

Transistor Museum™ Preservation Collection Historic Semiconductor Fact Sheet

WECO 1689 - 1952 Prototype Plastic Bead PCT Transistor

FIRST GERMANIUM TRANSISTORS



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by Jack Ward

TRANSISTOR MUSEUM™
PRESERVATION COLLECTION
WECO 1689
1952 PROTOTYPE PLASTIC
BEAD PCT TRANSISTOR

HISTORIC HAND-LABELED
EXPERIMENTAL DEVICE

Historical Background

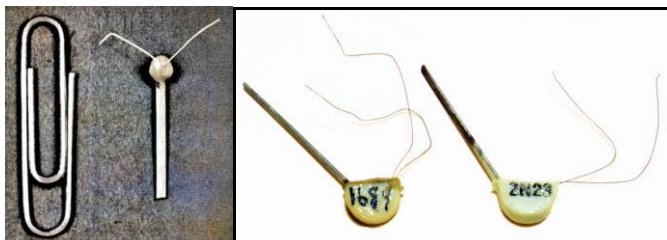
The original point contact transistor types developed by Bell Labs/Western Electric in the late 1940s into the early 1950s included several different case styles, which were used primarily to further investigate the manufacturing and performance limitations of the first transistor technology. The metal 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		
1689-2	2N23	POINT CONTACT BEAD
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

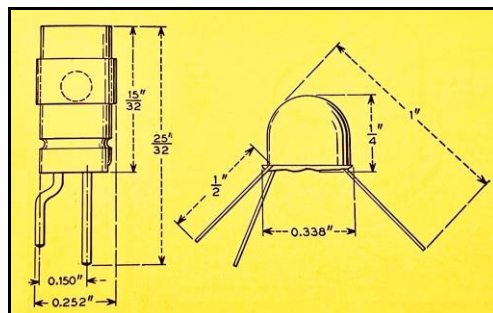
* SOLDERED INTO CIRCUIT

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 1689 was the prototype for the [2N23](#).

The Evolution of the WECO 1689



Shown above left is the [M1689 "Bead"](#) type point contact transistor, developed in 1951. The 1/8" spherical plastic case for the 1689 was the first attempt at Bell Labs to develop a small transistor case type that could be used more easily in miniaturized circuit construction. These first development types were identified as "exploratory". Production prototypes for the 1689 appeared in early 1952 and had crudely cast plastic resin semi-circular cases with hand-labeling (shown above center). More mature versions of the "bead" transistor, including mechanized production of the 1689 and the [2N23](#), were developed in late 1952/early 1953. The 1689 transistor in this Preservation Collection is a hand-labeled experimental production prototype from early 1952 and is one of the first prototype "bead" transistors made. Few of these devices were produced and fewer have survived the past 70 years.



Western Electric developed two [distinctly different case](#) types for early production runs of point contact transistors - shown above at left is the metal "cartridge" type and at right is the plastic "bead" type. The cartridge type was manufactured in larger quantities and proved to be more reliable - note in the chart at upper left than only two bead types were ultimately registered as "2N" types. However, Western Electric abandoned both these early case styles in the mid-1950s and developed a more robust and industry standard approach. Examples of this improved case style are [2N21, 2N67 and 2N110](#). These types survived into the 1960s. The WECO plastic "bead" point contact transistor is an impressive artifact of a key chapter in early transistor history.

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Shown above is an example of the earliest style packaging used for the 1689. Of note is the "artistic" rendering of the C/B/E lead identification - this was important since these early 1952 prototypes were still experimental and documentation describing correct use was likely not always available.

Image Courtesy Terry Hosking

Examples of Evolving Packaging for the First Plastic Bead Point Contact Transistors

The packaging developed for the 1689 evolved throughout 1952 and into 1953 as the technology and manufacturing processes for this transistor matured. Shown above are three small commonly used cardboard packages from 1953 that were typical for most mature commercial grade transistors from Western Electric at this time. Note minor changes in the printed content and design. Two Western Electric manufacturing sites (Allentown and Laureldale PA) were responsible for the bulk of WECO transistor production in the 1950s and the site of manufacture is sometimes printed on the package as shown for the 2N23 above. Less common packaging for these early transistors included the use of a large blue/white vacuum tube carton as shown at top - in this case the large carton was used as over-packaging for the smaller 1689 package (dated Sep 1953) shown above center. The tube carton is stamped on the top flap with "1689".

