begin with the 7mm reamer for every case. The goal is to gradually create a uniform cylinder, 1mm at a time. Reaming continues until the distal cutting flutes have engaged the canal.

If cement is going to be used, a stem 2.0mm smaller in diameter than the last reamer used should be selected. This provides the proper cement mantle around the stem. If screws are going to be used, an implant the same size as the last reamer used is selected. The press fit stem will be secured distally with two bi-cortical bone screws.

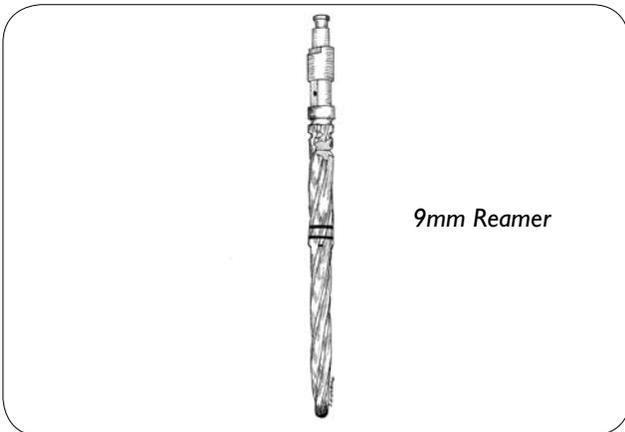
# SURGICAL CHECKPOINT / FIXATION OPTIONS

If interlocking the stem with bi-cortical bone screws is selected, the trial implants section on pages 12 and 13 may be omitted. The information obtained to this point may be sufficient to select the final implant and proceed to the "Selecting and Assembling the Implant" section on page 14. The final implant may be determined by using the following guidelines:

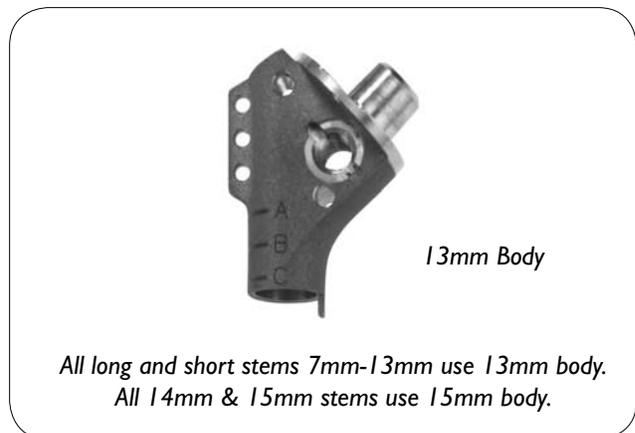
## Head size determined by measurement



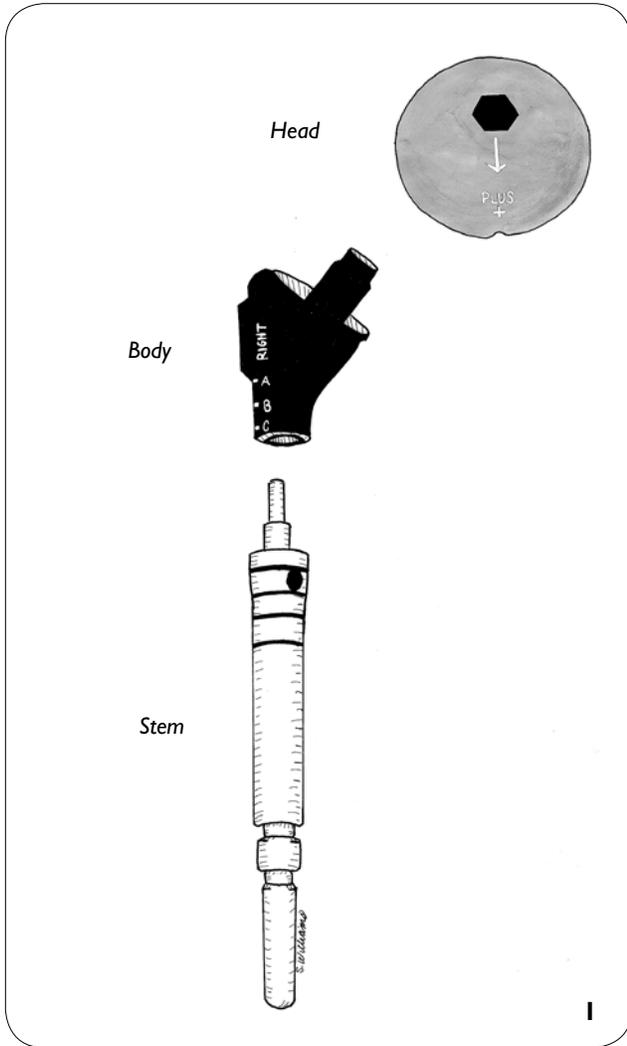
## Stem size determined by reamer results



## Body size determined by stem diameter

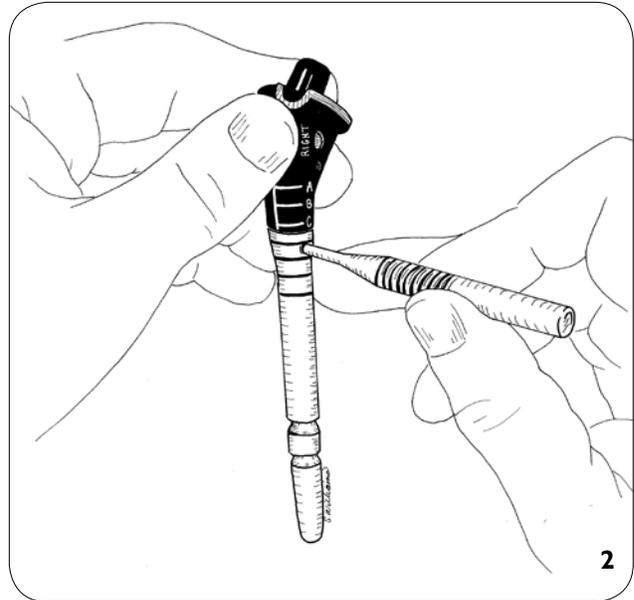


- The use of interlocking screws is only indicated for use on those patients with good bone quality.
- If interlocking with screws, the trial implants may be omitted.
- If using cement, trial implants may be helpful.



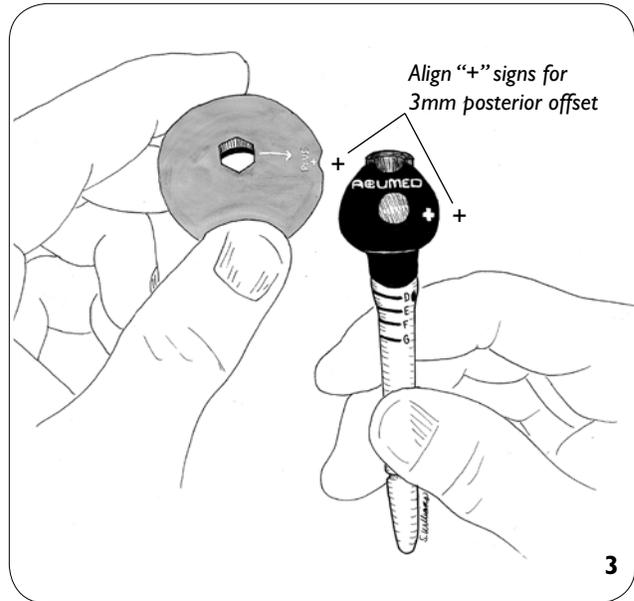
### Trial implants

The trial implants allow the surgeon to assess the fit and position of the implant.



