

AMPUTATION: PROSTHESIS

Prosthesis

- An artificial substitute
- replace the lost part of the body
- appearance and function

- Objectives of LL prosthesis
 - Transfer body weight
 - Simulate normal locomotion

- Objectives of UL prosthesis
 - Simulate normal hand function

ORTHOSIS

An external device applied on the body to:-

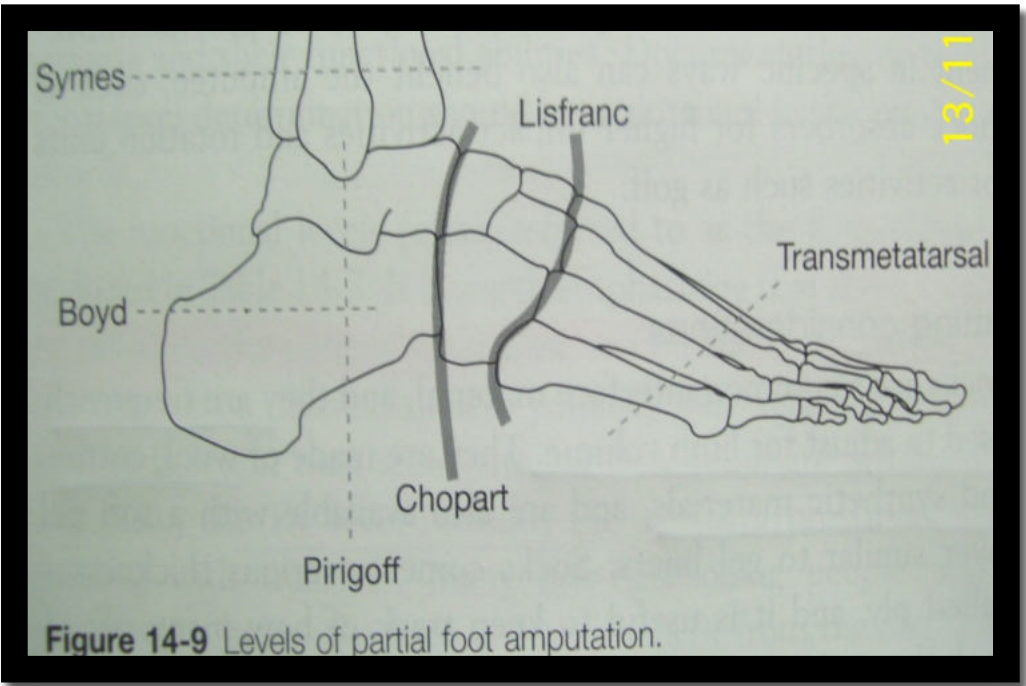
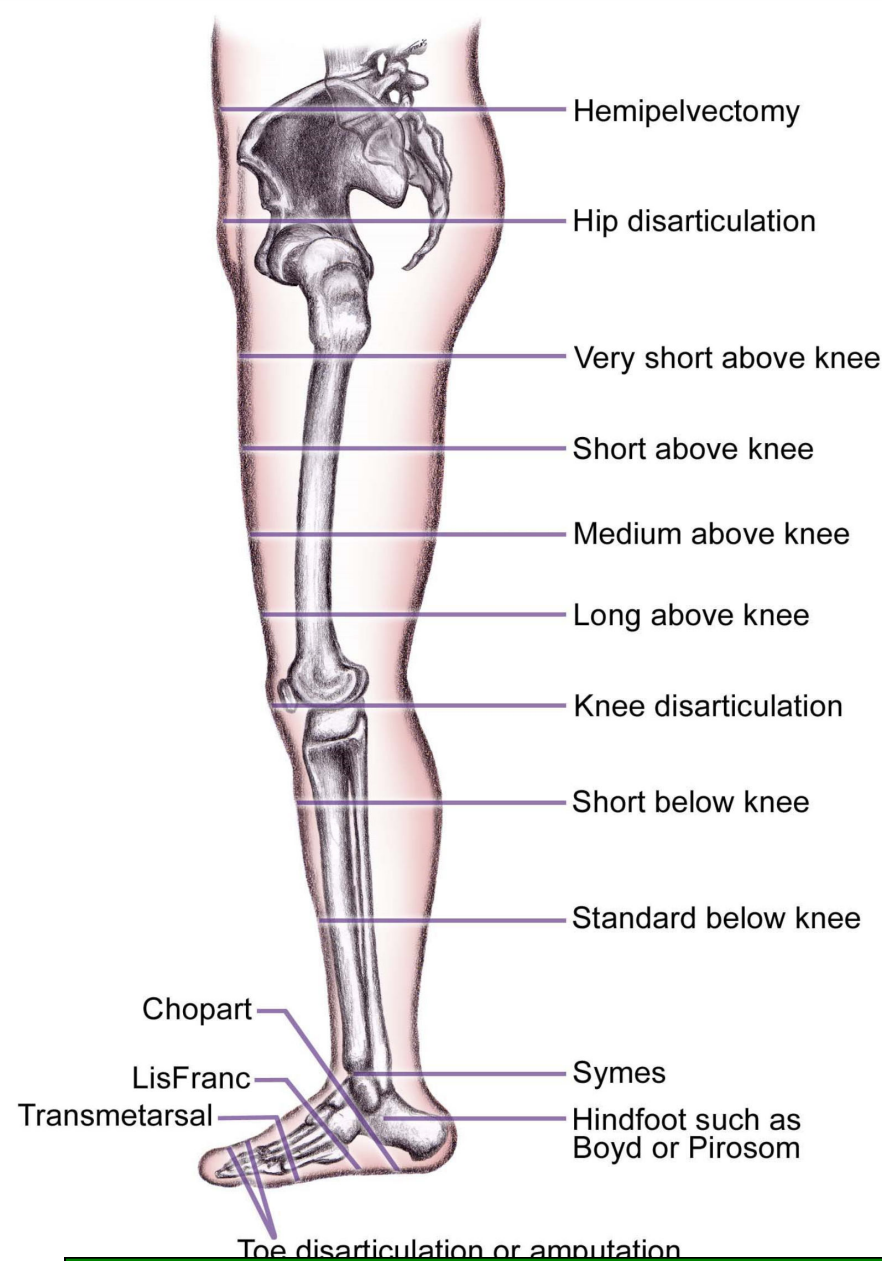
- Limit motion
- Correct deformity
- Reduce axial loading
- Improve function in certain segment of the body.



Functional levels

Description of the K-Level Modifiers	
K0	Does not have the ability or potential to ambulate or transfer safely with or without assistance, and a prosthesis does not enhance quality of life or mobility.
K1	Has the ability or potential to use a prosthesis for transfers or ambulation on level surfaces at fixed cadence. Typical of the limited and unlimited household ambulator.
K2	Has the ability or potential for ambulation with low-level environmental barriers such as curbs, stairs, and uneven surfaces. Typical of the limited community ambulator.
K3	Has the ability or potential for ambulation with variable cadence. Typical of the community ambulator who can traverse most environmental barriers and has vocational, therapeutic, or exercise activity that demands prosthetic utilization beyond simple locomotion.
K4	Has the ability or potential for prosthetic ambulation that exceeds basic ambulation skills, exhibiting high impact, stress, or energy levels. Typical of the prosthetic demands of the child, active adult, or athlete.

