Nike-Hercules MIM-14
A Model of Scale Data Collection and Presentation

Submitted to NARAM-60 R&D
Gary A. Crowell Sr. NAR14509

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- Summary -

This report will contain no equations, no tables, nothing more technical than a bulleted list. Never-the-less it describes the development of a valuable asset to the model rocket community, in the form of a collection of scale data for the Nike-Hercules. The data on this popular scale subject is presented in the form of a shared Dropbox folder that is accessible to anyone. That folder contains almost a Gigabyte of photographs, drawings, and technical information on the Nike-Hercules that has been accumulated by the author over the past decade. The data contained there is organized into logical sub-folders where desired details can readily be found. In addition, the folders document the locations of almost fifty Nike-Hercules missiles on public display, and the sad fact that many of those displays are disappearing.

The report will detail the actions taken to compile the data and briefly list the folder organization and contents. The reader is encouraged to browse the archive on-line. In addition to the data itself, it's intended that the archive as a whole represent a model of scale data collection and presentation that will encourage other collectors of scale data to share their data in a form that will benefit all modelers. Ready access to a wide variety of complete scale data may result in an increase in scale competition activity.

While the archive contains a wealth of Nike-Hercules data, this report also details the work that remains to be done. A previously unknown Nike-Hercules display was accidentally found during the writing of this report, so it is certain that there are many more Nike-Hercules displays that remain to be found. It's also certain that the drawings and CAD data can be presented in even greater detail.
A Model of Scale Data
Collection and Presentation

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Introduction:

A common recurring plea found on model rocketry forums is: “Does anyone have scale data for XYZ?” With 'XYZ' being the scale subject de jure. This almost always results in a helpful response including photos, a drawing (usually Alway) or a few web links, which is often sufficient for the modeler’s immediate purpose. However it is usually lacking if the modeler wishes to do a comprehensive study of the subject for an ultimate scale project.

The MIM-14 Nike-Hercules missile is a highly popular scale subject and there are many drawings and photographs available for it. While the available drawings are highly detailed, there is always the modeler that will desire an extra level of detail. A great advantage of the Nike-Hercules as a scale subject, is that so many were built and eventually surplussed, that there are many on display at museums and other locations across the U.S. and the world. But without a comprehensive directory of those displays, there might be one in your back yard that you don't know about. The ultimate scale reference is being able to lay you hands on an actual piece of hardware. Also however, without a directory, a modeler might be unaware he is viewing a training round or non-standard prototype.

Lastly, it is a sad truth that a distressing number Nike-Hercules displays are disappearing. Without maintenance, some are rusting away and being disposed of, while others succumb to property development, and some to museum closings. It is important do document those displays before they are gone.
This Project:

The primary objectives of this project are to collect and present Nike-Hercules scale data in a highly organized format that can serve as a primary resource for scale modeling, as well as serving an example to encourage the creation of similar repositories of other scale rocket subjects. It also documents the location of physical Nike-Hercules displays that can provide the modeler the valuable experience of being able to touch the prototype of their model. The following actions were taken in the effort to achieve these goals:

- Strive to collect all available Nike-Hercules scale drawings and documentation.
- Strive to collect all available Nike-Hercules photographs.
- Group photos by particular prototype display.
- Logically organize folders and add verbose, descriptive, common-format folder and filenames.
- Eliminate duplicate photos, keeping the highest resolution image.
- Eliminate duplicate documents, that may appear under different filenames.
- Identify prototype model types, where possible.
- Identify locations, features of the displayed prototype, and accessibility.
- Identify inaccuracies in displayed prototypes, if possible.
- Identify displays that no longer exist.
- Confirm scale drawing details and dimensions.
- Mine documentation for additional scale detail features.
- Collect the best photos of particular prototype features in 'detail' folders to facilitate modeling.
- Document the launcher.
- Collect documentation details and drawings of particular prototype features.
- Share the archive and invite everyone to add photos or information regarding any Nike-Hercules display.

Note: The information collected here has been scraped/acquired from many sources on the web and unfortunately there is usually no known attribution or provenance of that data. That information will gladly be included if anyone wishes to provide it, and, anything will be removed upon request.

The result of this activity is an open archive that currently contains almost 1500 files, totaling approximately 800MB of photos and documents, organized into nearly 100 folders. Almost 50 Nike-Hercules display sites are represented.
The Archive:

The simple list below of the archive folders and their content is a poor representation of the expanse of the archive, but it's the only thing that can be provided within a simple document. Readers are encouraged to browse the archive online to get a fuller impression of its value. Copies of the archive will also be available at NARAM-60 on USB drives, for anyone who wishes to directly obtain a copy, or browse the archive off-line.

The following sections provide a brief description of the archive structure and each folder's contents:

Nike-Hercules – Scale Data Archive

- Nike-Hercules – Documents
  Technical Orders, training manuals, and written descriptions of the Nike-Hercules system and air defense in general.

