19. Internationales Karton-Modellbau-Treffen
27. bis 29. April 2007
im Deutschen Schiffahrtsmuseum in Bremerhaven

Volkmar Grobe

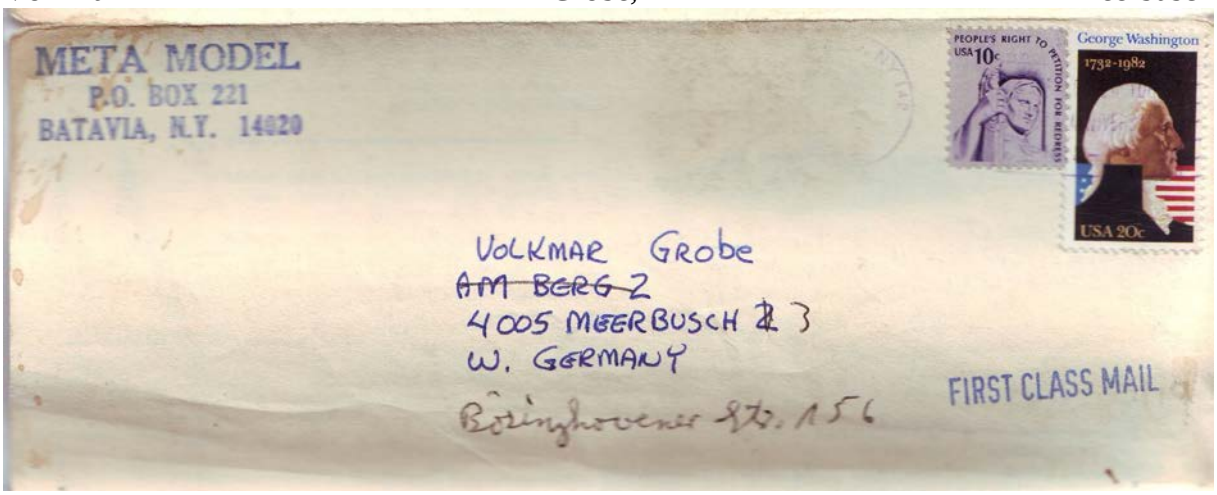
Meta-Models, Flugzeuge aus den USA

Meta-Modells Flugzeugmodelle

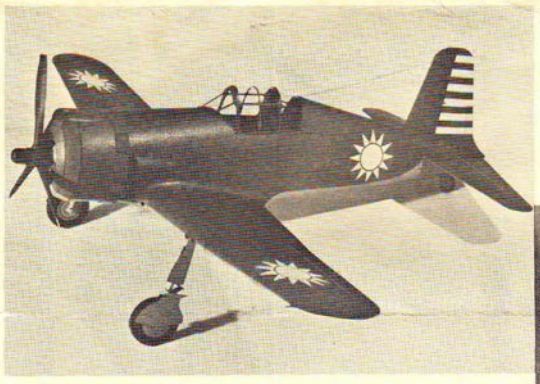
In den dunklen Zeiten des Kartonmodellbaus in den 70. und Anfang der 80.Jahre entdeckte ich in amerikanischen Modellbauzeitschriften Anzeigen verschiedener Kartonmodellbau-firmen, darunter die Firma Meta-Modells für vier Flugzeugmodelle im Maßstab 1:24 bzw. 1:96, die ich mir beschaffen konnte.
Hier muss etwas zu den Modellbaumaßstäben in den USA und England gesagt werden. Der Maßstab 1:24 stellt die Verdoppelung des Maßstabes 1:48 dar. Dieser basiert auf dem amerikanischen Maßstab ¼ Zoll zu einem Fuß, der von der „NMRA“ (National Model Railroad Association), dem 1936 gegründet amerikanischen Modellbahnverband. Dieser ging sofort daran Normen für Modelleisenbahnen aufzustellen. Die wesentlichsten Normen dabei waren die Maßstäbe der verschiedenen Spurweiten. Da zu dieser Zeit die Spurweite 0 mit 32 mm in den USA die wichtigste war, begann man dort mit dem Maßstab 1:48 auf der Basis des Maßsystems in Zoll und Fuß. Warum das englische Maßsystem mit 7 mm zu einem Fuß (gleich 1:43,5) für die Spurweite 0 nicht übernommen wurde, ist nicht überliefert. Für große Modelle wird dann häufig der Maßstab 1:96 verwendet, wie es Doug Emmons bei der XB 70 machte.
Diese Firma Meta-Models wurde Ende der 70. Jahre von dem amerikanischen Lehrer Doug Emmons gegründet. Er hatte schon als Kind Kartonmodelle und Modelle in Holzbauweise gebaut, wohl durch seinen Vater angeregt. Mitte der 60. Jahre kam er auf den Kartonmodellbau zurück.
Als erstes Modell konstruierte er die „Cunningham-Hall GA-36“, ein einmotoriges Sport- und Übungsflugzeug aus den dreißiger Jahren, welches 1979 anlässlich der Restaurierung des Original-Flugzeuges von Doug Emmons als Modellbaubogen herausgebracht wurde.
Das zweite Modell war der „Howard Hughes H-1 Racer“. Ein einmotoriges Rennflugzeug, welches von dem exentrischen Millionär Howard Hughes gemeinsam mit Dick Palmer unter Leitung von Glenn Odekirk entwickelt und gebaut wurde. Mit seinem 1000 Ps Pratt & Witney Motor und einer Tragflächenspannweite von 25 Fuß (7,62 m) erreichte sie am 13. Sept. 1935 352 mph (566 km/h) Geschwindigkeit und damit Weltrekord für Landflugzeuge.
Mit der 32 Fuß-Tragfläche (9,75 m) flog sie am19. Januar 1937 in den USA den Transkontinental-Rekord mit 332 mph (561 km/h). Das Flugzeug ist heute im „Smithsonian National Air and Space Museum“ ausgestellt. Das Modell enthält beide Tragflächen-Bauarten.
Im Auftrag des „U.S Air Force Museums“ in Wright Field konstruierte Doug Emmons 1980 den riesigen Bomber „North American XB 70 Valkyrie“ im Maßstab 1:96.
Als viertes und letztes Modell seiner Kartonmodelle brachte Doug Emmons 1981 das Jagdflugzeug „Vultee P-66 Vanguard“ wieder im Maßstab 1:24 heraus. Von diesem Flugzeug erschien im Januar/Februar-Exemplar 1984 der Modellbauzeitschrift „FineScale Modeler“ ein längerer Aufsatz von Doug Emmons, der das 1:1 Vorbild sowie den Bau des Modells behandelt. In dem Aufsatz ist eine detaillierte Dreiseitenansicht des Vorbildes enthalten.
Alle vier Modelle sind in hervoragender Detaillierung entworfen und auf sehr guten Karton in Aluminiumfarbe gedruckt. Die XB 70 ist allerdings wie das Vorbild in weiß gehalten. Die Bögen der drei einmotorigen Modelle sind etwas größer als A4 in gehefteter Form erstellt, die XB 70 in A3-Größe. Die Hughes H 1 kann mit beiden Tragflächengrößen gebaut werden. Die P 66 kann als Jäger der USAAF oder chinesische Maschine dekoriert werden.
Als letztes Projekt plante Doug Emmons ein frühes Flugboot (1912-13), das „Curtiss E Flying Boat“ von dem Flugzeug-Konstrukteur Glen Curtiss, dessen Entwicklung als Kartonmodell Doug Emmons aber später abbrach, da die fragile Tragflächenkonstruktion unüberwindliche Schwierigkeiten aufwarf.

Da hier in Bremerhaven immer sehr viele Schiffsmodelbauer anwesend sind möchte ich kurz auf einen weiteren amerikanischen Verlag hinweisen, den ich ebenfalls in einer amerikanischen Modellbauzeitschrift entdeckte, die um 1979/80 entstanden sind.
Als weitere Kartonmodellfirma fand ich damals auch die Bögen von „Cheniers Fighting Fleets, von denen ich später in Fritz Königs Geschäft Atelier GAG alle erwerben konnte. Da Fritz König diese militärischen Schiffsmodelle in seinem Geschäft im Bremer Schnoor nicht anbieten konnte, da seine dortigen Kunden dies ablehnten, führte er sie, wie er damals (1985/86) sagte, in seinem Atelier im „Giftschrank“.
Es handelt sich um die SMS Emden, die USS Maine und die USS San Fancisco, alle im M 1:256. Dazu den Schlachtkreuzer SMS Seydlitz, die HMS Dreadnought und den Schlachtkreuzer HMS Invincible. Diese drei Modelle sind im M 1:385 konstruiert. Alle sechs Modelle wurden auch von der Vertriebsfirma „PMI“ (Paper Models International) angeboten. Mir liegen dazu die PMI-Kataloge von 1985 und 1990 vor.
Fünf der produzierten Modelle sind in sw gedruckt und erfordern Nachfärbungen. Nur die Emden wurde in Farbe gedruckt. Die Blattformate entsprechen keinem Din-Format, sondern sind nach den Modellgrößen angelegt. Ob diese Schiffsmodelle heute noch erhältlich sind ist mir unbekannt.

