

HILL FIELD, AIRPLANE REPAIR HANGERS #1-#4  
(HILL FIELD, BUILDING 225)  
(HILL FIELD, BUILDING 108)  
5875 Southgate Avenue  
Layton Vicinity  
Davis County  
Utah

HAER No. UT-85-0

HAER  
UTAH  
6-LAY, V)  
28-

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

REDUCED COPIES OF MEASURED DRAWINGS

HISTORIC AMERICAN ENGINEERING RECORD  
Rocky Mountain System Support Office  
National Park Service  
P.O. Box 25287  
Denver, Colorado 80225-0287

# HISTORIC AMERICAN ENGINEERING RECORD

HILL FIELD, AIRPLANE REPAIR HANGARS #1-#4  
(HILL FIELD, BUILDING 225)  
(HILL FIELD, BUILDING 108)

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UTAH  
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HAER No. UT-85-O

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**Location:** 5875 Southgate Avenue, Hill Air Force Base, Layton Vicinity, Davis County, Utah

**UTM:** 12-417160-4551760

**Date of Construction:** 1942

**Architect:** Construction Division--Office of the Quartermaster General

**Builder:** George A. Whitmeyer & Sons Company

**Present Owner:** Hill Air Force Base

**Present Use:** Maintenance

**Significance:** The dual mission of the Ogden Air Depot/ Ogden Air Materiel Command (OOAMA) at Hill Field/Air Force Base during and after World War II was to repair, maintain, and store aircraft, as well as to receive, store and supply air materiel. Building 225, an immense steel and brick aircraft repair hangar, housed major repair facilities for both fighter escort and bomber aircraft, and provides vivid images of these processes.

**History:** Building 225 provided shelter for planes that required major repair, routine maintenance, or preparation for long term storage. The interior of the building is one large, open space that is divided among four separate hangars. Planes were dismantled in the massive hangars, and specific parts like engines, propellers, and flight instruments were repaired or manufactured in surrounding shops and then reassembled to aircraft in the hangars. Repaired and inspected aircraft were transferred from Building 225 to the Aircraft Operations Hangar (Building 1), where the Flight Test Section received, serviced, and maintained these planes in a flyable condition until test flights were completed. Bombers (such as B-24s and B-29s) and fighter escorts (such as P-47s and P-51s)<sup>1</sup> were both serviced in Building 225.

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<sup>1</sup>World War II era fighter escorts were small single engine planes that usually carried only one person. They were fast and maneuverable, and escorted bomber aircraft to their targets and intercepted incoming enemy aircraft. They were usually armed with machine guns and a few small bombs.

Airplanes entered the hangars through steel and glass sliding leaf doors that fill most of the north and south elevations. Above these doors, small tail doors open to accommodate the tails of larger planes. At the beginning of World War II, a single plane was moved into each docking station and all repairs were made on the stationary plane. As the war progressed, however, more efficient assembly line methods were explored and developed.

Scaffolding stands used in Building 225 were made of prefabricated "Dexion" components that could be assembled into virtually any size or shape because long angles with holes cut in them accommodated bolts at various locations. The long beams provided space for several technicians to work on an airplane simultaneously, and the height of the beam could be adjusted with a jack. If a plane arrived that did not fit one of the existing stands, one was either modified to the right height/length or a new one was assembled.

Quotas set by Air Command were rarely met in the beginning months of World War II. Replacement parts were often difficult to obtain, and the majority of special tools were unobtainable and had to be designed and manufactured on the Base. In the later years of World War II, these obstacles began to subside. A shortage of special parts, tools, equipment, and adequate working space continued to present challenges, but in gradually reduced proportion. Many items continued to be manufactured by the depot shops as the needs for them became sufficiently urgent.

Parts shortages again surged during the Korean Conflict of the early 1950s. In order to expedite the completion of projects, parts were frequently removed from the last planes in a repair line, repaired, and then reinstalled on planes that were ahead of the original planes. This enabled each early phase of production to proceed without delay, but often resulted in a crisis when the last plane was ready to receive unavailable parts. Sometimes, the parts arrived from other installations in time to complete the last planes in a line without delay, but often, the parts were unavailable from other sources and were manufactured locally.