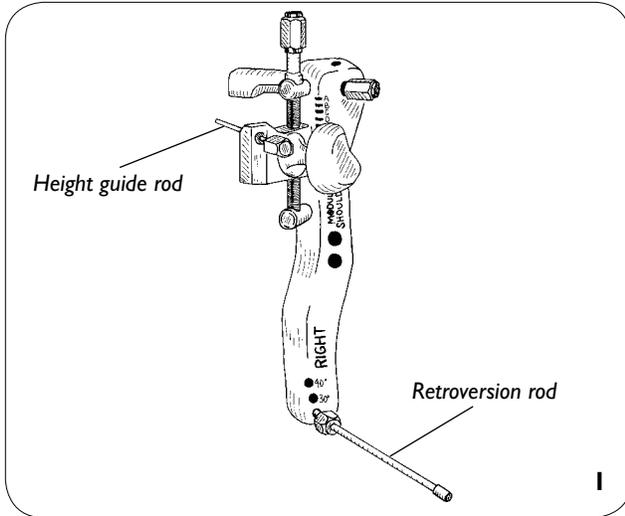
### Trial body and stem attachment

The trial body and stem are assembled and then secured with the trial wrench. The trial head selected from the sizer gauge is placed on the body.



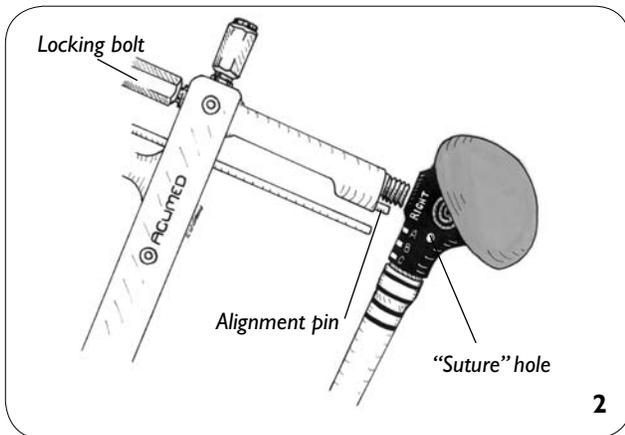
### Trial head attachment

The head and body are indexed to allow as much as 3mm posterior offset by aligning the "+" signs on both the head and the body. It is recommended that the full 3mm is used for fractures. If less than the recommended full 3mm is desired the head is simply rotated to the preferred position. The minimal amount of posterior offset is 1mm. This would result from the "+" sign on the head being placed 180 degrees from the "+" sign on the body.



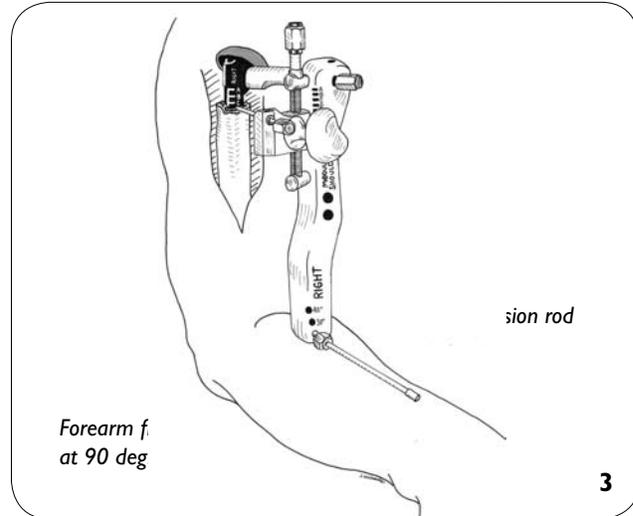
### Assemble targeting jig

The height guide rod is inserted into position and tightened with either hand pressure or with the finger wrench. The retroversion rod is inserted into one of three options: 20, 30 or 40 degrees and also tightened with hand pressure or with the finger wrench. At this point the estimated implant height may be set by pressing the black height button and raising or lowering the height guide rod to match the letter that corresponds to the preoperative templating. The letter on the targeting jig will correspond to the same letter on the body/stem of both the trials and the implants. Once implanted in the humerus, the height guide rod will rest on the edge of the humerus, pointing to the same reference letter on the trials and/or templates.



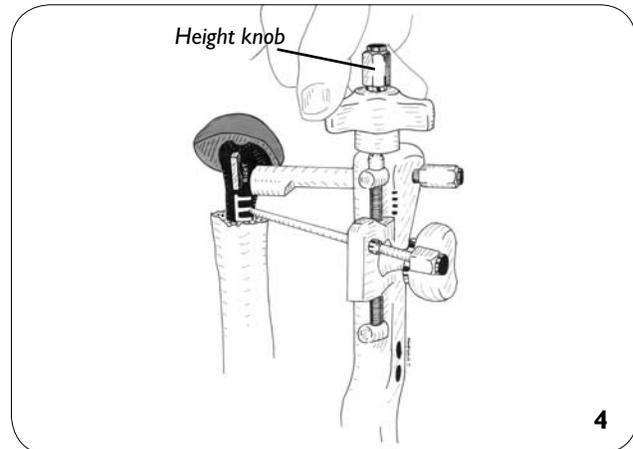
### Attaching implant to jig

The trial assembly is attached to the targeting jig by first inserting the alignment pin on the jig into the medial "suture" hole on the anterior side of the body. This assures that when the locking bolt is threaded into the mounting hole of the body, cross threading does not occur. The locking bolt is inserted and secured into position with the finger wrench.



### Adjusting retroversion

The trial is placed into the canal until the height guide rod is resting on the edge of the humerus, at the fracture level. The shoulder is reduced. With the forearm flexed at 90 degrees and in neutral rotation, the targeting jig is adjusted so the retroversion rod is parallel with the forearm. If the fracture is oblique, or the targeting jig is unstable, a small notch may be made in the humerus for the height guide rod to rest and stabilize the jig.



### Adjusting height

Height may now be assessed and adjusted if needed. Height can be adjusted by placing the finger wrench on the height knob and rotating, which raises or lowers the height guide rod resting on the humerus. **To lower the trial, the knob is rotated clockwise**, which will raise the height guide rod in the direction from G to A. The trial is then manually lowered with slight downward pressure. **To increase the height of the trial, the knob is rotated counterclockwise**. The height guide rod will remain on the edge of the humerus as the trial height is increased and the reference letter moves in the direction from A to G.