- Nike-Hercules – Drawings
  CAD drawings and other technical artwork.

- Nike-Hercules – Museums and Displays
  Collected views grouped into sub-folders by a particular Nike-Hercules subject in U.S. and foreign locations. A few photo collections are of unknown locations. Most folders contain added text files that include details on the location, and links to web sites and videos of the site. Note that some folders also contain photos featuring the Nike-Ajax, as it is often displayed alongside the Nike-Hercules. They are maintained here temporarily, awaiting the creation of a dedicated Nike-Ajax archive.

  - Nike-Hercules – U.S. Museums and Displays
    - Air Force Space and Missile Museum, Cape Canaveral AFS, FL note 1
    - Air Power Park, Hampton, VA note 1
    - American Airpower Museum, Farmingdale, NY
    - American Armoured Foundation Tank Museum, Danville, VA
    - American Legion, Cedar Lake, IN
    - BG-80, Bee Caves, Austin, TX note 2
    - Buffalo & Erie County Naval & Military Park, Buffalo, NY note 1
    - Camp San Luis Obispo, CA note 1
    - Ft. Bliss, TX
    - Ft. Hancock, Sandy Hook, NJ
    - Ft. Indiantown Gap, PA
    - Ft. Sill, OK
    - Gardendale High School, Gardendale, AL
    - HM-69, Everglades, FL
    - Irvin High School, El Paso, TX
    - Lewis Army Museum, Joint Base Lewis-McChord, WA note 1
    - MS-70, St. Bonifacius, MN
    - National Museum of Nuclear Science & History, Albuquerque, NM
Nike-Hercules – U.S. Museums and Displays (continued)

▪ Oak Forrest, IL note 5
▪ Peterson Air and Space Museum, Peterson AFB, CO note 3
▪ Quonset Air Museum, RI note 2
▪ Rocket Park, Houston, TX
▪ Selfridge Military Air Museum, Harrison Charter Township, MI note 1 note 3
▪ SF-88, San Francisco, CA
▪ St. Augustin Pass, NM
▪ U.S. Space & Rocket Center, Huntsville, AL
▪ U.S. Army Ordnance Museum, Aberdeen, MD note 4
▪ VFW Post 8911, Ft. Worth, TX
▪ White Sands, NM
▪ Young Patriots Park, Riverview, MI
▪ Unknown US Site - Excellent Measurement Photos
▪ Unknown US Site - Restoration Photos

Notes:
1. No folder; single photo or text information only.
2. Closed, missing, or disposition unknown.
3. Site requires secure access.
4. Closed, moving to Ft. Lee, VA.
5. Temporarily not displayed, expected to return.

Nike Hercules - Foreign Museums and Displays
▪ Base Tuono, Folgaria TN, Italy
▪ Museo Storico Aeronautica Militare, Vigna di Valle, Italy
▪ Gardermoen Aircraft Collection, Norway
▪ Gatow Berlin, Germany
▪ Unknown German Museum
▪ Auto und Technik Museum, Sinsheim, Germany
▪ GLVD, Utrecht, Netherlands
▪ Nationaal Militair Museum, Soest, Netherlands
▪ Stevnsfort Cold War Museum, Denmark
▪ Madrid, Spain
▪ Korea
▪ Taiwan

Nike Hercules - Unknown Sites
• **Nike-Hercules – Detail Views**

  Some of the best detail photos from all of the photos above are collected in these folders to highlight particular details. In some case these are combined with drawings clipped from technical manuals

  - Baro-Probe
  - Booster Fins – Tail Shroud
  - Booster Nozzles
  - Interstage
  - Misc Detail
  - Radar Fins
  - Sustainer Body – Fins
  - Sustainer Elevons – Tail Cone

• **Nike-Hercules – Other Data Folders**

  - **Nike M5 Motor**
    - Bob Biedron drawings of the Nike motor.
  - **Nike-Hercules – Goer Photos**
    - Photos of the proposed mobile Nike launcher. Most of these are just views of the Goer (Caterpillar M553) vehicle; just a couple with the Nike-Hercules in place.
  - **Nike-Hercules – Launch Photos**
    - What it says.
  - **Nike-Hercules – Artwork**
    - Artwork featuring the Nike-Hercules.
  - **Nike-Hercules – Unit Chevrons**
    - Unit markings collected from the photos.
  - **Nike-Hercules – Launcher**
    - Detail photos of the launcher.
  - **Nike-Hercules – Deployment Photos**
    - These are usually vintage photos of actual in-service Nike-Hercules. As current displays often use odd paint schemes, these could be used to verify actual paint patterns and text fonts that were used.
  - **Nike-Hercules – Uncategorized Photos**
    - This is a collection of photos of Nike-Hercules displays that only have one or two pictures each, and, as yet, no indication of their location.
  - **Nike-Hercules – Radar Photos**
    - Views of the Nike radar system antennas.
  - **Nike-Hercules – Site Photos**
    - Views of Nike launch sites.
  - **Nike-Hercules – Model Builds**
    - Interesting views of several Nike-Hercules model builds.
  - **Nike-Hercules – Paper Model**
    - Cardstock model of a Nike-Hercules.
  - **Nike-Hercules – Plastic Model**
    - Views of an assembled plastic model.
  - **NHK-1 Hymanoo-1**
    - Korean derivative of the Nike-Hercules.
  - **Nike-Zeus**
    - Follow-on development of the Nike-Hercules.
**Sources of information:**