Volkmar Grobe, Meerbusch

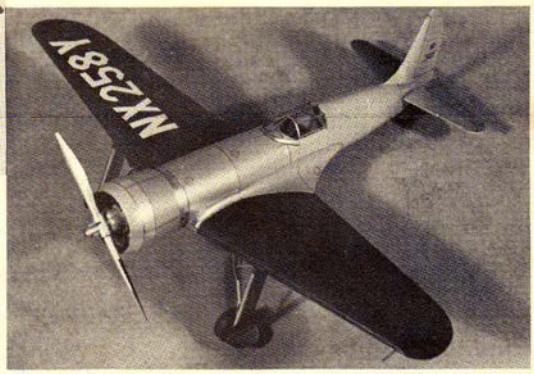


META MODEL CATALOG



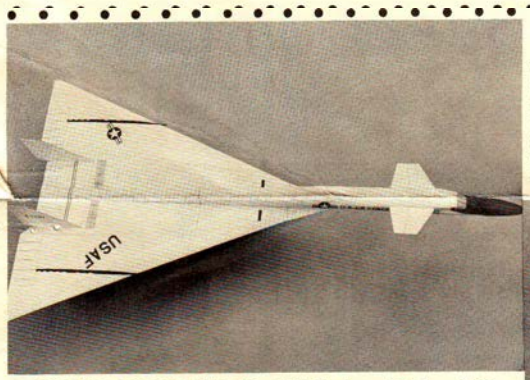
VULTEE P-66 "VANGUARD"

Meta Model's latest release, the Vultee P-66 is a fine full color 1/24 scale model of one of WW II's classiest, but least known fighters. The kit contains a new, well researched photo-essay history of the P-66, illustrated instructions, many spare parts including two complete cowl/engine assemblies, and construction options. Unique to card models, this kit has a full color gummed paper insignia sheet to allow choice of several U.S. and Chinese marking schemes.



HOWARD HUGHES RACER ›

The Hughes Racer kit includes a short history of the craft with photos of Howard Hughes and his record setting racer now in the National Air & Space Museum. In 1/24 scale, this full color kit offers parts for both short wing (closed circuit racing) and long wing (transcontinental racing) versions and many spare parts including a complete duplicate cowl. There are a number of construction alternatives, cockpit detail, landing gear and fully illustrated instructions.

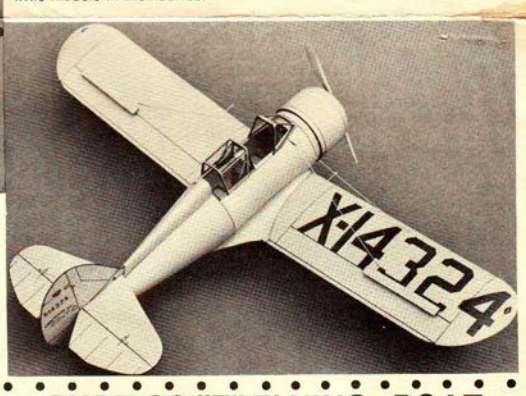


‹ XB-70 "VALKYRIE"

Commissioned by the Air Force Museum, this 1/96 scale full color kit builds into an impressive 24" model. The kit features a detailed history of the B-70 project with photos from the museum. There are fully illustrated instructions and enough spare parts to re-build the entire front half of the fuselage including sub- or supersonic windscreen positions. Also included are variable geometry wingtips and landing gear which are fine little models in themselves.

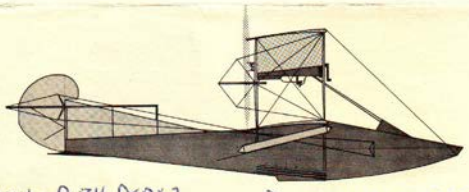
CUNNINGHAM-HALL GA-36 ›

A snazzy little two seat monoplane of the early 1930's, the GA-36 is presently being rebuilt in the Rochester, N.Y. area. A one of a kind aircraft, the GA-36 embodies many of the characteristics of the Golden Age of American aviation. The kit is a special restoration edition relating the history of the craft along with the work presently being done on it. In 1/24 scale and in full color, the model is a fully detailed replica complete with engine and interior cockpit detail.



‹ CURTISS "E" FLYING BOAT

Meta Model's next release is a special commission representing one of the first successful flying boats. Designed by Glen Curtiss in 1912-13, the Curtiss E boats were popular with sport aviators as well as with the armed services. This kit can be built either as the Vilas sportsman's boat (the hull of which is in the Curtiss Museum at Hammondsport, N.Y.) or the Navy's very first flying boat, the C-1. The kit has typical Meta Model features and is in full color.



Meta Model kits build into fine, full scale models just as they come. However, modellers are encouraged to move into designing their own models. A first step could be to use the patterns in these kits to build in sheet metal or plastic. Our kits are but the beginning in a fascinating odyssey of model sculpture.

META MODEL

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} They also sell all my models.

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Add $1.00 postage on all orders except Mr. Mulligan.

P-66 Vanguard	$4.50
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1/24 Plans for the Vultee P-66.....

META MODEL-C
P.O. Box 221
Batavia, N.Y. 14020

Meet Doug Emmons

Doug Emmons, 43, has been building models since 1944, when his father bought him a Strombecker wood kit of the B-17. He and his wife Cynthia and children Natasha, Zachary, and Gabriel live in Batavia, New York, where Doug's a schoolteacher and Cynthia's an artist and writer.

In addition to designing card models, Doug's hobbies include building inlaid wooden airplane and ship models and sculpture.

1/24 SCALE CARD MODEL KIT

CUNNINGHAM-HALL GA-36

The Cunningham-Hall GA-36 was designed and built in Rochester, N.Y., during the mid-Thirties by Randolph F. Hall. The small, sleek looking two seater was envisioned as a trainer for the armed services as well as a civilian sport plane. It incorporated a unique system of flaps and air passages through the wings which allowed very low stall and landing speeds when opened, and fast cruising speeds when closed. The aircraft was successfully test flown throughout the late Thirties, but was sold in 1941 and taken to Michigan. Here the engine was removed and the airframe left in a field to rust. Three decades later, restoration efforts were begun, and in the Spring of 1979, with the formation of the GA-36 Restoration Association Inc., the aircraft was returned to Rochester where rebuilding commenced. In conjunction with the restoration project, this special edition of the GA-36 card model kit has been released. Originally inspired by the natty good looks and historical importance of the Hall design, the model kit consists of card (heavy paper) patterns which, when cut, folded and assembled, result in a colorful and accurate scale model of the original GA-36.

Randolph Hall had come to Rochester in 1928 from the old Thomas Morse Aircraft Corporation of Ithaca, N.Y., to form the Cunningham-Hall Aircraft Corporation, a subsidiary of the carriage and automobile firm of James Cunningham, Son & Co., founded in 1838. Hall bought a group of aviation specialists with him and within a year had produced their first aircraft, the PT-6, a six place cabin biplane which was flown by a number of famous American aviators, including Jimmy Doolittle and Amelia Earhart. After experimenting for several years with high lift wing devices, Hall designed the GA-21 in 1934. By 1936, after extensive modifications, including the change from side-by-side to tandem seating arrangement and a cleaned up landing gear, this design became the GA-36. This aircraft was of all metal construction except for the fabric covered empennage, ailerons and flaps and part of the upper wing surface. The stabilizer was adjustable and the ailerons,which had only upward movement, were located in the upper surface of the wings above the flaps. Except at the wing tips, the flaps went full span. The special high lift wing had a vane aft of the lower leading edge which opened inward allowing air to enter the wing and flow over the lowered flaps thus increasing their efficiency at low speeds. This system operated automatically and extensive testing proved its ef-

Continued on Back Cover

1 META MODEL

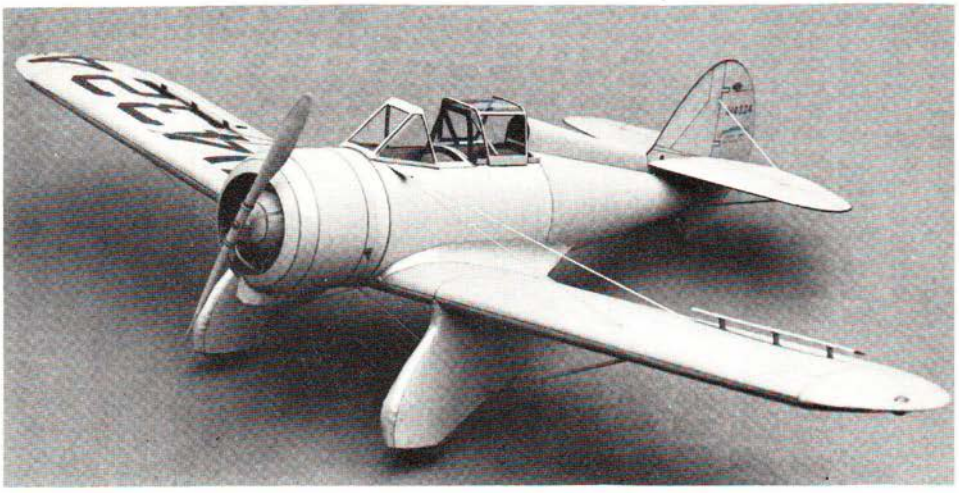
SPECIAL RESTORATION EDITION

fectiveness, but it was more complicated and less efficient than the newly developed Fowler flaps. This; coupled with the weight of the wing and overall robust construction, made the GA-36 somewhat slower and more expensive than other aircraft of its class. Proposed further modifications to correct these deficiencies were not carried out, and the aircraft was not put into production.