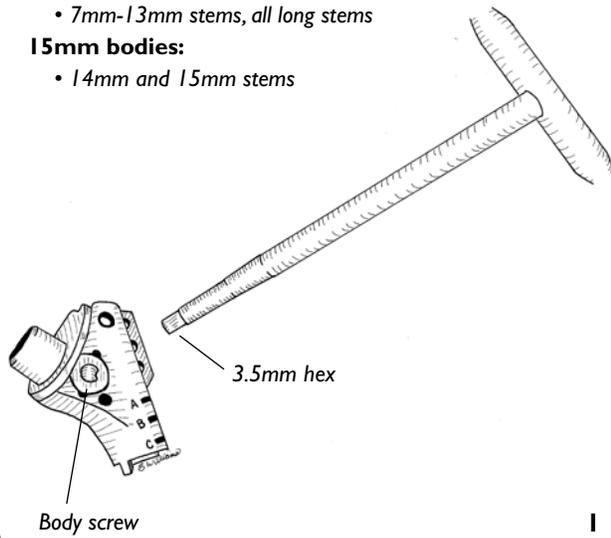
# SELECTING AND ASSEMBLING THE IMPLANT

## 13mm bodies:

- 7mm-13mm stems, all long stems

## 15mm bodies:

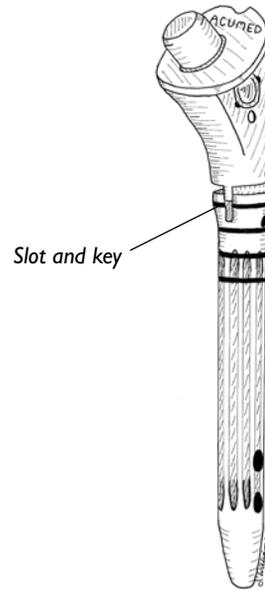
- 14mm and 15mm stems



1

### Removing body screw

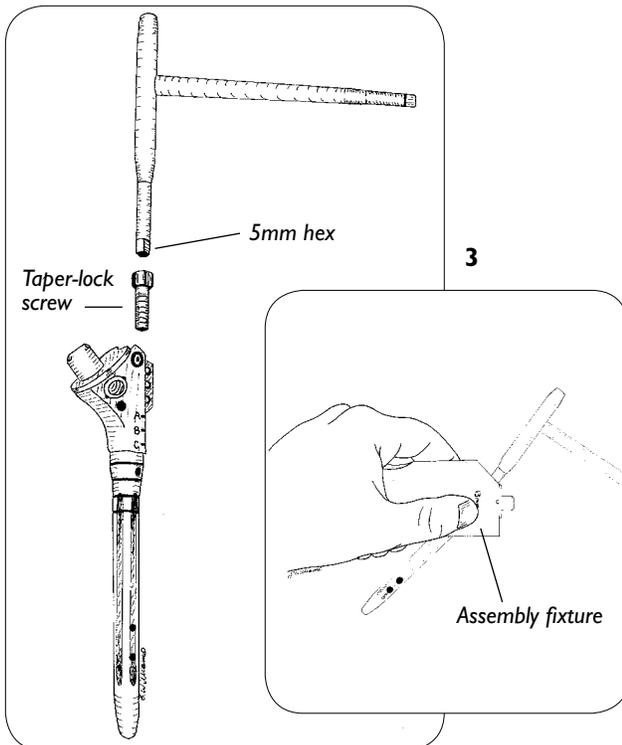
If the jig is to be used with the implant, remove the screw on the anterior face of the body and discard.



2

### Assembling body and stem

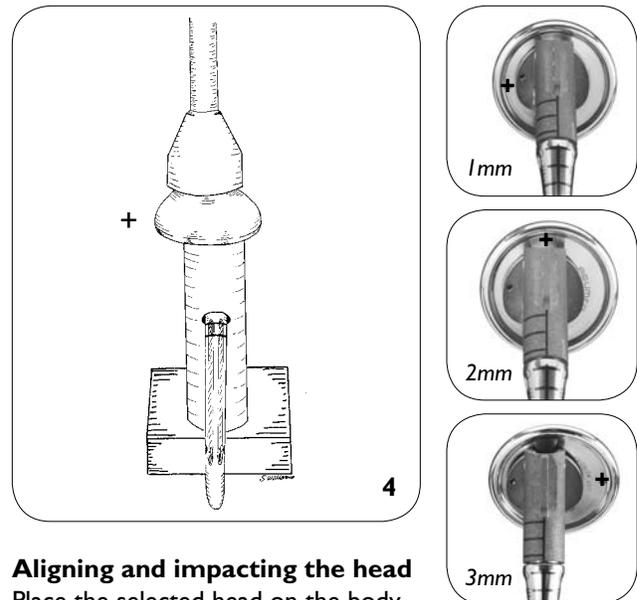
Lightly assemble the stem and the body, aligning the slot on the stem with the "key" on the body.



3

### Securing body and stem

Place the stem and body into the white assembly fixture to obtain a better grip and secure the taper-lock screw. Place the taper-lock screw into the proximal hole in the body and tighten with the 5mm hex wrench.



4

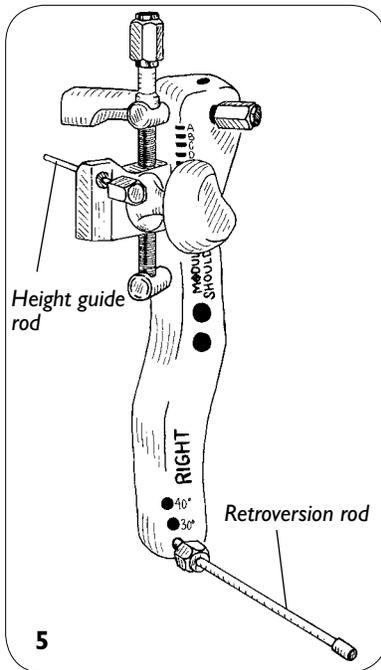
### Aligning and impacting the head

Place the selected head on the body with the "+" sign facing posteriorly for 3mm of posterior offset. The head and body are indexed to allow as much as 3mm posterior offset by aligning the "+" signs on both the head and the body.

Prior to impaction, insert the white assembly fixture into the black fixture base. Place a small piece of gauze on the head to protect the finish prior to impaction. Two sharp blows with a mallet on the impactor will firmly engage the locking taper of the head and body prior to implantation.

## Assemble targeting jig

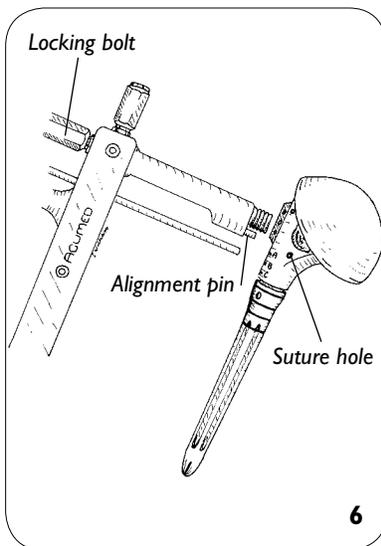
If the targeting jig is not yet assembled, it needs to be done at this time. The height guide rod is inserted into position and tightened with either hand pressure or with the finger wrench. The retroversion rod is inserted into one of three options: 20, 30 or 40 degrees and also tightened with hand pressure or with the finger wrench.



At this point the estimated implant height may be set by pressing the black height button and raising or lowering the height guide rod to match the letter that corresponds to the preoperative templating. The letter on the targeting jig will correspond to the same letter on the body/stem of both the trials and the implants. Once implanted in the humerus, the height guide rod will rest on the edge of the humerus, pointing to the same reference letter on the trials and/or templates.

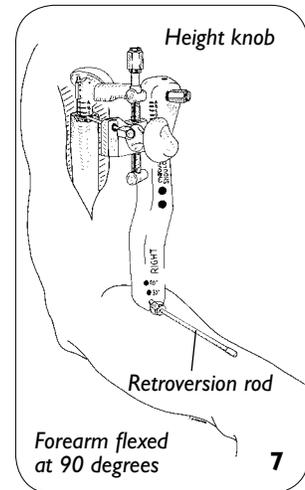
## Attaching implant to jig

The implant assembly is attached to the targeting jig by first inserting the alignment pin of the jig into the medial suture hole on the anterior side of the body. This assures that when the locking bolt is threaded into the mounting hole of the body, cross threading does not occur. The locking bolt is inserted and secured into position with the finger wrench.



## Assessing height and retroversion

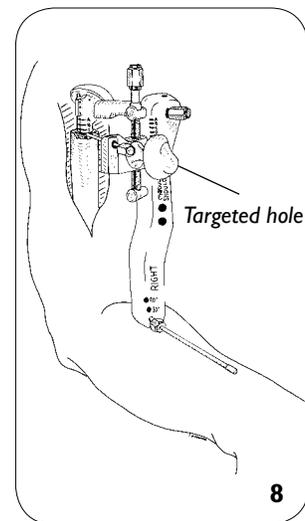
The implant is placed into the canal until the height guide rod is resting on the edge of the humerus at the fracture level. The shoulder is reduced, and with the forearm flexed at 90 degrees and in neutral rotation, the targeting jig is adjusted so the retroversion rod is parallel with the forearm. If the fracture is oblique, or the targeting jig is unstable, a small notch may be made in the humerus for the height guide rod to prevent unwanted rotation.



