IOR Gait Full Body Model

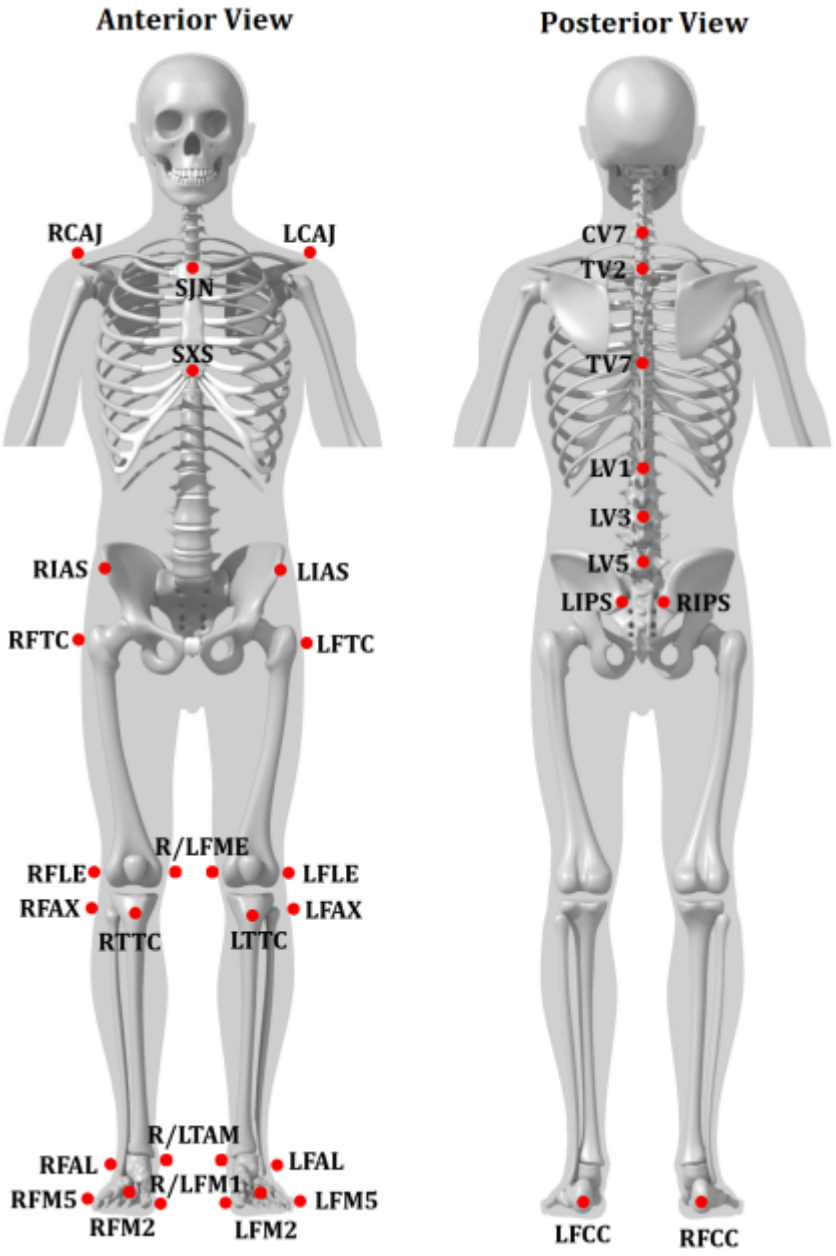
This tutorial explains how to implement the IOR Full Body Model in Visual3D.
The IOR Full Body Model is a combination of the IOR Multi-Segment Trunk, and the IOR Lower Extremity Model.
The naming convention in this tutorial follows Serge Van Sint Jan's convention.

Downloads

Sample files may be downloaded here.
The zip file contains:

1. C3D files which you can use to follow along with the tutorial
2. A model template which contains the landmark & segment definitions
3. A script which contains the planar & joint angle definitions
4. A report template which plots the relevant kinematics (joint angles & planar angles)
5. A completed CMO file

Target Placement

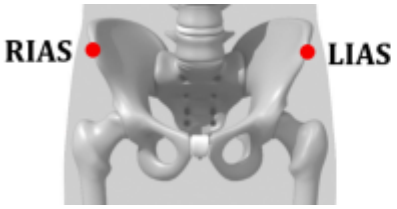


LCAJ/RCAJ (LA/RA): Left/Right acromion
SJN (IJ): Deepest point of the incisura jugularis
SXS (PX): Xiphoid process, i.e. most caudal point of the sternum
CV7 (C7): Spinous process of the seventh cervical vertebrae
TV2 (T2): Second thoracic vertebrae
TV7 (MAI): Midpoint between the inferior angles of the most caudal points of the two scapulae
LV1, LV3, LV5 (L1, L3, L5): First, third and fifth lumbar vertebrae
LIAS/RIAS (LASIS/RASIS): Left/Right anterior superior iliac spine
LIPS/RIPS (LPSIS/RPSIS): Left/Right posterior superior iliac spine
LFTC/RFTC (LGT/RGT): Most lateral prominence of the greater trochanter
LFLE/RFLE (LLE/RLE): Most medial prominence of the medial femoral epicondyle
LFME/RFME (LME/RME): Most medial prominence of the medial femoral epicondyle
LFAX/RFAX (LHF/RHF): Proximal tip of the head of the fibula
LTTC/RTTC (TT/RTT): Most anterior border of the tibial tuberosity
LFAL/RFAL (LLM/RLM): Lateral prominence of the lateral malleolus
LTAM/RTAM (LMM/RMM): Most medial prominence of the medial malleolus
LFCC/RFCC (LCA/RCA): Aspect of the Achilles tendon insertion on the calcaneus
LFM1/RFM1 (LFM/RFM): Dorsal margin of the first metatarsal head
LFM2/RFM2 (LSM/RSM): Dorsal aspect of the second metatarsal head
LFM5/RFM5 (LVM/RVM): Dorsal margin of the fifth metatarsal head

Segment Definitions

Pelvis

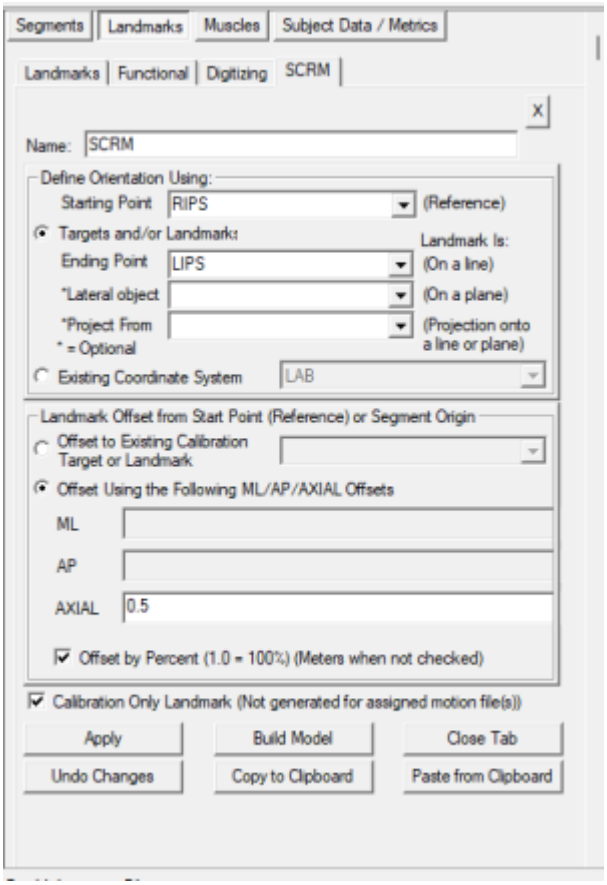
The pelvis segment coordinate system is consistent with the CODA pelvis, from which the Left and Right Hip Joint centers are automatically created.



LIAS/RIAS (LASIS/RASIS): Left/Right anterior superior iliac spine
LIPS/RIPS (LPSIS/RPSIS): Left/Right posterior superior iliac spine

Pelvis Landmarks

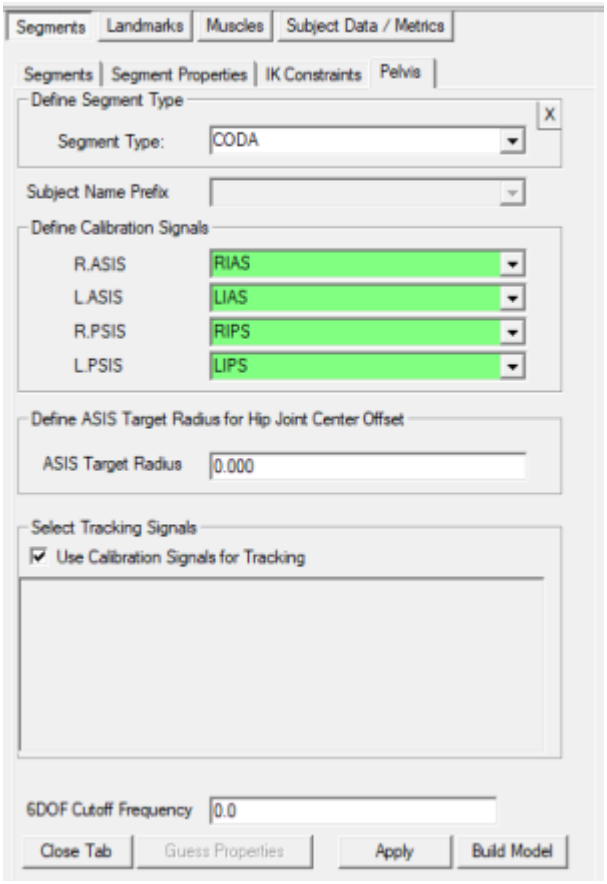
1. Create SCRM:



1. Click **Landmarks** button
2. Click **Add New Landmark** button
3. Create Landmark: SCRM
    - **Landmark Name:** SCRM
    - **Define Orientation Using:**
    - **Starting Point:** RIPS
    - **Ending Point:** LIPS
4. Offset Using the Following **ML/AP/AXIAL** Offsets:
    - **X:** 0.0 **Y:**0.0 **Z:**0.5
5. **Check:** Offset by Percent (1.0 = 100%)
6. **Check:** Calibration Only Landmark

