ATTACHMENT J-1
UNITeS STATEMENT OF WORK (SOW)
For Physical Models Of Launch Vehicles For NASA

16 November 2005
Version 1.0
UNITeS Statement of Work (SOW)
For Physical Models of Launch Vehicles for NASA

BACKGROUND:
The National Aeronautics and Space Administration (NASA) Marshall Space Flight Center (MSFC) has tasked Science Applications International Corporation (SAIC); the Prime, and it’s Acquisition Services Subcontractor; Arcata Associates Inc. (Arcata/UNITeS), performing under the Unified NASA Information Technology Services (UNITeS) Prime Contract NNM04AA02C, to support their requirement for physical models of proposed launch vehicles, a total of five different formats/groupings. Requirements for the models, and associated equipment, are listed in this Statement of Work (SOW). UNITeS will select a single vendor to fulfill the requirements listed in this SOW.

SCOPE AND OBJECTIVES:
To design and build scale models from the following drawings. The information contained herein describes the overall model and detail and expectations for the final product. The bidding contractor is to interpret these drawings and devise a plan to manufacture the models as described. These drawings are not intended to solve manufacturing issues or propose a plan for manufacture. It is the bidding contractor’s responsibility to develop and submit the plan for manufacturing the models.

The award contractor will work with UNITeS staff to review requirements and build required CAD models as required for construction. UNITeS will provide detailed dimensional drawings and consultation. The award contractor shall be required to provide review printed documents. All CAD files and other plates, molds, or other materials and data necessary for construction will become the property of the Government. The award contractor shall provide all CAD files to the UNITeS in STL or IGES format for review purposes.

The computer models used to develop these drawings are also available for review. These drawings are to aid in the understanding of the model geometry. These models are not suitable for manufacture. The information contained in this document supersedes any discrepancy between the computer files and this document.
Model Set A “LOFI-MODS”
1:144 Scale Low Fidelity Launch Vehicle Model Set

Overview of Contents.
Each Model Set A is to include an Acrylic base, Removable Cargo Launch Vehicle, removable Crew Launch Vehicle, and a padded corrugated box.
Model Set A – Figure A.1
1:144 Scale
Cargo Launch Vehicle Overall Dimensions
Model Set A – Figure A.2
Cargo Launch Vehicle General Details

- Acrylic Fuselage
- Faceted Shroud – not curved
- Detail Grooves
  (see below)
- Raised Rings on RSRB
- 5 SSME Engines
- SEP Rockets (4Ct)
- SEP Rockets (4Ct)
- Detail Grooves
Model Set A – Figure A.3
Cargo Launch Vehicle Engine Area Detail

Boatail
Raised Rings
5 SSME Engines
Raised Detail

Base Pin Inserts Through RSRB Nozzles and Center SSME Engine – Provide Brass Sleeve
Model Set A – Figure A.4
Cargo Launch Vehicle Colors, Finish and Details

- White – Semi Gloss
- Pantone 145C – Matte Finish
- Pantone 459C – Semi Gloss
- White – Semi Gloss
- Black – Semi Gloss
- Dark Gray Stripes – Matte Finish
- US Flag and “USA” Decal (Both Sides)
- NASA Logo Decal (Both sides)
- Pantone 459C – Semi Gloss
- Black – Semi Gloss
- Red – Semi Gloss
- Gray – Semi Gloss
- Black – Semi Gloss (On edge and inside cone)

Note: Stripes must be painted – visible brush strokes are not acceptable.
Model Set A – Figure A.5
1:144 Scale
Crew Launch Vehicle Overall Dimensions

1.5" Dia. 1" Dia. 24.2"

.2" Dia. 1.5" 4.35"

1.5" Dia.

8.75"

1" Dia.

11.1"

24.2"
Model Set A – Figure A.6
Crew Launch Vehicle General Details

- Detail grooves
- Thrusters (2 Ct) 180 deg. apart
- Grey Area Slightly Recess
- RCS Pod (4 Ct)
- Raised Rings
- Detail Grooves
- RCS Pod (4 Ct)
- Raised Details
- Aft Skirt Sep motors (2 Ct)
- Base Rod Through Center of Nozzle – Provide Brass Sleeve
- Grey Area Slightly Recess
- RCS Pod (4 Ct)

(RCS pods and each individual nozzle must be attached with a pin to resist breakage.)

