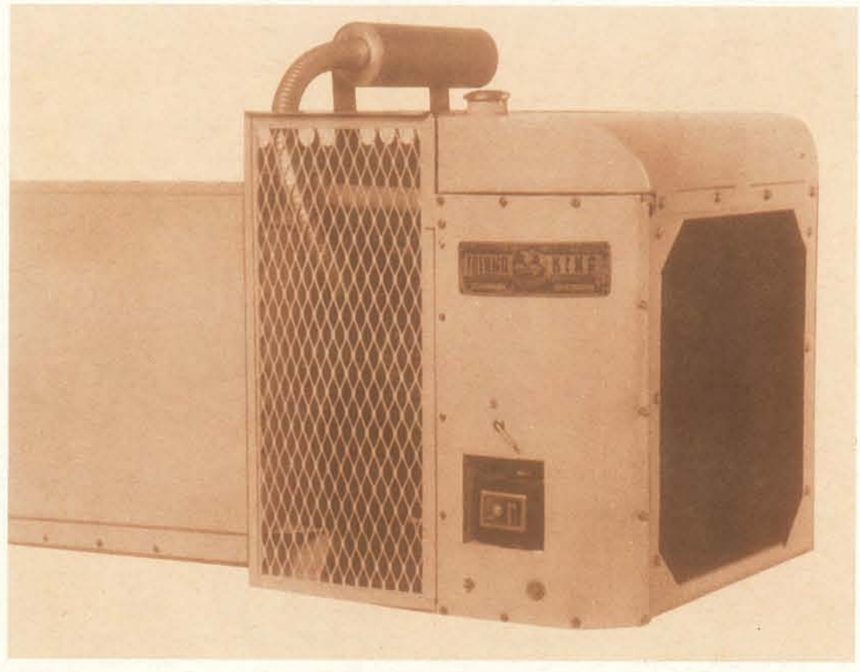
Thermo King Model C Transport Refrigeration Unit



An International Historic Mechanical Engineering Landmark.
The American Society Of Mechanical Engineers, October 1, 1996.

ASME International

TK30373

THERMO KING
World Leader in Transport Temperature Control

H192

REFRIGERATION ON WHEELS: THE EVOLUTION

First developed in the late 19th century, commercial mechanical refrigeration gradually found its way into butcher shops, breweries and meat packing companies. It wasn't until 1938 that refrigeration found itself on the roadways. Until then, farm products were transported from processor to retailer by rail and road using ice as a coolant. Spoilage was common.

Trucking companies realized the potential for hauling perishable commodities. Consumer demand for meat, poultry, produce and dairy products was increasing at an astounding rate. Without a doubt, the market was ready for transport refrigeration. But adequate equipment was not yet available.

The U.S. Thermo Control Company, known today as Thermo King Corporation, was founded in response to this basic need.

THE FIRST UNIT

In the summer of 1938, a Minneapolis trucking company executive named Harry Werner came off the golf course only to get word that he had just lost another load of meat. The exasperated Werner groaned to his golfing partners, "There should be a way to refrigerate a trailer."

Joining Werner on the golf course was Joseph A. Numero, a manufacturer of sound systems for movie theaters. Numero, who liked challenges, responded on an impulse by saying, "We can build a unit for you in 30 days." Not knowing that Werner would take the proposal seriously, this remark ultimately propelled Numero into becoming the founder and first president of Thermo King Corporation.

Some weeks later, Werner started asking for his new refrigeration unit. So Numero turned to his business associate, Fred Jones, a self-taught mechanical genius who was to become Thermo King's vice president of engineering. Jones went to work building the initial model from an improvised assortment of components, some of which he salvaged from junkyards. The result was a heavy, clumsy unit that was mounted underneath the trailer. It was operable, however, and marked the invention of Thermo King's Model A unit – the world's first workable mechanical transport refrigeration system. A year or so later, an improved Model B under-mount unit was developed, soon followed by the Model C.

Fred Jones and Joseph Numero.

THE AWARD NOMINATOR

In his twenty-fifth year at Thermo King Corporation, Herman H. Viegas, P. E., is a section engineering manager. He has been a member of ASME for 27 years, and currently serves as chairman of the History and Heritage Committee for Region VII. The Model C International Landmark designation and this brochure are largely the results of his efforts.