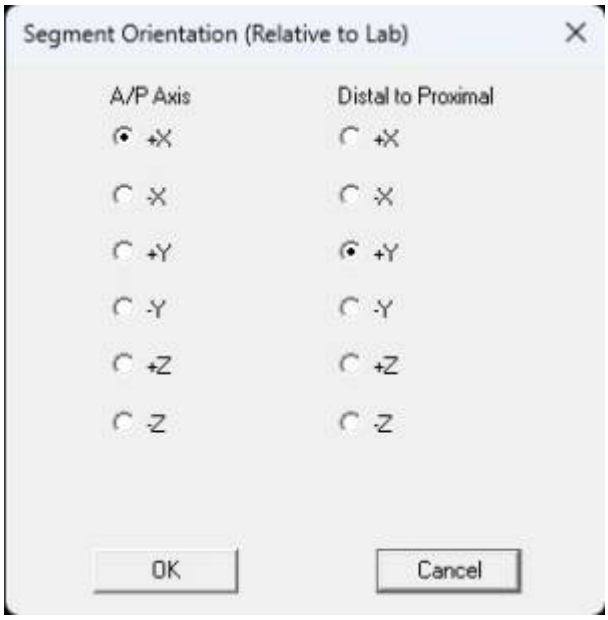
Pelvis Definition

2. Create Pelvis Segment:



1. In the **Segments** tab, select *Pelvis* in the Segment Name box
2. In **Segment Type**, select CODA
3. Click on the **Create Segment** button
4. In the **Pelvis** dialog:
    - **Define Calibration Targets**
    - **R.ASIS:** RIAS
    - **L.ASIS:** LIAS
    - **R.PSIS:** RIPS
    - **L.PSIS:** LIPS
    - **Select Tracking Targets:**
    - **Check:** Use Calibration Signals for Tracking
5. Clost **CODA Segment Markers** dialog box
6. Click on **Build Model**
7. Click on **Close Tab** before proceeding

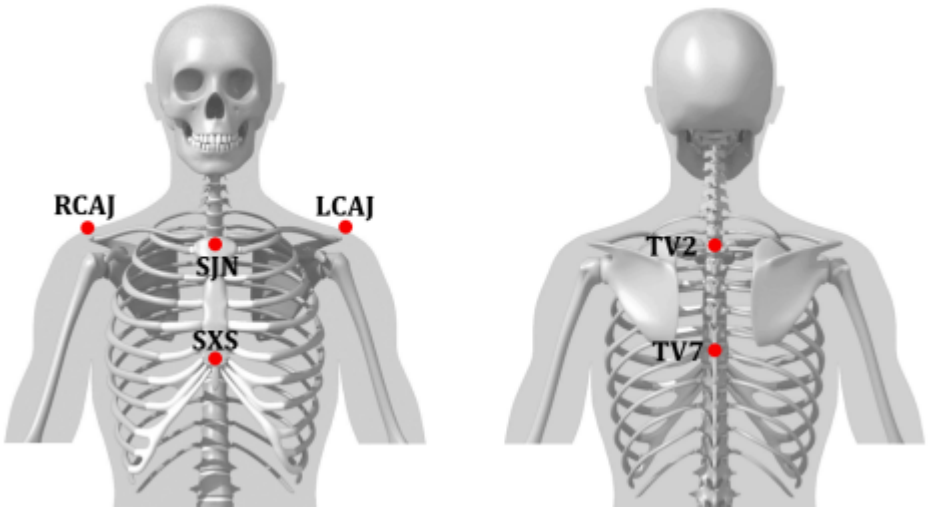
3. Modify the Segment Coordinate System



- Define the Segment Orientation as:
  - **A/P Axis:** +X
  - **Distal to Proximal:** +Y

Thorax Segment

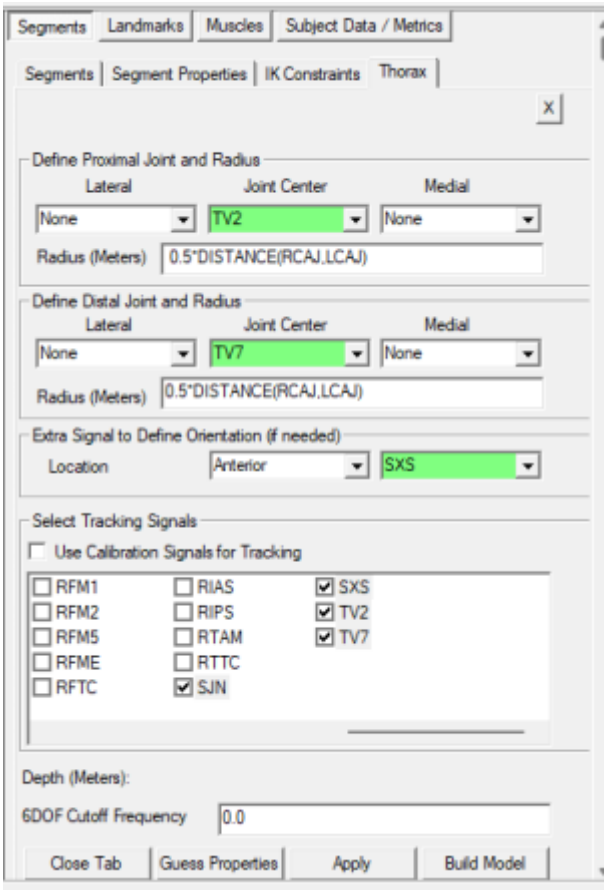
This marker set is consistent with the Rizzoli Gait model and the ISB recommendations.



LCAJ/RCAJ (LAR/RA): Left/Right acromion
SJN (IJ): Deepest point of the incisura jugularis
SXS (PX): Xiphoid process, i.e. most caudal point of the sternum
C7V (C7): Spinous process of the seventh cervical vertebrae
TV2 (T2): Second thoracic vertebrae
TV7 (MAI): Midpoint between the inferior angles of the most caudal points of the two scapulae

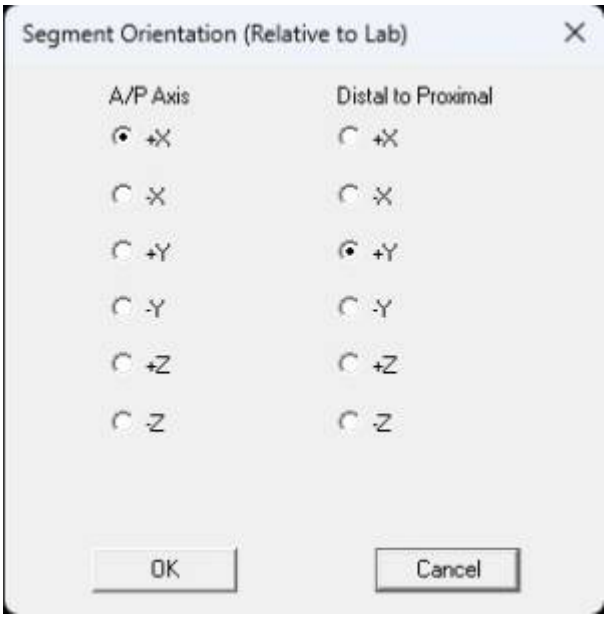
Thorax Definition

4. Create Thorax/Ab:



1. In the **Segments** tab, select *Thorax/Ab* in the Segment Name box.
2. Click **Kinematic Only**
3. Click on the **Create Segment** button
4. In the **Thorax/Ab** tab, enter these values:
    - **Define Proximal Joint and Radius**
    - **Lateral:** None **Joint:** TV2 **Medial:** None
    - **Radius** 0.5*DISTANCE(RCAJ,LCAJ)
    - **Define Distal Joint and Radius**
    - **Lateral:** None **Joint:** TV7 **Medial:** None
    - **Radius:** 0.5*DISTANCE(RCAJ,LCAJ)
    - **Extra Target to Define Orientation**
    - **Location:** Anterior SXS
    - **Select Tracking Targets:**
    - SJN, SXS, TV2, TV7
5. Click on **Build Model**
6. Click on **Close Tab** before proceeding.

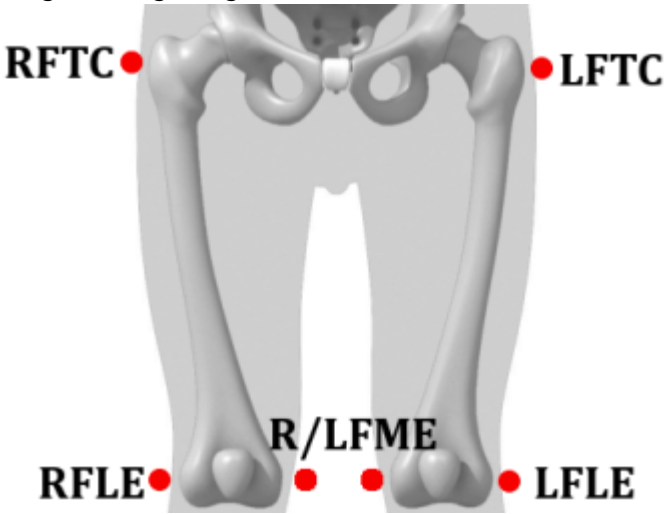
5. Modify the Segment Coordinate System ** * Define the Segment Orientation as: * **A/P Axis: +X



- **Distal to Proximal:** +Y

Thigh Segment

The RIGHT_HIP/LEFT_HIP landmarks are used to define the thigh segments. These landmarks are created automatically when the Pelvis segment is defined (so the Pelvis must be defined prior to creating the thigh segments).



LFTC/RFTC (LGT/RGT): Most Lateral prominence of the greater trochanter
LFKE/RFLE (LLE/RLE): Most lateral prominence of the lateral femoral epicondyle

LFME/RFME (LME/RME): Most medial prominence of the medial femoral epicondyle

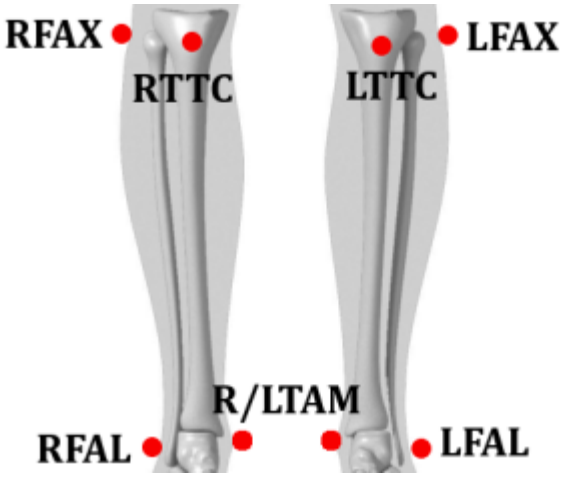
Thigh Definition

6. Create Right Thigh:

1. In the **Segments** tab, select Right Thigh in the Segment Name box
2. Click on the **Create Segment** button
3. In the **Right Thigh** tab, enter these values:
    - **Define Proximal Joint and Radius**
    - **Lateral:** None **Joint** RIGHT_HIP **Medial:** None
    - **Radius:** 0.5*DISTANCE(RIGHT_HIP,LEFT_HIP)
    - **Define Distal Joint and Radius**
    - **Lateral:** RFLE **Joint:** None **Medial:** RFME
    - **Select Tracking Targets:**
    - RIGHT_HIP,RFLE,RFME,RFTC
4. Click on **Build Model**
5. Click on **Close Tab** before proceeding