In efforts to increase efficient production methods, all activity in the Hangars was carefully monitored and controlled by the Production Control Branch. The status of aircraft and parts could be accurately determined at any of the various stages of production. The Branch obtained and disseminated technical information to workers and handled technical correspondence, including all official long distance telephone calls

pertaining to the engineering department. As the Production Control Branch gathered statistics, employees and materials could be more efficiently allocated among the departments.

Coordination between departments came gradually as the units began to understand their relationship to each other and as specialized labor and production line methods became widespread. Even with careful planning, though, operations progressed at different rates in each department. Frequent rush orders or parts shortages caused congestion in the production lines that disrupted interdepartmental flow.

The Inspection Section, established in January 1942 under P.W. Buller, was located in the Annex of Repair Hangar #1. Difficulties were encountered because unskilled personnel were often assigned as inspectors, due to the rapid turnover of personnel through induction.

The best inspectors were usually experienced mechanics, and were recruited whenever possible. The inspection of aircraft was not a casual matter; workers were required to be on guard to recognize and correct all faults, however small. Techniques were developed to complete predictable, thorough, efficient inspections, commonly referred to as "Shake-Downs." Each plane was divided into several sections, and specially trained inspectors investigated each system. The fuel system, oxygen system, empennage (tail area), and rigging were inspected in a sequence that provided minimum lost motion and duplication of effort. At times, confusion was experienced through conflicting specifications and Technical Orders. These questions were referred to Air Service Command for clarification.

### **Specific Projects**

During World War II, Boeing B-24 bombers were the first airplanes repaired by an assembly line process at the Ogden Air Depot, with the planes moving through successive stations for specialized tasks instead of receiving all repairs at one dock. This increased efficiency so much that all hangars were subsequently organized into multiple assembly lines that were each designed for a specific type of aircraft. Most of these World War II era planes traveled through the assembly line tail first, since they were more easily moved backwards than forwards.

When the first P-47 fighter escorts were overhauled in the Aircraft Repair Hangars in 1943, all paint was stripped from each airplane that entered the line in Building 225. This process was discontinued after a few days, however, due to the lack of proper ventilation. In order to complete the Air Command quota of 13 planes each month, the assembly line was moved every eight hours, with approximately 139 people working the line at any given time. As work progressed, three stations were added that established a finer breakdown of tasks and enabled less experienced personnel to contribute to the process.

In 1945, A-20 aircraft were overhauled in the Aircraft Repair Hangars. Each plane was first cleaned with high pressure cleaners in Hangar #4, moved to an Inspection Station for a complete "Shake-Down" inspection, and then sent through a series of 12 specialized stations for disassembly, repair and re-assembly. Armament was removed, and any necessary repairs were made to the engine, fuel cell, electrical and hydraulic systems, radio, and other parts. The completed aircraft was inspected again prior to their release to Building 1 for in-flight testing.

Air-to-air refueling equipment was installed on B-29 Superfortresses in May 1950. These aircraft had a 141 foot wing-spread and were turned to a 45 degree angle in order to fit into hangars that were only 110 feet wide. Workers at Hill Field designed special jigs and braces that enabled the planes to move from station to station along the assembly line while maintaining their 45 degree angle.

Building 225 was modified in 1947 to create compartmentalized shop space in the flat-roofed area between Hangars 3 and 4. Interior walls were added that provided separate rooms for a machine shop, welding shop, metal plating shop, fabric repair shop, and paint & dope room. These shops were subsequently cleared from the building in 1950, though, to make room for a B-26 overhaul line. The heavy equipment used in the shops, including a 500 ton Lake Erie Hydro and a massive transformer vault that supplied electricity to the Hangars, were relocated to other buildings. After the remodeling, Building 225 had enough space to house the simultaneous overhaul of fourteen B-29's and 28 B-26's.

#### **Aircraft Storage**

In addition to aircraft repair, Building 225 was used to prepare aircraft for long-term storage<sup>2</sup>, and to remove aircraft from storage status and prepare them for service when needed. In December, 1944, seventeen B-24J Airplanes were transferred to Tulsa, OK, after being removed from storage at Ogden Air Depot. After two weeks of work on each plane, four aircraft were released for transfer each day. Approximately 200 personnel were divided among 5 stations to accomplish this job. Each entire airplane was cleaned and inspected, and engines, oxygen systems, electrical systems, fuel systems, instruments, propeller governors, automatic pilot controls, radios, and armament were all repaired or replaced as needed.