The GA-36 is 20 ft. long with a span of 30 ft. Its maximum weight is 2100 lbs., its ceiling 13,000 ft., its range 450 miles and its top speed 150 mph. Its engine was a 152 h.p. Warner Super Scarab five cylinder radial.

Meta Model
P.O. Box 221
Batavia, N.Y. 14020

Model recommended for ages 13 and up



MODEL BUILT FROM THIS KIT

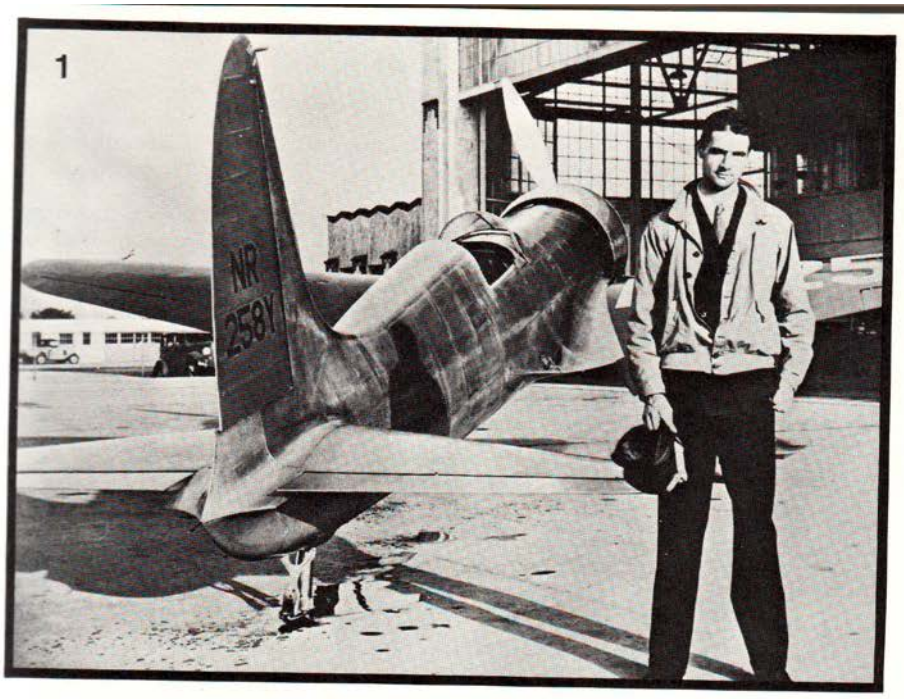
HOWARD HUGHES H-1 RACER

A 1/24 SCALE CARD MODEL KIT

Featuring extra parts for building either the long or short wing version and practice parts, with illustrated instructions, for the novice card model builder.

"Hell's Angels Hughes", as the July, 1936 POPULAR AVIATION magazine labeled him, was one of America's most famous and enigmatic personalities. Industrialist, movie producer and aviator extraordinary, Howard Hughes attracted widespread attention in all his pursuits. In the aviation field, he excelled as designer, pilot and financier, challenging the frontiers of aviation technology in the Thirties and Forties. His H-1 Racer of 1935-37 reflects his ideals and his willingness to spend the time and money necessary to achieve them. Thus, when Hughes gathered about him a group of aviation specialists for the purpose of designing and building an aircraft to break the world landplane speed record, what emerged was the most advanced aircraft of its time and an example of mechanical beauty and technical craftsmanship unparalleled to this day.

2 META MODEL



The H-1 was designed by Hughes and Dick Palmer and built under the supervision of Glenn Odekirk. It was designed around a Pratt & Whitney Twin Wasp Jr. engine, developing close to 1000 horsepower under racing conditions. This bulky radial powerplant was enclosed in a long chord, bell-shaped cowl which reduced drag and increased cooling. The fuselage was 27 feet long and built around a substantial central keel, its aluminium skin butt jointed, flush riveted and finished to a high polish. The wings were built of metal and plywood, the wooden skin being covered with balloon cloth which was given many coats of dope, then hand rubbed to a gleaming finish. All control surfaces were fabric covered. Long and graceful fillets joined the wings to the fuselage and helped stabilize airflow.

The canopy of the H-1 was unique because the cover was cranked down into the fuselage sides like a car window, and the windscreen slid forward to provide plenty of room for access. Also unusual for the time was the track of the landing gear (10 feet) which folded inward when retracting.

The aircraft was first built in the 25 foot wingspan version. This aircraft set a new landplane speed record of 352 mph on September 13, 1935. Later, the aircraft was fitted with the 32 foot wing, and this long wing version set the transcontinental record averaging 332 mph on January 19, 1937.

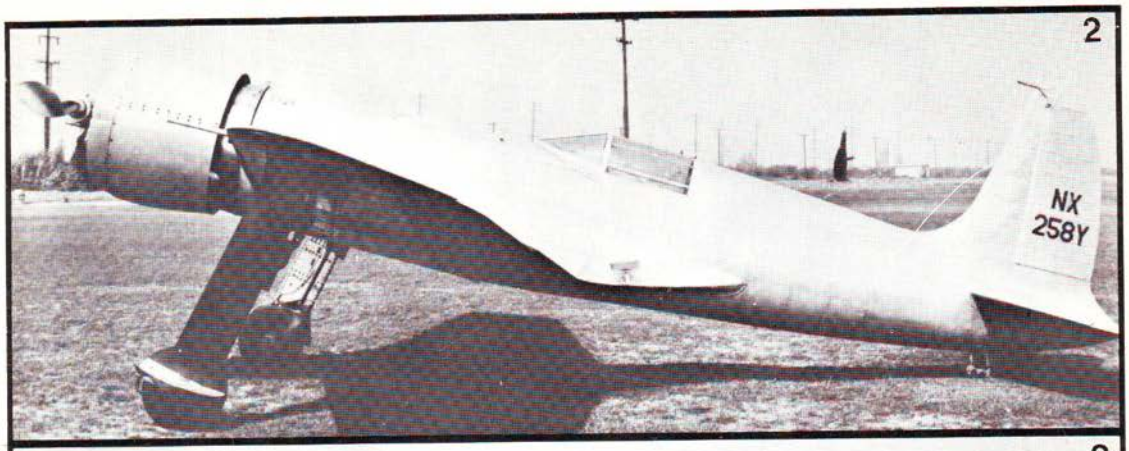
After the transcontinental flight, the H-1 was returned to Culver City, California and stored in a humidity controlled hanger until 1975, when it was moved to the Smithsonian's National Air and Space Museum. It can now be seen beautifully refurbished and displayed in its long wing version.

The present model design is based on research which was supported by the following: Robert C. Mikesh (definitive short wing plans); Joey Reinlieb (drawings and detail photographs); R. S. Hirsch (plans). Photograph credits: Cover, #1, 3 & 4, the Smithsonian Institution; #2, Stephen J. Hudek.

The serious modeler may wish to consult Vol. 16 of Paul Matt's HISTORICAL AVIATION ALBUM, featuring thoroughly researched plans as well as a photographic essay on the history of the H-1. The R. S. Hirsch plans are also recommended. Further photo essays are to be found in AIR CLASSICS, March, 1976, and AIRPOWER, September, 1977. See also Reed Kinert's RACING PLANES AND AIR RACES, Vol. III.

Meta Model
P.O. Box 221
Batavia, N.Y. 14020 USA

Recommended ages: 13 and up



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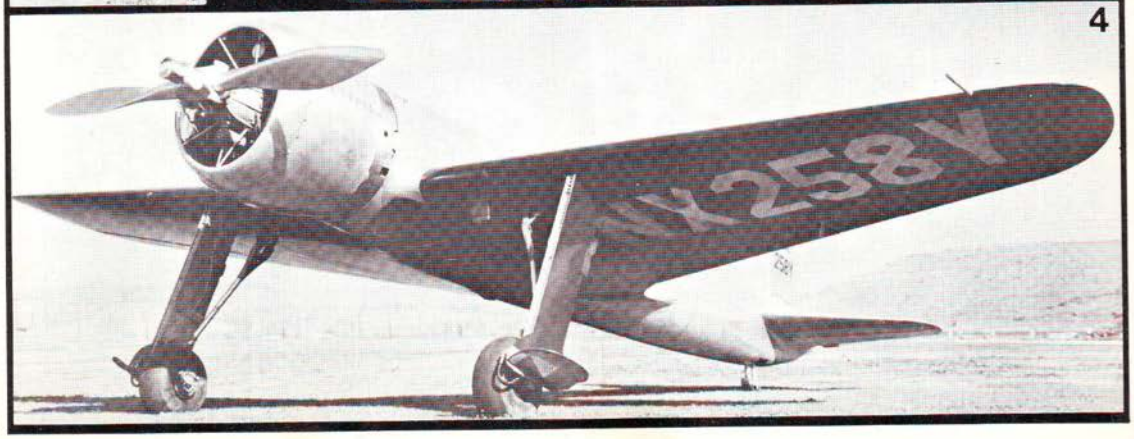


4

U.S. AIR FORCE MUSEUM

NORTH AMERICAN

XB-70 "Valkyrie"

A 1/96 SCALE CARD MODEL KIT

Featuring full color printed parts which build into an authentic scale model 24" long. Many duplicate parts are included as well as illustrated instructions, photos and history of the aircraft.