Lower Limb Amputation level

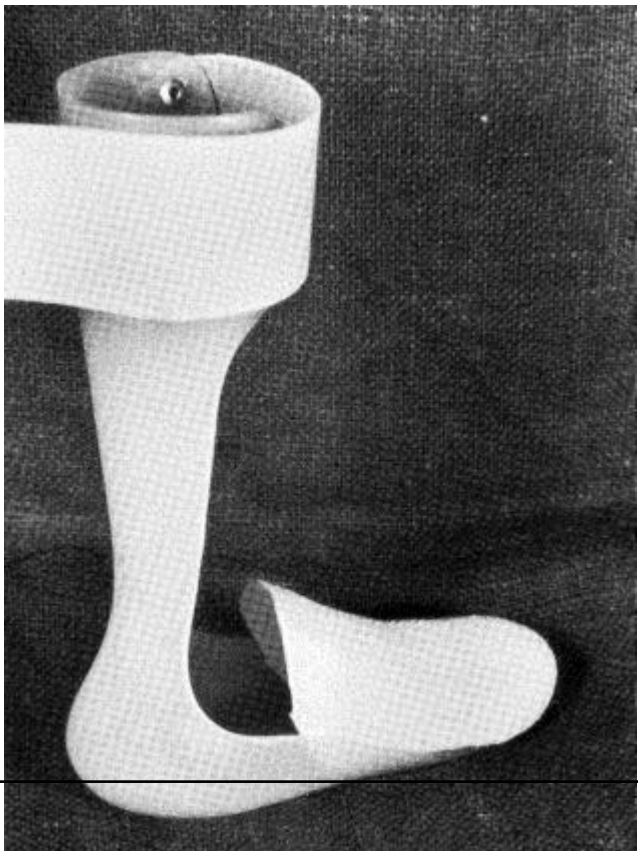
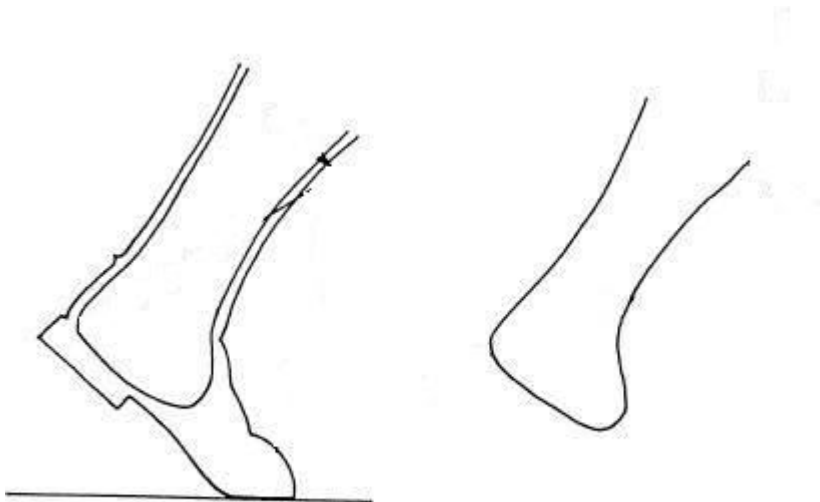