There can be no denying that the primary resource for all of the initial searches for Nike-Hercules data is the massive website compiled by [Ed Thelen at ed-thelen.org](http://ed-thelen.org). While this site contains a great deal of data concerning the history of the Nike-Hercules, it is difficult to use to find current information regarding displays. It was also never the primary intent of that website to compile photographs or data for modeling purposes. Also, unfortunately, many of the links on the site are now broken.

Much of the material must be attributed to the generosity of users inhabiting the on-line forums at ['The Rocketry Forum'](http://therocketryforum.com), ['Ye Olde Rocket Forum'](http://yeolderocketforum.com), and the ['Nike Missile Forum'](http://nikemissileforum.com).

Collected 2D Drawings are the amazing work of: Peter Alway (Rockets of the World), Dan Joyce (American Space Modeling), Stephan Maire, Risal V. Minakov, R. S. Barker (American Space Modeling), Ronald Goforth, Bob Biedron, and others that I am certain have been missed.

The slim remainder of material has resulted from the author's diligent Google searching and scraping of information from the internet.

**Development details:**

The only equipment and facilities used in this project have been the personal computer equipment of the author, consisting of several steam-powered desktops, and a barely luggable laptop.

The author has never entered an R&D project that concerns this subject material. A search of R&D archives has discovered no other projects similar in nature to this subject material.

Other than my personal computer time and bandwidth, the only monetary expenditure for this project has been the printing of copies of this document for NARAM submission; a total certainly less than $10. While the archive uses the cloud-storage services of Dropbox, the current size is well within the limits allowed for free storage.
Project Results:

The results of this project are poorly represented by the simple list of folders included above. Appreciation of the many hours of work invested in the project can only be achieved by spending some time browsing the shared folder of the archive:

Nike-Hercules Scale Data Archive

While a tremendous amount of work remains to be done, this current archive is a wealth of collected Nike-Hercules information unlike any other single source. With 'everything' collected in a single cloud-storage folder accessible to all, it is hoped that it will often be downloaded and re-hosted as an insurance that the collection will never be 'lost' as web pages often are. It is also hoped that it will serve as a model to encourage others to share their collections of scale data on other subjects.

Further Development:

The potential for future development of this archive is limited only by the hours that can be dedicated to it. It is unlikely that it will ever be completely 'finished'. A few of the tasks to be completed, continued, or started, are:

○ Rationalization of the filenames within folders. E.g., many photos currently have names like: "49075646_e9dd482490_o.jpg". A standard naming system needs to be developed that includes at least the location of the photograph.

○ Most folders contain .txt files with supplementary information; these need to be converted to .doc and .pdf files so that clickable links may be embedded.

○ Add common IPTC metadata to photos.

○ Continued search for additional Nike-Hercules museum and display sites.

○ Continued search for additional Nike-Hercules photographs and documentation.

○ Categorize and include the dozens of photographs that are not currently included in the archive.

○ Create and include 2D Nike-Hercules drawings with an enhanced level of detail beyond current drawings.

○ Personal visitation by the author to a Nike-Hercules site, with the intention of gathering currently undocumented dimensions and detail.
Further Development (continued)

- Additional mining of Nike-Hercules technical manuals and documents for detail information that may be found in drawings and text.
- Continued refinement of folder organization, folder names, and filenames.
- Attempt to document photograph sources and provide attribution when possible. Obtain permission for use or delete any copyrighted photos.
- Add map links to display locations.
- Determine what changes characterize the different A – B – C versions of the Nike-Hercules.
- Create and include 3D Nike-Hercules model data (see example below and the thread 'Nike Hercules CAD model build' on 'The Rocketry Forum').
- Start all over again on a new prototype subject.

Example of a 3D CAD model that will eventually be included in the archive.
In closing:

Short of having original construction blueprints, I strongly believe that I have created the most complete documentation archive of the Nike-Hercules in existence, and it is shared for everyone to use. This submission of the archive as an R&D report to NARAM-60 will serve as a formal announcement of it's availability. I am confident that it will be a valuable asset to the model rocketry community for many years. I also hope that it will encourage the creation of similar open archives of other model prototypes.

And finally, a plea: Does anyone have scale data on 'XYZ'? If you do, I'll take it. I'll organize it and work to create an on-line repository for that data. garyacrowellsr@gmail.com

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