RECOMMENDED FOR AGES 13 AND UP

THE XB-70 "VALKYRIE" STORY

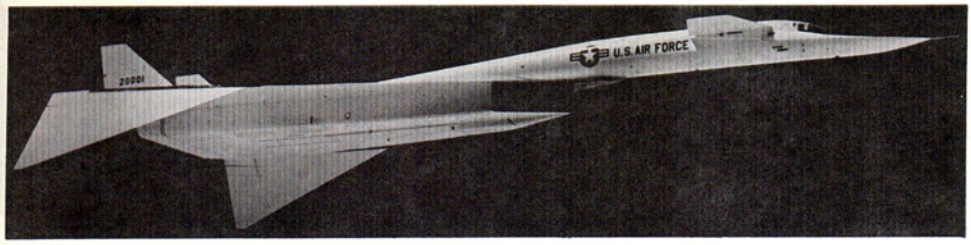
Technical characteristics

At the time of its roll-out ceremony in Palmdale, California, on 11 May 1964, the XB-70 Valkyrie was the heaviest, most powerful, and, except for the aerial launched X-15, fastest aircraft in the world. It also had the largest fuel system, the largest variable geometry flying surfaces, the most powerful accessory systems and just about the greatest range of any aircraft the world had seen. The huge airframe, 194 feet long with a wingspan of 105 feet (and a root chord of 117 feet), was built of newly developed materials fabricated in new ways. In fact, a whole new technology was created to meet the demands of this 2000 mph "air vehicle" where surface skin temperatures reached from 550° to 630° F.

Design work on the XB-70 began at North American Rockwell in 1954. It was to be the

(Continued on Inside Cover)

MODEL



XB-70-1 in flight. Notice the wing tips in supersonic position with nose ramp in subsonic. Photo: AFM

vious that the cost of this project was very great. At least 1.3 billion dollars were expended in the engineering and design stage, and another 750 million in construction.

Flight Characteristics

The first flight of the XB-70 took place on the morning of 21 September 1964 with test pilots Alvin S. White and Joseph F. Cotton. With 5000 newsmen and spectators looking on, the XB-70 lifted into the air for the first time on a 1:45 hour flight from Palmdale to Edwards Air Force Base where flight testing was to be based. During the first flight, landing gear problems occured which were to haunt the XB-70 throughout its career. The flight, which had originally called for supersonic speeds, was further hampered by an engine malfunction and was cut short. Nevertheless, the flight program on the most advanced aircraft in aviation history had started. Mach 1 was exceeded on the third flight and from there on a wealth of data was obtained from the XB-70 testing program. Mach 2 was exceeded on flight #17 on 14 October 1965. On the 12th test flight on 7 May 1965 while in excess of Mach 2, pieces of the skin peeled off of the wing apex and became lodged in the engines. Three engines had to be shut down, but a safe landing was made.

In perfect atmospheric conditions, the XB-70's best time from take-off to Mach 3 was 25 minutes. There was a definite procedure for acceleration to supersonic speeds as many factors of altitude, pressure and temperature had to be taken into account. For example, the engine inlet ducts had to be trimmed correctly for each increase in speed and for temperature so that the engines would receive the right amount of air flow at the right pressure. Further, manuevering the large aircraft took time. To make a 180° turn in a 20° bank required 13 minutes circumscribing a path 250 miles wide.

Above 600 mph, the aircraft was in full supersonic configuration with the canopy ramp up. In this configuration, the pilots were without forward vision and flying at supersonic speeds was done on instruments even though this involved difficulty in keeping the aircraft on even flight insofar as the horizon could not be seen. Because of this, speeds as high as Mach 2.5 were sometimes attained with the canopy ramp down so that the pilots could more easily keep the aircraft on an even keel by viewing the horizon. New instrumentation later helped solve this problem. At Mach 3, one pilot described the ride as like driving a Greyhound bus around the Indianapolis raceway at 200 mph! As it was, on the first XB-70, the pilot workload was quite high and on the second aircraft many more automatic devices were incorporated to ease the pilot's responsibilities.

Landing the XB-70 presented some problems. The pilots' position was some 40 feet above and 110 feet in front of the main wheels. In addition, a powerful ground effect built up underneath the large delta wings which gave a 15% increase in lift close to touch down. This pillow of air made landing at first tricky, but as pilots grew used to the tendency to float gently near the ground, landings were described as pleasant.

The second and last XB-70 joined the flight testing program on 17 July 1965 and attained Mach 3 on its 17th flight on 3 January 1966. Externally, the second XB-70 (XB-70-2) differed from the first in having 5° dihedral built into the wing (the first craft had none) which increased lateral stability of the aircraft at very high speeds (although at some cost to subsonic flying characteristics). Internally, the variable inlet system for the engines was automated so that the pilot did not have to manually adjust for changing speeds and atmospheric conditions as proved difficult in the first aircraft. Further, as it was determined that a majority of the supersonic testing would be done with the improved XB-70-2, numerous data recording devices were installed and telemetry was improved so that over a thousand in-flight functions could be monitored on the ground during flight. Finally, fuel leaks, which had been a problem with the first aircraft (one entire tank had never been used due to leakage), were solved thus increasing the fuel capacity and range.

On the second aircraft's 39th flight on 19 May 1966, a speed of Mach 3.08 was reached and 33 minutes were flown in excess of Mach 3 during a 2700 mile mission. On 8 June 1966, XB-70-2 took off on its 46th flight, piloted by Alvin White. It was a routine flight, primarily for airspeed calibration and to familiarize Maj. Carl Cross with the aircraft, for this was his first flight in the XB-70. Also scheduled for the latter part of the flight was a photography session requested by the General Electric Company to publicize aircraft using its engines. Formed up on the XB-70 for this session were a T-38, F-4, F-5 and F-104, all powered by General Electric engines. The photo plane was a Learjet. By 9:30, after 20 minutes of formation flying, the job was almost completed, but for yet unknown reasons, the F-104 piloted by NASA chief research pilot Joe Walker flew very close to the right wing tip of the XB-70. His tail touched the wing tip and the F-104 rolled left along the wing of the XB-70, smashing into the vertical stablizers, partially destroying the right stabilizer and completely destroying the left. Walker was killed immediately and the XB-70 was doomed. While it flew on for a few seconds, it soon entered a rolling and yawing manuever and began to break up. With great difficulty, White managed to actuate the ejection sequence and made good his escape and, although injured, survived. Maj. Cross did not get out of the aircraft.

With the loss of the more advanced of the two craft, the flight testing program was curtailed, and the end was in sight for the entire project. Thirty four additional flights were made by the first XB-70 after the crash of the second. Speed was restricted to Mach 2.5 due to continuing problems with loss of skin during supersonic flights. Indeed, the first XB-70 acquired only two minutes in excess of Mach 3 in its entire flight program. Much work was done on testing instruments and procedures for the projected supersonic transport (SST).

On 4 February 1969 the XB-70 made its last flight, #83, from Edwards AFB to the Air Force Museum at Wright Patterson AFB in Dayton, Ohio. The flight was made at subsonic speeds and when the aircraft touched down for the last time, it had recorded 160 hours total flight time, less than half of which was at supersonic speeds. Total flight time of the other craft, XB-70-2, was 92:22 hours. It spent 47:17 hours in supersonic flight of which 1:46 was at Mach 3 or above.

The XB-70 Valkyrie was indeed an awesome aircraft. The culimination of countless hours of engineering and technical planning (70 times that required for the B-17, according to one estimate), it emerged as half aircraft and half spacecraft. Even at this writing, over a decade after its last flight, it is an aircraft of extremely futuristic design and concept. Yet looking at it, one may envision some evil eyed, long necked, bat winged and many taloned prehistoric bird of prey. "The Thing" many called it. But bird of prey it was not, for even prior to its first flight, it was obsolete by the standards of military need for which it was constructed. The two aircraft were completed without military hardware solely for high speed, high altitude research and development, ostensibly toward America's SST, an aircraft which did not make it even as far as the XB-70.

