NATIONAL MODEL RAILROAD ASSOCIATION

Data Sheet

DIESEL LOCOMOTIVE 1

ALCO HH-SERIES SWITCHERS
MANUFACTURER: ALCO
DATE BUILT: 1931-1940
HORSEPOWER: 600-1000

RESEARCHER: JERRY T MOYERS
PHOTOGRAPHY AND CAPTIONS: LOUIS A MARRE COLLECTION
DRAWINGS: STEPHEN M. PRIEST, MMR

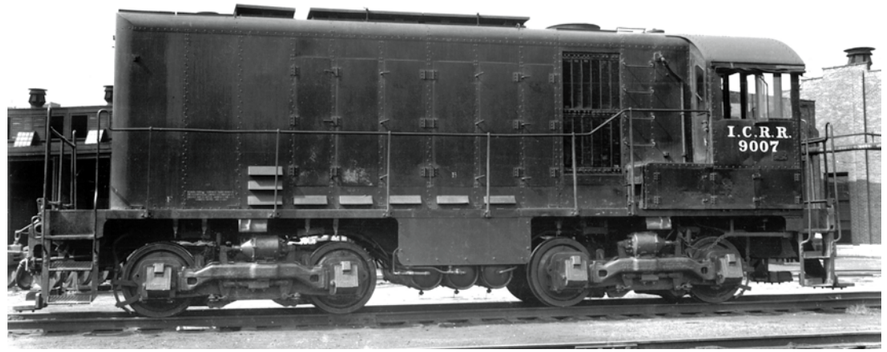
In this issue of Scale Rails, *the NMRA is pleased to announce the debut of a series of new or revised Data Sheets. The initial Data Sheets, covering early American Locomotive Co. (Alco) diesel-electric switching locomotives, are the work of noted diesel authority and modeler Jerry T. Moyers. Jerry's highly detailed diesel drawings have appeared in* Railroad Model Craftsman, *and he has also worked closely with a number of manufacturers and importers to improve the accuracy of their products.*

Noted author Louis A. Marre has provided the reader with detailed captions to augment his choice of the quaity photographic doumentation included in the Data Sheets.

The Data Sheets will include prototype information about a specific manufacturer, specifications for the particular locomotive(s) featured, and an in-depth discussion of models thereof. Readers with expertise concerning other locomotive models or builders are invited to contact the editor. – Ed.

Top left: **Boston & Maine Phase 1 1102 is ex-Alco demonstrator 602, with the cab as front, shown at work in Boston on September 1, 1951. This unit dates from May 1934 as Alco 602. B&M also purchased a stock unit and numbered it 1101. Note that B&M "reversed" the controls and now the long end is marked as F-1 for front end, No. 1 side.**

Bottom left: **Lackawanna bought Phase 1 examples of the earliest high hood configuration, oriented with the cab as front. Lackawanna 323 is seen here at the end of a long career. Its bell has been removed from the simple bracket next to the headlight, but otherwise it is intact after 30 years of hard service. The unit was at the Jersey City enginehouse, where these units spent their entire careers, on September 21, 1963, when they had recently been retired by actual owner Erie Lackawanna — whose number this unit carries.**



Above: **Many high hood purchasers were interested in diesels because of anti-smoke ordinances. Illinois Central met its Chicago obligations with eight HH600s among other purchases. The long end was front by 1935 when these units were delivered. The 9007 shows the left side details, including the rounded-off and cleaned-up front end of the Kuhler design. The photo was made in Chicago, naturally, on September 25, 1949.**

Below: **Peoria & Pekin Union 100 Phase 2, its first diesel, is a 1936 version of the HH600, not notably different from other Kuhler modifications. This one does have the truck chains firmly in place. The box on the walkway beneath the radiator is an owner modification, probably a toolbox. Long end is front. The photo dates from September 3, 1938, when the unit was just two years old.**

ALCO HH-SERIES DIESEL

by Jerry T. Moyers

The American Locomotive Company of Schenectady, New York, long a mainstay on the American railroad locomotive scene with its excellent line of steam engines (external combustion), began delving into the internal combustion business in the early 1920s. Initially, Alco teamed up with GE-Ingersoll-Rand in the development and sale of boxcab locomotives. From that point until 1929, Alco's diesel locomotive efforts were varied.

