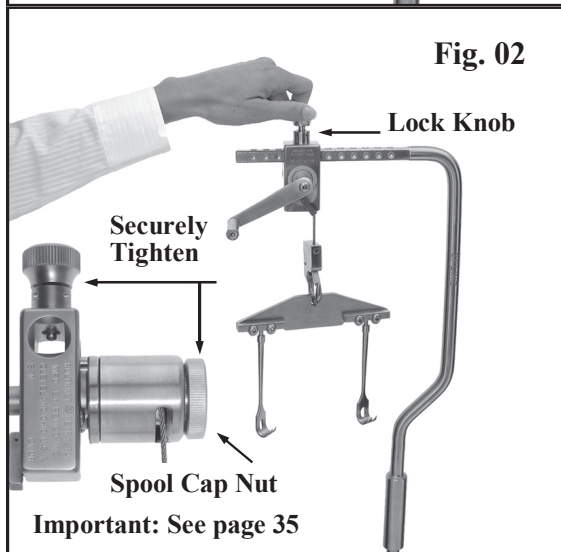


**RATCHET/RAKE ASSEMBLY, 4100-IMR-6**, is a unique retractor to lift an incision site. The ratchet portion of the Rultract® Retractor operates as a winch. When lifting, tension generated on the Cable is transferred to the self-locking Gearbox. The ratcheting system (Fig. 01) gently and evenly elevates the sternum at approximate increments of 1 mm. per click and locks into place. Rake Plate and Rakes pivot independently to adapt to the configuration of the sternum.

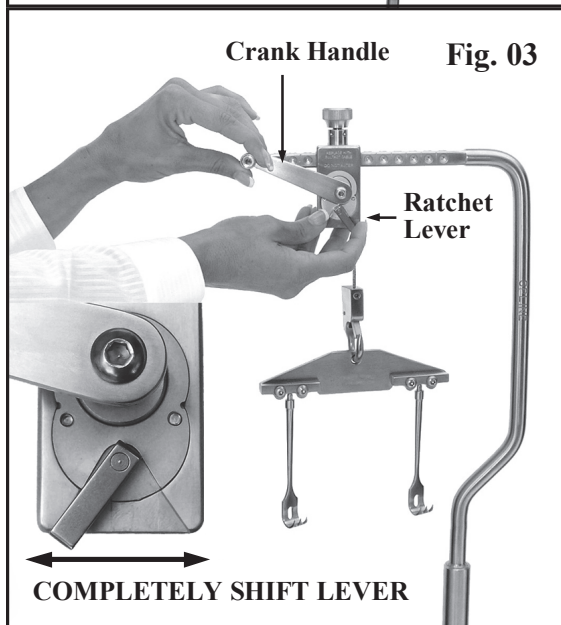
**Attaching Ratchet To Top Post**

Back out (open) the non-removable Lock Knob until it stops (Fig. 02). The Crank Handle may be placed either to the right or left of the surgeon depending on preference. The Top Post has alignment marks and detents on the squared section for securing the Gearbox to the post. Slide the Ratchet onto Top Post to desired position between alignment marks. Placement of the Gearbox between alignment marks locates the Lock Knob directly over detent for proper tightening (Fig. 04). Tip of Lock Knob must completely insert into detent of Top Post to assure proper seating. Note opened and closed position of Lock Knob (Fig. 05 & 06). **CAUTION: Hand tighten Lock Knob and Spool Cap Nut securely** (Fig. 02).



**Release or Reverse Ratchet**

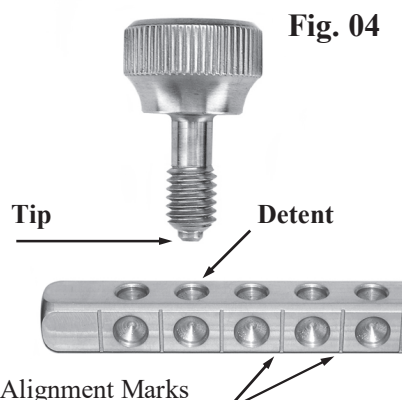
To release or reverse the Ratchet, firmly grasp Crank Handle and turn slightly (approximately 1 mm.) in the direction it will move. While maintaining tension on the crank handle, simultaneously shift Ratchet Lever **COMPLETELY** in the opposite direction to slowly lower site (Fig. 03).