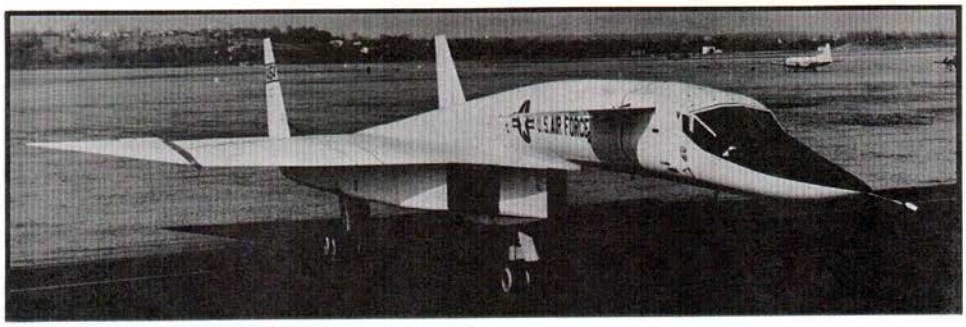
XB-70-1 on ground with support vehicles. Note mobile crane for pilot entry/exit. Photo: AFM

Military thinking in the Sixties concluded that a bomber with extremely high speed at high altitude (and at extremely high cost per unit) was not immune to defensive measures. Further, it was concluded that this particular design was not suited to low level, low speed missions. At high Mach speeds, the XB-70 could not be manuevered to any great extent for defensive purposes. Because of its large and distinctive radar reflection, its path could be easily predicted by ground radar and its speed, though great, did not make it immune from surface to air missiles. Further, its electronic counter measure defensive systems were handicapped by reason of its own high speed. Finally, ICBM missiles were capable of much that the XB-70 could accomplish, although this in itself did not necessarily mean that manned strategic bombers were obsolete. The question seems to have become: What *sort* of strategic bomber is needed? Thinking of the 1970's appears to emphasize low level aircraft of lower speeds with electronic counter measures for defense and greater load carrying abilities. Indeed, the old B-52 bomber has been continually reworked to keep it operational into the 1980's.

Military aviation philosophy of the 1950's emphasized the maxim "the higher and faster, the better". This ideal led to the development of the XB-70, and with the demise of this maxim came the obsolescence of the Valkyrie. Nevertheless, construction of the XB-70 was itself a tremendous task, and American industry and technology were not found wanting. The material and aerodynamic advances required for the design and construction of the XB-70 have proven of value to many fields as well as to the state of the art in aviation today.

Bibliographic Notes

The HISTORICAL AVIATION ALBUM, Vols. VII and VIII, contained a fine two part article on the XB-70 by Thomas G. Foxworth, and much information from this article appears above. Along with many good photographs, Foxworth's article also included Paul Matt's accurate and highly detailed drawings of the XB-70. The serious modeler may wish to consult these drawings upon which the present kit is based. They are available from Paul Matt, Historical Aviation Album, P.O. Box 33, Temple City, California, 91780. Bill Gunston's BOMBERS OF THE WEST (New York: Charles Scribner's Sons, 1973) contains a chapter on the XB-70. Gunston's work places the XB-70 in the military-political environment and compares it to other manned bombers. Information from this source was valuable for the present booklet.



XB-70-1 at the Air Force Museum shortly after last flight, 4 Feb. 1969. Photo: AFM

successor to the B-52 with its great range and carrying capacity, but slow speed, and the B-58 with its high speed, but deficient range and load. The design requirements were difficult to meet with many unknown problems to be discovered and resolved. One major difficulty was that the type of design which could fly long distances at supersonic speed with great loads was different from the design required for getting the aircraft off the ground at low speeds from standard Strategic Air Command runways.

Another problem lay with the design requirements themselves. In 1954 the assumption was that flying higher and faster was essential for safety in defended air space, an assumption which held true through the end of WW II . However, with the new rocket and space technology coming into being, there seemed no limit to how high and how fast aircraft could be designed to go. The advance in speed of each new generation of aircraft was increasing almost exponentially. In 1945, the B-29 flew at 300 mph. Less than ten years later, the B-52 was flying 550 mph. Ten years after this, the XB-70 was to fly at 2000 mph. It had taken aviation about 50 years to reach 500 mph, but only 20 more to quadruple that figure. There appeared no end in sight, and, despite the amazing advances in the XB-70 design, the planners' main worry was that they had not projected their design requirements *far enough* into the future. Should it have been designed to go even faster and higher?

The XB-70 was built around six General Electric J93 single shaft variable stator engines of 30,000 lbs. static thrust each and arranged side by side in the huge engine housing fuselage below the wings. This housing, actually one of two complete fuselages on the aircraft, was 110 ft. long, 37 ft. wide and 7 ft. deep. Since these engines could consume air only at subsonic speeds, one of the real engineering achievements of the XB-70 was the design of an air induction control system which would slow the incoming supersonic air flow. The initial phase of the induction control was to split the incoming air into two separate passageways and cause a shock wave which had the effect of slowing the air flow from Mach 3 (about 2000 mph depending on atmospheric conditions) to Mach 2.7. Inside the air passageways were movable ramps which imparted further shock waves which continued to slow the air flow. Further, since supersonic air flow has to slow as it goes through a construction, just opposite that of subsonic air flow, the throat of the air passageway was narrowed like a venturi tube so that the incoming air flow was finally slowed to Mach .5. However, as the supersonic air flow slowed, its pressure increased within the intake passageway and excess air could be expelled through ducts leading to the upper surfaces of the wings.

The discovery of "compression lift" allowed the designers to overcome problems in the design of the wing for both take off and supersonic flight. It was found that the shock wave created by the XB-70 in supersonic flight would increase the air pressure under the wings by 40 lbs. per square inch. Thus the aircraft could support a great deal of its weight by literally riding on its own shock wave. This enabled a decrease of angle of attack of the wing and consequent reduction of induced drag. It also allowed the wing to be designed within necessary requirements for heavily loaded take offs.

The XB-70 has unusual canard surfaces (small wings) located forward of the wings which were used for lift control and trim during supersonic flight and were an interesting throw-back to the Wright brothers designs. Another unusual feature is the downward folding wing tips. The value of this feature was to increase directional stability and allow an overall reduction in surface drag by reducing the size of the two vertical stabilizers. In addition, by lowering the wing tips (25° down above 300 mph and full 65° down at Mach 1.4) the effective wing area near the trailing edge of the wing was reduced (because of the delta shape of the wing) which had the effect of shifting the center of lift forward, closer the center of gravity. This reduced the amount of trim and control necessary to fly the aircraft. The down folded tips also increased compression lift by focussing the shock wave from the engine inlet back toward the fuselage increasing the air pressure under the wings.

The immense heat generated by supersonic speeds required many ingenious engineering solutions. To increase insulation properties, honeycomb sandwich panels were designed to form the basic structural elements. These were high strength metal sheets enclosing a honeycomb core made from exceedingly thin metal strips. These elements were tac welded and brazed together using new procedures which had to be developed. The welding process could cause no dimpling or other imperfections because these large sheets of honeycomb panels had to be perfectly smooth for aerodynamic requirements. Some of the parts of the airframe which became hottest (630°) during supersonic flight were the leading edges of the wings and engine air intakes. These were fabricated from Rene refractory alloy, one of many new alloys used in the construction of the XB-70. Only the upper fuselage was built in a conventional manner, and even that was made almost completely of titanium.

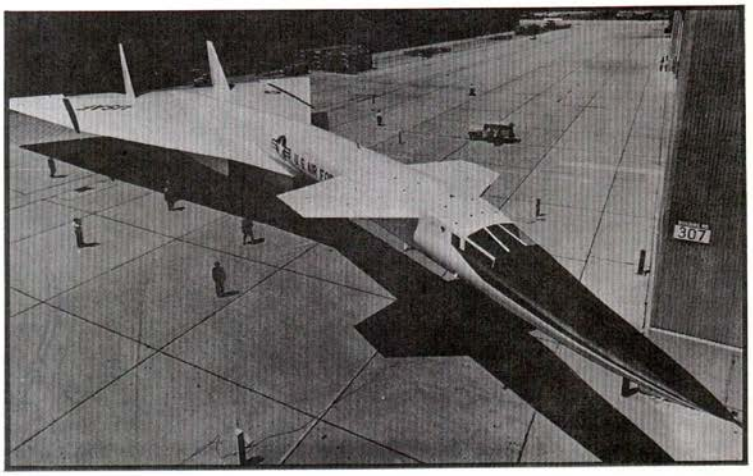
Much attention was given to insulating the fuel tanks which were located in the rear portions of the upper fuselage and in the wings. Not only did the temperature of the fuel have to be kept below its flash point, but the fuel itself was also used as a coolant. In subsonic aircraft, external air may be used to cool internal systems such as engines and electronic gear, but in supersonic flight, the air flow on the surface of the airplane becomes hotter than the systems requiring cooling. Throughout the fuel tankage system (holding 160 tons of fuel), components of the hydraulic and electric systems were immersed in the fuel to keep them cool. A system was developed, using ethylene glycol circulated through the fuel tanks, to cool the tires as well as other hydraulic and mechanical systems throughout the aircraft.

Secondary power systems within the aircraft were extensive. The hydraulic system itself used 260 gallons of a new fluid called Oronite 70, and powered 85 linear actuators and 44 hydraulic motors of different kinds as well as serving other functions. With a total horsepower in the thousands, it was made up entirely of materials which could withstand the 630° F operating temperatures of the aircraft. The electrical system was powered by six 60KVa generators each run by one of the J93 engines and supplied 240/416 V current for over 600 services.

The landing gear struts were machined out of super strength H-11 tool steel and weighted 10,000 lbs. each. The 10 tires were made of heat repellent aluminum impregnated rubber. In the beginning, each tire was good for only three landings, but later developments of the tire allowed up to 10 landings each.