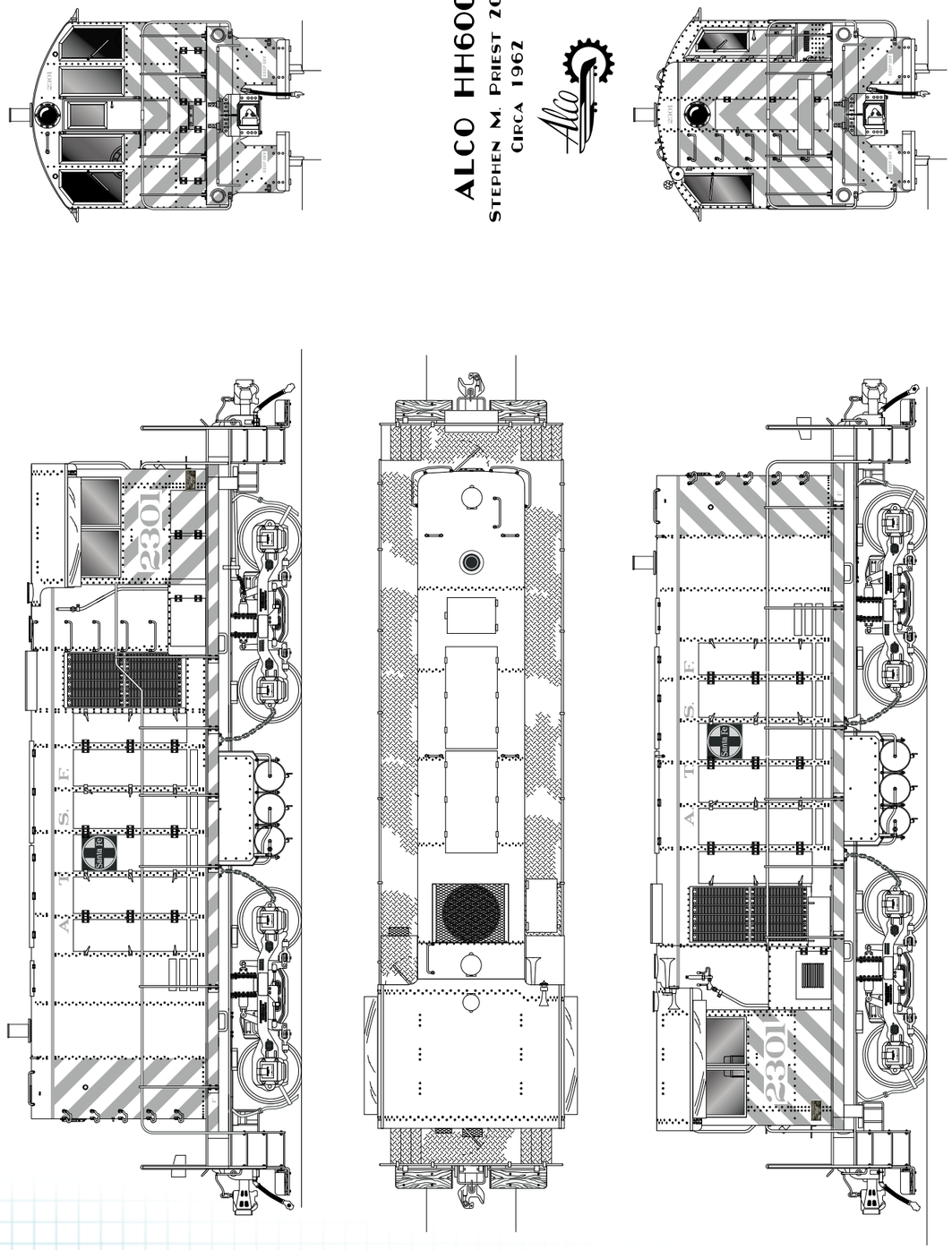
That all changed in 1929 when Alco acquired the McIntosh & Seymour (M&S) Engine Company of Auburn, New York. While M&S cataloged a large variety of diesel engines, none met the requirements for locomotive application. M&S therefore began the development of its line of locomotive diesel engines. M&S had long been the producer of carbureted gasoline engines for the H. J. Brill Company.

