

# Transistor Museum™ Preservation Collection Historic Semiconductor Fact Sheet

## WECO A1698 - 1952 Prototype Point Contact Transistor

### FIRST GERMANIUM TRANSISTORS



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by Jack Ward

TRANSISTOR MUSEUM™  
PRESERVATION COLLECTION  
**WECO A1698**  
1952 PROTOTYPE POINT  
CONTACT TRANSISTOR

HISTORIC HAND-LABELED  
DEVELOPMENTAL DEVICE

### Historical Background

The original point contact transistor types developed by Bell Labs/Western Electric in the late 1940s into the early 1950s included several different case styles, which were used primarily to further investigate the manufacturing and performance limitations of the first transistor technology. The metal cartridge case style, "[Type A](#)" was the first mechanically rugged point contact transistor. By mid-1949, [Type A production at Murray Hill numbered over 3700 transistors](#). These early transistors were in great demand by [Bell Labs-Western Electric engineers](#) for purposes of device characterization and circuit development. To meet the increasing demand for transistors, large scale commercial production of transistors began in 1951 at the [Western Electric Allentown plant](#). The developmental types manufactured at Allentown consisted of the original metal "cartridge" style (with a modification of the Type A lead structure to facilitate easier use with sockets), and a plastic "bead" case type. As shown in the table at left, the "cartridge" types were [1698, 1768, 1723, 1725, 1729, and 1734](#). The "bead" types were [1689 and 1760](#). These early developmental types of transistors were used primarily for experimental circuit development and manufacturing process development and [were obsolete by 1956](#). Until the Allentown mechanized large scale production processes were established, early transistors up until 1952 were hand labeled, but with little standardization. Date codes were often included (Month/Year) and frequently serial numbers or paint swatches were used for identification of specific units. Cardboard packaging was sometimes used. See page 2 for examples of early case styles and packaging.

DESIGNATION		DESCRIPTION
WESTERN ELECTRIC	RTMA	
1689-1		POINT CONTACT BEAD
1689-2	2N23	
1698	2N22	POINT CONTACT CARTRIDGE
1760	2N26	POINT CONTACT BEAD
1768	2N24	POINT CONTACT CARTRIDGE
1723	2N21	POINT CONTACT CARTRIDGE *
1725		POINT CONTACT CARTRIDGE
1729	2N25	POINT CONTACT CARTRIDGE
1752-1	2N27	n-p-n JUNCTION
1752-2	2N28	n-p-n JUNCTION
1752-3	2N29	n-p-n JUNCTION
1734		POINT CONTACT CARTRIDGE

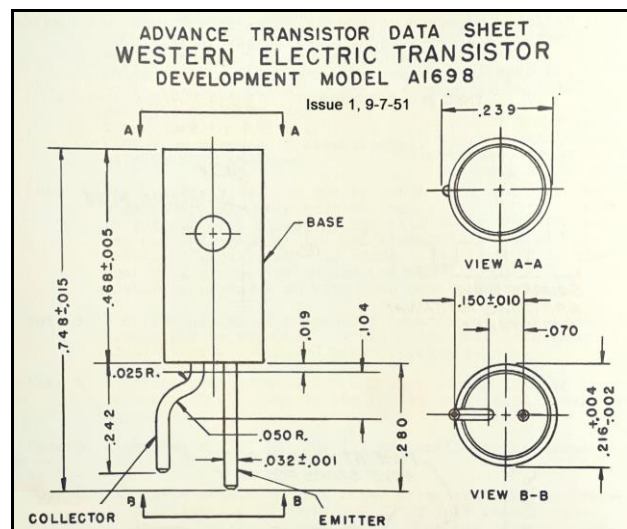
\* SOLDERED INTO CIRCUIT

The above table from the May-July 1952 Bell Labs-Signal Corps Transistor Progress Report provides a useful cross-reference between early [Western Electric developmental transistor types](#) and the subsequent industry standard "2N" designations. The A1698 was the prototype for the [2N22](#).