Shank Segment

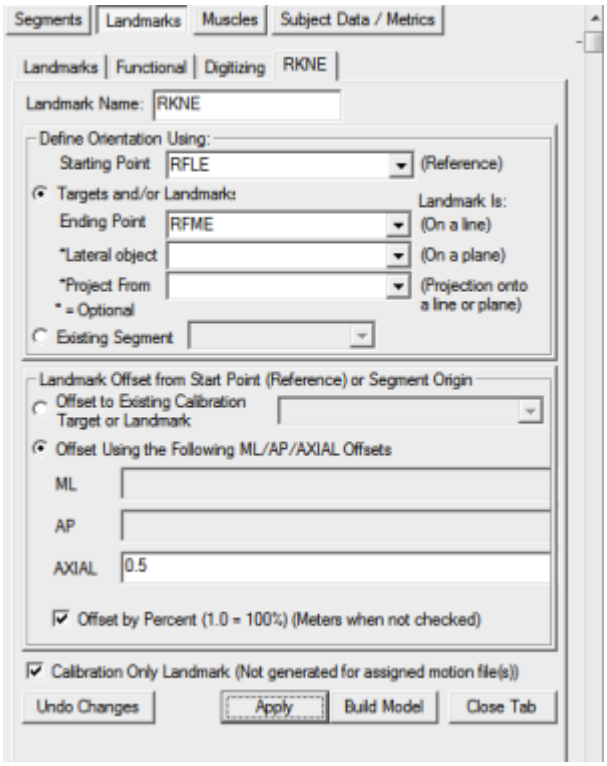
The segment coordinate system is different from the conventional gait model because the shank segment is designed according to markers located on the tibia and fibula, not the femur as with the Conventional Gait Model



LFAX/RFAX (LHF/RHF): Proximal tip of the head of the fibula
LTTC/RTTC (TT/RTT): Most anterior border of the tibial tuberosity
LFAL/RFAL (LLM/RLM): Lateral prominence of the lateral malleolus
LTAM/RTAM (LMM/RMM): Most medial prominence of the medial malleolus

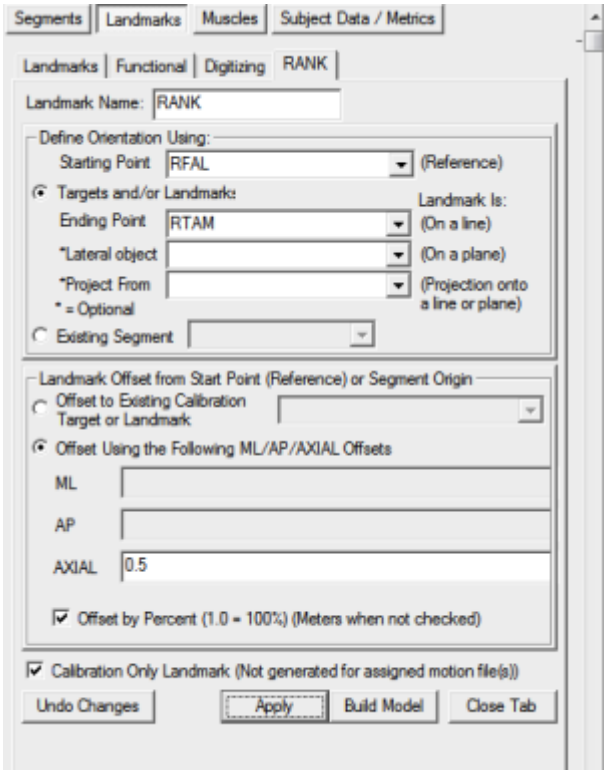
Shank Landmarks

7. Create RKNE Joint Center:



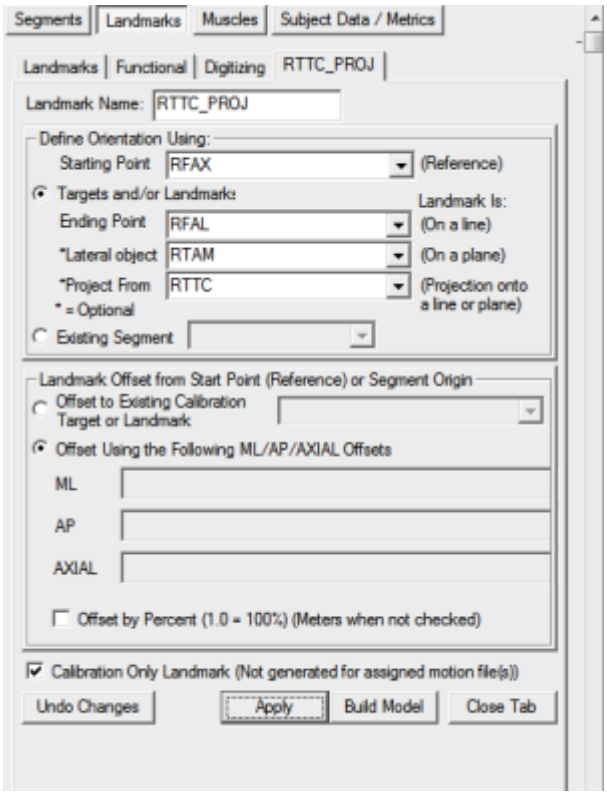
1. Click **Landmarks** button
2. Click **Add New Landmark** button
3. Create Landmark: RKNE
    - **Landmark Name:** RKNE
    - **Define Orientation Using:**
    - **Starting Point:** RFLE
    - **Ending Point:** RFME
4. Offset Using the Following **AXIAL** Offset: 0.5
5. **Check:** Offset by Percent (1.0 = 100%)
6. **Check:** Calibration Only Landmark

8. Create RANK Joint Center:



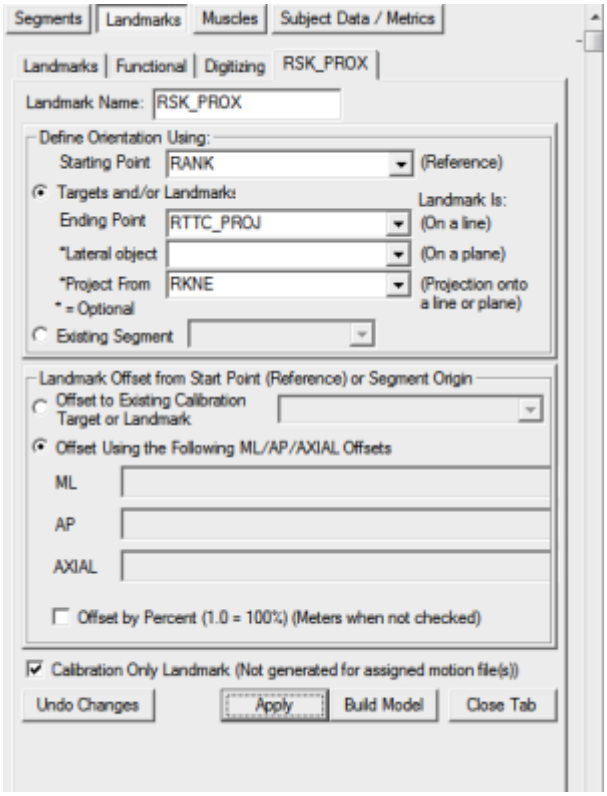
1. Click **Landmarks** button
2. Click **Add New Landmark** button
3. Create Landmark: RANK
    - **LANDMARK Name:** RANK
    - **Define Orientation Using:**
    - **Starting Point:** RFAL
    - **Ending Point:** RRAM
4. Offset Using the Following **AXIAL** Offset: 0.5
5. **Check:** Offset by Percent (1.0 = 100%)
6. **Check:** Calibration Only Landmark

9. Create RTTC_PORJ:

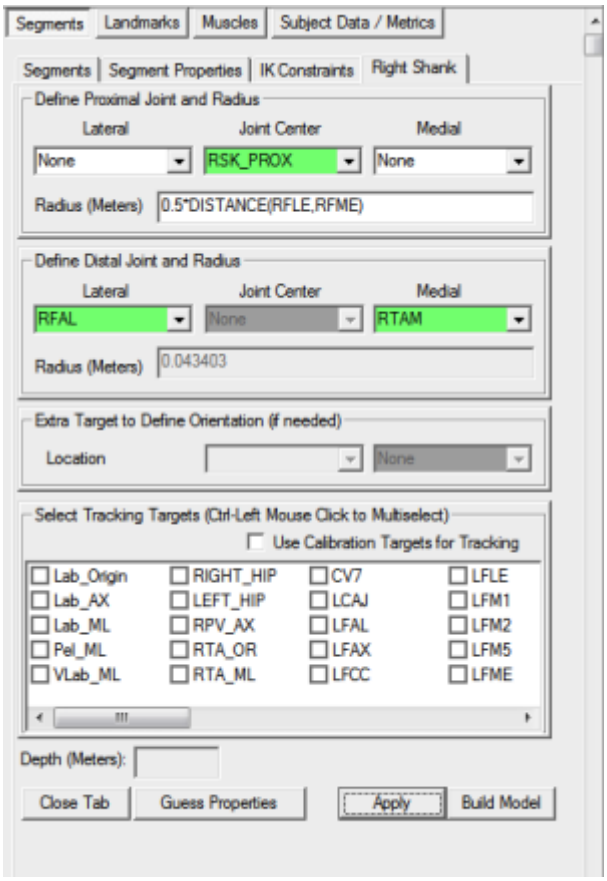


1. Click **Landmarks** button
2. Click **Add New Landmark** button
3. Create Landmark: RTTC_PROJ
    - **Landmark Name:** RTTC_PROJ
    - **Define Orientation Using:**
    - **Starting Point:** RFAX
    - **Ending Point:** RTAM
    - **Lateral Object:** RTAM
    - **Project From:** RTTC
4. **Do Not Chck:** Offset by Percent (1.0 = 100%)
5. **Check:** Calibration Only Landmark

10. Create RSK_PROX:



1. Click **Landmarks** button
2. Click **Add New Landmark** button
3. Create Landmark: RSK_PROX
    - **Landmark Name:** RSK_PROX
    - **Define Orientation Using:**
    - **Starting Point:** RANK
    - **Ending Point:** RTTC_PROJ
    - **Lateral Object:** Leave Blank
    - **Project From:** RKNE
4. **Do NOT Check:** Offset by Percent (1.0 = 100%)
5. **Check:** Calibration Only Landmark



Shank Definition

11. Create Right Shank:

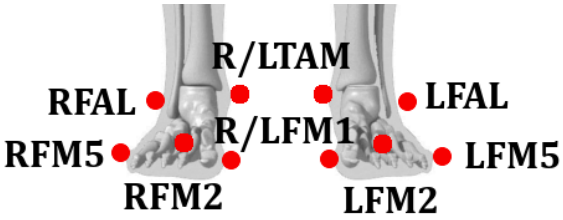
1. In the **Segments** tab, select Right Shank in the Segment Name box
2. Click on the **Create Segment** button
3. In the **Right Shank** tab, enter these values:
    - **Define Proximal Joint and Radius**
    - **Lateral:** None **Joint:** RSK_PROX **Medial:** None
    - **Radius:** 0.5*DISTANCE(RFLE,RFME)
    - **Define Distal Joint and Radius**
    - **Lateral:** RFAL **Joint:** None **Medial:** RTAM
    - **Select Tracking Targets:**
    - RFAL, RFAX, RTAM, RTTC