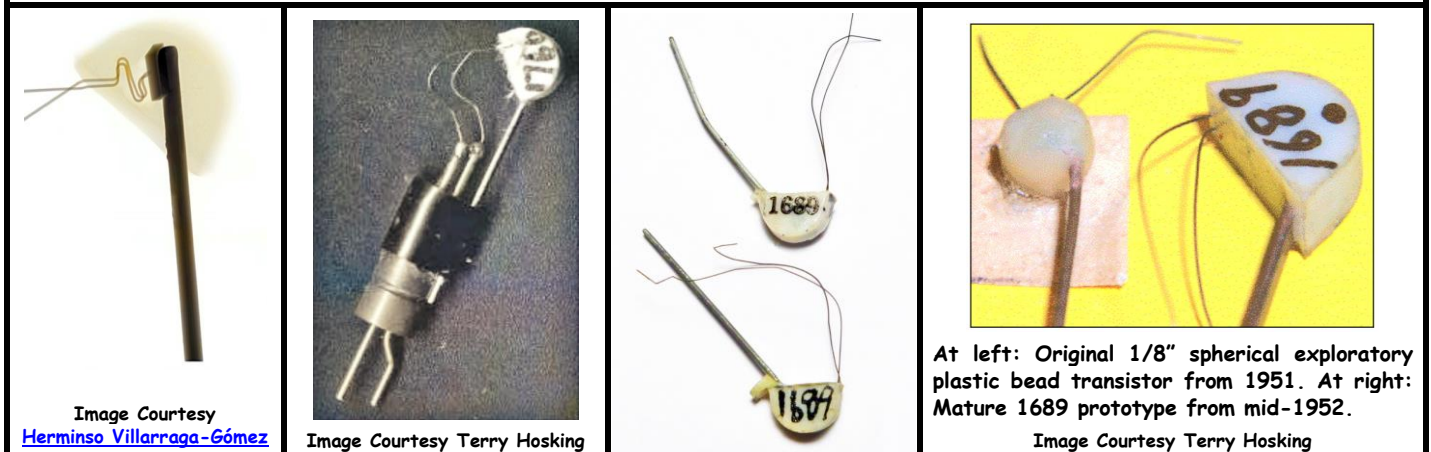


Image Courtesy
[Herminso Villarraga-Gómez](#)

Image Courtesy Terry Hosking

At left: Original 1/8" spherical exploratory plastic bead transistor from 1951. At right: Mature 1689 prototype from mid-1952.

Image Courtesy Terry Hosking

The Western Electric 1689 - 1952 Prototype Plastic Bead Point Contact Transistor

By 1951 Western Electric was actively engaged in developing the technical and manufacturing advances required to enter large scale production of the newly invented transistor. At this time the original metal cartridge point contact transistor technology was best understood with [thousands of units already manufactured](#). The plastic bead point contact technology was still [at the exploratory stage](#), with the first experimental prototypes appearing in early 1952. The photo above right highlights the changes implemented for the transition from exploratory to developmental prototype. The second photo above of the two 1689s illustrates the transition from experimental prototype to fully developed and released product. Note the hand-written identification and the crudely cast plastic case for the bottom developmental prototype and the stamped identification and polished plastic case for the production-ready unit. Third photo from right above is a classic - some industrious WECO engineer adapted the more robust metal cartridge case to support electrical testing of a plastic case type. At far left is an ["x-ray" internal view](#) of the fragile point contacts and germanium block for a 2N23. The 1689 transistor in this Preservation Collection is a hand-labeled experimental production prototype from early 1952 and is one of the earliest Western Electric developmental prototype plastic "bead" transistors made.