### The Evolution of the WECO 1698



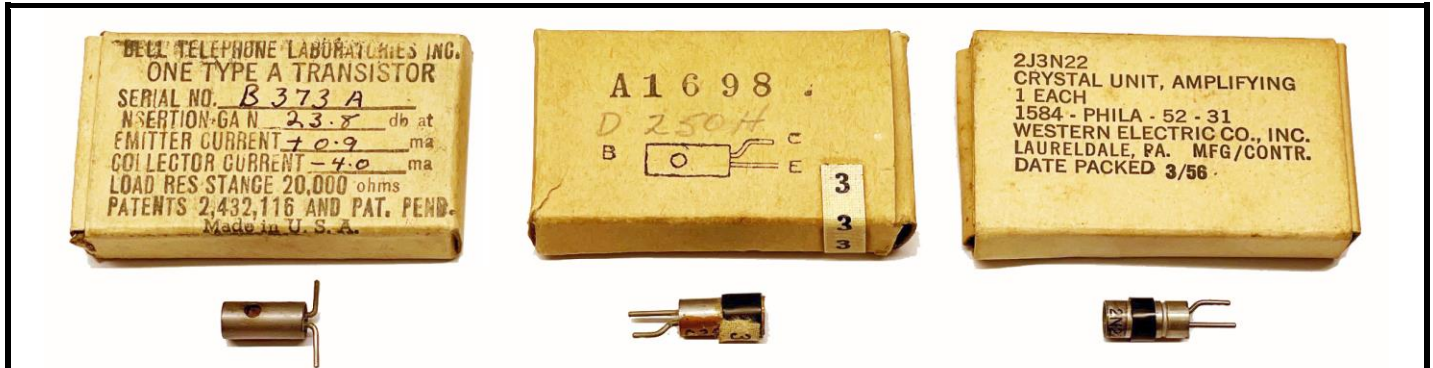
[On 1 October 1951 the first line for the mass production of transistors](#) was started at the Western Electric Allentown Works. Earlier transistor production was done at the Bell Labs facility in Murray Hill. At left above is an example of the original "[Type A](#)" transistor produced at Bell Labs between 1949 and 1951. The hand labeled A1698 shown above is from start-up Allentown production in late 1951 into early 1952. The "A" indicates Allentown production. The later machine stamped 1698 shown above is dated Feb 1952 and the 2N22 is dated March 1954. The A1698 transistor in this Preservation Collection is rare and represents one of the first transistors in commercial production.



Above is a section of the first issue of the [A1698 transistor data sheet published Sept 7, 1951](#). The following text was also included: "*The A1698 is a point contact transistor triode in cartridge form. It is designed for use in switching circuits where the large-signal parameters of the active device are of primary interest.*"

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### Examples of Evolving Packaging for the First Cartridge Type Point Contact Transistors

The original Type A transistor was packaged as shown above left. Each unit was hand serialized and operating parameters were documented on the packaging. The initial production prototype A1698 transistors were manufactured at the Western Electric plant in [Allentown beginning in October 1951](#) - these first 1698 types were hand labeled, as shown in the middle photo below, and formal packaging wasn't provided for these first developmental units. By February 1952 Allentown A1698 transistors included printed packaging, as shown in the middle photo above. Higher quality printed packaging was commonly used after 1953 from commercially distributed point contact types, with the 2N22 example shown upper right.



### The Western Electric A1698 - 1952 Prototype Point Contact Transistor

As shown at left the mechanical construction of the cartridge point contact transistors was somewhat complex, with key transistor performance parameters determined by two sharpened metal points in contact with a small slab of germanium. The adjustment of the contact pressure and spacing of the two points was done during the manufacturing process with technician access facilitated by a small hole on the side of the metal case. The [parts diagram and the photo of the 1951 A1698](#) above left clearly shows the adjustment hole and the inner construction of the contacting points. After satisfactory adjustment of the points, a circular black plastic band was typically slipped over the metal case to cover and protect the PN junctions established by the points contacting the germanium block. The center photo shows examples of early A1698 transistors with and without the protecting band and also with an example of a transistor socket developed to allow easy circuit replacement of these early point contact transistors. The [physics of operation for these early transistors was poorly understood](#) with the initial large scale production of these cartridge types leading to challenging and [rapidly evolving manufacturing processes](#). Commercial uses of point contact transistors was limited due to widely varying and often erratic performance. Nonetheless, these first transistors are historically very significant in demonstrating the enormous potential for THE TRANSISTOR. Western Electric often promoted the power of transistors with ads and giveaways, such as the 1955 paperweight from the Delaware Phone System.