This part to be metal or flexible to resist breakage.
Model Set A – Figure A.7
Crew Launch Vehicle Colors, Finish and Details

- White – Semi Gloss
- Pantone 145C – Matte Finish
- Pantone 459C – Semi Gloss
- White – Semi Gloss
- Gray – Semi Gloss
- Silver – Gloss
- Black – Matte Black
- US Flag and “USA” Decal (Both Sides)
- NASA Logo Decal (Both sides)
- NASA Logo Decal (Both sides)
- “UNITED STATES” Decal (Both sides)
- Pantone 459C – Semi Gloss
- Black – Semi Gloss
- Red – Semi Gloss
- Gray – Semi Gloss
- Black – Semi Gloss (On edge and inside cone)

Note: Stripes must be painted – visible brush strokes are not acceptable.
Model Set A – Figure A.8
Base Details

Stainless Steel Rods With Rounded Tips

Glossy Acrylic Base With Beveled Edge – Felt Pads On Bottom

Color Printed Brass Label

Rod to be sized to prevent wobble.

All vehicles are to have a brass sleeve. The rods are to be designed where the base of the vehicle does not rest on the acrylic base. The mounting rods should be designed to be removable but must be rigid to support models.
Model Set A – Figure A.9
Box Details

Case Details:
Each model is to have a rugged plastic case suitable for airline travel as shown below. The interior of the case should have custom molded foam padding. Each is to have a laminated label on the exterior similar to that shown in Figure A.8. Case of impact resistant plastic by Pelican or Equal.
**Model Set B “HIFI-MODS”.**
1:144 Scale High Fidelity Launch Vehicle Model Set

Overview of Contents.
Each Model Set B is to include an Acrylic base, Removable Cargo Launch Vehicle, removable Crew Launch Vehicle and padded rigid airline case.
Model Set B – Figure B.1
1:144 Scale
Cargo Launch Vehicle Overall Dimensions
Model Set B – Figure B.2
Cargo Launch Vehicle Shroud Details

Faceted Shroud

Clear Acrylic Shroud

Design Fitting For Snug Compression Fit

See Figure B.30 for Ascent Module Details

*See Figure B.5 for Connection Pin Information

See Figure B.31 for Descent Module Details

Welded Or Stamp Metal Frame
(This piece needs to be removable)

This connection must have a snug compression style fitting to keep clear acrylic shroud tight when assembled.
Model Set B – Figure B.3.0
1:144 Scale
Cargo Launch Vehicle Ascent Module

Structure and components may be enlarged for durability. May be painted on acrylic.

X-Crimping Grooves

Nozzle Only – No Piping Required
Model Set B – Figure B.3.1
Cargo Launch Vehicle Descent Module

- Gold Crinkle Foil Tanks (8 ct.)
- Descent Module Tanks
- Railing May be Painted Detail on Acrylic
- Descent Module Structure
- Structure May Be Thickened For Manufacturability & Durability
Model Set B – Figure B.4
Cargo Launch Vehicle Engine Details

J-2S+ Engine Detail

See Figures A2 and A.3

Raised Rings

Domed Bottom

Raised Rings

Domed Top

Raised Details
These 3 pins attach to the acrylic base. All pins are to be removable from the base for shipping.

Crew vehicle has 2 removable pins.

Brass Sleeve at All Pins – Typical All Model Sets

Step Pin Diameter Down at Lander

This removable pin attaches to the earth departure stage and runs up to the ascent module.
Model Set B – Figure B.6
Cargo Launch Vehicle Colors, Textures and Decals

- Clear Acrylic Shroud - Gloss
- White – Semi Gloss
- All Tanks – Gold Crinkle Foil
- All Engines Black – Semi Gloss
- Legs & Frame – Gray Semi Gloss
- Pantone 145C – Matte Finish
- Dark Gray Stripes – Matte Finish
- White – Semi Gloss
- Pantone 459C – Semi Gloss
- Black – Semi Gloss
- Red – Semi Gloss
- Gray – Semi Gloss
- Black – Semi Gloss (On edge and inside cone)

Note: Stripes must be painted – visible brush strokes are not acceptable.
Model Set B – Figure B.7
1:144 Scale
Crew Launch Vehicle Overall Dimensions
Model Set B – Figure B.8
Crew Launch Vehicle General Details

Metal frame

RCS Pod (4 Ct)

Raised Rings

RCS Pod (4 Ct)
(RCS pods and each individual nozzle must be attached with a pin to resist breakage.)

Detail Grooves

Thrusters (2 Ct)
180 deg. apart

This part to be metal or flexible to resist breakage.