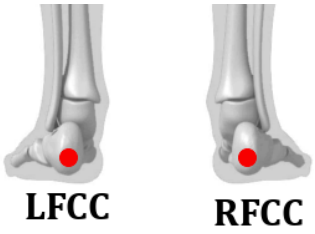
12. Modify the Segment Coordinate System:

- Define the Segment Orientation as:
- **A/P Axis:** +X
- **Distal to Proximal:** +Y

Foot Segment

The foot segment coordinate system is consistent with some version of the Conventional Gait Model. The foot segment is created using the RANK/LANK landmarks which are described in the Shank Landmarks section

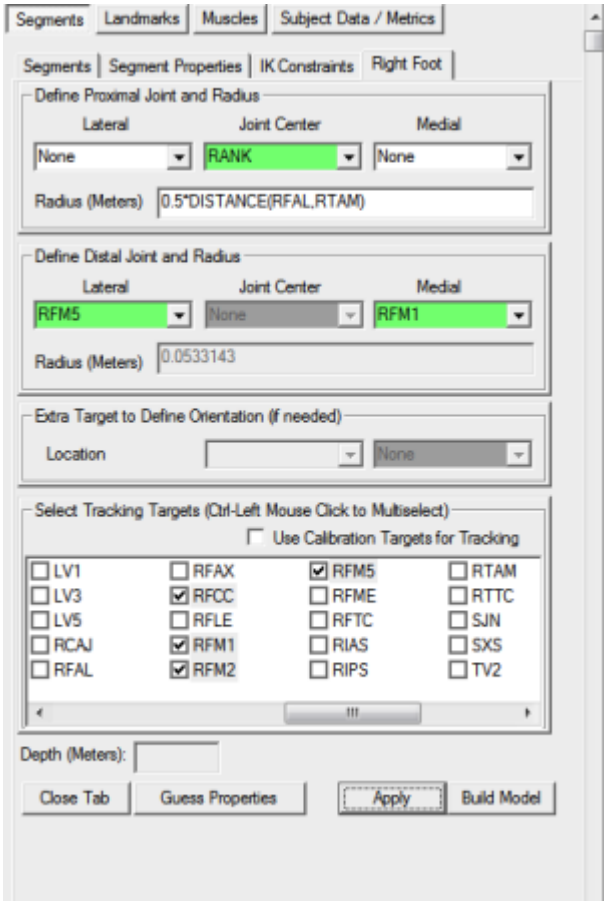




LFAL/RFAL (LLM/RLM): Lateral prominence of the lateral malleolus
LTAM/RTAM (LMM/RMM): Most medial prominence of the medial malleolus
LFCC/RFCC (LCA/RCA): Aspect of the achilles tendon insertion on the calcaneous
LFM1/RFM1 (LFM/RFM): Dorsal margin of the first metatarsal head
LFM2/RFM2 (LSM/RSM): Dorsal aspect of the second metatarsal head
LEFM5/RFM5 (LVM/RVM): Dorsal margin of the fifth metatarsal head

Kinetic Foot

13. Create Right Foot:



1. In the **Segments** tab, select the Right Foot in the Segment Name box

2. Click on the **Create Segment** button
3. In the **Right Foot** tab, enter these values:
    - **Define Proximal Joint and Radius**
    - **Lateral:** None **Joint:** RANK **Medial:** None
    - **Radius:** 0.5*DISTANCE(RFAL,RTAM)
    - **Define Distal Joint and Radius**
    - **Lateral:** RFM5 **Joint:** None **Medial:** RFM1
    - **Select Tracking Targets:**
    - RFCC, RFM1, RFM2, RFM5
4. Click on the **Build Model**
5. Click on **Close Tab** before proceeding

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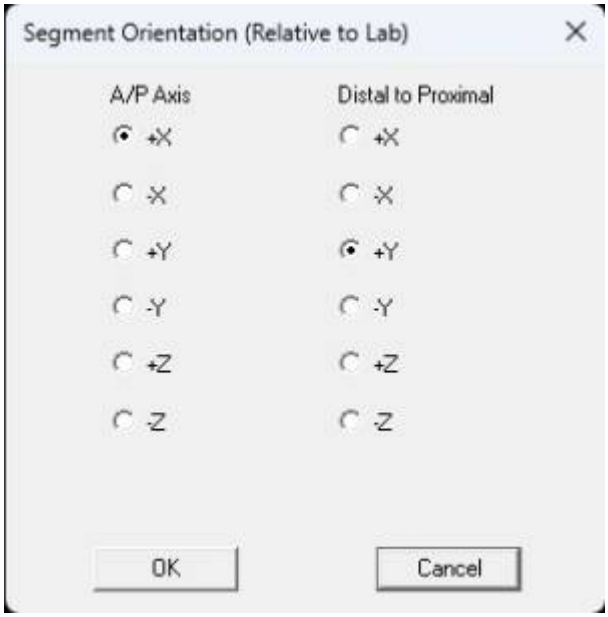
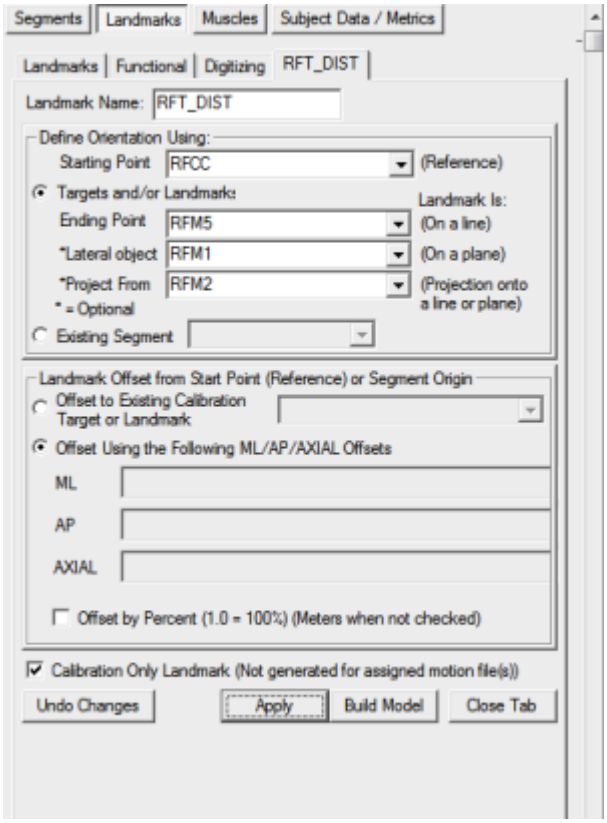
14. Modify the Segment Coordinate System:



- Define the Segment Orientation as:
    - **A/P Axis:** +X
    - **Distal to Proximal:** +Y

Kinematic Foot Landmarks

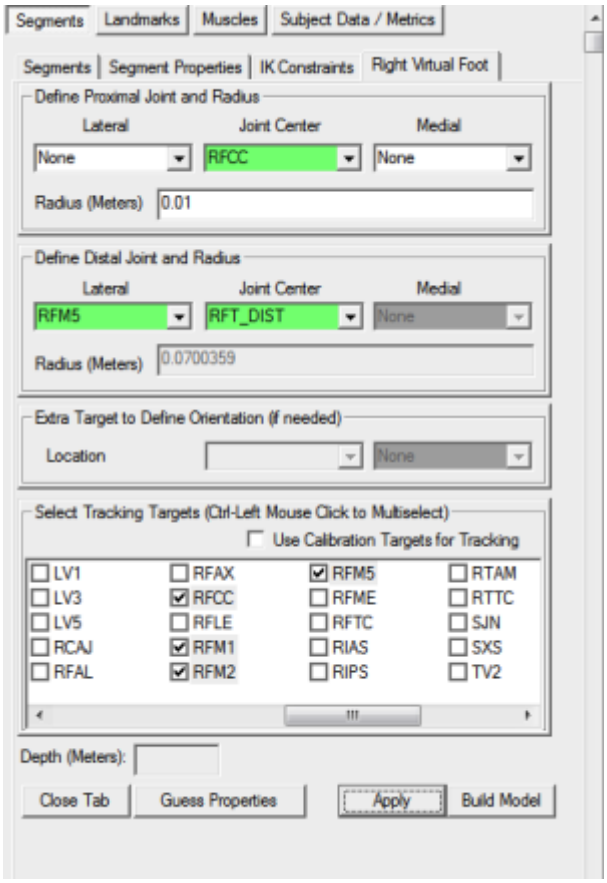
15. Create RFT_DIRT:



1. Click **Landmarks** button
2. Click **Add New Landmark** button
3. Create Landmark: RFT_DIST
    - **Landmark Name:** RFT_DIST
    - **Define Orientation Using:**
    - **Starting Point:** RFCC
    - **Ending Point:** RFM5
    - **Lateral Object:** RFM1
    - **Project From:** RFM2
4. **Do NOT Check:** Offset by Percent (1.0 = 100%)
5. **Check:** Calibration Only Landmark

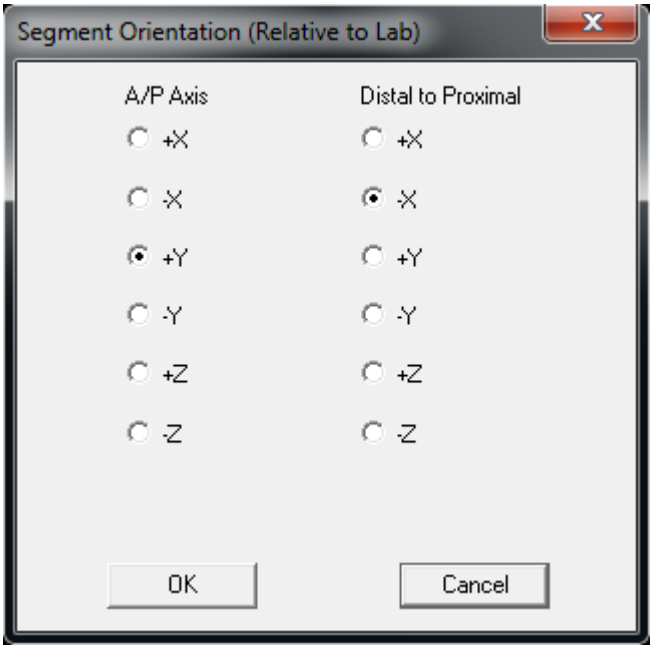
Kinematic Foot Definition

16. Create Right Virtual Foot:



1. In the **Segments** tab, type *Right Virtual Foot* int the Segment Name box
2. Check the **Kinematic Only** Check Box
3. Click on the **Create Segment** button
4. in the **Right Virtual Foot** tab, enter these values:
    - **Define Proximal Joint and Radius**
    - **Lateral** None **Joint:** RFCC **Medial:** None
    - **Radius:** 0.1
    - **Define Distal Joint Radius**
    - **Lateral:** RFM5 **Joint:**RFT_DIST **Medial:** None
    - **Select Tracking Targets:**
    - RFCC, RFM1, RFM2, RFM5