Ironically, the development of the locomotive diesels was actually based on that gasoline engine. This was, of course, after the Brill patents had expired. The M&S-proposed designs became Alco Model 330, a 300 hp, six-cylinder, 9½ x 10½-inch (bore and stroke), 700 rpm, 75 psi bmep engine; and Alco Model 531, a 600 hp, six-cylinder, 12½x13-inch 700 rpm, 75 psi bmep engine.

Above: Milwaukee Road 1602, a March 1939, Phase 1 HH660 shows some of the benefits the second carbody revision; the hood slots have been replaced by louvered openings. Battery box covers, above the air reservoirs do not appear to be of constant height, and now there are real "stairs" at the four corners of the frame for crew access. The photo dates from May 1939, when the unit was two months old, and was taken in Cedar Rapids, Iowa. High hoods came in any color — but it was always black, by customer choice.

Below: Louisville & Nashville 10, built in March 1939 but not purchased until September of that year, is not only a late model HH660, but a dated illustration of the tentative nature of many early diesel purchases. The photo is reliably dated as Louisville on March 29, 1939. However, the reliable L&N roster notes that it was "delivered" in September of that year. The "delivered" should really read "accepted," for the unit was obviously on a six-month trial before L&N made the commitment to purchase. Apart from that curious set of facts, it is a fine pristine example of the latest HH660 design. The prime mover is a 538, which supplanted the 531 but without any notable changes in the external appearances of the switchers.

"Brake mean effective pressure" (bmep) is a very effective yardstick for comparing the performance of one engine to another, and for evaluating the reasonableness of performance claims or requirements. Bmep is defined as the average (mean) pressure



that, if imposed on the pistons uniformly from the top to the bottom of each power stroke, would produce the measured (brake) horsepower output. The bmep is purely theoretical and has nothing to do with actual cylinder pressures. It is simply an effective comparison tool.

Both of the M&S designs were four-stroke-cycle engines that set the precedent for virtually all Alco engine designs. The Alco marketing concept at the time, was to develop a standard line of switching locomotives as follows:

- 300 hp, 66-ton, B-B double-ended boxcab,
- 300 hp, 66-ton, B-B end cab
- 600 hp, 66-ton, B-B end cab.

Let's follow the progression of Alco switching locomotives from the unit equipped with the Model 531 engine through its derivatives: the turbocharged (turbo-supercharged) Model 531-T, Model 538, the turbocharged Model 538-T.

ALCO DEMONSTRATORS

Alco's first demonstrator, which truly launched locomotive production, featured the first Model 330 M&S 300 hp prime mover. Released in January 1931, it was a 66-ton, double-ended boxcab numbered 300. Number 300 was significant in several ways: It first utilized the distinctive "Blunt" truck, named for designer James G. (Jerry) Blunt, an Alco mechanical engineer who received a patent for his design in October 1924. And it was the only Alco boxcab demonstrator. This unit was later sold to the Jay Street Connecting Railroad.

The end-cab configuration had become the standard for both 300 hp and 600 hp production units. Initially, Alco declared the cab end of its locomotives as the front, with the control stand mounted appropriately. The first end-cab demonstrator, with the cab as front, was a 300 hp, 66-ton unit, confusingly also numbered 300. This locomotive was assigned Alco Model 404-OE-132 (two four-wheel trucks, oil-electric, 132,000 pounds [66 tons]) and was completed in July 1931.

The second 300 also introduced several unusual features: The hood sides sloped inward from the platform to the top of the hood. There were numerous rectangular openings along the bottom of the hood doors and above the platform on both sides, with fixed covers at 45 degrees for ventilation of the long hood. The generator end was placed next to the cab, and the radiators were located in the sloping hood on each side of the generator. This unit was soon sold to Lehigh Valley as No. 102. The LV ordered a second unit, 103, delivered in December 1931.