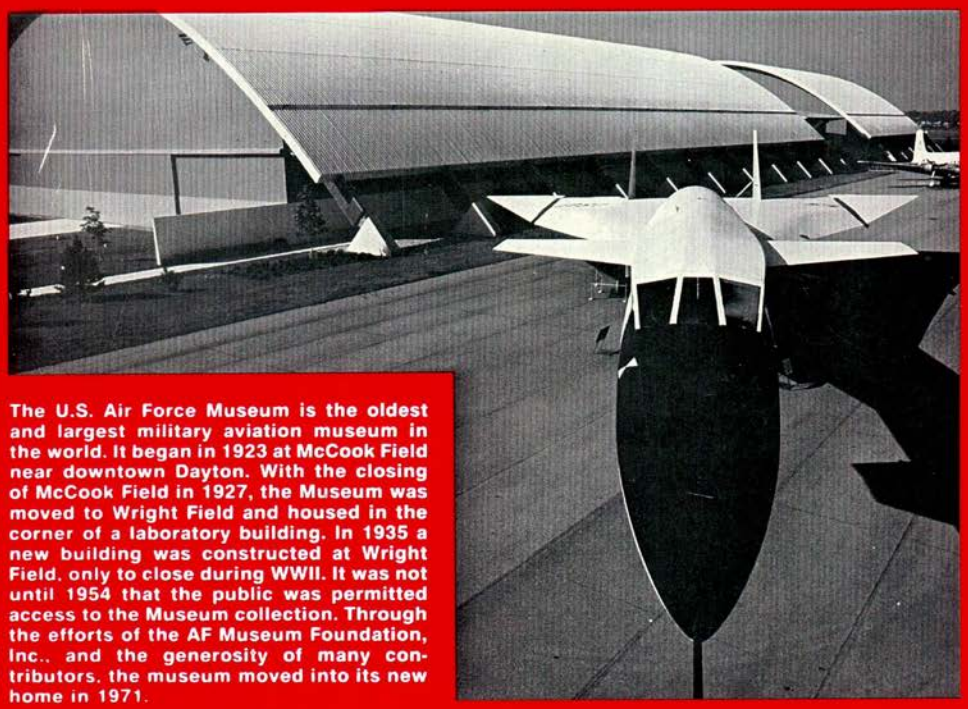
Much more could be said about the engineering and design characteristics of the XB-70 project, and the interested reader should consult the bibliography for further in depth reading on the subject. It is ob-

(Continued on Back Cover)



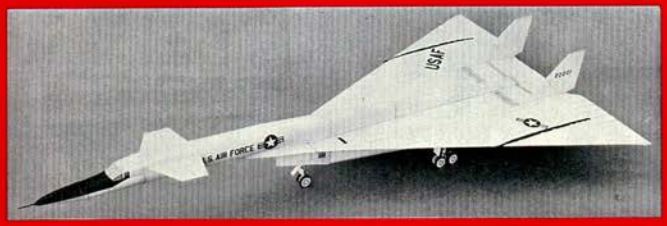
XB-70-1 immediately after roll-out ceremonies at the North American plant in Palmdale, California, on 11 May, 1964. The nose ramp is in supersonic position. Notice the relative size of the aircraft to the people beneath it. Compare this photograph of the new XB-70-1 with the above photograph of the same aircraft after the last flight some four and a half years later. Photo: Smithsonian.

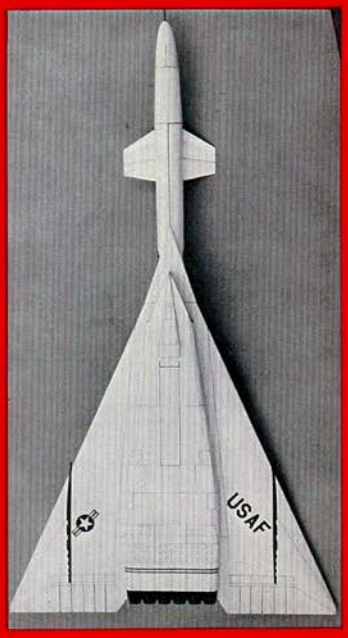
THE U.S. AIR FORCE MUSEUM



The U.S. Air Force Museum is the oldest and largest military aviation museum in the world. It began in 1923 at McCook Field near downtown Dayton. With the closing of McCook Field in 1927, the Museum was moved to Wright Field and housed in the corner of a laboratory building. In 1935 a new building was constructed at Wright Field, only to close during WWII. It was not until 1954 that the public was permitted access to the Museum collection. Through the efforts of the AF Museum Foundation, Inc., and the generosity of many contributors, the museum moved into its new home in 1971.

MODELS BUILT FROM THIS KIT





META MODEL
P.O. Box 221

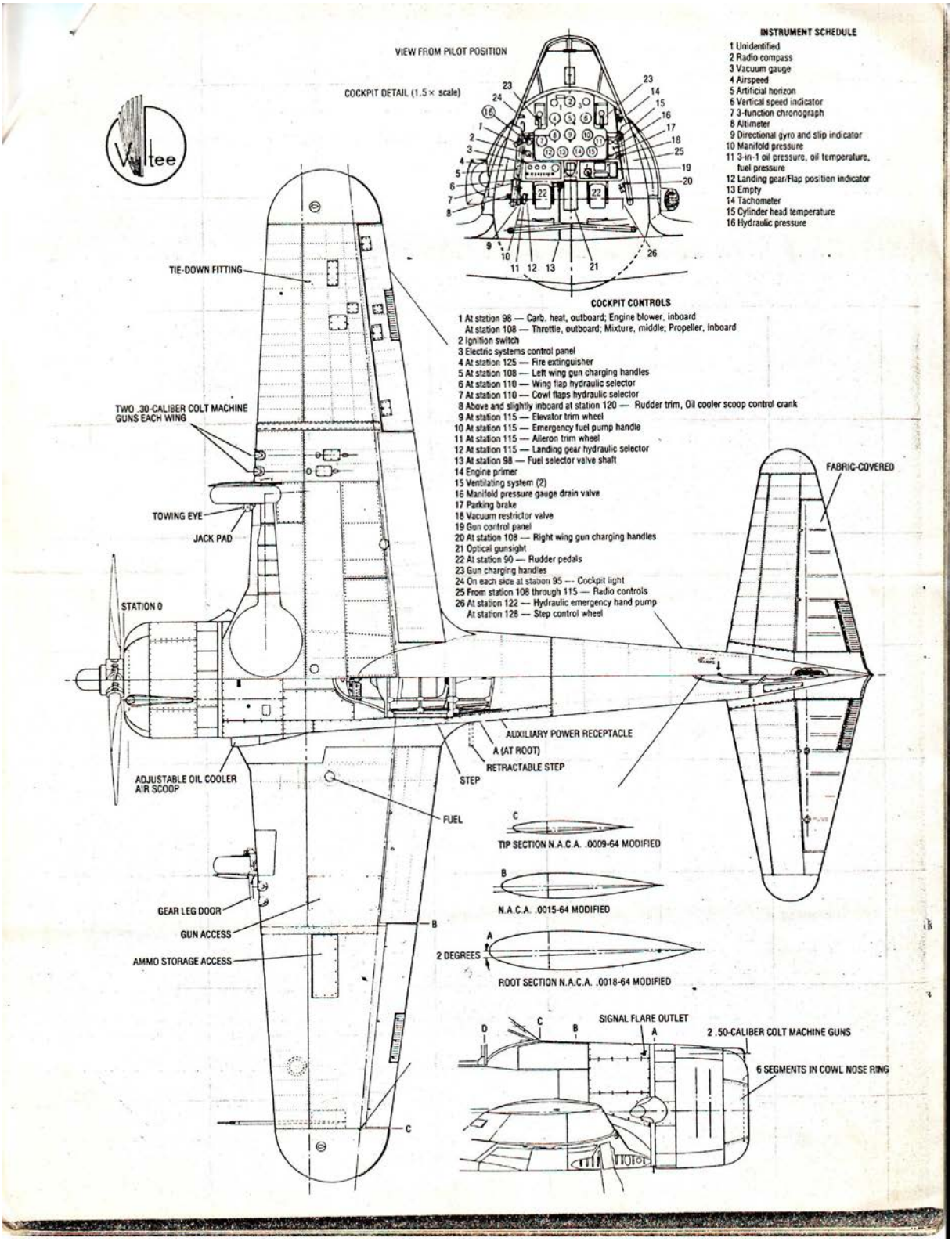
VULTEE P-66 VANGUARD

A 1/24 SCALE CARD MODEL KIT

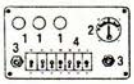
The Vultee Vanguard was one of the classiest fighter aircraft of the early Forties. Its performance was superior to the production fighters of the day, and its sleek, hungry appearance attracted worldwide attention. Development began in Downey, California when Richard Palmer, designer of Howard Hughes' famous Racer (now in the Smithsonian), initiated work on a four aircraft project for Vultee in late 1937. The idea was to design one fighter and three trainers with enough parts in common so that production line facilities could be simplified. Only two of these designs were actually produced, the Vanguard and the BT 13, and only the latter saw extensive duty for the U.S. Army Air Force. Yet the production and operational history of the Vanguard has long intrigued its admirers. The story turns out to be as interesting and convoluted as the political and military events of the years in which it was developed.