17. Modify the Segment Coordinate System:

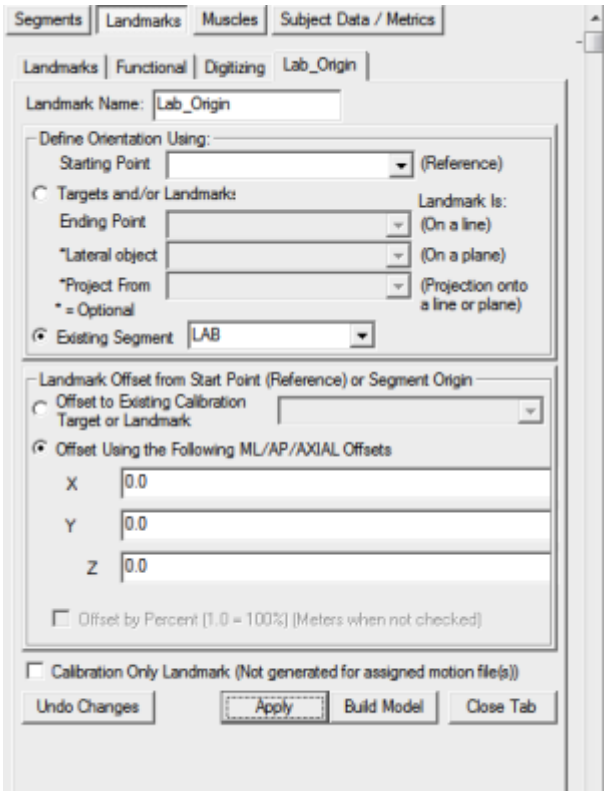


- Define the Segment Orientation as:
  - **A/P Axis:** +Y
  - **Distal to Proximal:** -X

Virtual Lab

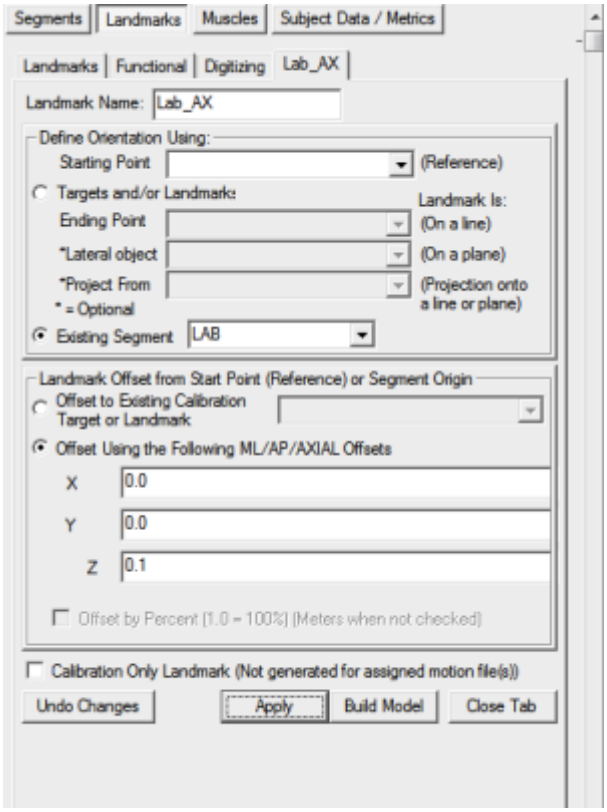
Virtual Lab Landmarks

18. Create Lab_Origin:



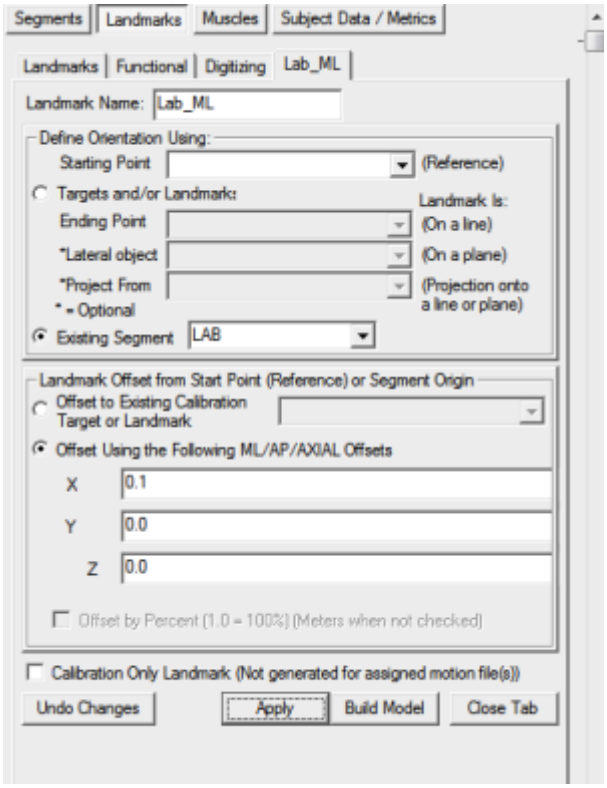
1. Click **Landmarks** button
2. Click **Add New Landmark** button
3. Create Landmark: Lab_Origin
    - **Landmark Name:** Lab_Origin
4. Offset Using the Following **ML/AP/AXIAL** Offsets:
    - **X:** 0.0 **Y:** 0.0 **Z:** 0.0
5. **Do NOT Check:** Offset by Percent (1.0 = 100%)
6. **Do NOT Check:** Calibration Only Landmark

19. Create Lab_AX:



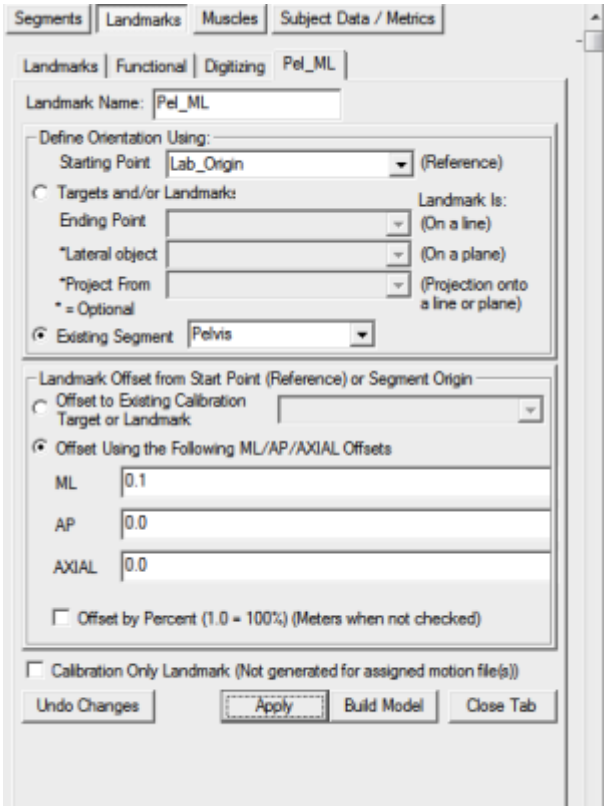
1. Click **Landmarks** button
2. Click **Add New Landmark** button
3. Create Landmark: Lab_Origin
    - **Landmark Name:** Lab_AX
4. Offset Using the Following **ML/AP/AXIAL** Offsets:
    - **X:** 0.0 **Y:** 0.0 **Z:** 0.1
5. **Do NOT Check:** Offset by Percent (1.0 = 100%)
6. **Do NOT Check:** Calibration Only Landmark

20. Create Lab_ML:



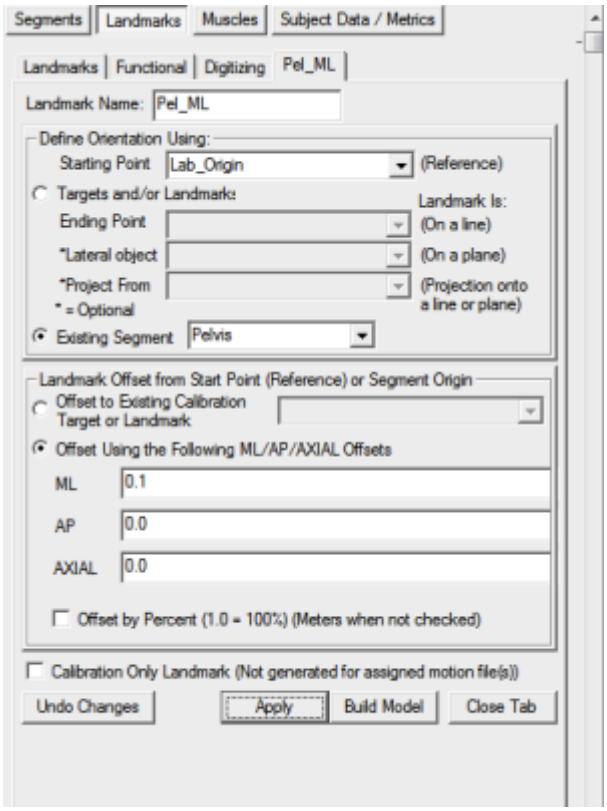
1. Click **Landmarks** button
2. Click **Add New Landmark** button
3. Create Landmark: Lab_ML
    - **Landmark Name:** Lab_ML
4. Offset Using the Following **ML/AP/AXIAL** Offsets:
    - **X:** 0.1 **Y:** 0.0 **Z:** 0.0
5. **Do NOT Check:** Offset by Percent (1.0 = 100%)
6. **Do NOT Check:** Calibration Only Landmark