Top: **New York Central System acquired five HH660s on the accounts of subsidiary Boston & Albany, in April and May 1939. This observation provides the author with the chance to correct the entry in *The Diesel Locomotive: The First 50 Years* that erroneously lists them as HH600s. When the B&A was absorbed by NYCS, the units were relettered and renumbered, surviving in NYC service until 1963, along with six units always on the books of NYC proper. Former B&A 601, now NYC 807, is shown at DeWitt, New York, on November 24, 1962. Note the classy little visor over the headlight — not an Alco idea.**

Above: **NYC 810 in a right rear view at Niles, Michigan, in May 1953 offers at least a side view of the back of the cab, which has a "lip" of sheet metal behind the cab roof, more a styling touch than anything really practical as a rain shield.**

Below: **The Erie bought four HH660s very near the end of production.We show the 303 working in Jersey City on April 2, 1957, with two rerail frogs on hangers above each truck on this side, as well as a pushpole bracketed on the running board: Erie is ready for anything. This is a final phase HH660, not differing in any substantial way from all production after the 1938 revision of the carbody.**

TERMINOLOGY

Alco did not originally refer to its locomotives as HH600s, S1s, S2s, etc. Within Alco, they were known primarily by their company model and, later, specification numbers. The shorthand designations were presumably created by railroaders and/or railfans. Jerry A. Pinkepank, editor of the *Diesel Spotters Guide*, implies that he coined the designation of "HH" or High Hood for the HH600. Alco subsequently did use this form of reference, but not until much later. Alco produced demonstrators 304–306 in 1932, fitted with the 300 hp engine and drop-equalized trucks. These units were designated as Alco Model 404-OE-114 (57-ton). They were sold to the U.S. Navy in 1935.

***Left:* New Haven had ten HH600s (0911–0920) with which they were well pleased, so when Alco announced the imminent end of high-hood unit production, it hastened to complete the fleet with ten more, delivered at the very end of production in December 1939, road numbers 0921–0930. Unit 0924 was working South Station on July 26, 1967, in the McGinnis paint scheme still at ease on a unit design dating from 1931. The right side high-angle view of NH 0924 shows the simple roof details of the late high-hood design, as well as its owner's fondness for air-operated steam-type whistles instead of single-bell air horns. The grab-iron ladder up the right side of the nose is an Alco feature, not an owner modification.**

Alco's first 600 hp end-cab locomotive, demonstrator No. 600, was completed in June 1931 and designated as Alco Model 404-OE-200. The convention at the time was to mount the engine/generator on top of the platform and over the mainframe longitudinal members. Due to the higher profile of the six-cylinder 531 engine, the top of the hood then reached almost to the top of the cab, so it might be considered the first high hood. It was quickly purchased by New Haven and renumbered 0900.

This unit continued the practice of having the area under the cab open for easy access to the air brake equipment, and fuel tank, sloping hood sides, and drop-equalized trucks. For reasons known only within Alco (possibly for better weight distribution on the trucks or to move the main generator away from potential radiator leaks), the positions of the engine and generator were reversed so that the generator was at the end of the hood, farthest from the cab, and the cab side sheets extended down to completely enclose the air brake equipment. Exactly when these changes took place has yet to be determined; however, demonstrator No. 603 had the generator at the front of the hood and the area under the cab enclosed. It was also equipped with Blunt trucks. The 603 was sold to Delaware, Lackawana & Western as its 401.

LOCOMOTIVE PHASES

Seven additional units were ordered in 1932 by Lackawanna and completed in 1933. Like the 401, these units featured vertical side sheets on the long hood, a flat end plate culminating in square corners with the sides and a featheredge at the curved top, enclosed air brake equipment, fuel tank, and Blunt trucks, which were now the accepted standard. It's assumed that these were Model 404-OE-200. This group of locomotives has been designated as Phase 1 and features the early characteristics that we now know as the HH600 or "High Hood" series.

Following the completion of the Lackawanna units, Alco constructed demonstrator 602. The 602 was sold to Boston & Maine and renumbered 1102. Another locomotive, possibly from Alco stock, was a 600 hp end-cab completed in April 1934. It incorporated styling refinements by industrial designer Otto Kuhler and bore Alco Model 404-DL-132. The Kuhler refinements included raising the curved top of the hood to cab height for a straight end-to-end top line, recessing the headlight, curving the end sheet slightly, and rounding the juncture of the hood sides with it. The featheredge between the hood front and the curved top was maintained. Kuhler did not remove the rectangular openings along the bottom of the hood doors and above the platform on both sides, which were for ventilation of the long hood. These locomotives, like the Phase 1s, utilized ladders to access the four corners of the platform.