ACKNOWLEDGMENTS

Thermo King Corporation is grateful to all those who have contributed to the designation of the Model C refrigeration unit as an International Historic Mechanical Engineering Landmark. Special thanks to the following:

- L. B. Hartz Company, Thief River Falls, Minnesota, for donating the unit to the Thermo King dealer in St. Paul.
- Thermo King Sales & Service of St. Paul, Minnesota, for repairing the unit and donating it to the Thermo King Corporation.
- Arnold Johnson and Dale Johnson for assisting in providing data for the unit specifications and in the restoration of the Model C to its original color scheme. Arnold began his career at Thermo King in February 1942 and retired in March 1985. Dale Johnson is Vice President of Strategic Planning and has the longest service record at Thermo King today.
- Jeffrey Nelson and the Thermo King Model Shop and Factory Paint Department for restoring the Model C to its original form.

TECHNOLOGICAL SIGNIFICANCE

The original patent (#2,303,857 applied for on November 16, 1939) granted to the fledgling company was basically for the application of existing refrigeration technology to transport refrigeration. The technical challenges included building a structural frame and refrigerant tubing connections that would stand up to the constant pounding of road vibrations. Thermo King met the challenge and a new industry was soon born.

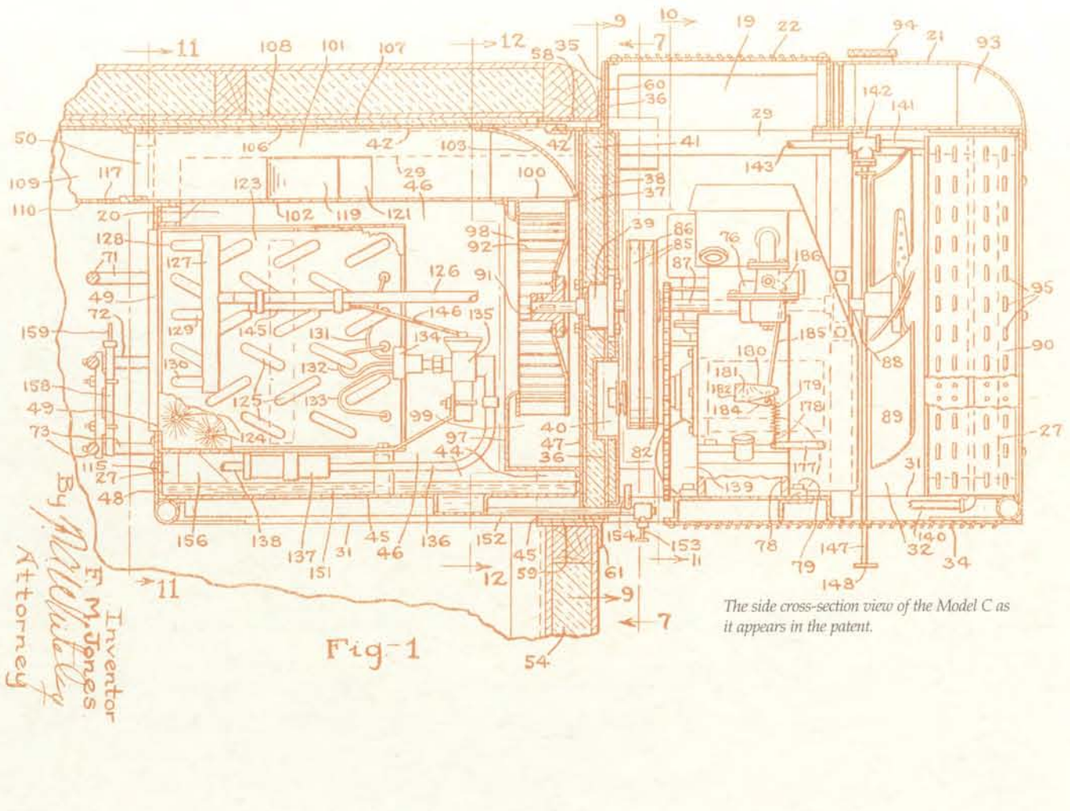
The first two models of Thermo King units were mounted under the truck or trailer and were rather bulky. But they worked, and by 1942 they were operating in several states. With mechanical refrigeration, perishable products could now be shipped thousands of miles.