21. Create Lab_ML:



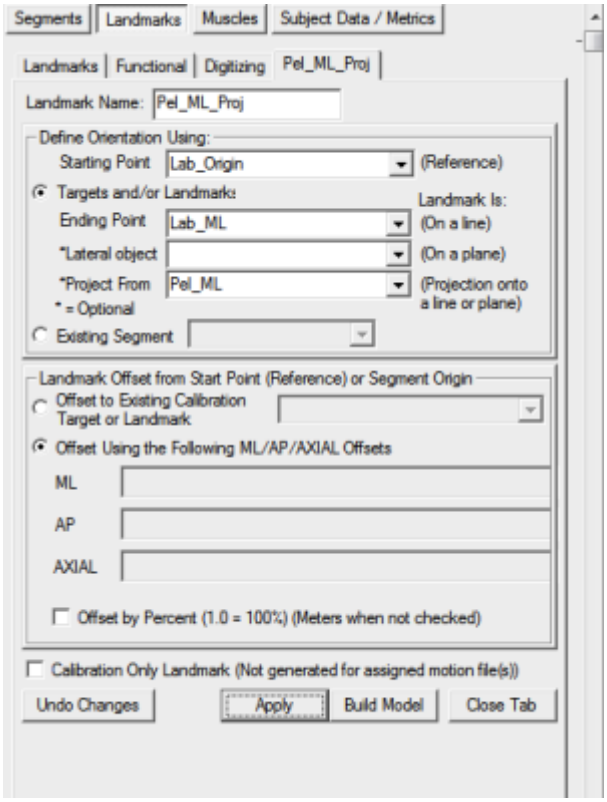
1. Click **Landmarks** button
2. Click **Add New Landmark** button
3. Create Landmark: Lab_ML
    - **Landmark Name:** Lab_ML
4. Offset Using the Following **ML/AP/AXIAL** Offsets:
    - **X:** 0.1 **Y:** 0.0 **Z:** 0.0
5. **Do Not Check:** Offset by Percent (1.0 = 100%)
6. **Do NOT Check:** Calibration Only Landmark

22. Create Pel_ML:



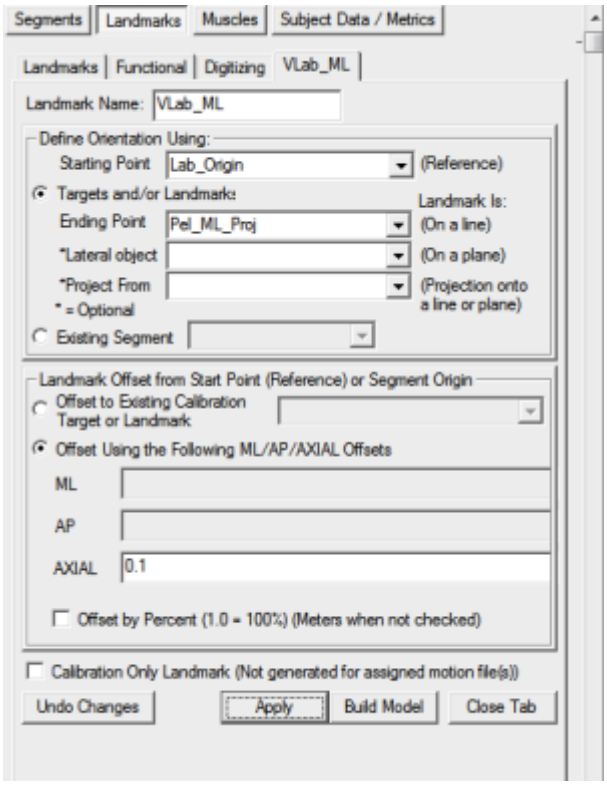
1. Click **Landmarks** button
2. Click **Add New Landmark** button
3. Create Landmark: Pel_ML
    - **Landmark NameL** Pel_ML
    - **Define Orientation Using:**
    - **Starting Point:** Lab_Origin
    - **Existing Segment:** Pelvis
4. Offset Using the Following **ML/AP/AXIAL** Offsets:
    - **X:** 0.1 **Y:** 0.0 **Z:** 0.0
5. **Do NOT Check:** Offset by Percent (1.0 = 100%)
6. **Do NOT Check:** Calibration Only Landmark

23. Create Pel_ML_Proj:



1. Click **Landmarks** button
2. Click **Add New Landmark** button
3. Create Landmark: Pel_ML_Proj
    - **Landmark Name:** Pel_ML_Proj
    - **Define Orientation Using:**
    - **Starting Point:** Lab_Origin
    - **Ending Point:** Lab_ML
    - **Project Point:** Pel_ML
4. **Do NOT Check:** Offset by Percent (1.0 = 100%)
5. **Do NOT Check:** Calibration Only Landmark

24. Create VLab_ML:

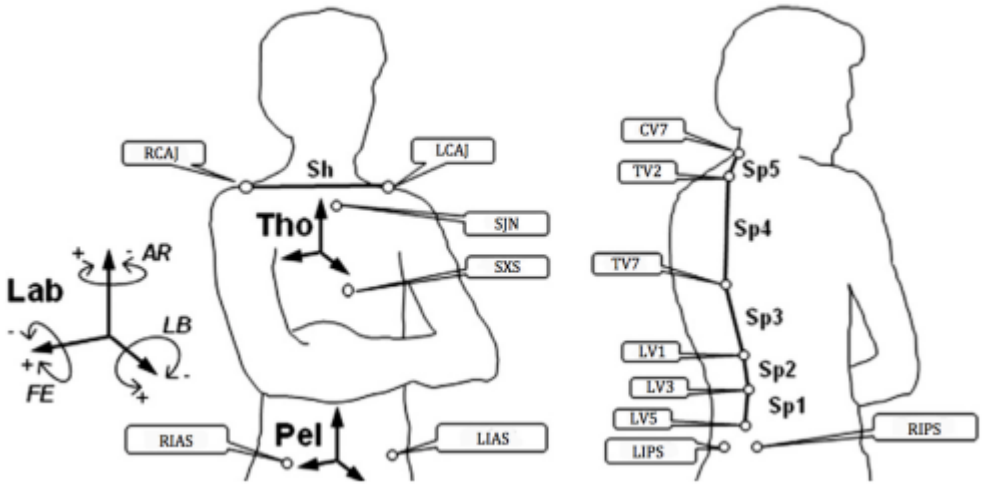


1. Click **Landmarks** button
2. Click **Add New Landmark** button
3. Create Landmark: VLab_ML
    - **Landmark Name:** VLab_ML
    - **Define Orientation Using:**
    - **Starting Point:** Lab_Origin
    - **Ending Point:** Lab_ML
    - **Project Point:** Pel_ML_Proj
4. Offset Using the Following **ML/AP/AXIAL** Offsets:
    - **AXIAL:** 0.1
5. **Do NOT Check:** Offset by Percent (1.0 = 100%)
6. **Do NOT Check:** Calibration Only Landmark

Planar Angles

To calculate the orientation of the trunk segments, planar angles are calculated to determine the orientation of the various segments relative to one another. To calculate a planar angle, you need to

either reference the ORIGINAL or PROCESSED folder when defining a target. If your targets have not been filtered or interpolated, you will not have a processed folder and will need to use the ORIGINAL. However, if you plan to process your target data in any way, you should do this now, prior to creating you planar angles.

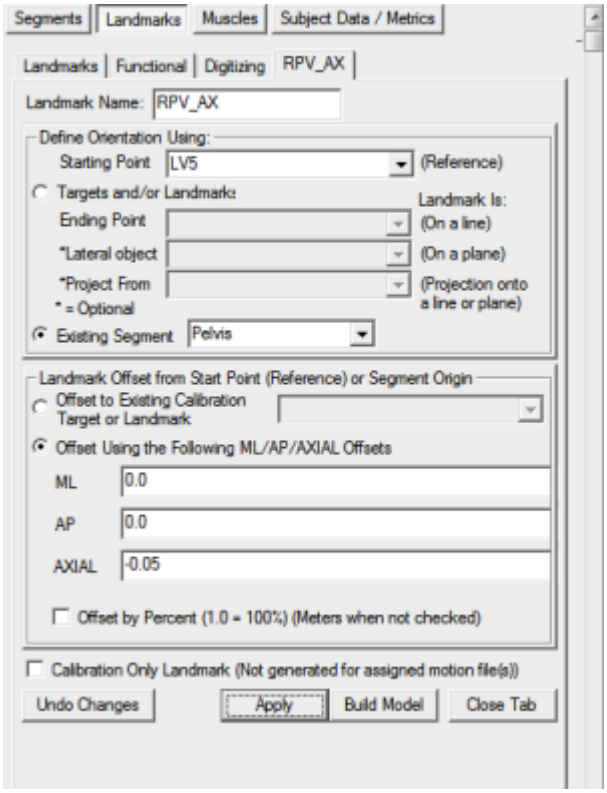


The following abbreviations are used in naming the planar angles

- **FE** Flexion/Extension
- **LB** Lateral Bending
- **AR** Axial Rotation

Spine FE & LB Landmarks

25. Create RPV_AX:



1. Click **Landmarks** button
2. Click **Add New Landmark** button
3. Create Landmark: RPV_AX

- **Landmark Name:** RPV_AX
- **Define Orientation Using:**
- **Starting Point:** LV5

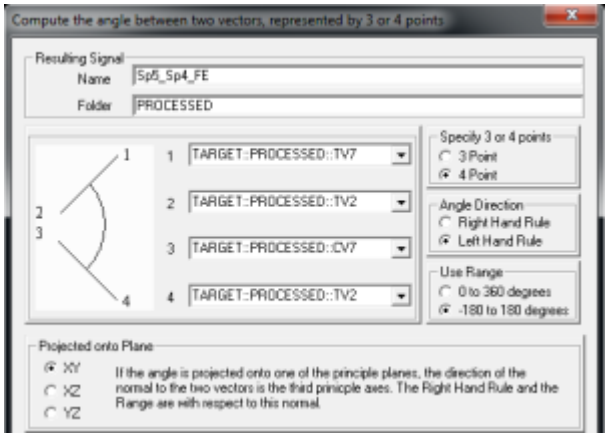
4. Offset Using the Following **ML\AP\AXIAL** Offsets:
   - **X:** 0.0 **Y:** 0.0 **Z:** -0.05
5. **Do NOT Check:** Offset by Percent (1.0 = 100%) (Meters when not checked)
6. **Do NOT Check:** Calibration Only Landmark (Not generated for assigned motion file(s))

FE Planar Angles

Below defines the orientation (flexion/extension) of the adjoining spine segments resolved in the pelvis coordinate system
NOTE: For the FE Planar Angles, the same definitions for the angles are used for both the left & right side. This means the different sets of signals do not need to be created for the left and right sides (as with the LB and AR planar angles).
NOTE-2: To access these dialogs, you need to edit a command pipeline, the "Compute_Planar_Angle" pipeline command.