Lisfranc / chopart amputation

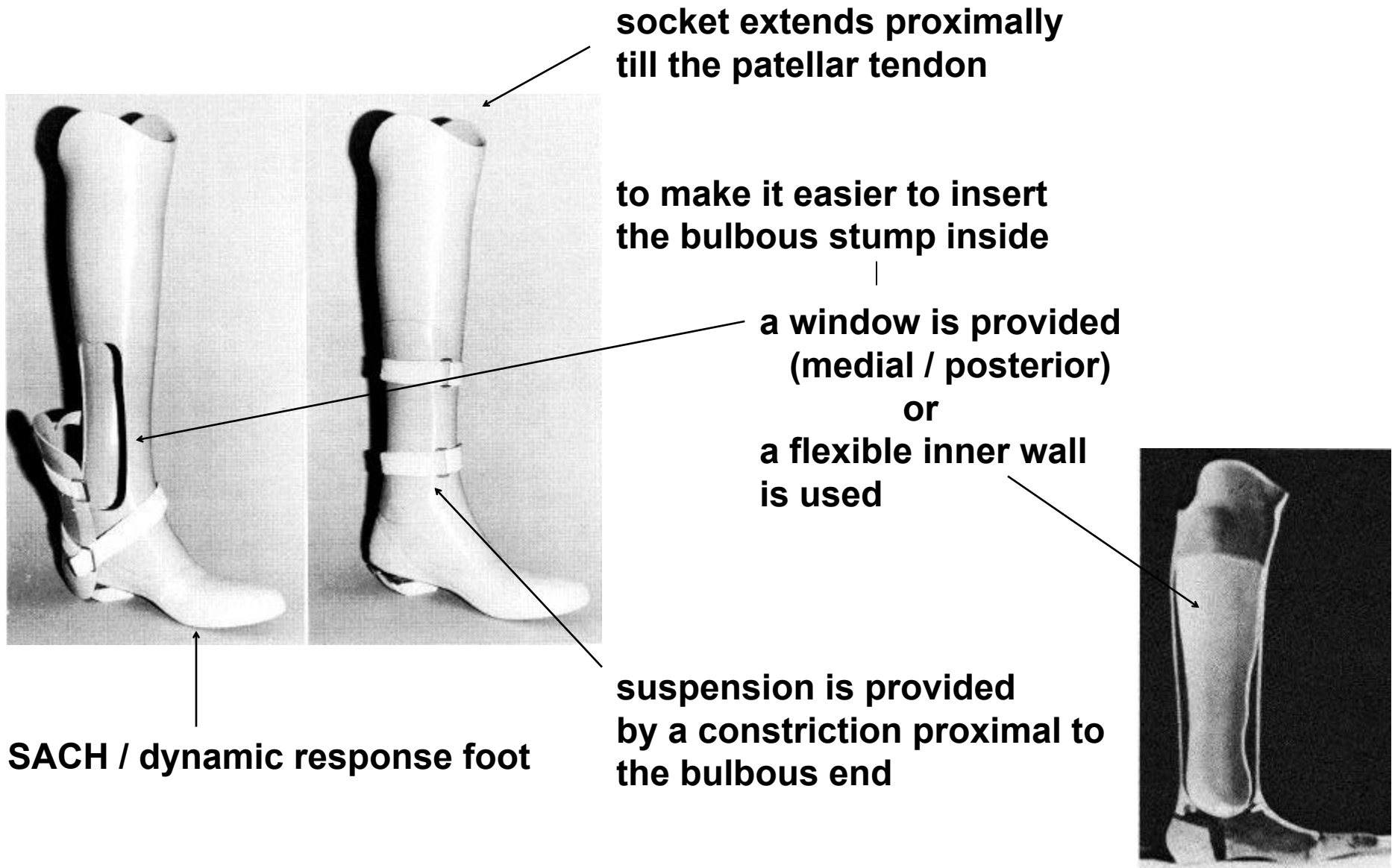
The options are

1. high-top shoe with filler

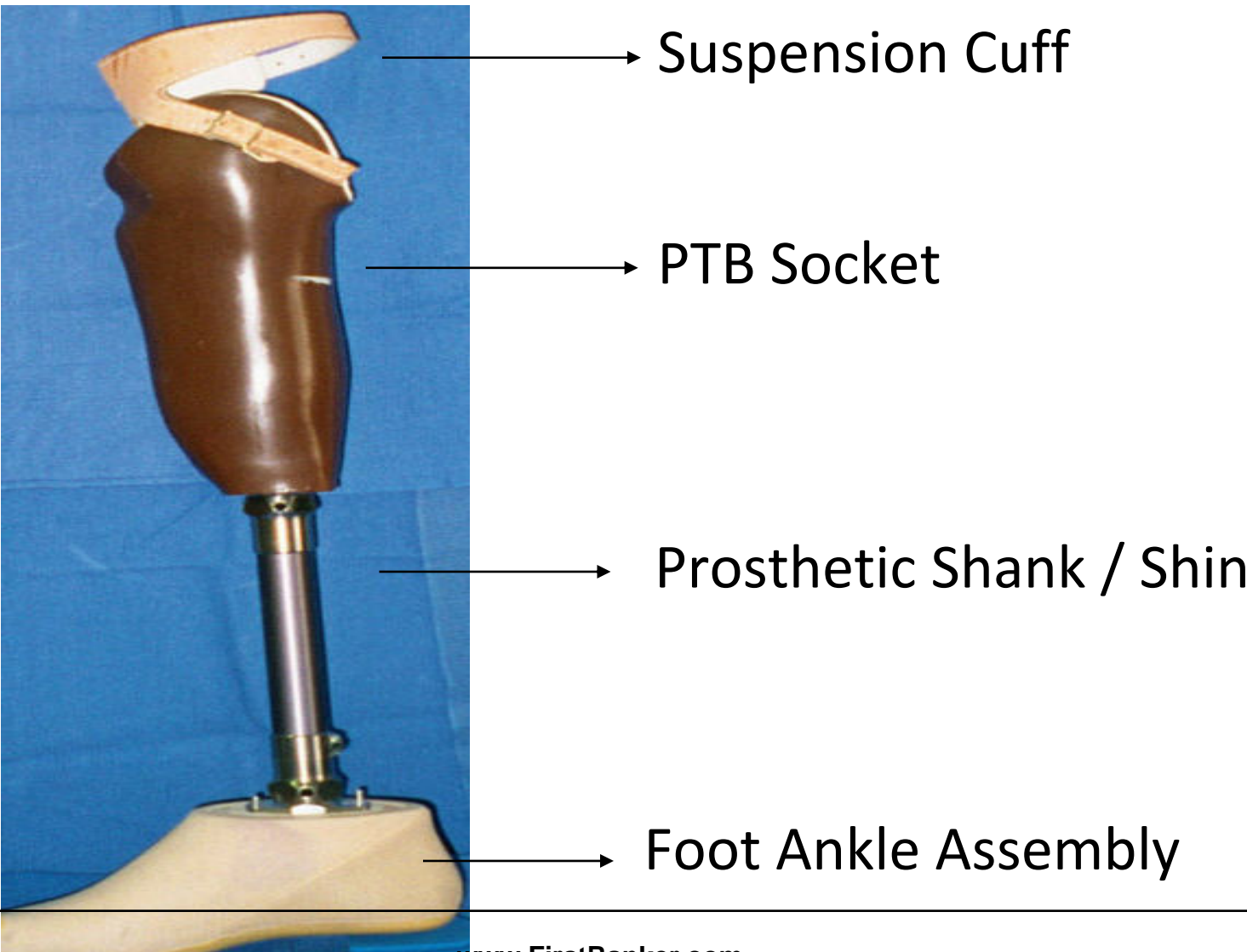
2. AFO with filler



Syme's amputation



Below Knee/Transtibial Prosthesis

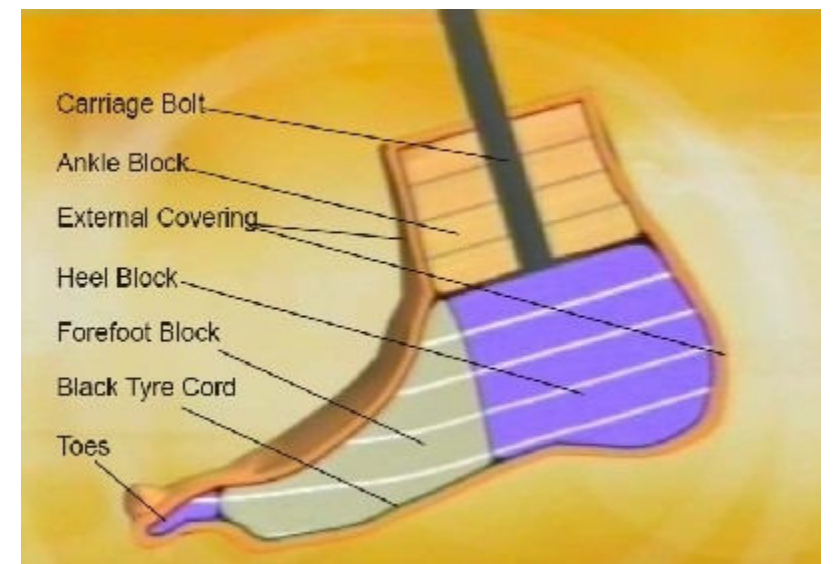
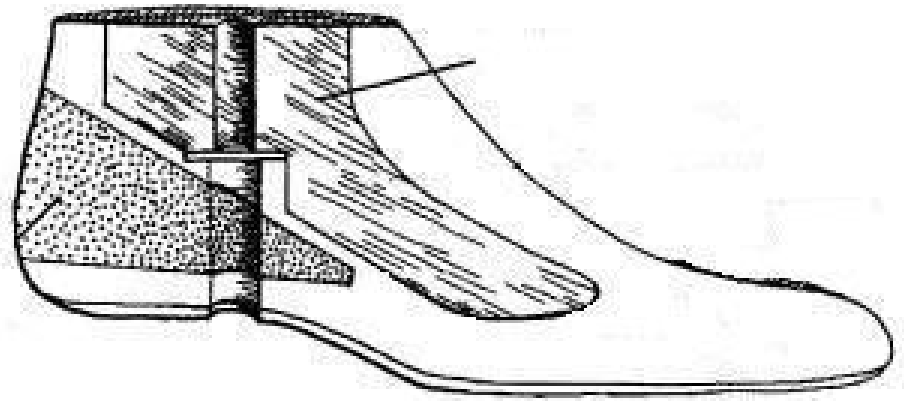


B/K amputation

• foot-ankle assembly

types

- # SACH foot
- # single axis foot
- # multiaxis foot
- # dynamic response foot
- # jaipur foot
- # madras foot