**Tip of Lock Knob must insert into detent of square bar**

**Knob Opened**

**Knob Closed**



**Fig. 05**

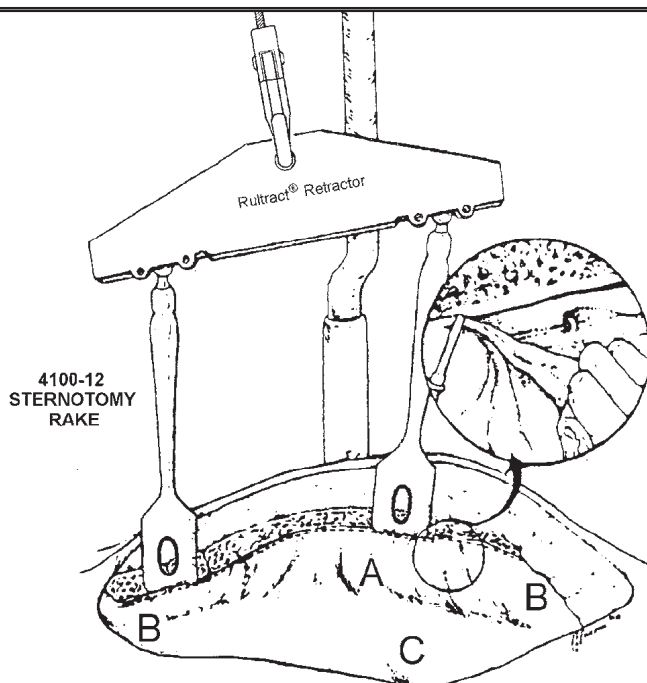
**Fig. 06**



## Suggestions for Application and Removal of Rultract® Sternotomy Rakes

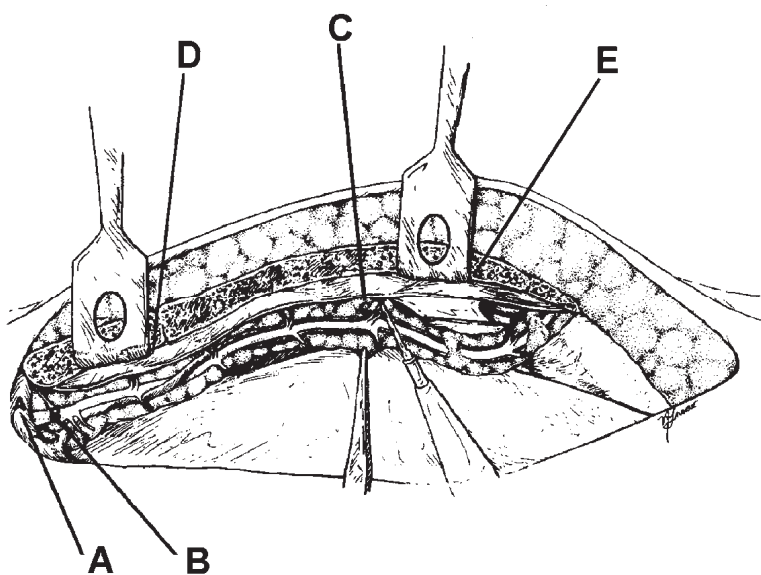
01. Gearbox should be positioned and secured in place at center of Top Post for average size patient.
02. Position Rakes at lower manubrium and lower sternum.
03. Place flat surface of the Rake flush against the sternal edge for secure grab.

The Ratchet mechanism will retract the operative site at approximately 1 mm. per click and lock into place after each click. Retract sternum slowly as dissection progresses medially. **Slowly elevate throughout procedure as needed for exposure. To release or reverse the ratchet, firmly grasp Crank Handle and turn slightly (approximately 1 mm.) in the direction it will move. While maintaining tension on the Crank Handle, simultaneously shift ratchet lever COMPLETELY in the opposite direction to slowly lower site.**



### OPERATOR'S VIEW:

Operator's view after placement of the retractor.  
 A) Fibrofatty areolar tissue.  
 B to B) After completing incision, gentle retraction and finger dissection exposes vessels.  
 C) Pericardium.