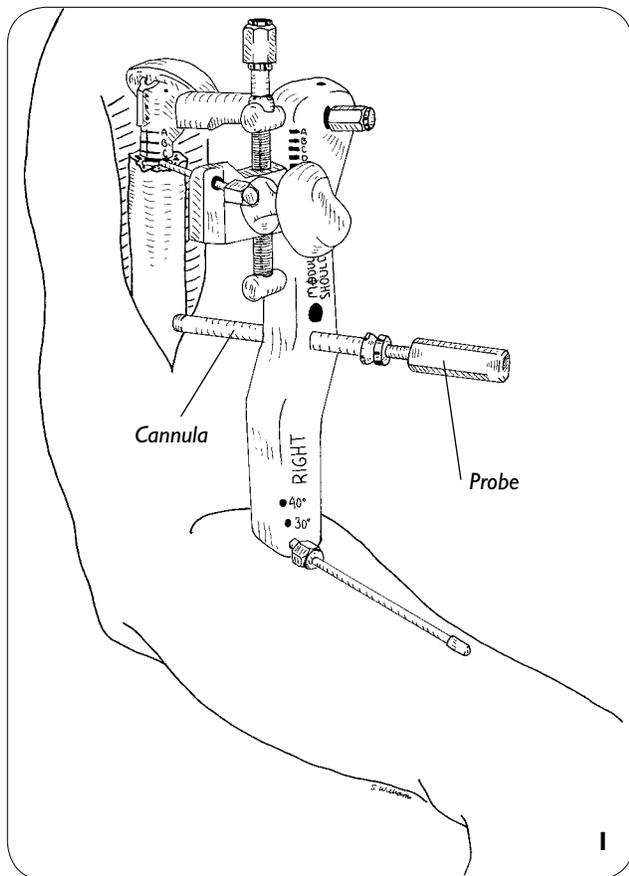
Height may now be assessed and adjusted, if needed. Height can be adjusted by placing the finger wrench on the height knob and rotating to raise or lower the height guide rod resting on the humerus. (See Fig. 4 on pg.13) **To lower the implant, the knob is rotated clockwise**, which will raise the height guide rod in the direction from G to A. The implant is then manually lowered with slight downward pressure. **To increase the height of the implant, the knob is rotated counterclockwise**. The height guide rod will remain on the edge of the humerus as the implant height is increased and the reference letter moves in the direction from A to G.

## Range of motion testing

Range of motion may now be assessed with or without the targeting jig in place. If the jig is removed, a 1.5mm guide wire (not included) may be inserted to maintain implant position. The 1.5mm wire cannula is inserted into the targeted hole between the D and E on the targeting jig. This will target the proximal hole in the stem, just distal to the body/stem junction. Once the wire has been driven through the bone, the targeting jig may be removed and the implant position may be more thoroughly examined.

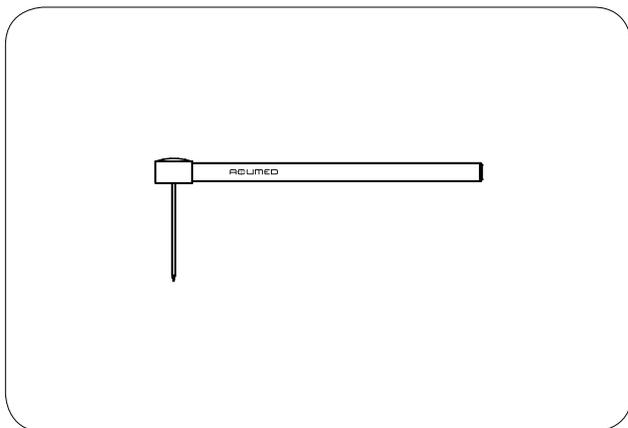


# INTERLOCKING THE IMPLANT

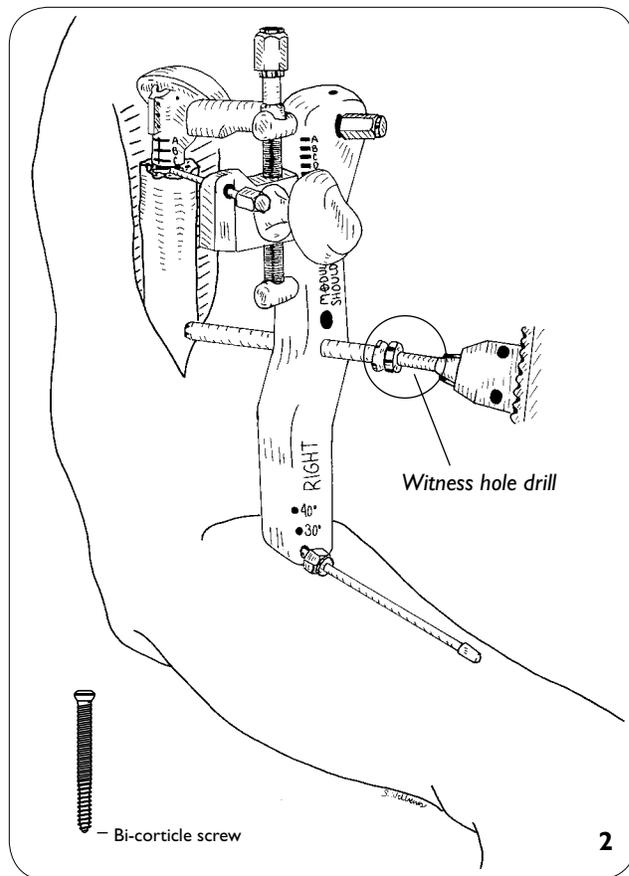


## Dimple bone

After appropriate soft tissue dissection and identification of neurovascular structures, either by extending the primary incision or by making new ones, the probe and cannula are inserted into either of the two interlocking holes. Once the cannula reaches the bone, lightly tap the probe against the bone to create a starting dimple.



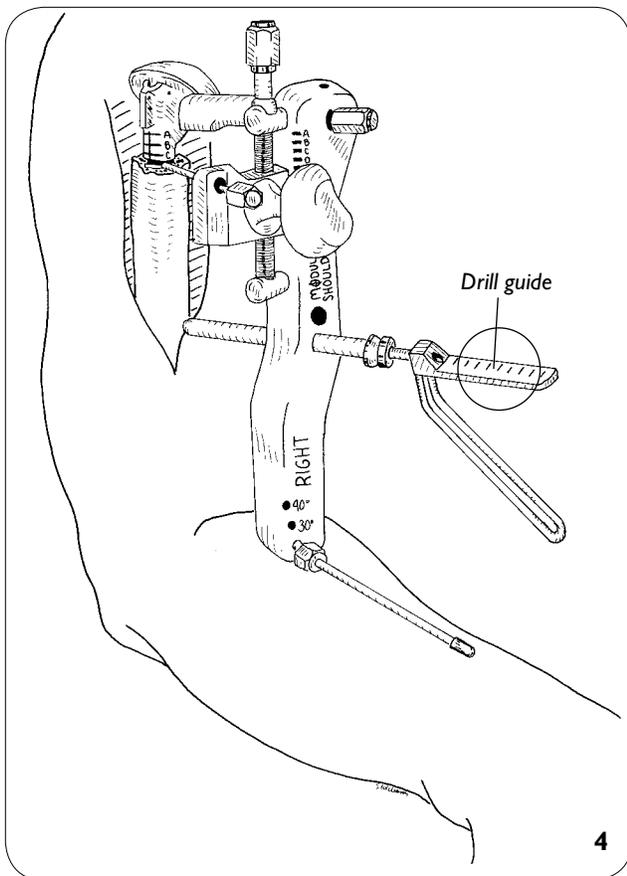
The distal interlocking screws on the long stems are targeted using a freehand technique. A freehand targeting guide (MS-0210) is included in the instrument set.