B/K amputation

exoskeletal



endoskeletal/modular

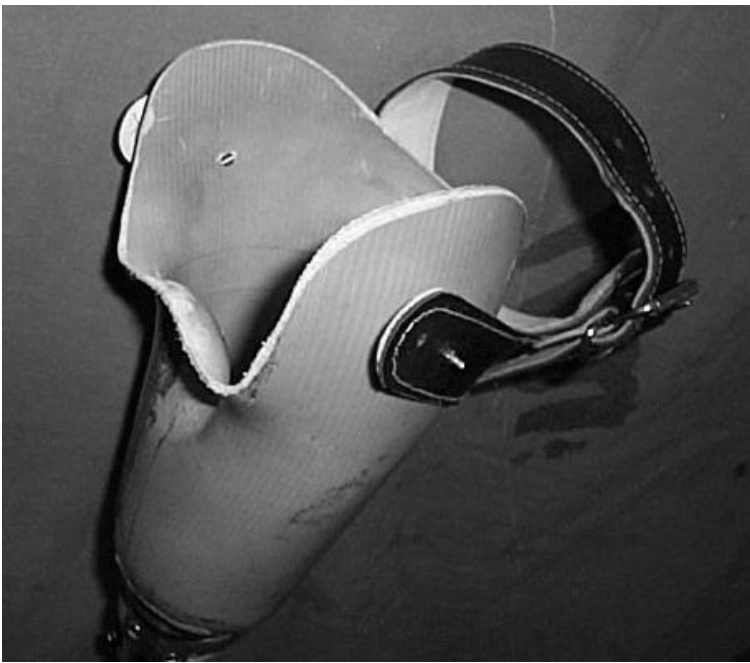


B/K amputation

- **socket**

types

- **PTB socket**
- **total surface bearing**

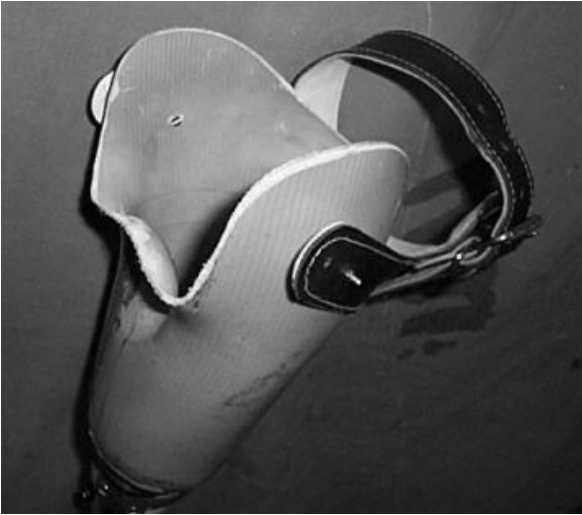


B/K amputation

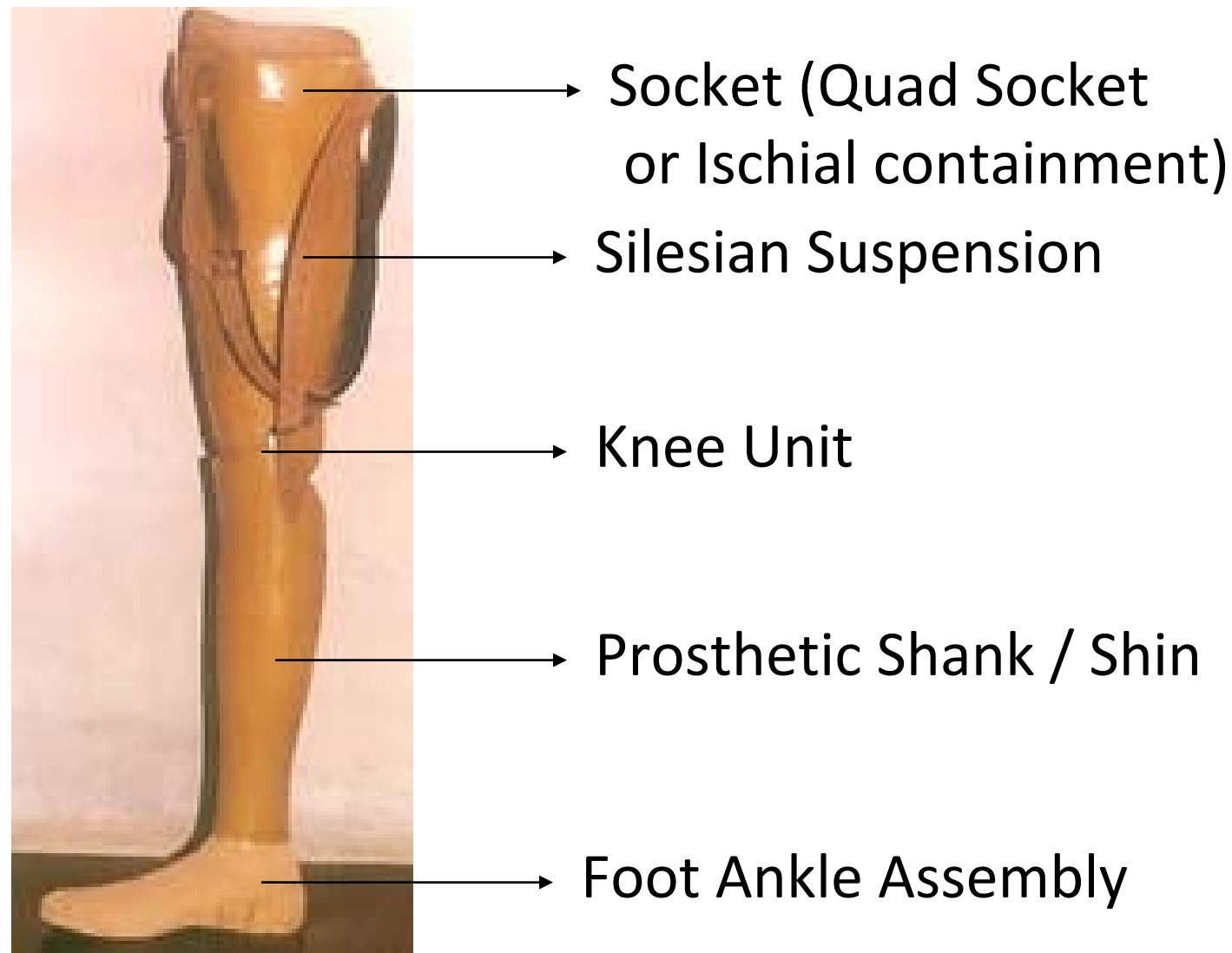
- **suspension**

types

- # **supracondylar cuff**
- # **sleeve**
- # **distal attachment**
- # **suction**
- # **thigh corset**
- # **fork strap & waist belt**



Above Knee/Transfemoral Prosthesis

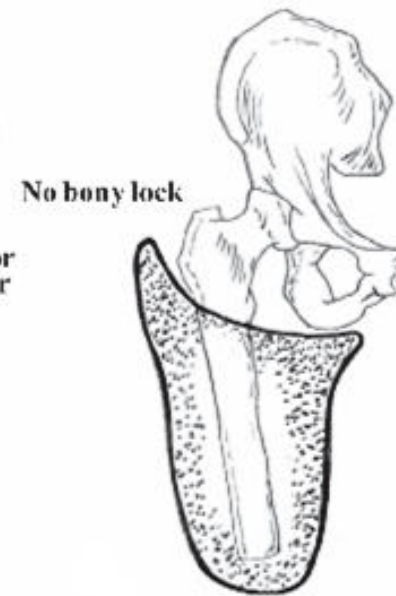
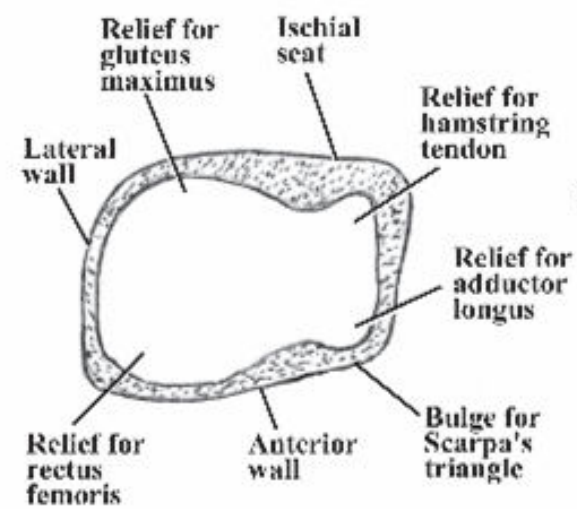


Knee Joints

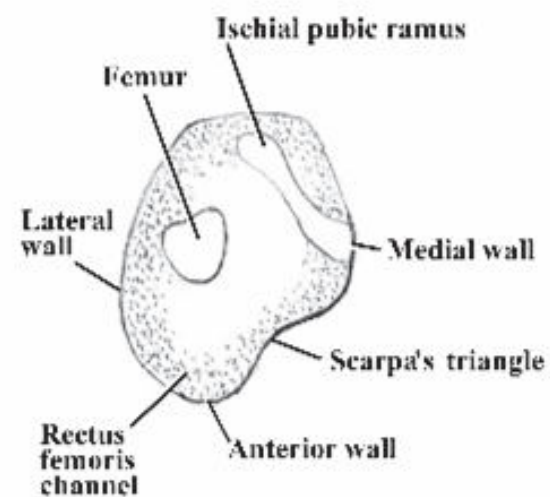
- Constant Friction Single axis knee joints
- Manual Locking knee
- Polycentric knee units
- Weight Activated Stance Control knee
- Hydraulic knee units
- Pneumatic knee units
- Microprocessor controlled knee joints



