SA7 GRAIL

MODEL DESCRIPTION DOCUMENT (MDD)

Version 1.0

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PREPARED FOR:

U.S. ARMY PEO STRI
ATTN: KEITH NEILSEN
12423 RESEARCH PARKWAY
ORLANDO, FL 32826-3275

PREPARED BY:
DIGNITAS TECHNOLOGIES, LLC
3504 LAKE LYNDA DR., SUITE 170
ORLANDO, FL 32817

DOCUMENT REVISION HISTORY

Version	Description	Date
0.1	Draft	01/07/15
1.0	Initial Release	09/11/15

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1   MODEL OVERVIEW

1.1   DESCRIPTION

This document details the 3-Dimensional (3D) model of the SA7 Grail commonly used by opposing forces and insurgents. The SA7 Grail weapon model can be used with any of the characters and with a set of animations (see the specific character and animations Model Description Documents for more information). The SA7 Grail weapon model can be attached to specific attach points on the character models. . During runtime, weapons are attached and detached to the character model by the 3D visualization system. This model can be used with any visualization system that can import FBX or COLLADA formats.

The SA7 Grail weapon model was developed by Dignitas Technologies for the SE Core DT Phase III Small Business Innovative Research (SBIR) project. The model is part of a larger set of character and weapon models, and animations, developed to support the LVC-IA AAR 3D Viewer.   The model design was based on internet research of the SA7 Grail. To meet the LVC-IA AAR performance requirement, a medium fidelity model was developed.

1.2   REFERENCES

- 3D_Model_Development_Process.docx
    - o   The 3D model development process details Dignitas Technologies' procedure for building 3D weapons and animations.
- Weapon_Model_Specification.docx
    - o   The weapon model specification provides the requirements for developing 3D weapon models and attachments.

Figure 1 SA7 Grail Weapon Model

1.3   MODEL VERSION AND HISTORY

Information about the model version can be found in the "Model_Version.txt" file located in the model's directory (same directory the model's .fbx file is located).

Table 1 Weapon Revision History

Version	Description	Date
1.0	Initial release of the SA7Grail_skelmesh.fbx	10/03/14

1.4   MODEL SUMMARY

Table 2 Model Summary

| Model Name	SA7Grail_skelmesh.fbx
Model Units	Meters
Model Length	1.68 Meters long or 168 Centimeters
Coordinate System	Cartesian X, Y, Z (see Figure 2 below)
Model Origin	Origin is located at center mass between the launch tube and pistolgrip. (0, 0, 0) (*See figure 2 below*)
Model Orientation Runtime	Forward: Positive Y Up: Positive Z
Model Orientation Maya	Forward: Positive Z Up: Positive Y
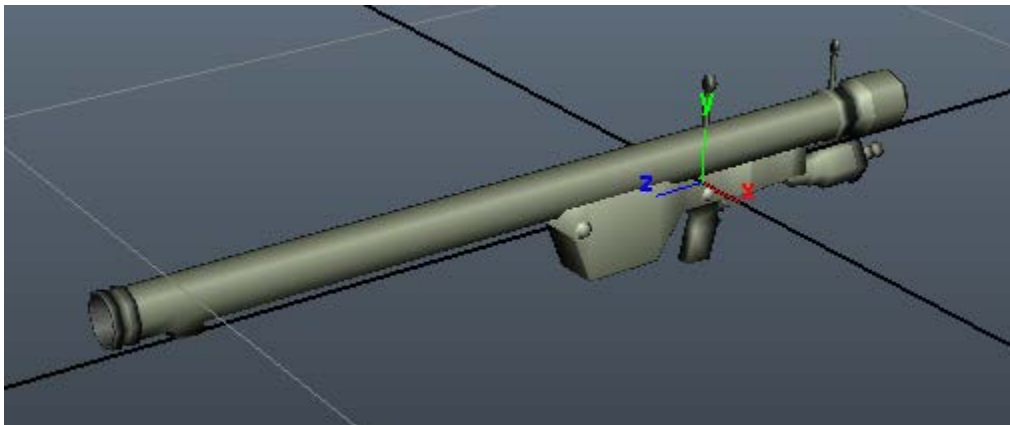
Figure 2 SA7 Grail Origin on Cartesian X, Y, Z Coordinate System

1.5   LICENSING/RIGHTS

Models built by Dignitas Technologies along with all files and documentation, have full Government Purpose Rights.

2   MODEL ATTRIBUTES

2.1   POLYGON ALLOCATION

Polygon allocation is the number of triangles and vertices for a given state and Level of Detail (LODs) in the model. The method for calculating the number of polygons is to gather each model state then count the polygons present in each representation. Animations are not included in the polygon allocation. The SA7 Grail weapon model has a single LOD which is labeled LOD0.

Table 3 Polygon Allocation

Model	# of Triangles	# of Vertices
SA7 Grail	1340	702

2.2   LEVEL OF DETAIL (LODS)

Dignitas supports only one LOD (LOD0) and no switch distances at this time.

2.3   TEXTURE MAPS

Textures:

- SA7Grail_COL.dds (Diffuse) 512 x 512 pixels
- Texture Version: 1.0

Figure 3 SA7 Grail Texture Map

2.4   SENSOR VIEWS

Not applicable at this time.

2.5   SKELETAL STRUCTURE

2.5.1   JOINTS IN THE RIG

A **rig** is a skeleton that attaches to the 3D model to allow for animations to be added. The **joints** in the rig hold the translation and rotational data from the animations.

Naming convention for joints:

Table 4 Naming Convention for Joints

foregrip
pistolgrip
buttStock

2.5.2   ATTACH POINTS AND ATTACH MODELS

Attachments are external models, such as weapons, cell phones, etc, that can be combined with character models at certain **Attach Points** for animations.

Attach Points are unweighted joints on the character model rig that represent locations where **Attachments** can be connected.

These Attachments are combined with character models during runtime based on the animation applied to the character model rig.   Table 5 lists all Attach Points, associated Attachments, and corresponding animations for this weapon model.

Table 5 Attached Models

Attach Point (on Rig)	Attach Model	Animations
stowedWeaponAttach	SA7 Grail (foregrip)	All stowed animations
RightHandWeaponAttach	SA7 Grail (foregrip)	All WeaponFiring animations
RightHandWeaponAttach	SA7 Grail (foregrip)	Incapacitated and Killed animations

3   ANIMATIONS

The animations listed below are associated with this weapon when it is attached to a character model. For additional animations compatible with this weapon, or more information on those listed above, please refer to the Animation MDDs.

- Walking
- Running
- Standing
- Kneeling
- Incapacitated
- Crouching
- Killed

4   VERIFICATION APPROACH

4.1   RUNTIME SYSTEMS

This 3D model, associated accessories and weapons, and animations were tested using the following:

- Veritas 3D Viewer v1.13
- Veritas Model Viewer v1.4
- FBX Viewer 2013.3
- OneSAF v8.0

5   LIMITATIONS

No limitations

6   CONTACT INFORMATION

Project Manager: Greg Dukstein

Phone: (407) 601-7847

Email: gdukstein@dignitastech.com