## Drill witness hole

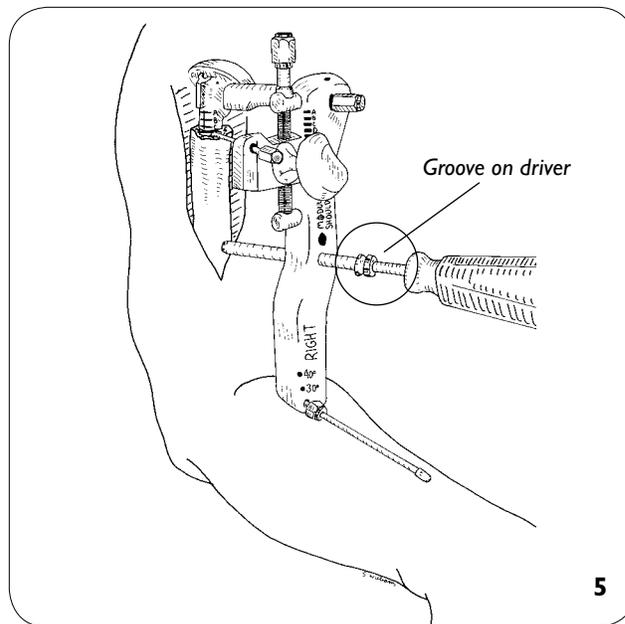
The first drill inserted is the witness drill (HR-3106). This drill only penetrates the near cortex and has two functions. First, it opens the near cortex to make room for the unique bi-cortical screws that increase in diameter as they near the head. This increases the strength of the screw. The second reason for the witness drill is the rigidity of the shank helps to ensure an accurate starting point for the subsequent 2.7mm drill. Due to the hard, irregular shape of the humeral diaphysis, some drills may “walk” on the bone affecting drill accuracy.

# INTERLOCKING THE IMPLANT



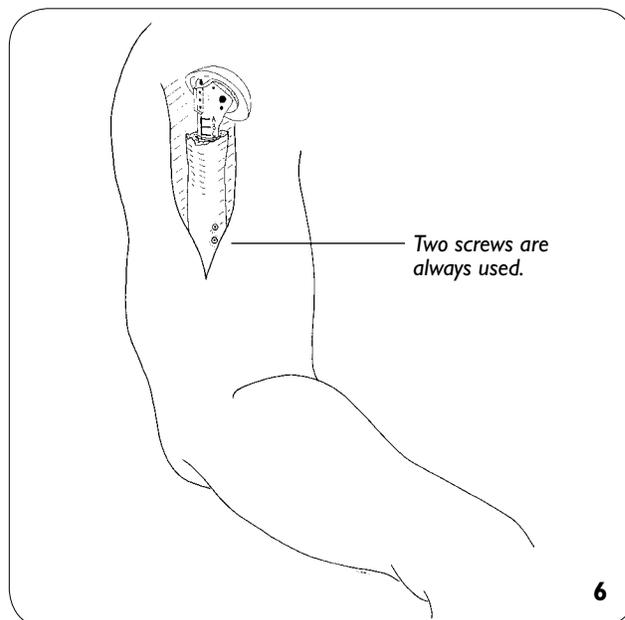
## Drilling and screw length determination

The drill guide is placed in the cannula and advanced until it reaches the bone. The 2.7mm drill is inserted to a depth of 1 to 2mm through the far cortex. The length of the screw is determined by the laser mark on the drill corresponding to a number on the back of the drill guide. It is critical that prior to reading the screw length, the drill guide is pressed against the bone to ensure an accurate measurement. It may be helpful to maintain the targeting jig position by leaving the first drill in place prior to inserting the screw. The cannula and drill guide are removed, leaving the drill in place. The second hole is targeted using the same steps as previously outlined. After drilling with the 2.7mm drill, the screw is inserted as described in the next illustration. This two-drill technique is used primarily when targeting the longer stems when a slight adjustment is needed to align the cannula and the stem.



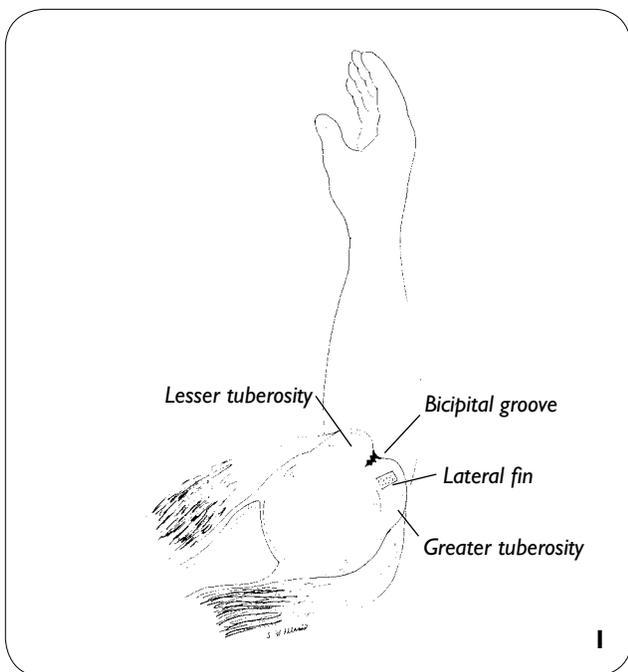
## Inserting screw

The 2.5mm driver is used to implant the bi-cortical screw. When the groove on the driver shaft is near the end of the cannula, the screw head is nearly flush with the bone. At this time the cannula can be slightly pulled from the bone to directly visualize the final seating of the screw.



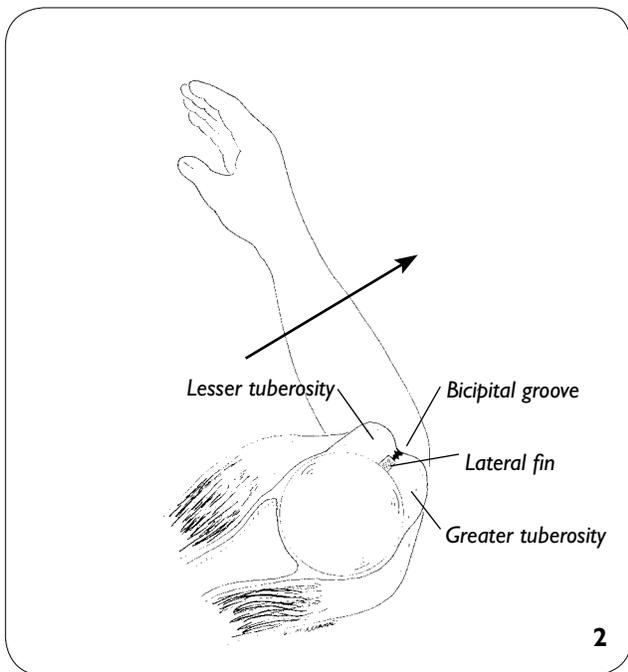
## Two screw fixation

When using interlocking screws, it is imperative that two screws are always used. The use of interlocking screws is only indicated for use on those patients with good bone quality.



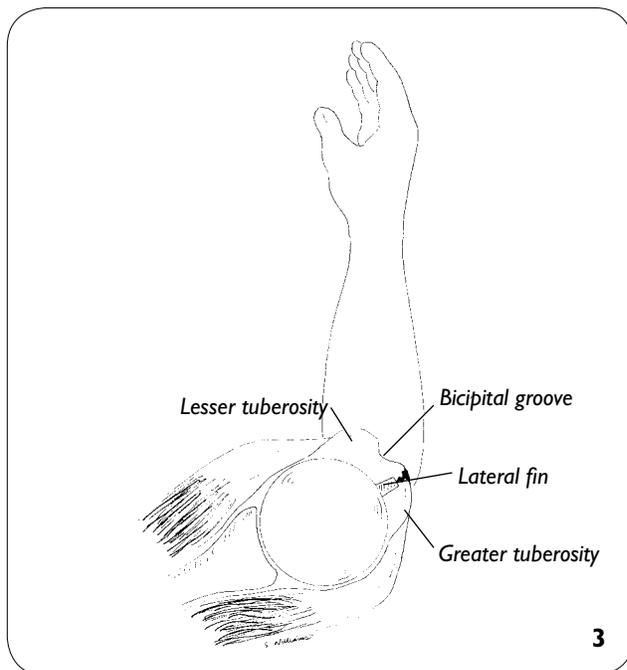
### Proper tuberosity alignment

When the fracture is through the bicipital groove, the greater tuberosity must be brought forward and around the lateral fin and into its anatomical position.