A/K amputation



quadrilateral socket



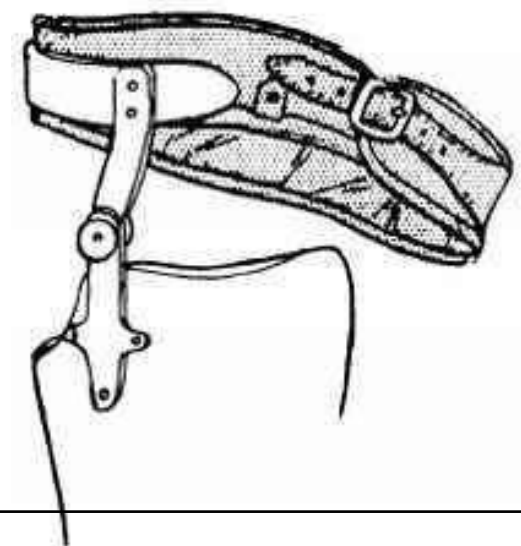
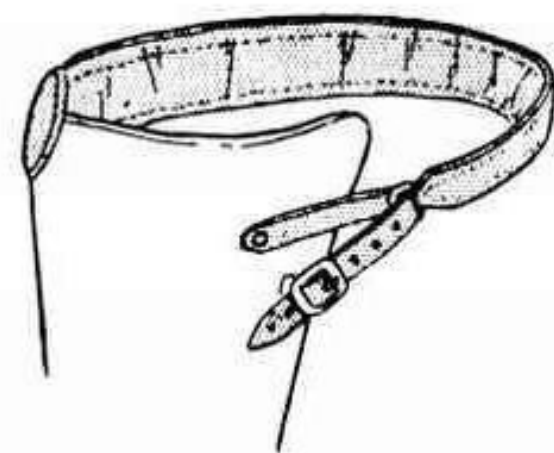
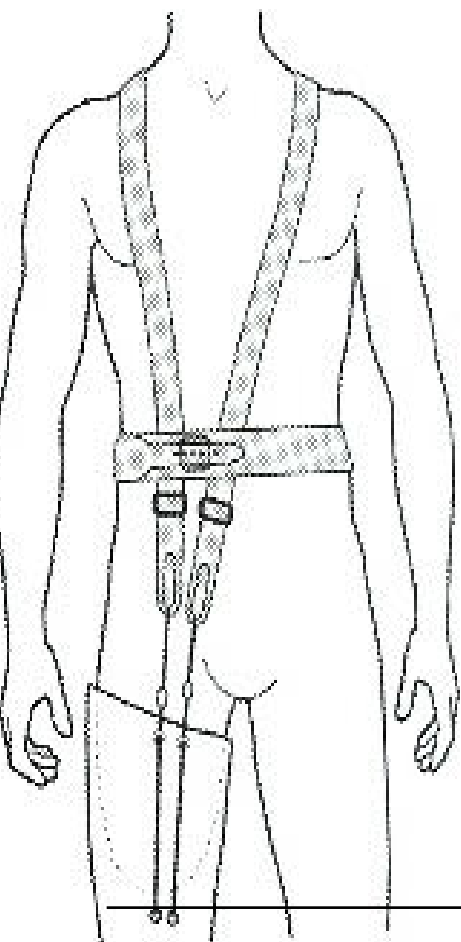
ischial containment socket

A/K amputation

• suspension

types

- # suction
- # silesian belt
- # hip joint & pelvic band
- # total elastic suspension belt
- # shoulder suspension



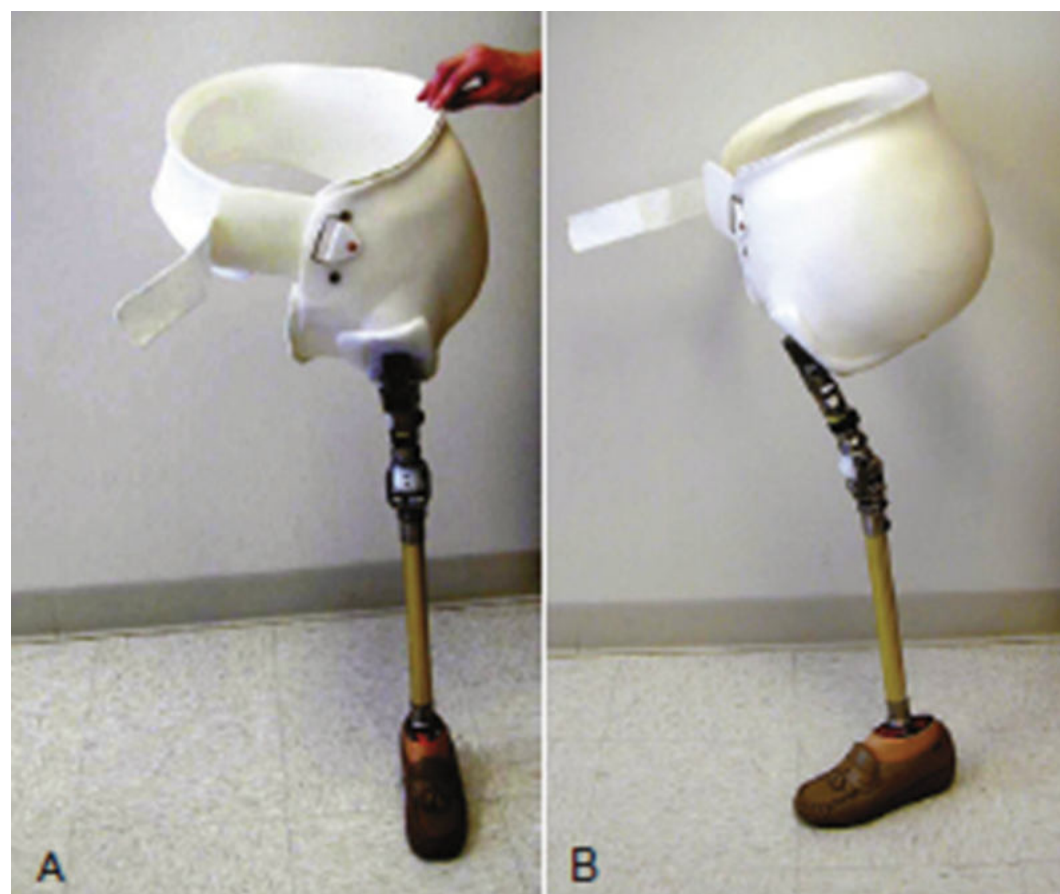
Knee disarticulation prosthesis

knee joints

the options are

1. outer hinges
2. polycentric knee joint

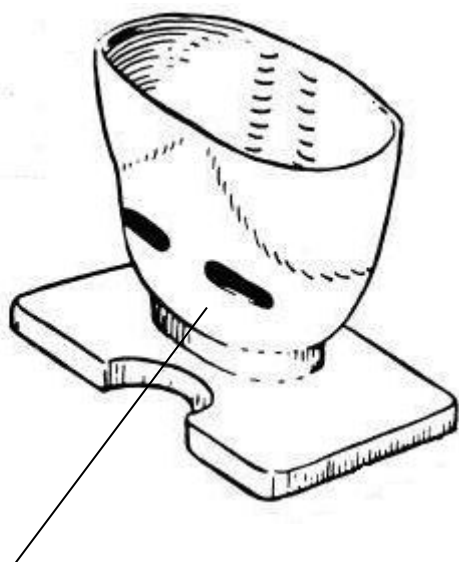
hip disarticulation / hemipelvectomy / <5 cm residual femur



translumbar amputation / hemicorporectomy

- for sitting

bucket prosthesis

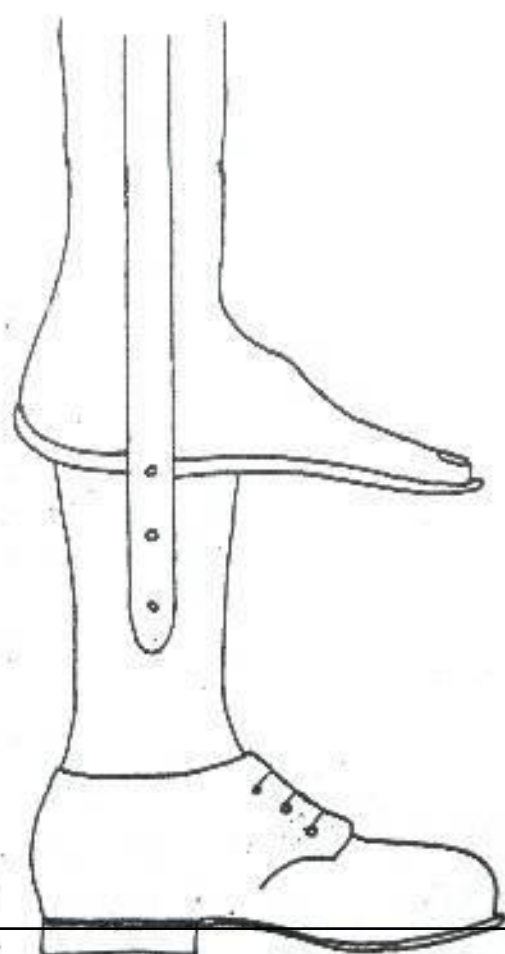


slits for bladder / bowel
drainage bags



Proximal focal femoral deficiencies

- extension prosthesis



features

- socket – is like an AFO
- if adequate weight-bearing is not possible on the foot, the socket is extended upto the ischium
- below the socket