Designated the Vultee Model 48, the Vanguard proto-type was an all metal aircraft with a semi-monocoque fuselage. It featured a two spar wing with hydraulically activated split flaps and fully retractable landing gear. While designed around a Pratt and Whitney R 1830 air-cooled radial (continued inside)

4 META MODEL

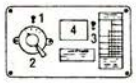

VIEW FROM PILOT POSITION
COCKPIT DETAIL (1.5× scale)
INSTRUMENT SCHEDULE
1 Unidentified
2 Radio compass
3 Vacuum gauge
4 Airspeed
5 Artificial horizon
6 Vertical speed indicator
7 3-function chronograph
8 Altimeter
9 Directional gyro and slip indicator
10 Manifold pressure
11 3-in-1 oil pressure, oil temperature, fuel pressure
12 Landing gear/Flap position indicator
13 Empty
14 Tachometer
15 Cylinder head temperature
16 Hydraulic pressure
COCKPIT CONTROLS
1 At station 98 — Carb. heat, outboard; Engine blower, inboard
At station 108 — Throttle, outboard; Mixture, middle, Propeller, inboard
2 Ignition switch
3 Electric systems control panel
4 At station 125 — Fire extinguisher
5 At station 108 — Left wing gun charging handles
6 At station 110 — Wing flap hydraulic selector
7 At station 110 — Cowl flaps hydraulic selector
8 Above and slightly inboard at station 120 — Rudder trim, Oil cooler scoop control crank
9 At station 115 — Elevator trim wheel
10 At station 115 — Emergency fuel pump handle
11 At station 115 — Aileron trim wheel
12 At station 115 — Landing gear hydraulic selector
13 At station 98 — Fuel selector valve shaft
14 Engine primer
15 Ventilating system (2)
16 Manifold pressure gauge drain valve
17 Parking brake
18 Vacuum restrictor valve
19 Gun control panel
20 At station 108 — Right wing gun charging handles
21 Optical gunsight
22 At station 90 — Rudder pedals
23 Gun charging handles
24 On each side at station 95 — Cockpit light
25 From station 108 through 115 — Radio controls
26 At station 122 — Hydraulic emergency hand pump
At station 128 — Step control wheel
TIE-DOWN FITTING
TWO .30-CALIBER COLT MACHINE GUNS EACH WING
TOWING EYE
JACK PAD
STATION 0
ADJUSTABLE OIL COOLER AIR SCOOP
FUEL
GEAR LEG DOOR
GUN ACCESS
AMMO STORAGE ACCESS
FABRIC-COVERED
AUXILIARY POWER RECEPTACLE
A (AT ROOT)
RETRACTABLE STEP
STEP
TIP SECTION N.A.C.A. .0009-64 MODIFIED
N.A.C.A. .0015-64 MODIFIED
2 DEGREES
ROOT SECTION N.A.C.A. .0018-64 MODIFIED
SIGNAL FLARE OUTLET
2 .50-CALIBER COLT MACHINE GUNS
6 SEGMENTS IN COWL NOSE RING

PREPARED FOR
FINESCALE MODELER
BY
Dick Gleason



ELECTRICAL PANEL
(4× scale)

1 Rheostats for gunsight, flight instruments, and instrument panel lights
2 Ammeter
3 Indicator lights
4 Toggle switches for battery, pitot heater, starter, oil dilution, running lights, cockpit lights, landing light

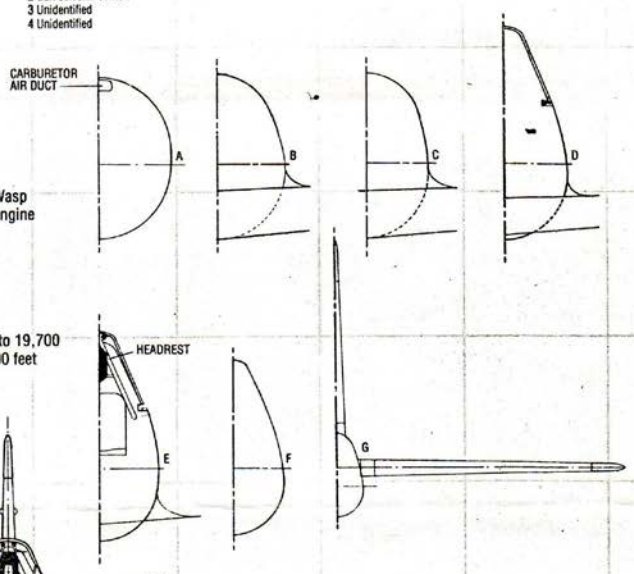


GUN CONTROL PANEL
(4× scale)

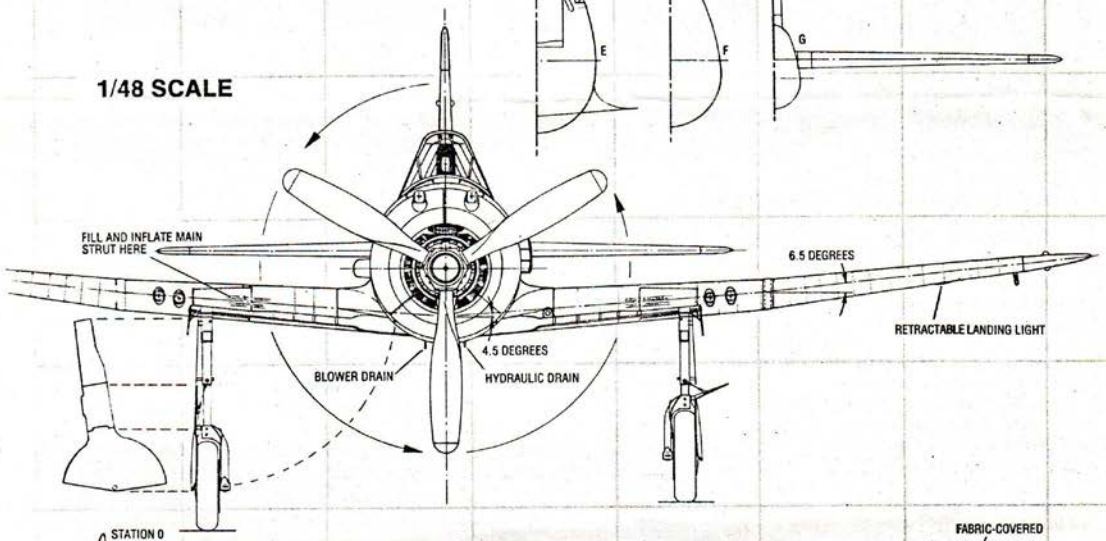
1 Gun safety switch
2 Gun selector switch
3 Unidentified
4 Unidentified

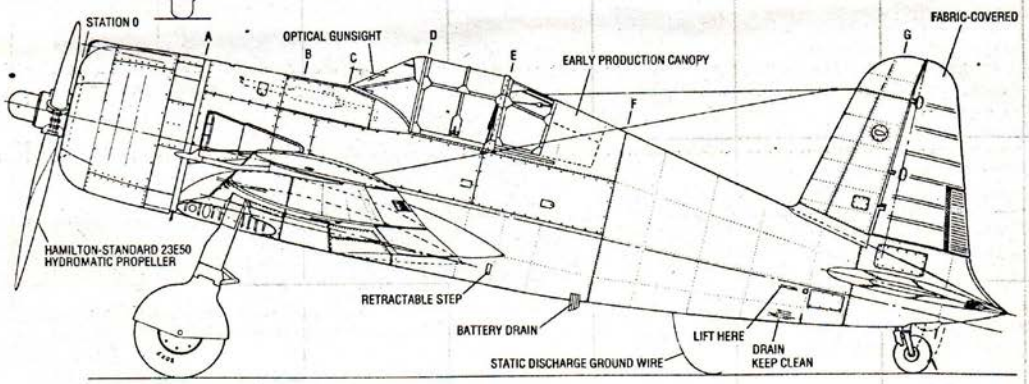
VULTEE P-66 VANGUARD

Manufacturer: Vultee Aircraft
Power plant: One 1,200 horsepower Pratt & Whitney Twin Wasp R-1830-S3C4-G 14-cylinder, air-cooled radial engine
Dimensions: Wingspan - 35′ 10″
Length - 28′ 5″
Height - 13′ 1″ (level)
Wing area - 196.78 square feet
Weights: Empty - 5,235 pounds
Gross - 7,100 pounds
Performance: Speed - 340 mph. Rate of climb - 9.2 minutes to 19,700 feet. Range - 850 miles. Service ceiling - 28,200 feet



1/48 SCALE





He recalls having seen a P-66 in a revetment about 30 miles from Chengtu. He and a group of pilots drove into the town of Chengtu and observed a veritable museum of aircraft all parked in revetments along lengthy taxiways. He remembers counting over thirty aircraft in one area consisting of a P-66, P-40s, P-43s, Russian I-15s and others. Walker notes, however, that throughout his wartime flying in China, the P-51 was the only CNAF aircraft he actually saw used in operations.

One P-66 did appear again on a U.S. Army Air Force inventory, according to Allan Blue. Evidently aircraft number 42-6856 made a wheels-up landing 100 miles south of Chengtu, near Woo-Tu airdrome and was transferred to Calcutta, India, on 23 January, 1944, but its subsequent history is not recorded. Further than this, little information has come to light regarding the operational career of the P-66 Vanguard.