This locomotive, the first to incorporate the Kuhler modifications, was sold to Belt

Railway of Chicago as that railroad's No. 300. This locomotive was also the first unit to be completely built with Westinghouse electrical equipment. The hood end was designated as the front on this and subsequent switcher production. This series of locomotives has been designated as Phase 2.

By 1935, it was apparent that to compete with the fledgling Electro-Motive Corp. (later the Electro-Motive Div. of General Motors, or EMD), it would be imperative that Alco increase the rating of the 531 engine to at least 900 horsepower. It appeared that there were two basically workable solutions: increase the 531 to eight cylinders, or incorporate the Buschi system of turbo-supercharging the six-cylinder engine, a project that Alco had been corporately experimenting with for some time. The supercharger was the least expensive and most readily available solution.

The first 531-T unit (Phase 1) was delivered to Philadelphia, Bethlehem & New England in early 1937. Birmingham Southern also received a 531-T unit in 1937. The last 531 switcher (600 hp, Phase 3) was delivered in June 1938. Also in 1938, Auburn completed an upgrade on the 531 prime mover, which increased the horsepower from 600 to 660 and from 900 to 1,000 on the turbocharged 531. These engines were redesignated Models 538 and 538-T.

The first 538 (660 hp, Phase 1) unit, designated as Model 404-DL-199, was released in August 1938. The carbody underwent several significant external changes. Gone were the slotted air inlets at the bottom of the hood, being replaced by rectangular, louvered openings toward the bottom of the hood doors that covered impingement air filters. Access to the platform was now by "Pullman-style" steps. The featheredge at the juncture of the hood front and the curved top was nicely rounded to blend with both. The late 600 hp units shared this carbody and have been designated as Phase 3, while the 660 hp units are Phase 1. Externally, however, they are identical.

The 531-T continued in production until October 1938. The first 1,000 hp 538-T (HH1000, Phase 1) came out in November 1938. (*The Diesel Spotter's Guide* incorrectly lists these engines as Model 539.) Production of the HH series continued until early 1940.

LOOKING AHEAD

This concludes our overview of early Alco diesel switcher production. The diesel switcher Data Sheet series will continue with the better-known Alco switchers beginning with the S1/S3 series.

ALCO'S "BLUNT" SWITCHER TRUCK

The Alco "Blunt" truck was the invention of, and named for, Alco mechanical engineer James G. (Jerry) Blunt. A patent for this unique truck was applied for September 18, 1923, and patent 1,512,576 was granted October 21, 1924.

The truck was first applied to Alco 66-ton, double-ended boxcab demonstrator No. 300 released in January 1931. The demonstrator was later sold to the Jay Street Connecting Railroad as its 300. The next application was on 600 hp end-cab demonstrator 601, built in 1932. The 601 later became Lehigh Valley 105. An additional unit, 600 hp end-cab demonstrator 602, was constructed and sold to Boston & Maine as its 1102. Based on extensive field (yard) experience gained from other units, this unique truck's amazingly flexible floating bolster and its ability to equalize the locomotive weight on each of the four wheels over unbelievably rough track established it as the standard Alco two-axle, two-motor switcher truck.

The Association of American Railroads mandated the adoption of the Commonwealth Steel Co. truck as the universal switcher truck (AAR Type A), supposedly for commonality purposes. The truck, of totally different suspension technology, had a rigid bolster, double-drop-equalizer design. Consequently, the highly flexible Blunt truck was displaced after some 20 years of exemplary service.

During that period, the Blunt truck went through at least three significant, although generally unheralded, design changes. The original design incorporated only one brake shoe per wheel. During that period, the bolster suspension method was changed. The four suspension springs were either exposed or covered by the H-configuration bolster. Which design came first is subject to question. *Model Railroader Cyclopedia, Vol. 2, Diesel Locomotives*, page 19, states that the exposed springs were the earlier design, but reference to prototype photos of High Hood locomotives does not bear this out. Some of the last HH660 units built are riding on the exposed spring trucks, whereas some early production units are riding on covered spring trucks.