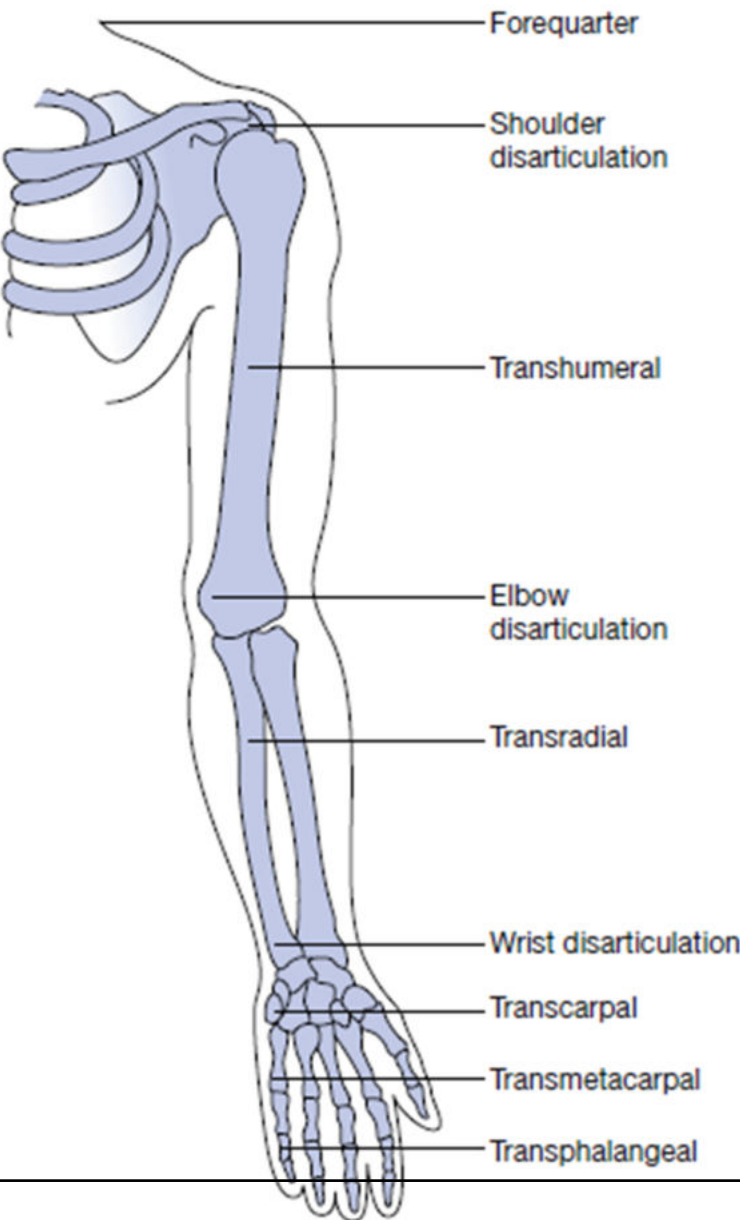
a shoe raise is given
(if limb length discrepancy is less)
or
a prosthetic foot is given
(if limb length discrepancy is more)

energy consumption

• traumatic unilateral B/K	7% more than non-amputees
• vascular unilateral B/K	25%
• traumatic unilateral A/K	25%
• vascular unilateral A/K	87%
• bilateral amputees	more

UPPER LIMB LEVELS OF AMPUTATION

- Transphalangeal
- Transmetacarpal
- Transcarpal
- Wrist disarticulation
- Transradial
- Elbow disarticulation
- Transhumeral
- Shoulder disarticulation
- Forequarter amputation



MAJOR MOTOR FUNCTIONS OF THE HAND

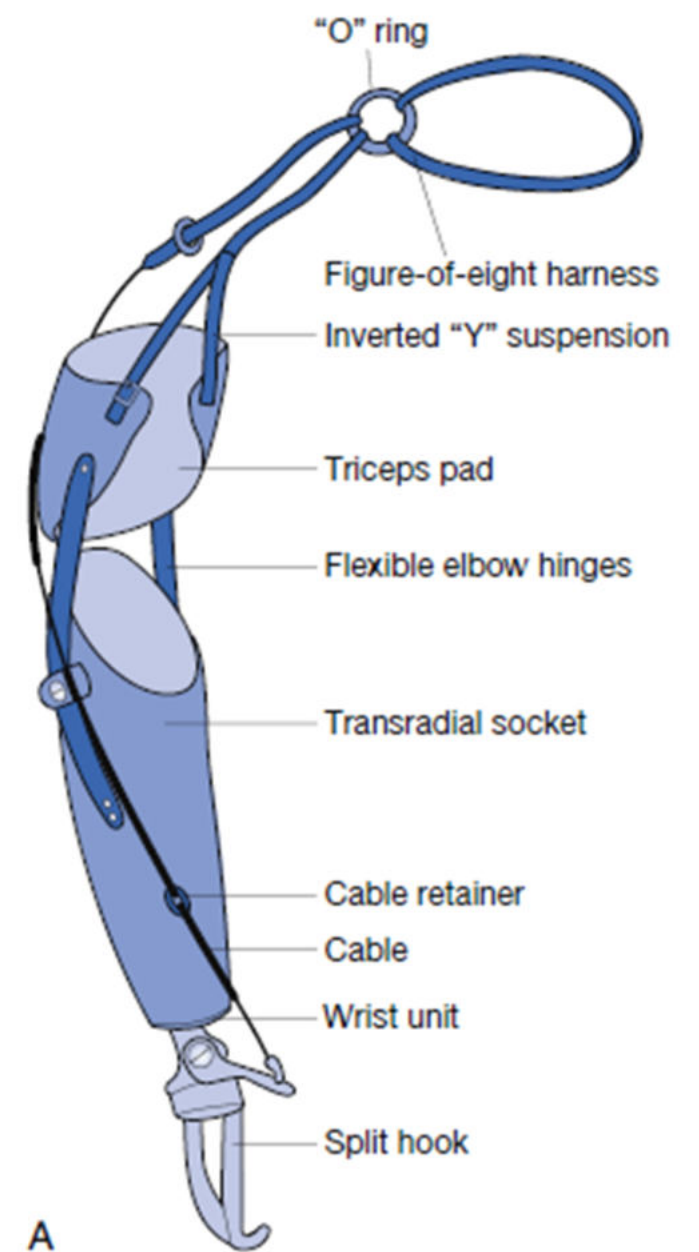
- Grasp
 - Spherical
 - Cylindrical
 - Hook
- Release
- Precision
 - Pinch-tip to tip, pulp to pulp, lateral key
 - Three jaw chuck

VARIOUS UPPER LIMB PROSTHESES

- Cosmetic: least function
- Body powered: most harnessing & body movt. needed
- Battery powered (myoelectric or switch controlled): heavy, expensive & extended therapy time
- Hybrid (cable to elbow or TD and battery powered)