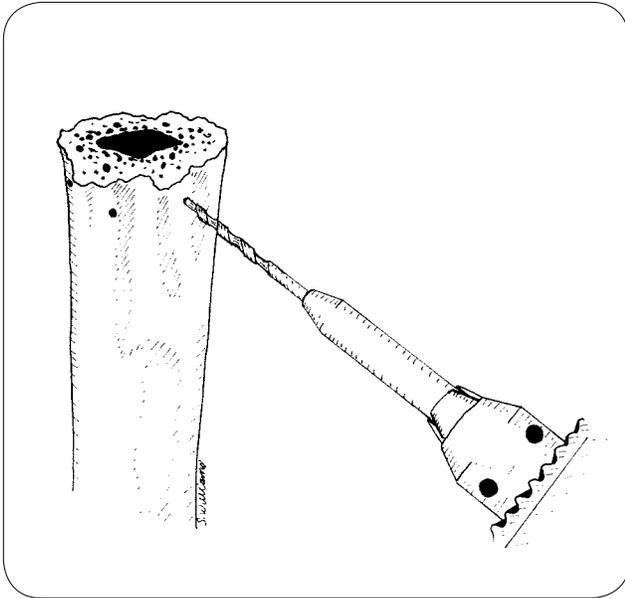
### Incorrect tuberosity alignment

If the tuberosities are brought together at the fin, external rotation will be restricted.



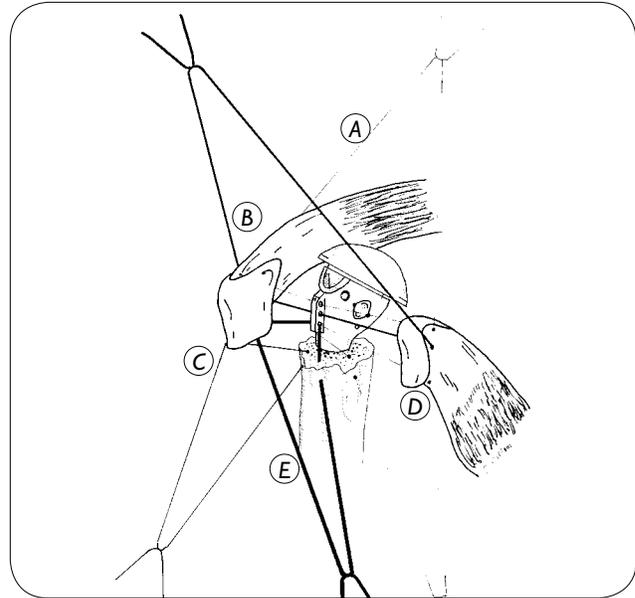
### Proper tuberosity alignment

If the fracture is through the greater tuberosity, the lateral fin can be in the location where the tuberosities are united and secured into position.



### Drilling for sutures

Using a small drill bit, drill holes into the humeral shaft at least 1cm distal to the fracture site. These holes should be on opposite sides (lateral and medial) to the center of the humeral prosthesis, or distal, but in alignment with the greater tuberosity and lesser tuberosity reattachment sites.



### Suture configuration

Pass four to six #2 or #5 non-absorbable sutures through the bone-tendon junction of the greater tuberosity and pass three to four of the same sutures through the bone-tendon junction of the lesser tuberosity.

Counting from superior to inferior, pass the second (A) and third (B) sutures of the greater tuberosity (GT) through the top two fenestrations of the prosthetic stem, and attach to and replace the same numbered sutures in the lesser tuberosity (LT). Attach the tuberosities together.

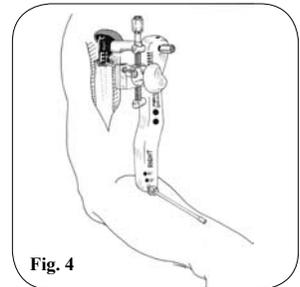
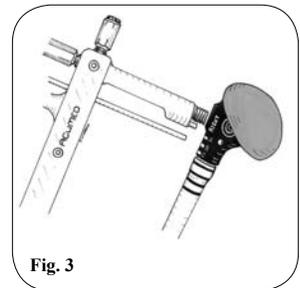
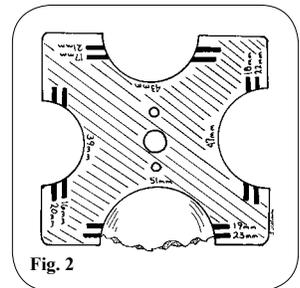
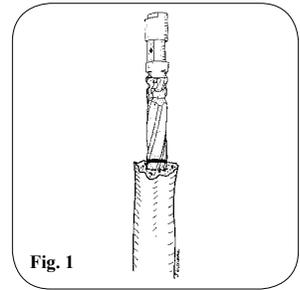
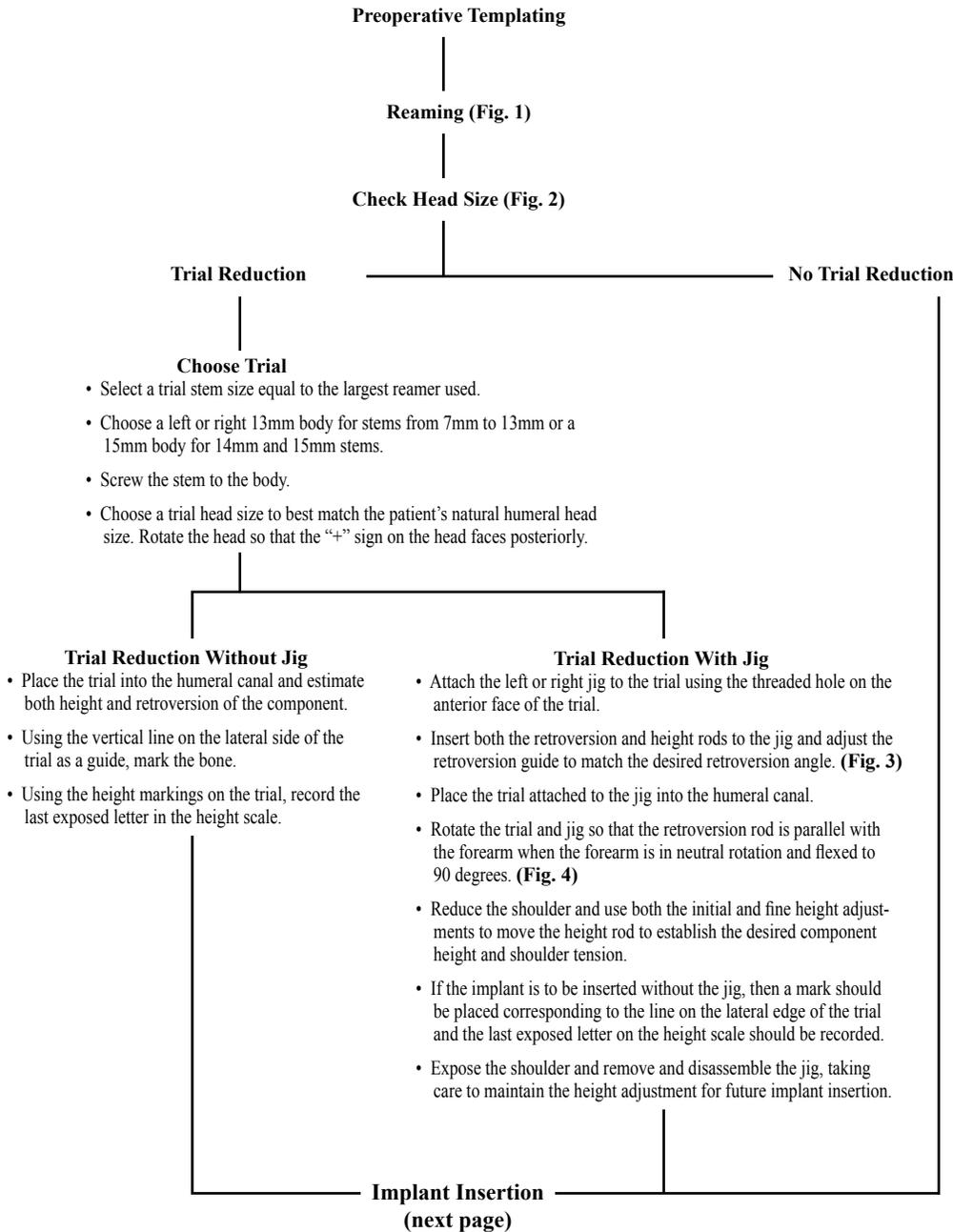
Pass the most distal (C) suture in the GT through the most lateral drill hole in the humeral shaft and tie the GT to the shaft. Repeat this step with the most distal suture (D) in the LT, passing it through the medial drill hole.