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<sup>2</sup>In mid-1944, the Ogden Air Service Command estimated that 2750 aircraft could be stored on the base. No inside storage facilities were available for engines, propellers, or tires that were removed from planes before they were placed in storage.

Also in 1944, two progressive repair lines were established in Hangar 2 in order to process twenty P-47 fighter escorts for removal from storage each month. Sixty workers with specialized training were transferred to the project from various other areas, including the airplane repair, armament, sheet metal, electrical hydraulics, engine repair, communications, instrument repair, painting, and inspection departments. An acute shortage of spare parts presented a major problem which required that many parts be manufactured at Hill Field as they were needed.

In 1947, when over \$161,000,000 worth of aircraft was stored on the Base, Colonel Frank D. Hackett stated in a press conference to local reporters:

Preparing the airplanes for temporary storage is quite a job in itself but preparing the planes for permanent storage entails a great deal more of work. For temporary storage the planes are blocked up off of the ground to take the weight off the tires, the engine is "pickled" (sprayed inside and out with rust inhibitor oil), all outside metal surfaces of the craft are sprayed with zinc chromate, and most of the engine openings are covered over with tape to keep all dust and moisture out. For permanent storage, all metal surfaces - inside and out - must be treated to prevent oxidation. The wings, fuselage, and empennage must be washed clean of all foreign material, then acid treated, and painted with zinc chromate; the controls must be locked and control cables and pulleys treated with special rust inhibitor; the radio and radar equipment as well as flying, navigation, and engine instruments must be removed from the plane, checked over, and then sealed in moisture proof containers for storage inside the craft.

I might add that the windows and blisters of the plane are painted over with light-reflecting white paint to minimize the effect of the sun shining through glass and hitting the interior of the planes. If this were not done, the cabins of the planes would heat up and there would be danger of fire from spontaneous combustion.

Aircraft placed in permanent storage at Hill Field was maintained in as near a flyable condition as possible. All aircraft were moored to the ground and placed on wood blocks to remove weight from the tires, which were covered with balloon cloth to prevent deterioration of the rubber by oil and grease that might drip from the engines. All moveable controls were locked internally and externally by wood and metal locks, and all exposed machine surfaces were coated with paint or other exterior corrosion preventatives. Cloth tape, painted with a dope and aluminum paste, was used to seal all vent openings, thereby preventing the entrance of foreign material or water. All engine oil was drained,

metal spark plugs were removed, and engine cylinders were sprayed with a preservative oil and sealed. The fuel tanks, brake system, hydraulic system, carburetors, and anti-icing systems were treated and sealed against the elements.

#### **Fire Prevention**

Fire prevention initiatives occurred throughout the base in the early 1950s. An automatic sprinkler system was installed in Building 225 by the Automatic Sprinkler Company of America from Youngstown, OH, in 1950. Deluge-type interior fixtures were installed in the Hangars, and wet-spray fixtures were placed in the flanking administrative area. The Grinnell Company of Providence, RI, constructed a 300,000 gallon reservoir and pump house that supplied water to the new system.

#### **General**

**Description:** Building 225 (752' x 572') is an immense steel and brick aircraft repair hangar. The structure is divided into two identical wings. The east wing was built in 1942, and the west wing was completed the following year. The massing of the building is broken into five sections; the four corners of the building each contain a separate hangar that is covered with a rounded hangar roof; the central section of the building has a flat roof.

The steel frame building is constructed over a concrete foundation and floor. Segmentally arched steel trusses support the roof line and vertical corrugated siding covers most of the exterior of the building. The ends of the hangars are equipped with sliding leaf doors made of steel and glass which run most of the length of the elevation. Just above these doors, at the center of the hatched elevation, is a small tail door which opens to accommodate the tails of larger aircraft.

The two-story brick wings located to the east and west of the hangars held administrative offices. These wings are constructed of beige brick laid in six-course American bond. Continuous concrete bands that circle the administrative section of the building articulate the window lintels and sills on both floors.

Building 225 has received only one significant addition since its construction. A two story administrative office and three bay garage were built at the center of the east wall. There have been several minor alterations including new windows, doors and new interior space layout.