BODY POWERED PROSTHESES : COMPONENTS

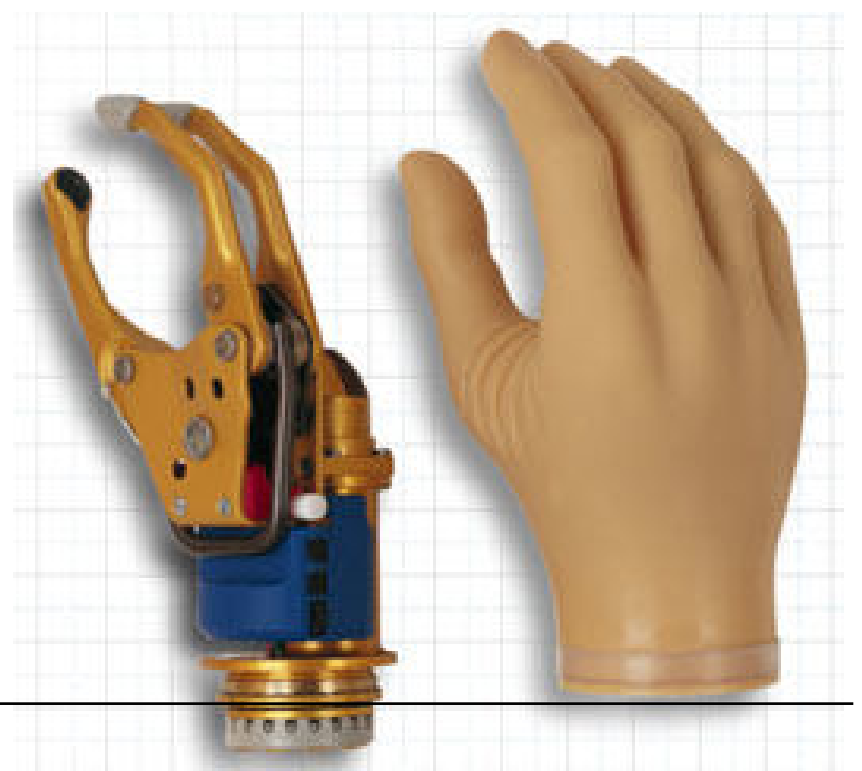
- Socket
- Suspension
- Control cable system
- Terminal device
- Interposing joints (wrist, elbow, shoulder)



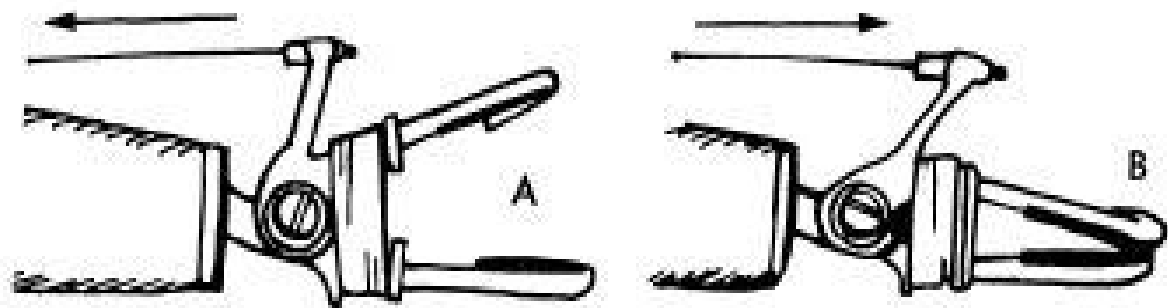
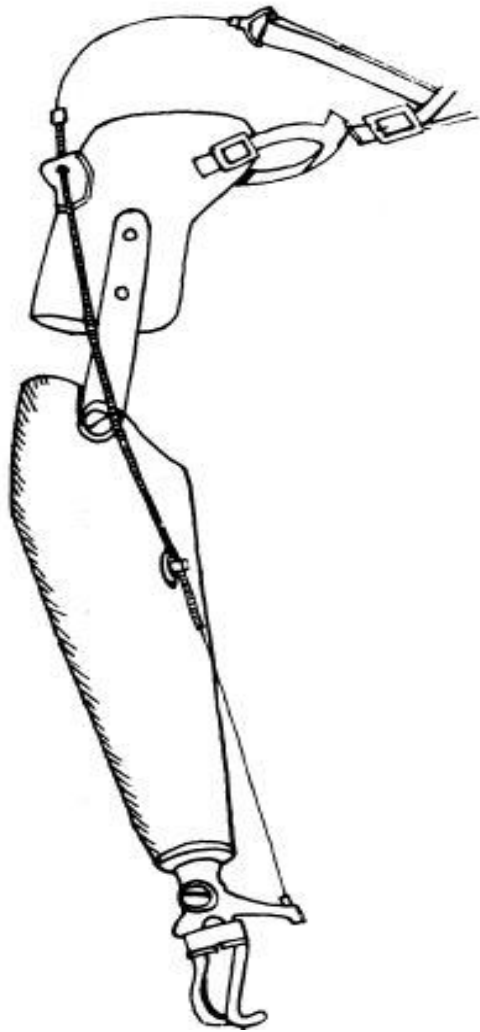
TERMINAL DEVICES



1. Passive: cosmetic hand , flexible mitts
2. Active: hook devices , prosthetic hand
 - a. Voluntary opening
 - b. Voluntary closing



CONTROL CABLE MECHANISMS



SOCKET

- **Socket**
dual-wall design



SUSPENSION

Harness

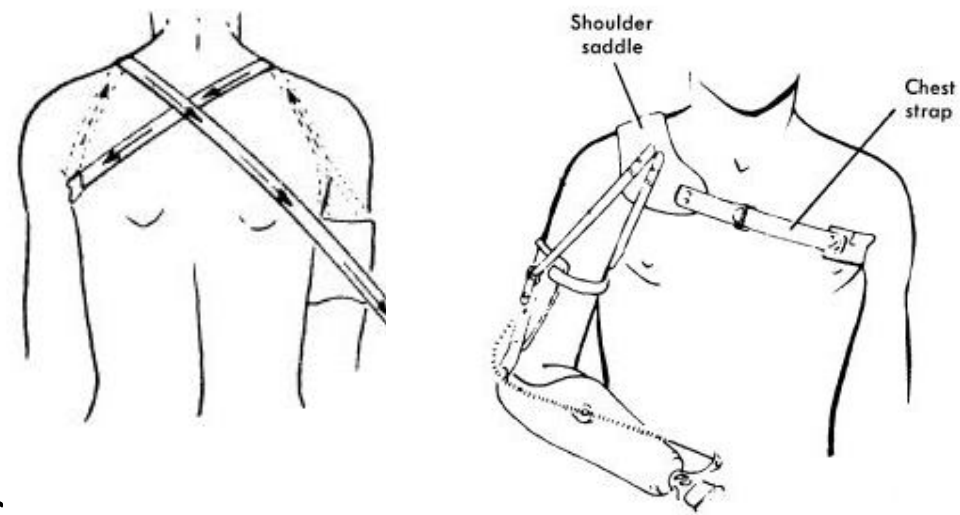
1. Figure of 8/ Standard trans radial harness
2. Shoulder saddle and chest strap