### PROPER PLACEMENT:

Proper placement of rakes at lower manubrium and lower sternum. Parallel incisions 1 cm. lateral and medial to the internal thoracic vessels. Gentle retraction from the lateral edge of the pedicle helps in the dissection.  
 (A) Subclavian vein.  
 (B) Internal thoracic artery.  
 (C) Perforating branches.  
 (D) Lower manubrium.  
 (E) Lower sternum.

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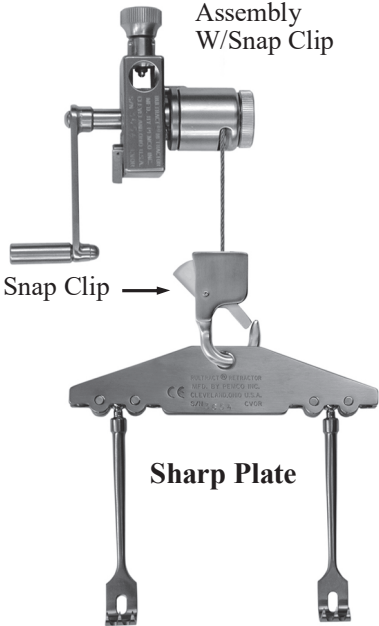
ACCESSORIES:

**SINGLE RAKE:** Remove the supplied Sharp Tip Sternal Rake Plate Assembly from the Snap Clip (Fig. 01) and replace with a single rake. Example: With an Extender Bar and Snap Clip, the unique lifting design of the Rultract® System may be used with a variety of single rakes. The optional Extender Bar gives direct upward lift of xiphoid area (Fig. 02).

**DULL TIP RAKE PLATE:** The Dull Tip Sternal Rake Plate Assembly is an accessory available for use with the fragile sternum. *Use of the Dull Tip Rake Plate is at surgeon's discretion.* (See Proper Placement drawing, p. 4).

Fig. 01

4100-IMR-6  
Ratchet/Rake  
Assembly  
W/Snap Clip



4100-39S Extender Bar  
W/ Cross Square

Fig. 02

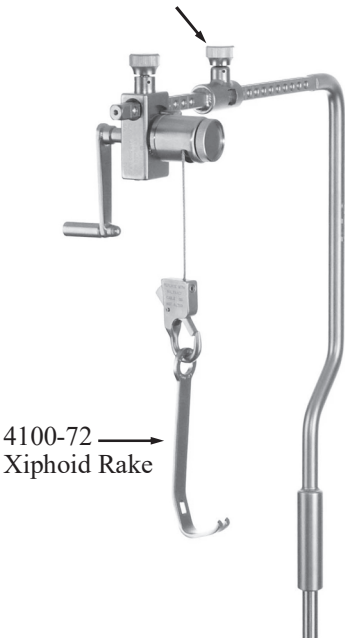
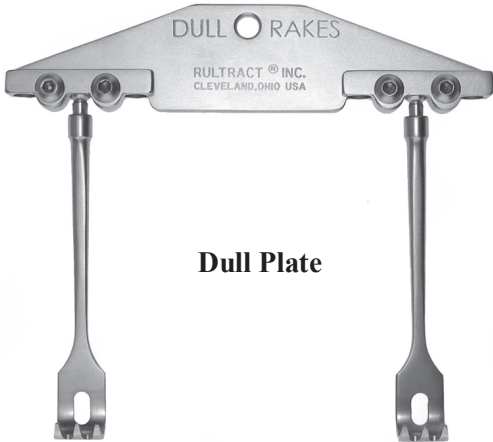


Fig. 03

Accessory: 4100-52D  
Dull Tip Sternal Rake  
Plate Assembly



Comparison: Sharp Tip Rake vs. Dull Tip Rake

Sharp Tip Sternal  
Rake 4100-12

Dull Tip Sternal  
Rake 4100-12D

Each Ratchet/Rake Assembly is sold with Sharp Tip Sternal Rakes.

The supplied Sharp Tip Sternal Rakes on the Rultract® IMA retractor are designed for use on all patients. To **secure elevation of the sternum without slipping** the flat surface of rake should be flush against sternal edge. While retracting slowly, the rake tips penetrate the sternum.

CAUTION:

The Dull Tip Sternal Rake Plate is available as an accessory. The exact physiology of the sternum cannot be determined until the chest is opened. Therefore, the requesting institution assumes responsibility of having a Sharp Tip Sternal Rake Plate Assembly available at all times.