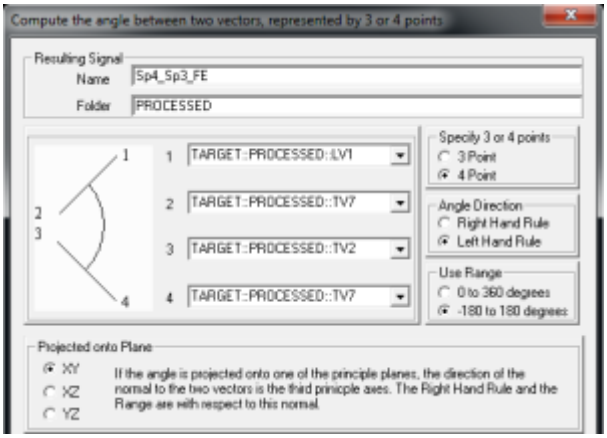
Spine FE Definitions

26. Create Sp5_sp4_FE Planar angle:



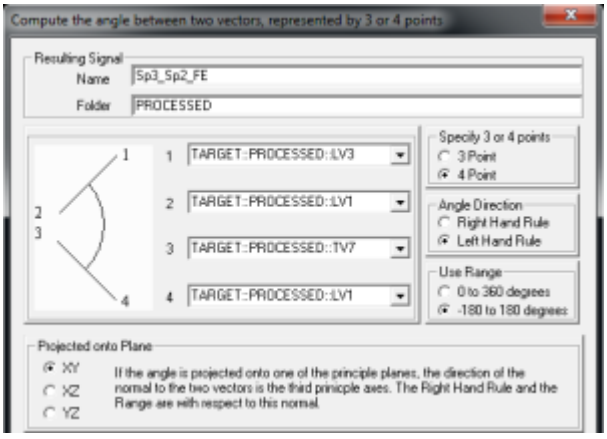
1. Define **Resulting Signal** Name: Sp5_Sp4_FE
2. Calculate a **4 point angle** between the following targets:
   1. TARGET::PROCESSED::TV7
   2. TARGET::PROCESSED::TV2
   3. TARGET::PROCESSED::CV7
   4. TARGET::PROCESSED::TV2
   - **Angle Direction:** Left Hand Rule
   - **3D Space:** Always 0 to 180 degrees
   - **Projected onto Plane:** XY
   - **Note: The Reference segment will need to be changed to RPV within the text option.**

27. Create Sp4_Sp3_FE planar angle:



1. Define **Resulting Signal** Name: Sp4_Sp3_FE
2. Calculate a **4 point angle** between the following
    1. TARGET::PROCESSED::LV1
    2. TARGET::PROCESSED::TV7
    3. TARGET::PROCESSED::TV2
    4. TARGET::PROCESSED::TV7
    - **Angle Direction:** Left Hand Rule
    - **3D Space:** Always 0 to 180 degrees
    - **Projected onto Plane:** XY
    - **Note: The reference segment will need to be changed to RPV within the text option**

28. Create Sp3_Sp2_FE planar angle:

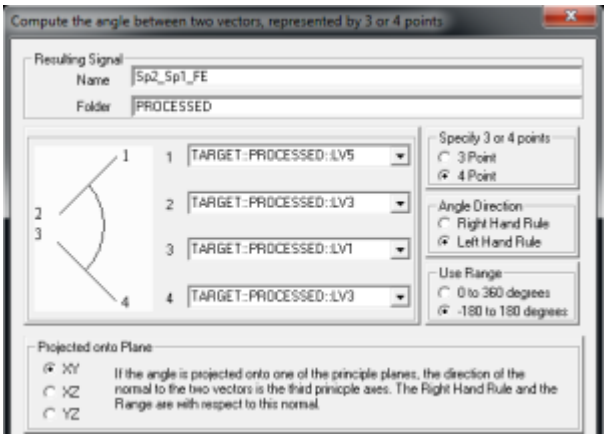


1. Define **Resulting Signal** Name: Sp3_Sp2_FE
2. Calculate a **4 point angle** between the following targets:
    1. TARGET::PROCESSED::LV3

2. TARGET::PROCESSED::LV1
3. TARGET::PROCESSED::TV7
4. TARGET::PROCESSED::LV1
   - **Angle Direction:** Left Hand Rule
   - **3D Space:** Always 0 to 180 degrees
   - **Projected onto Plane:** XY
   - **Note: The reference segment will need to be changed to RPV within the text option**

---

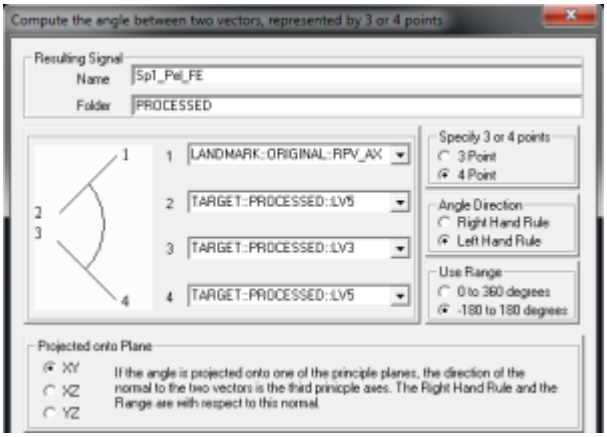
29. Create Sp2_Sp1_FE planar angle:



1. Define **Resulting Signal** Name: Sp2_Sp1_FE
2. Calculate a **4 point angle** between the following targets:
   1. TARGET::PROCESSED::LV5
   2. TARGET::PROCESSED::LV3
   3. TARGET::PROCESSED::LV1
   4. TARGET::PROCESSED::LV3
      - **Angle Direction:** Left Hand Rule
      - **3D Space:** Always 0 to 180 degrees
      - **Projected onto Plane:** XY
      - **Note: The reference segment will need to changed to RPV within the text option.**

---

30. Create Sp1_Pel_FE planar angle:



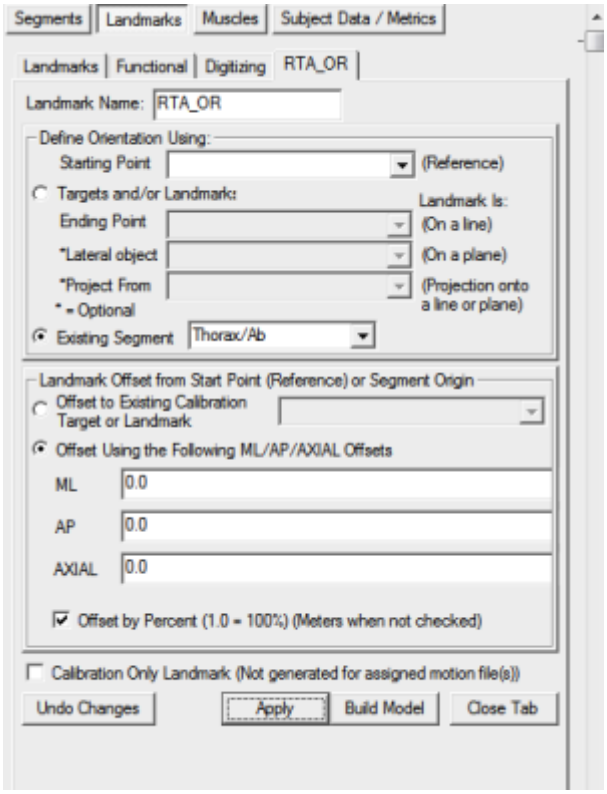
1. Define **Resulting Signal** Name: Sp2_Sp1_FE
2. Calculate a **4 point angle** between the following targets:
    1. LANDMARK::ORIGINAL::RPV_AX
    2. TARGET::PROCESSED::LV5
    3. TARGET::PROCESSED::LV3
    4. TARGET::PROCESSED::LV5
    - **Angle Direction:** Left Hand Rule
    - **3D Space:** Always 0 to 180 degrees
    - **Projected onto Plane:** XY
    - **Note: The reference segment will need to be changed to RPV within the text option.**

Shoulder LB

Below defines the orientation of the line between the shoulder targets (LCAJ/RCAJ) relative to the trunk segment

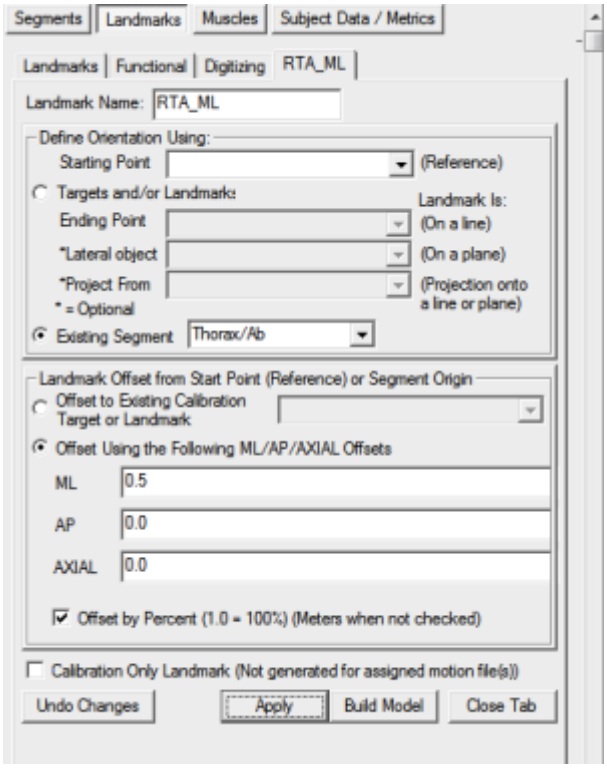
Shoulder LB & AR Landmarks

31. Create RTA_OR:



1. Click **Landmarks** button
2. Click **Add New Landmark** button
3. Create Landmark: RTA_OR
    - **Landmark Name:** RTA_OR
    - **Existing Segment:** Thorax/Ab
4. Offset Using the Following **ML/AP/AXIAL** Offsets:
    - **X:** 0.0 **Y:** 0.0 **Z:** 0.0
5. **Check:** Offset by Percent (1.0 = 100%) (Meters when not checked)
6. **Do NOT Check:** Calibration Only Landmark (Not generated for assigned motion file(s))

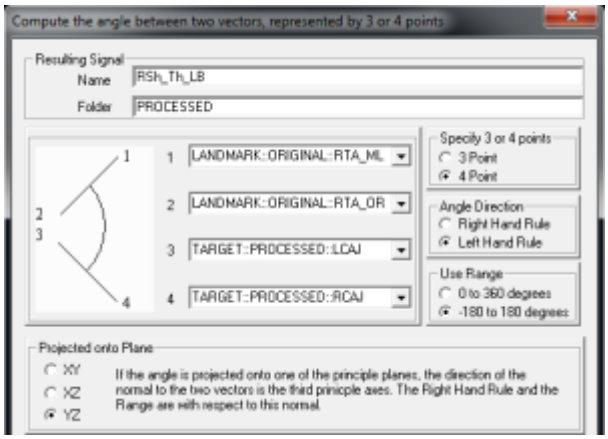
32. Create RTA_ML:



1. Click **Landmarks** button
2. Click **Add New Landmark** button
3. Create Landmark: RTA_ML
    - **Landmark Name:** RTA_ML
    - **Existing Segment:** THORAX/Ab
4. Offset Using the Following **ML/AP/AXIAL** Offsets:
    - **X:** 0.5 **Y:** 0.0 **Z:** 0.0
5. **Check:** Offset by Percent (1.0 = 100%) (Meters when not checked)
6. **Do NOT Check:** Calibration Only Landmark (Not generated for assigned motion file(s))