What was the P-66 like to fly? How might it have fared in relation to other aircraft of its time? Again, Col. Johnson provides some interesting clues. Johnson was a P-40 pilot, and his remarks reflect a natural comparison of the two aircraft. First, he says, the P-66 was a delightful aircraft to fly, requiring very little familiarization work. It handled very well and had excellent manueverability. Johnson thinks that it could have come close to holding its own with the Zero in this capacity, a rare accomplishment indeed. The P-66 also had a good climb rate, and while it did not spin well, its recovery from a stall was straight and simple.

Col. Johnson recalls that the P-66 was a very stable aircraft, although in a dive he could look back along the fuselage and see wrinkles in the skin. At first this worried him, but it never became a problem. Johnson attributed the "tin can" feeling of the aircraft to the lighter construction used on the P-66, which was also more lightly armed and armored than the P-40. He did not think the P-66 was stressed to fly over 400 mph, although it accelerated better and attained a higher cruise speed than the P-40. As a gun platform, the P-40 was superior, Johnson concluded, after using the guns of the P-66 a number of times in tests.

The Pratt and Whitney 1830 engine which powered the Vanguard drew praise from Col. Johnson as being highly reliable and powerful. He compared its radial stability favorably to the in-line Allison of his P-40. In fact, the only serious fault which he remembers was the continuing problem of tail wheel collapse.

Why was the P-66 not accepted for production for the Army Air Force? Probably because it did not promise the performance of other aircraft already in the testing stages at that time, such as the P-38 and P-47. Nor could Vultee, a small company, provide the production facilities which the Curtiss P-40 and Bell P-39 already enjoyed in 1940-41. Certainly a production fighter for the U.S. Army Air Force would have had to carry more armor and armament. The P-66 mounted two .50 cal. machine guns in the upper cowling, but only four .30 cal. machine guns in the wings firing outside the propeller arc. External stores would have been another requirement. Meeting heavier weaponry expectations would have changed the Vanguard's fine lines and reduced its performance capabilities with its original 1200 h.p. engine. Whatever the case, the Vultee Vanguard was a fine airplane which flew under a number of flags and earned an interesting niche in the history of WW II aviation.

Specifications: Wingspan, 35 ft., 10 in.; length, 28 ft., 5 in.; airfoil section, root, NACA 0018-64 mod., tip, NACA 0009-64 mod.; incidence, 2 deg; dihedral, center section, 4½ deg., outer panel, 6½ deg.; total wing area, 196.78 sq. ft. Powerplant, one 1200 h.p. Pratt and Whitney R-1830-33 fourteen cylinder twin row radial. Armament, two .50 cal. and four .30 cal. machine guns. Weights, empty, 5235 lbs., loaded, 7100 lbs. Performance: Max speed, 340 at 15000 ft; range, 850 miles at 290 mph, 17000 ft; climb to 19700 in 9.2 min.; service ceiling, 28200 ft.

Note: Readers having further information about the Vultee Vanguard are encouraged to contact META MODEL. Significant developments will be included as addenda in future Vanguard kit distribution. Plans of the P-66 have been prepared in conjunction with this kit release and are available.

Credits:

META MODEL wishes to acknowledge the contributions which the following have made to this publication: Robert Martin shared information collected for AAHS Research Project 8111 on the history of the P-66 including the accounts of Col. Roberts and Col. Reynolds. Allan Blue offered his research findings. Dustin W. Carter provided drawings and historical information as did Joey Rheinlieb. Col. R. T. Johnson's personal recollections were invaluable. Edward L. Leiser offered research ideas and photography. Kenneth Sumney and Stephen Hudek contributed photographs. (Photo credits: #1, W. J. Johnson, #2, Sumney, #3, Leiser.) Finally, credit must go to Don Thurau and the staff of Fix Printing, Batavia, N.Y., for their continued patience in the face of META MODEL perplexities.

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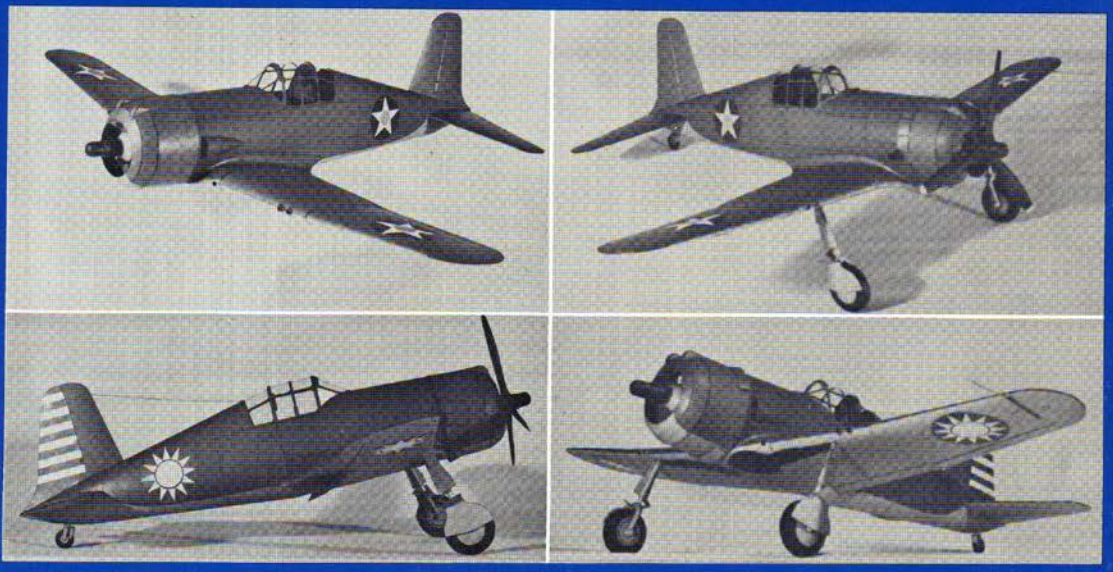
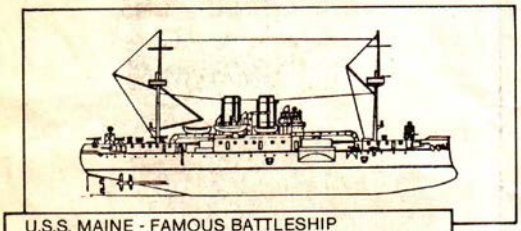
PHOTOS OF MODELS BUILT FROM THIS KIT



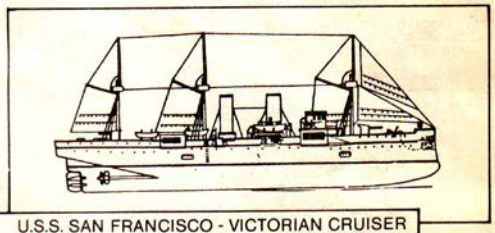
Chenier's Fighting Fleets

American made models of ships from the early development of modern warships and famous World War I fighters. Each has it's own story, along with easy to follow directions and diagrams. The Emden is in full color. The others are to be colored with art pencils or felt pens. The style of these models is reminiscent of the turn-of-the-century metal toy ships seen in old pictures and catalogs. Rare objects, these charming models have real historical significance.



U.S.S. MAINE - FAMOUS BATTLESHIP

CFF 1003 Scale 1/265 14½" long $6.95



U.S.S. SAN FRANCISCO - VICTORIAN CRUISER

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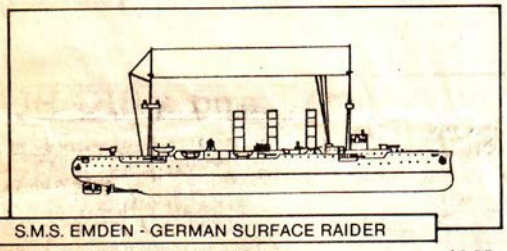

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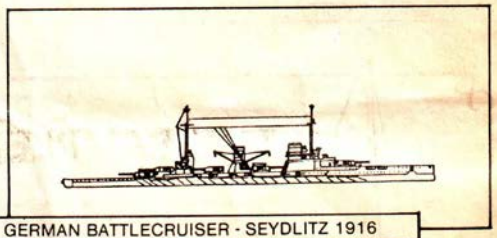
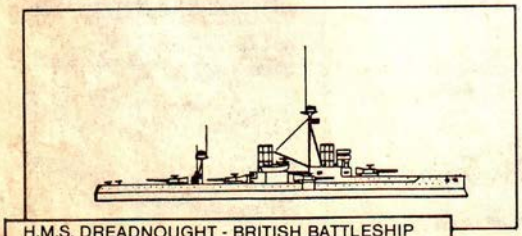
CFF 1001 Scale 1/265 18½" long $6.95



GERMAN BATTLECRUISER - SEYDLITZ 1916

CFF 1004 Scale 1/384 20½" long $6.95



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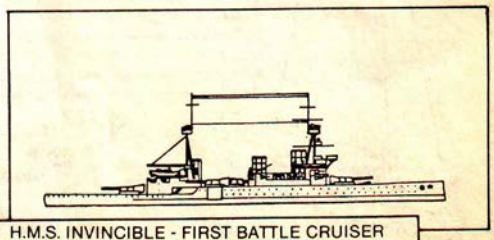

H.M.S. INVINCIBLE - FIRST BATTLE CRUISER

CFF 1006 Scale 1/384 16¾" long $6.95