The most superior suture in the GT (E) can be passed through the medial drill hole in the humeral shaft then brought back superiorly into the tuberosities to create figure of eight closing. This same step can be repeated with the most superior suture in the LT to the lateral drill hole in the humeral shaft.

**Closure:** The delto-pectoral fascia is closed over a suction drain after thoroughly irrigating the wound. The 0.25% Marcaine is infiltrated into the subcutaneous tissue prior to closure to reduce post-operative pain.

**Post-operative care:** If the fixation of the tuberosities is secured, gentle passive assisted range of motion is begun on the first post-operative day. These exercises are performed in the supine position and should not be painful to the patient. The sling is removed four times a day for ten minute sessions. Active elevation and resistive exercises are avoided for six weeks, allowing the tuberosities to heal. Aggressive manipulation of the extremity should be avoided.

## Polarus Modular Shoulder System Surgical Steps



## Polarus Modular Shoulder System Surgical Steps

### Implant Selection

- For cemented use, choose a stem which is two sizes smaller than the largest reamer used.
- For non-cemented use, choose a stem which is equal in size to the largest reamer used.
- Choose a left or right 13mm body for stems from 7mm to 13mm and a left or right 15mm body for 14mm and 15mm stems.
- Choose a head size which best matches either the natural head or the trial head used.

### Implant Assembly

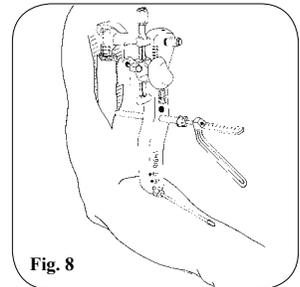
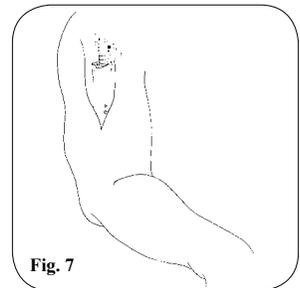
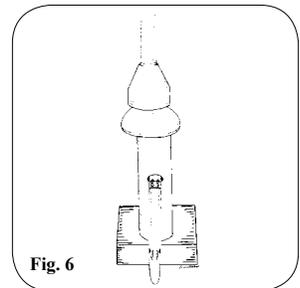
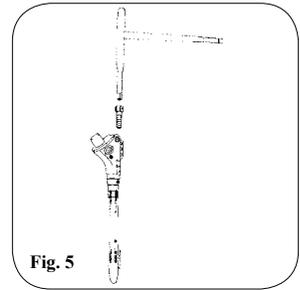
- Lightly assemble the stem and body, making sure to align the key on the body with the slot on the stem. **(Fig. 5)**
- Place the locking screw into the proximal hole in the body and lightly tighten.
- If the jig is to be used with the implant, remove the screw on the anterior face of the body and discard.
- Place the assembled stem and body into the plastic assembly fixture and tighten the taper-lock screw with firm hand pressure.
- Place the chosen head onto the body with the “+” sign facing posteriorly.
- Place the stem/body/head assembly and the plastic assembly fixture into the assembly base and onto the table.
- Use a small piece of gauze to protect the head finish and with the head impactor and a mallet, seat the humeral head with two sharp blows. **(Fig. 6)**

### Implant Insertion Without Jig

- If trials were used, then the height readings and the retroversion mark on the humerus should be used to establish the implant position. **(Fig. 7)**
- If trials were not used, then place the implant into the humeral canal and estimate both the height and retroversion of the component.

### Implant Insertion With Jig

- Attach the left or right jig to the implant using the threaded hole on the anterior face of the body.
- Insert both the retroversion and height rods to the jig and adjust the retroversion guide to match the desired retroversion angle.
- If cement is used it may be inserted at this point.
- Place the implant and jig assembly into the humeral canal.
- Rotate the implant and jig so that the retroversion rod is parallel with the forearm when the forearm is in neutral rotation and flexed to 90 degrees.
- Reduce the shoulder and use both the initial and fine height adjustments to move the height rod to establish the desired component height and shoulder tension.
- If cement is used, the component should be held in this position until the implant is secure.
- If interlocking screws are to be used they may be targeted and inserted at this time. **Two screws must always be used to secure the humeral component. (Fig. 8)**



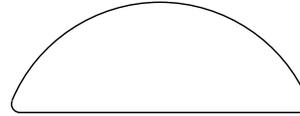
## INSTRUMENT TRAYS



*Straightforward instrumentation has been developed for ease of use and durability.*

**HEADS**

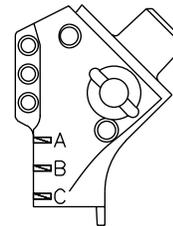
39mm x 16mm Shoulder Head	SH-3916-S
39mm x 20mm Shoulder Head	SH-3920-S
43mm x 17mm Shoulder Head	SH-4317-S
43mm x 21mm Shoulder Head	SH-4321-S
47mm x 18mm Shoulder Head	SH-4718-S
47mm x 22mm Shoulder Head	SH-4722-S
51mm x 19mm Shoulder Head	SH-5119-S
51mm x 23mm Shoulder Head	SH-5123-S



**BODIES**

LEFT 13mm Shoulder Body	SH-1340L-S
RIGHT 13mm Shoulder Body	SH-1340R-S
LEFT 15mm Shoulder Body	SH-1540L-S
RIGHT 15mm Shoulder Body	SH-1540R-S

**Note:** Taper-lock screw and body screw included with Shoulder Body



**SHORT STEMS**

7mm x 130mm Short Shoulder Stem	SH-0713-S
8mm x 130mm Short Shoulder Stem	SH-0813-S
9mm x 130mm Short Shoulder Stem	SH-0913-S
10mm x 130mm Short Shoulder Stem	SH-1013-S
11mm x 130mm Short Shoulder Stem	SH-1113-S
12mm x 130mm Short Shoulder Stem	SH-1213-S
13mm x 130mm Short Shoulder Stem	SH-1313-S
14mm x 130mm Short Shoulder Stem	SH-1413-S
15mm x 130mm Short Shoulder Stem	SH-1513-S



**LONG STEMS**

8mm x 200mm Short Shoulder Stem	SH-0820-S
8mm x 220mm Short Shoulder Stem	SH-0822-S
8mm x 240mm Short Shoulder Stem	SH-0824-S
8mm x 260mm Short Shoulder Stem	SH-0826-S
8mm x 280mm Short Shoulder Stem	SH-0828-S