Shoulder LB & AR Definitions

33. Create RSh_Th_LB planar angle:



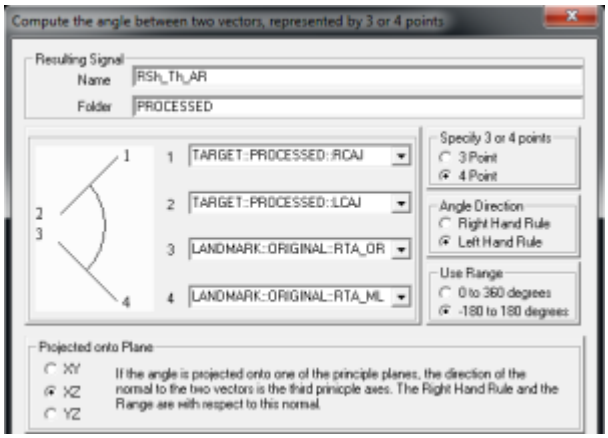
1. Define **Resulting Signal** Name: RSh_Th_LB
2. Calculate a **4 point angle** between the following targets:
    1. LANDMARK::ORIGINAL::RTA_ML
    2. LANDMARK::ORIGINAL::RTA_OR
    3. TARGET::PROCESSED::LCAJ
    4. TARGET::PROCESSED::RCAJ
    - **Angle Direction:** Left Hand Rule
    - **3D Space:** Always 0 to 180 degrees
    - **Projected onto Plan:** YZ
    - **NOTE: The reference segment will need to be changed to RTA within the text options.**

34. Create LSh_Th_LB planar angle:

- When defining the left signal, use same definitions **except** set:
    - **Angle Direction:** Right Hand Rule

---

35. Create RSh_Th_AR planar angle:



1. Define **Resulting Signal** Name: RSh_Th_AR
2. Calculate a **4 point angle** between the following targets:
    1. TARGET::PROCESSED::RCAJ
    2. TARGET::PROCESSED::LCAJ
    3. LANDMARK::ORIGINAL::RTA_OR
    4. LANDMARK::ORIGINAL::RTA_ML
    - **Angle Direction:** Left Hand Rule
    - **3D Space:** Always 0 to 180 degrees
    - **Projected onto Plane:** XZ
    - **Note: The reference segment will need to be changed to RTA within the text option**

36. Create LSh_Th_AR planar angle:

- When defining the left signal, use same definitions **except** set:
    - **Angle Direction:** Right Hand Rule

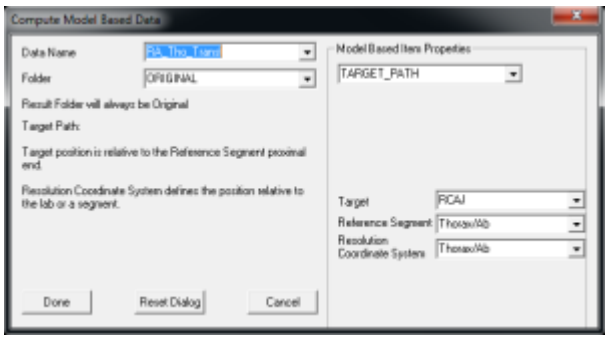
—-

Translation

Below defines the translation of the shoulder targets (LCAJ/RCAJ) in the trunk coordinate system

Shoulder Translation Definitions

37. Define RA_Tho_Transl:



1. Open the **Compute Model Based** dialog
2. Select **TARGET_PATH** from drop down list
    - **Date Name:** RA_Tho_Transl
    - **Target:** RCAJ
    - **Reference Segment:** Thorax/Ab
    - **Resolution Coordinate System:** Thorax/Ab

38. Define LA_Tho_Transl:

- When defining the left signal, use the same definitions **except** set:
  - **Target:** LCAJ

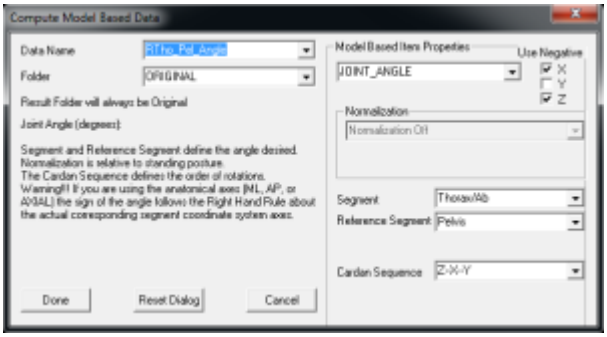
Joint Angles

The Tho_Pel and Tho_Lab angles are described here, while the lower extremity joint angles were created based on the segment coordinate systems described here

---

Joint Angle Definitions

39. Define the RTho_Pel_Angle:



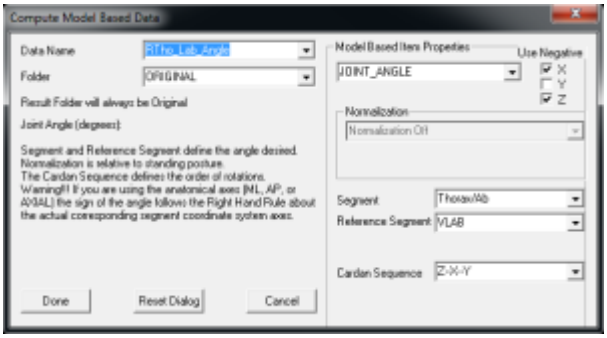
1. Open the **Compute Model Based** dialog
2. Select **JOINT_ANGLE** from drop down list
   - **Data Name:** RTho_Pel_Angle
   - **Segment:** Thorax/Ab
   - **Reference Segment:** Pelvis
   - **Cardan Sequence:** Z-X-Y
3. **Use Negative:**
   - **X:** TRUE **Y:** FALSE **Z:** TRUE

---

40. Define LTho_Pel_Angle:

- When defining the left signal, use same definitions **except** set:
  - **Use Negative**
    - **X:** FALSE **Y:** TRUE **Z:** TRUE

41. Define the RTho_Lab_Angle:

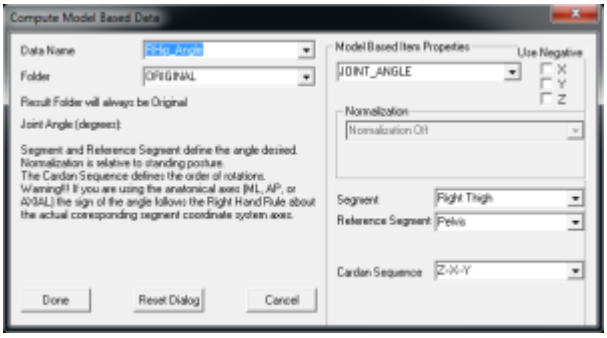


1. Open the **Compute Model Based** dialog
2. Select **JOINT_ANGLE** from the drop down list
    - **Data Name:** RTho_Lab_Angle
    - **Segment:** RThorax/Ab
    - **Reference Segment:** VLab
    - **Carden Sequence:** Z-X-Y
3. **Use Negative:**
    - **X:** TRUE **Y:** FALSE **Z:** TRUE

42. Define LTho_Lab_Angle:

- When defining the left signal, use same definitions **except** set:
    - **Use Negative:**
        - **X:** FALSE **Y:** TRUE **Z:** TRUE

43. Define the RHip_Angle:



1. Open the **Compute Model Based** dialog

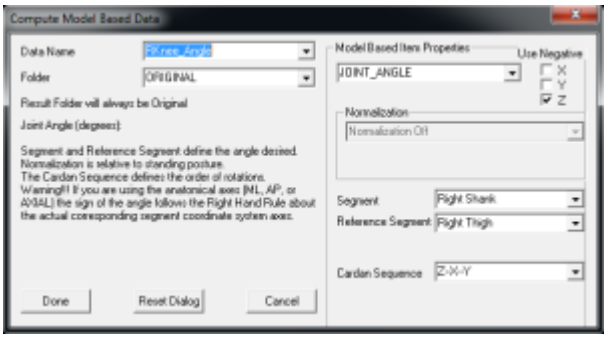
2. Select **JOINT_ANGLE** from drop down list
    - **Date Name:** RHip_Angle
    - **Segment:** Right Thigh
    - **Reference Segment:** Pelvis
    - **Carden Sequence:** Z-X-Y
3. **Use Negative:**
    1. **X:** FALSE **Y:** FALSE **Z:** FALSE

44. Define LHip_Angle:

- When defining the left signal, use same definitions **except** set:
    - **Segment:** Left Thigh
    - **Use Negative:**
        - **X:** TRUE **Y:** TRUE **Z:** FALSE

---

45. Define the RKnee_Angle:



1. Open the **Compute Model Based** dialog
2. Select **JOINT_ANGLE** from drop down list
    - **Data Name:** RKnee_Angle
    - **Segment:** Right Shank
    - **Reference Segment:** Right Thigh
    - **Cardan Sequence:** Z-X-Y
3. **Use Negative:**
    - **X:** FALSE **Y:** FALSE **Z:** TRUE

---

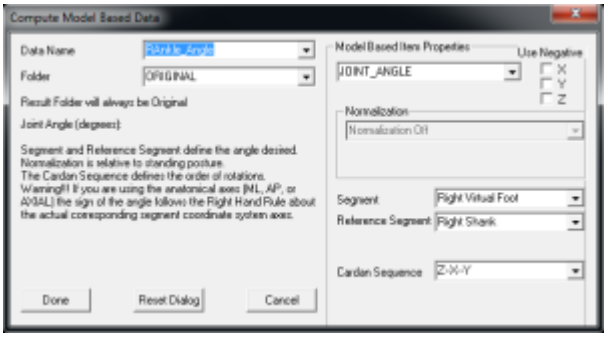
46. Define LKnee_Angle:

- When defining the left signal, use same definitions **except** set:

- **Segment:** Left Shank
- **Reference Segment:** Left Thigh
  - **Use Negative:**
    - **X:** TRUE **Y:** TRUE **Z:** TRUE

---

47. Define the RKnee_Angle:



1. Open the **Compute Model Based** dialog
2. Select **JOINT_ANGLE** from drop down list
   - **Data Name:** RAnkle_Angle
   - **Segment:** Right Virtual Foot
   - **Reference Segment:** Right Shank
   - **Cardan Sequence:** Z-X-Y
3. **Use Negative:**
   - **X:** FALSE **Y:** FALSE **Z:** FALSE

---

48. Define LAnkle_Angle:

- When defining the left signal, use the same definitions **except** set:
  - **Segment:** Left Virtual Foot
  - **Reference Segment:** Left Shank
  - **Use Negative:**
    - **X:** TRUE **Y:** TRUE **Z:** FALSE

IOR Multi-Segment Foot Model

detailed tutorial focusing on the IOR Multi-Segment Foot Model.

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