Base Rod Through Center of Nozzle – Provide Brass Sleeve

Stamped Metal or Welded Metal Frame

Raised Details

Aft Skirt
Sep motors
(2 Ct)
Model Set B – Figure B.9
Crew Launch Vehicle Colors, Textures, and Decals

White – Semi Gloss

Silver Heat Shield

US Flag and “USA” Decal (Both Sides)

NASA Logo Decal (Both sides)

Black – Matte Black
(Engine nozzles)

NASA Logo Decal (Both sides)

Pantone 145C – Matte Finish

Silver – Gloss

White – Semi Gloss

“UNITED STATES” Decal (Both sides)

Pantone 459C – Semi Gloss

Gray – Semi Gloss

Black – Semi Gloss
(On edge and inside cone)

Note: Stripes must be painted – visible brush strokes are not acceptable.
Model Set B – Figure B.10
Box Details

Case Details:
Each model is to have a rugged plastic case suitable for airline travel as shown below. The interior of the case should have custom molded foam padding. Each is to have a laminated label on the exterior similar to that shown in Figure A.8. Case of impact resistant plastic by Pelican or Equal.
Model Set C “MOBL-MODS”
1:144 Scale High Fidelity Launch Vehicle Model Set – Ruggedized for Travel

Overview of Contents.
Each Model Set C is to include an Acrylic base, Removable Cargo Launch Vehicle, removable Crew Launch Vehicle, and rigid airline case.
Model Set C – Figure C.1
Model Overview

Model design is the same as Model Set B except the construction is to be much stronger both in design and in packaging.

Model Construction:
All parts are to be constructed of metal except for the transparent acrylic shroud. Other exceptions will be considered provided it doesn’t detract from its durability.

Part Finish:
All parts are to have a highly durable paint such as epoxy or powder coating.

Case Details:
Each model is to have a rugged plastic case suitable for airline travel as shown below. The interior of the case should have custom molded foam padding. Each is to have a laminated label on the exterior similar to that shown in Figure A.8. Case of impact resistant plastic by Pelican or Equal.
Model Set D “BOX-MODS”
1:288 Scale Low Fidelity Launch Vehicle Model Set

Overview of Contents.
Each Model Set D is to include an acrylic base, Removable Cargo Launch Vehicle, removable Crew Launch Vehicle, and a padded corrugated box. This model Set is the same as Model Set A except the sale is 1:288.
Model Set D – Figure D.1
Box Details

Each models set to have a corrugated box similar to that shown in Figure D.1 above. Each box is to include a white adhesive laser printer color label similar to that shown on Figure A.8 of approximately 4” wide. Each box should have “Fragile” visible on all 6 sides of the box. The interior of the box shall be padded sufficiently to allow the models to be transported and shipped without damage. The base and models are to fit within one box. The box size and configuration is to be determined by the contractor and approved by the government.
Model Set E
1:48 Scale High Fidelity Lander and Capsule Model Set
Model Set E – Figure E.1
1:48 Scale
Lander and CEV Overall Dimensions
Model Set E – Figure E.2
Lander and Capsule Model Components

Model Set E is comprised of the detachable components as illustrated above. This model should be strong enough for the Descent Module to be placed on its feet and support the Ascent Module and CEV. The Design should anticipate this configuration and provide a physical mechanism such as a pin for stability and continuity.
Model Set E – Figure E.3
1:48 Scale
Ascent Module Details

Structure and components to be metal for durability.

X-Crimping Grooves

Some Engine Detail Required

Side View

End View

Top View

1.44”

3.77”

2.5”

1.35”Dia.

1.15”
Model Set E – Figure E.4
Descent Module Details

Structure Must Support Ascent Module & CEV Without Legs Flexing

Top Platform – Etched Grid Texture

Railing May Be Enlarged

Crinkle Foil Tanks

Metal Frame

Ascent Module Nozzle Inserts Here
Model Set E – Figure E.5
CEV Details

Thruster Grooves (4 ct.)
Recessed Window (4 ct.)
Crew Hatch – Detail Grooves
Radiators – Grooved Texture
Painted Window - Grooves
Thrusters (4 ct.)
Removable Solar Panels
Solar Panels Removable @ This Point
Capsule is to detach from the service module. Provide a mechanism to attach to service module such as compression fitting, pin, twist or magnetic.

Connection Rod Through Center – Brass Sleeve Typical
Model Set E – Figure E.6
Lander and Capsule Colors, Textures, & Decals

Overview

- Med. Gray Platform and Boxes
- Metal Legs/Frame
- Gold Crinkle Tanks
- Black Hatch - Matte
- Gold Windows – Foil Gloss
- Lt. Gray Matte
- Dk. Gray Matte Thrusters
- White Semi Gloss
- Black Semi Gloss
- Blue Solar Panel Decal
- Silver Heat Shield
- Dk. Blue Painted Windows

Flag & “USA” Decal (2 ct.)
NASA Decal (2 ct.)
Polished Steel or Aluminum

Acrylic Base

Color Printed Brass Label

Lunar Surface Access Module & Crew Exploration Vehicle

1:48 Scale
**Model Set E – Figure E.8**

Case Details
Each model is to have a rugged plastic case suitable for airline travel as shown below. The interior of the case should have custom molded foam padding. Each is to have a laminated label on the exterior similar to that shown in Figure E.7. Case of impact resistant plastic by Pelican or Equal.