**INTERLOCKING SCREWS**

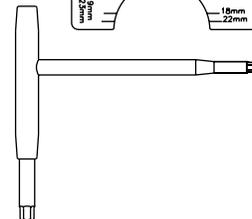
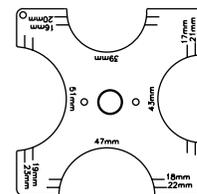
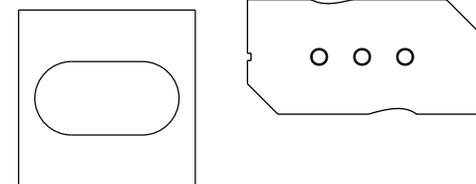
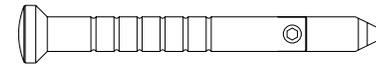
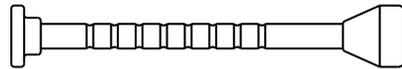
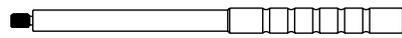
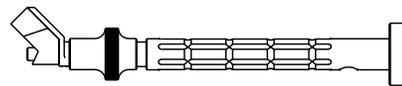
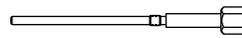
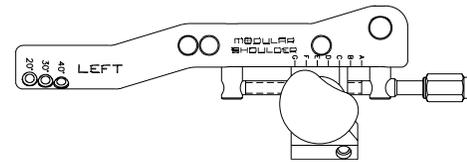
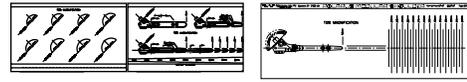
3.5mm x 17.5mm Cortical Screw	HCO3175-S
3.5mm x 20.0mm Cortical Screw	HCO3200-S
3.5mm x 22.5mm Cortical Screw	HCO3225-S
3.5mm x 25.0mm Cortical Screw	HCO3250-S
3.5mm x 27.5mm Cortical Screw	HCO3275-S
3.5mm x 30.0mm Cortical Screw	HCO3300-S
3.5mm x 32.5mm Cortical Screw	HCO3325-S
3.5mm x 35.0mm Cortical Screw	HCO3350-S

**Note:** Screw Length Is Measured From Under The Head



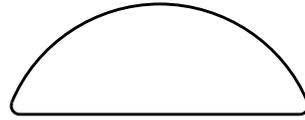
**STANDARD INSTRUMENTS**

Shoulder X-Ray Template	FHUM-51
Shoulder Implant Targeting Guide (Left, Small)	SH-0110
Shoulder Implant Targeting Guide (Right, Small)	SH-0120
Distal Alignment Rod	SH-1117
Height Guide Rod	SH-1120
Shoulder Impactor / Extractor	SH-1400
Shoulder Impactor / Extractor Handle	SH-1407
Head Impactor	SH-1500
Head Removal Fork	SH-1600
Shoulder Assembly Fixture	SH-2000
Shoulder Assembly Fixture Base	SH-2001
Shoulder Locking Bolt	SH-2004
Shoulder Head Sizer	SH-2005
3.5 / 5.0mm Hex Driver	TH-3550



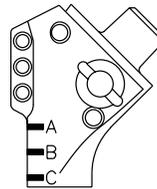
**TRIAL HEADS**

39mm x 16mm Shoulder Trial Head	SH-T3916
39mm x 20mm Shoulder Trial Head	SH-T3920
43mm x 17mm Shoulder Trial Head	SH-T4317
43mm x 21mm Shoulder Trial Head	SH-T4321
47mm x 18mm Shoulder Trial Head	SH-T4718
47mm x 22mm Shoulder Trial Head	SH-T4722
51mm x 19mm Shoulder Trial Head	SH-T5119
51mm x 23mm Shoulder Trial Head	SH-T5123



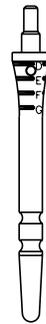
**TRIAL BODIES**

LEFT 13mm Shoulder Trial Body	SH-T1340L
RIGHT 13mm Shoulder Trial Body	SH-T1340R
LEFT 15mm Shoulder Trial Body	SH-T1540L
RIGHT 15mm Shoulder Trial Body	SH-T1540R



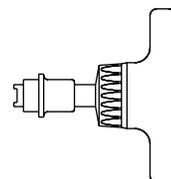
**TRIAL STEMS**

7mm x 130mm Trial Shoulder Stem	SH-T0713
8mm x 130mm Trial Shoulder Stem	SH-T0813
9mm x 130mm Trial Shoulder Stem	SH-T0913
10mm x 130mm Trial Shoulder Stem	SH-T1013
11mm x 130mm Trial Shoulder Stem	SH-T1113
12mm x 130mm Trial Shoulder Stem	SH-T1213
13mm x 130mm Trial Shoulder Stem	SH-T1313
14mm x 130mm Trial Shoulder Stem	SH-T1413
15mm x 130mm Trial Shoulder Stem	SH-T1513
Trial Wrench	SH-2006



**MODULAR SHOULDER REAMERS**

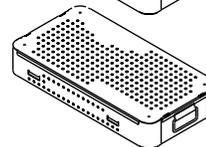
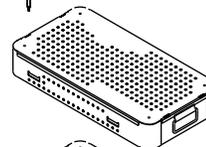
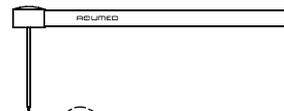
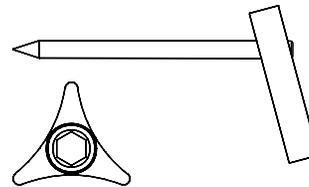
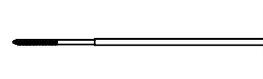
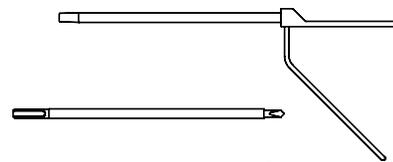
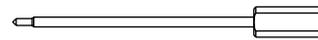
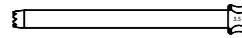
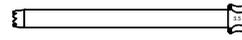
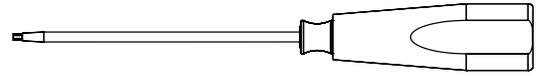
13mm x 7mm Shoulder Reamer	SH-R1307
13mm x 8mm Shoulder Reamer	SH-R1308
13mm x 9mm Shoulder Reamer	SH-R1309
13mm x 10mm Shoulder Reamer	SH-R1310
13mm x 11mm Shoulder Reamer	SH-R1311
13mm x 12mm Shoulder Reamer	SH-R1312
13mm x 13mm Shoulder Reamer	SH-R1313
15mm x 14mm Shoulder Reamer	SH-R1514
15mm x 15mm Shoulder Reamer	SH-R1515
Bone Graft Ratcheting T-Handle	BG-8043



# PRODUCT SHEET - 4 OF 4

## STANDARD INSTRUMENTS

2.5mm Hex Driver For 3.5mm Screws	HD-2500
3.5mm Cannula	HR-3101
1.5mm Wire Cannula (gold)	SH-2007
3.5mm Probe	HR-3102
3.5mm Drill Guide / Depth Gauge	HR-3104
Witness Hole Drill	HR-3106
3.5mm Cortical Screw Tap	HR-3107
3.5mm Tap Drill ea.	HR-D105
Large Cortex Awl	MS-0200
Locking Bolt Finger Wrench	MS-0611
2.0mm x 20" Nitinol Guide Wire ea.	WN-2020
Freehand Targeting Guide	MS-0210
Modular Shoulder Tray #1	SH-0001
Modular Shoulder Tray #2	SH-0002





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The devices shown are covered by  
one or more of the following patents:  
5,961,555; 6,102,953; 6,168,627;  
6,168,628. Other US and  
International patents pending.