The third design change, although not necessarily concurrent with the High Hood locomotive production, was the front and rear extension of the side frames to permit the conversion to two clasp brake shoes per wheel. This change seems to have occurred in the early 1940s and was carried through to the mandated AAR Type A truck.

ALCO "HIGH HOOD" DIESEL SWITCHER MODELS

by Jerry T. Moyers

HH600

Prototype manufacturer: American Locomotive Company (Alco)
Manufacturer's identification: Model 404-OE-132
Popular identifier: HH600
Model manufacturers: HO – William K. Walthers, Atlas

The prototype HH600 was produced in three different carbody configurations or phases. There are no known models of the Phase 1. William K. Walthers produced a sand-cast brass body shell of a quasi Phase 2 HH600 back in the 1940s or 1950s. A mechanism was available to fit with the body shell. Current availability is limited to body shells occasionally being offered for sale on eBay.

Atlas recently released a beautiful, if minutely flawed, model of the "high-hood" HH600/660. The Atlas model represents the last carbody, Phase 3, utilized by the 600 hp HH600. An identical carbody housed the later 660 hp HH660. This permitted Atlas to spread the tooling costs over two products. The following comments therefore apply to both models. As there are no known engineering drawings of the locomotive, I referred to numerous prototype photographs to determine detail fidelity.

The sand cast HH600 was produced by W. K. Walthers in the 1940s. This shell occasionally can be found on eBay or at swap meets.

The art of producing outstanding models appears to be reaching a zenith in detail fidelity and performance — almost. The Blunt trucks, for example, have only one brake shoe per wheel and have exposed springs for the floating bolster, both of which are prototypically correct. (Trucks with the springs covered by the bolster were also available during the same time period.)

The brake cylinder should lean outboard of the sideframe slightly, rather than being straight above it. As on the prototype, a single truck design operates equally well in either position on the locomotive — there is no left-hand or right-hand truck. Prototype photos suggest that the cab vent, rear sand fill, and radiator fan guard are about twice as high above the hood and cab as they should be, an easy fix for the fastidious modeler. The inside diameter of the exhaust stack is too small, which results in the stack walls appearing too thick, another easy feature to correct with a drill bit.

An interesting detail is the roof vent, which appears to be an automotive-style ventilation hatch of the type found on most American automobiles on the hood centerline immediately in front of the windshield prior to World War II. An additional but seldom seen detail replicated by Atlas is the extension on the right front (engineer's side) of the cab roof, presumably to reduce sun glare under certain conditions.

A significant Alco switcher feature long overlooked by model manufacturers until recently is the fact that the rear cab corners are radiused, not square. The Atlas HH model cab corners have this characteristic radius, and the cab sides extend slightly beyond the platform edges, which is also prototypical. The model correctly reproduces the louver-covered impingement carbody filters on the lower portion of the hood doors, which replaced the covered ventilation slots of the Phase 1 and 2 switchers.

The overall quality of the die work and attention to detail has provided the HO modeler with an outstanding replica of the prototype.

The initial release of the HH600 was painted and lettered for Elgin, Joliet & Eastern, and the HH660 is painted for Erie, New Haven, Maine Central, and Southern Pacific. Each is offered in two road numbers, plus undecorated.

HH660

Prototype Manufacturer: American Locomotive Company (Alco)
Manufacturer's identification: Model 404-DL-199
Popular identifier: HH660
Model manufacturers: HO – Atlas

The Atlas model represents the last carbody, Phase 3, utilized by the 600 hp

HH600. An identical carbody housed the later 660 hp HH660. See HH600 comments above.

HH900

Prototype Manufacturer: American Locomotive Company (Alco)
Manufacturer's identification: Unknown.
Popular identifier: HH900
Model manufacturer: None known.

HH1000

Prototype Manufacturer: American Locomotive Company (Alco)
Manufacturer's identification: Unknown.
Popular identifier: HH1000
Model manufacturer: None known.

The prototype was produced in only one carbody phase. The basic difference between the HH660 and the HH1000 is in the size, height, and width of the radiator section, and the presence of two louvered doors above the existing hood end doors. This provides Atlas with the possibility of revising HH660 body shell dies to produce the HH1000 and, in the interim, the kitbasher with an interesting project.

Models shown manufactured by Atlas