During World War II, Thermo King made units exclusively for the military. These were used in vehicles, warehouses and shelters. This led to further design refinements which were later used in civilian applications. After the war, Thermo King found existing compressors were inadequate for the transportation environment. In response, Fred Jones set about to design a compressor specifically for over-the-road use.

The result was the Model 2B. This two-cylinder compressor was in production by the end of 1946 and featured a lightweight aluminum body, cast iron sleeves and aluminum alloy pistons. The Model 2B was designed with no piston rings for reduced friction and longer life.

In addition to the two-cylinder model, a four-cylinder version was also manufactured. Among the subsequent improvements to the two models was a higher compression ratio which allowed the compressor to operate over a wider temperature range. Now, a variety of cargo, including everything from fresh produce to ice cream, could be transported reliably.

Mounted underneath the trailer, the Thermo King Model A was the first workable, mechanical transport refrigeration system.



The side cross-section view of the Model C as it appears in the patent.

The Model C unit, the subject of this landmark, was developed just before the war. A United States patent for this unit was applied for in July 1941 and was issued in December 1943. According to the patent, Jones states that the principal object of the invention was "to provide a cooling unit small in size and weight, and positioned, together with the air conducting passages, so as to occupy substantially none of the storage space within the vehicle compartment." Jones further explains that his invention would "provide a cooling unit embodying a single unitary casing wherein is mounted all of the instrumentalities, including the power unit, for producing necessary movements of air and means for cooling said air and means for controlling and operating the several instrumentalities."

Undoubtedly, Jones succeeded.

International Historic Mechanical Engineering Landmark

Thermo King Model C Transport Refrigeration Unit
1940

The refrigeration units placed on trucks in 1938 by the Thermo King Corporation revolutionized the transportation of perishable foods. The Model C was the first self-contained unit designed for placing on the front wall of a truck or semi-trailer. These installations and subsequent ones on refrigerated vehicles, ships and railroads have had worldwide impact on the preservation of food and other perishables during distribution.

ASME International

The American Society Of Mechanical Engineers–1996

THE HISTORY AND HERITAGE RECOGNITION PROGRAM OF ASME

The ASME History and Heritage Recognition Program began in September 1971. To implement and achieve its goals, ASME formed a History and Heritage Committee, composed of mechanical engineers, historians of technology, and the Curator Emeritus of Mechanical and Civil Engineering at the Smithsonian Institution. The Committee provides a public service by examining, noting, recording and acknowledging mechanical engineering achievements of particular significance. The History and Heritage Committee is part of the ASME Council on Public Affairs and Board on Public Information. For further information, please contact Public Information, the American Society of Mechanical Engineers, 345 East 47 Street, New York, NY 10017-2392, 212-705-7740; fax 212-705-7143.

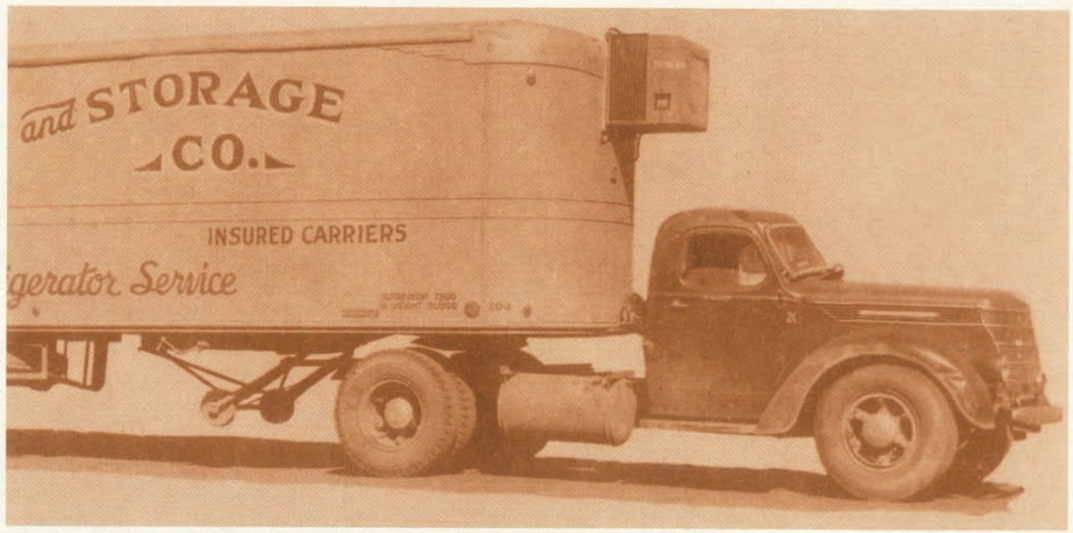
An ASME landmark represents a progressive step in the evolution of mechanical engineering. Site designations note an event or development of clear historical importance to mechanical engineers. Collections mark the contributions of several objects with special significance to the historical development of mechanical engineering.