## Single Rake Use: Xiphoid Entry

Attach Extender Bar to end of Top Post and mount Ratchet Assembly. Remove Sternal Rake Plate Assembly from Snap Clip and replace with Xiphoid Rake (Fig. 01).

After dissection is started position rake under xiphoid process (Fig. 02). Stabilize rake by hand (Fig. 03). **SLOWLY** elevate to insure proper placement. The ratchet mechanism will retract the operative site at approximately 1 mm. per click and lock into place after each click. ***Slowly elevate throughout the procedure as needed for exposure.***

***Caution: Always stabilize the single rake by hand to elevate and expose operative site. Failure to do so may result in rake slipping.***

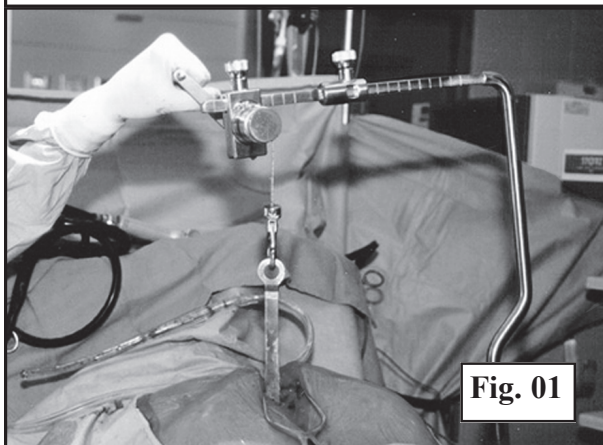


Fig. 01

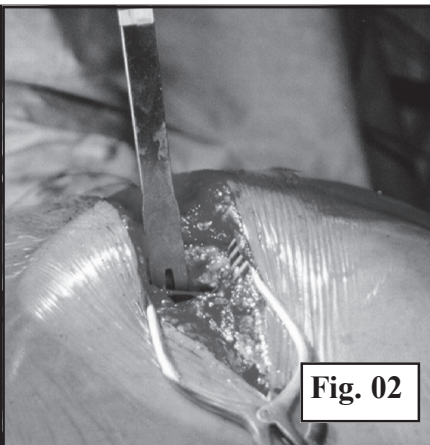


Fig. 02

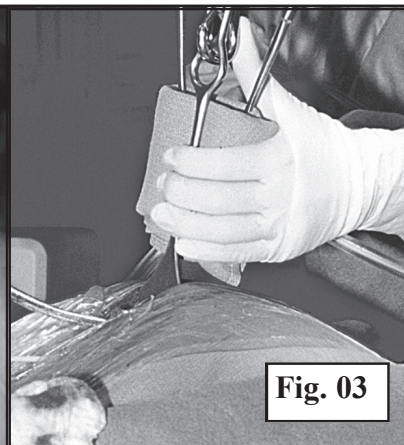


Fig. 03

### **4100-39S: EXTENDER BAR with CROSS SQUARE** (see p. 21)

**Horizontal Position Into Hub:** Extender Bar attached to Top Post positions ratchet over xiphoid area for direct upward lift of incision site (Fig. 04).

### **Horizontal Position Thru Cross Square for Right Angle Extension:**

**With arm board in place** Cross Square feature provides proper placement of ratchet to chest wall by mounting Rultract® System above or below the arm board (Fig. 05 & 06).

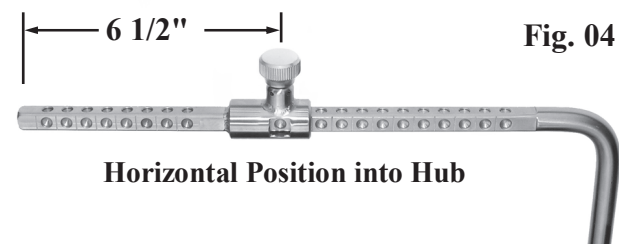


Fig. 04

Horizontal Position into Hub

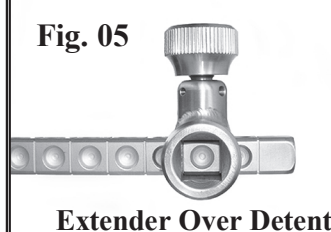


Fig. 05

Extender Over Detent

Fig. 06



Right Angle Set-Up With Cross Square

Arm board