Self suspending

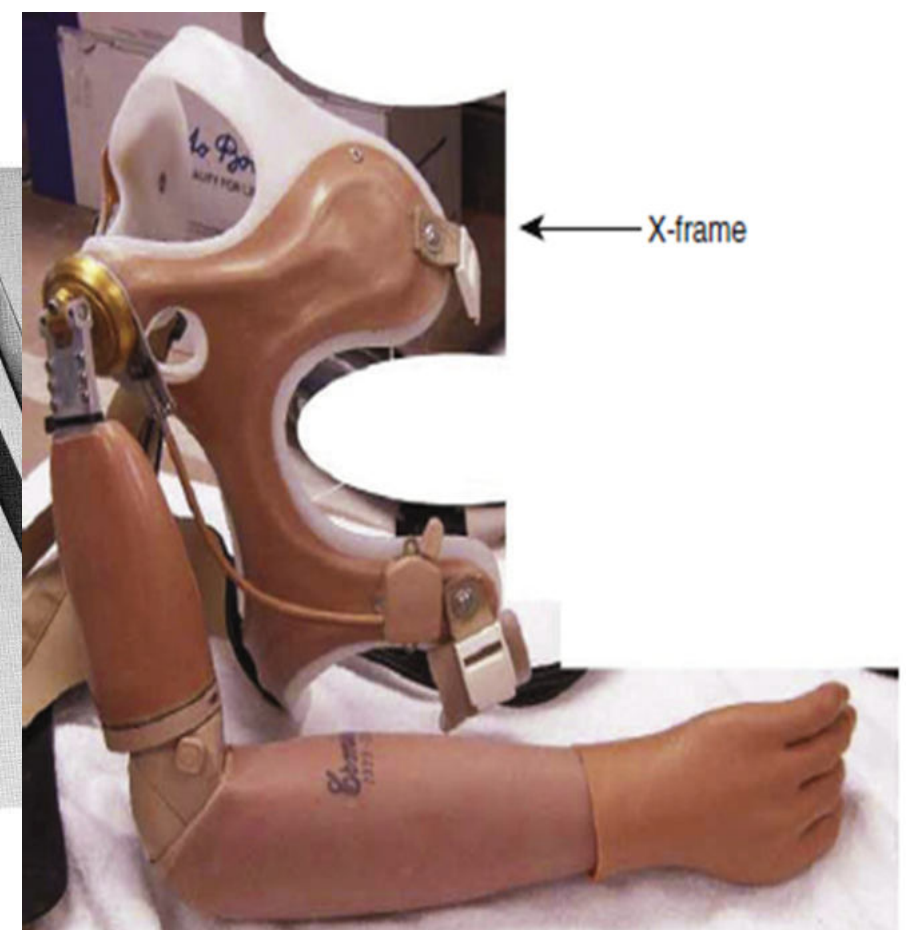
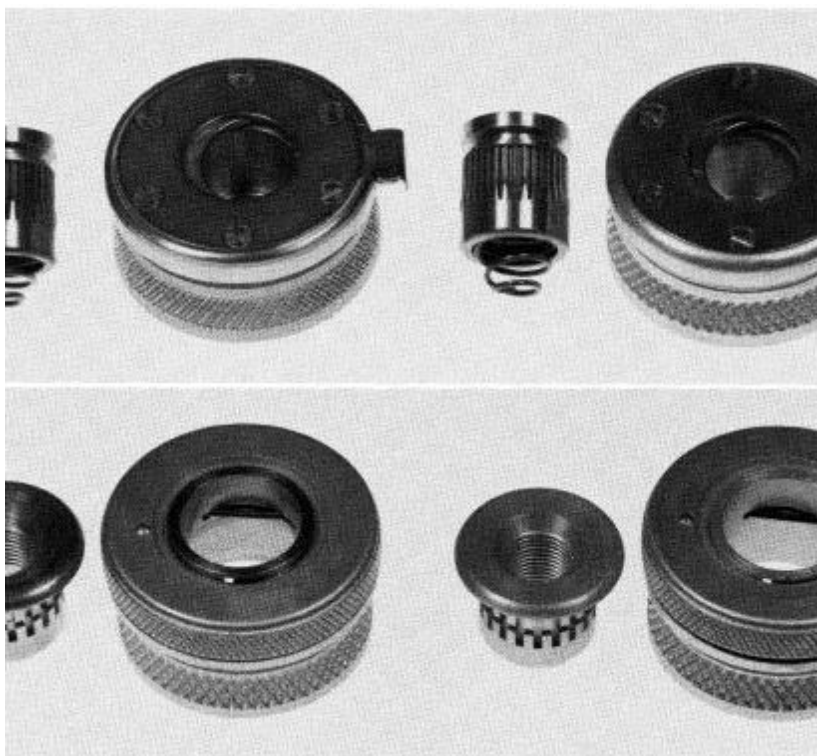
1. Muenster
2. Supracondylar

Suction

1. Suction socket with air valve
2. Gel sleeve with locking pin

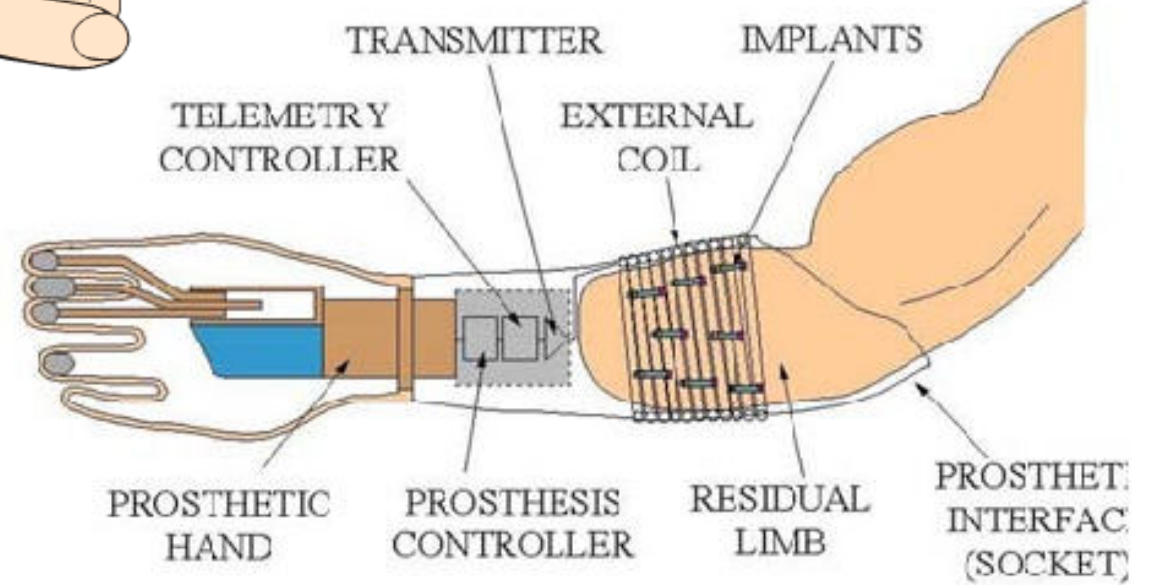
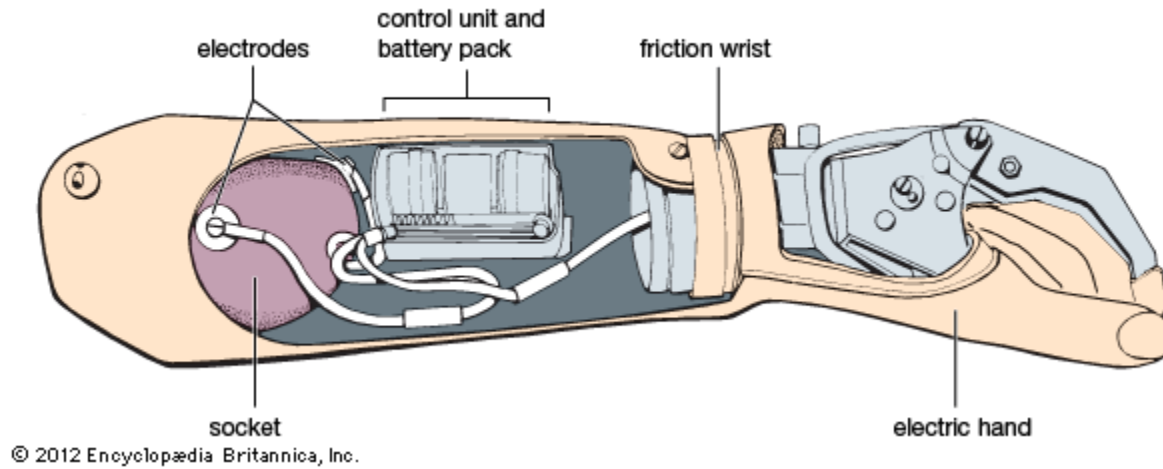


JOINTS: WRIST, ELBOW & SHOULDER UNITS



Externally powered prostheses/Myoelectric prostheses

Parts of a below-elbow myoelectric prosthesis



BIONIC HAND