The ASME Historic Mechanical Engineering Recognition Program illuminates our technological heritage, and serves to encourage the preservation of the physical remains of historically important works. It provides an annotated roster for engineers, students, educators, historians and travelers, and helps establish persistent reminders of where we have been and where we are going along the divergent paths of discovery.

THE MODEL C

1940

The Model C was in production throughout the 1940s. This self-contained, front-mount unit weighed far less than the Model A, and was much more efficient. The Model C unit receiving the International Historic Mechanical Engineering Landmark designation was purchased by L. B. Hartz Wholesaler located in Thief River Falls, Minnesota. It was retired from service in the mid-1960s after 25 years of operation. The unit was donated by L. B. Hartz to the Thermo King dealership in St. Paul. The dealership repaired the unit, donating it, in turn, to Thermo King Corporation. The unit has since been restored to its original running condition by Thermo King and is now on display at the company's world headquarters in Minneapolis, Minnesota.



Thermo King's Model C was the world's first front-mount refrigeration unit.

SPECIFICATIONS

MODEL C	Serial number 198, manufactured in 1940
WEIGHT	700 lbs.
ENGINE	Briggs and Stratton, single-cylinder, air-cooled, 4-cycle
COMPRESSOR	Lynch Model Par S-150, 4-cylinder, reciprocating
REFRIGERANT	12 lbs. R12
STARTER	6-volt automotive type with Bendix drive

Though cooling capacities were never measured in the 1940s, it is estimated that the Model C had a capacity of 8000-10,000 Btu/hr. for a conditioned space of 35°F at an ambient temperature of 90°F. For comparison, a typical Thermo King trailer refrigeration unit today has a cooling capacity of 44,000 Btu/hr. for a conditioned space of 35°F at an ambient temperature of 100°F.

CONTRIBUTIONS TO SOCIETY

Linking the supply and demand for perishable food means bringing together cities, countries and continents. Today, sophisticated transportation equipment and precise temperature control systems allow people in Europe to eat bananas all year round and people in China to enjoy ice cream made in New Jersey.

Now, more than three quarters of the food throughout the United States is produced, packaged, shipped and stored under refrigeration. Greater customer demand has led to agricultural development and broader growth of the dairy and meat industries. The result is a U.S. frozen food industry with annual sales in excess of $40 billion.

In addition to food transportation, refrigeration allows the availability of delicate cargo such as a photographic film, pharmaceuticals and flowers throughout the United States and other parts of the world.

On every continent, in every type of climate, transport temperature control equipment is making the world better.

It is indeed fitting that the National Medal of Technology was awarded to Frederick M. Jones and Joseph A. Numero. The awards were presented posthumously on September 16, 1991, to their widows by President George Bush at a ceremony in the White House Rose Garden.

Fred Jones and Joseph Numero.

The invention of transport refrigeration has led to agricultural development and broader growth of the dairy and meat industries.

FOR FURTHER READING

Thermo King Instruction Manual–The Modern Method of Transport Refrigeration, Thermo King Corporation, 1944.

"Born Handy," The Saturday Evening Post, May 7, 1948.

"His Inventions Live On," St. Paul Pioneer Press, June 6, 1971.

The Thermo King Story–Growth of an Industry, Thermo King Corporation, 1977.

"Thermo King owes a lot to founder's hot idea," Minneapolis Star Tribune, June 15, 1987.

Evolution of Transport Refrigeration, Thermo King Corporation, September 1993.