

# Bailey's Bridge

By Dr. Larry Roberts

In the early days of World War II, British engineers were faced with the problem of bridging that was inadequate for their new armored and mechanized equipment. Modifications of existing materiel met some bridging requirements, but new equipment was clearly needed.

Mr. Donald Coleman Bailey, chief engineer of the British Experimental Bridging Establishment, offered a solution to this problem by proposing a bridge design based on panel trusses. Bailey's design met the criteria in terms of manpower requirements, transportation needs, flexibility of design, and flexibility in load-bearing capacity (see photo on back cover).

Recognizing the advantages offered by Bailey's bridge, British engineers rushed the initial fabrication, test and, ultimately, production of the panel bridge. The normal design-to-production time of one year for military hardware was cut almost in half. In seven and one-half months, British engineers had produced the new "Bailey bridge." By the time the United States entered the war, British engineer units had employed the Bailey bridge in combat and had noted its remarkable versatility.

American military engineers faced similar problems—the increased vehicle weights exceeded the capacities of existing bridging material. Like the British, they initially tried to modify existing bridges to handle the loads. However, the success of the Bailey bridge soon prompted the Army to examine its adoption as a partial

answer to the needs of the newly organized armored and mechanized forces. The fact that both armies could use the same bridge offered the possibility of interchangeability of components in tactical situations. If this was possible, it would simplify the production process.

Americans began to work with the Bailey bridge early in 1941, and for the next two years American engineers, civilian and military, tested and modified its design. The major problem with the bridge was the close production tolerances required for the panel sets to be truly interchangeable.

The British approach to production was for contractors to produce the components, with assembly at a central facility. The Americans chose to contract complete bridge sets to American steel and metal fabrication companies. In an attempt to ensure uniformity of production, American engineers acquired master gauges, duplicated those gauges, and provided them to contractors.

Field tests of the Bailey under various conditions confirmed the value of its design and its potential for use in many tactical situations. The Bailey could be used as a semi-permanent fixed bridge, spanning dry gaps or small streams, and it could be used with pneumatic floats or pontoons across wide water bodies.

Early use of the bridge by combat engineers in battle reconfirmed the results of field trials. Throughout the war, Baileys were used in many configurations, from floating bridges to suspension

bridges. It could be altered in place, raising its load-bearing limits to accommodate heavier loads and greater volumes of traffic.

The one aspect of the Bailey which defied solution was the problem of manufacturing tolerances. Examination of factory production and reports from field units revealed that American-made sets were not interchangeable with British sets, and sometimes were not compatible with other American sets.

The problem was variation in the gauges used by the fabricators. It was not until the very end of the war that American gauges matched those of British instruments. Interoperability simply did not exist. This forced front-line units to segregate American- and British-produced sets, complicating the logistical support for engineer operations.

The operational value of the Bailey far outweighed the difficulties of production and interchangeability. In Sicily and Italy, the Bailey was often the bridge of choice. In northern Europe, the Bailey complemented the tactical float bridges and assault bridges, especially for armored forces. The Bailey was also used in the Pacific and in China. By the end of the war, tens of thousands of vehicles had crossed versions of the panel bridge that was born of military necessity, constructed by countless British and American engineers, and designed by Donald Bailey.

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