

# TRANSISTOR MUSEUM™

## "THE FIRST TRANSISTORS IN SPACE"

PRESERVING HISTORIC 1950S/60S TRANSISTORS  
USED IN EARLY SPACECRAFT AND MISSILES



### **POLARIS MISSILE GERMANIUM TRANSISTOR TYPE "R212"**

### **HISTORIC TRANSISTOR PRESERVATION COLLECTION**

#### **HISTORIC PHOTO ARCHIVE**

This iconic photograph was taken on Nov 16, 1963 and shows President John Kennedy, on the deck of the USS Observation Island, observing the firing of a Polaris missile from the nuclear submarine, USS Andrew Jackson. Kennedy later stated: "It is still remarkable to me that a missile can be successfully and accurately fired from beneath the sea."

**Photo Credit:** U.S. government printing office.

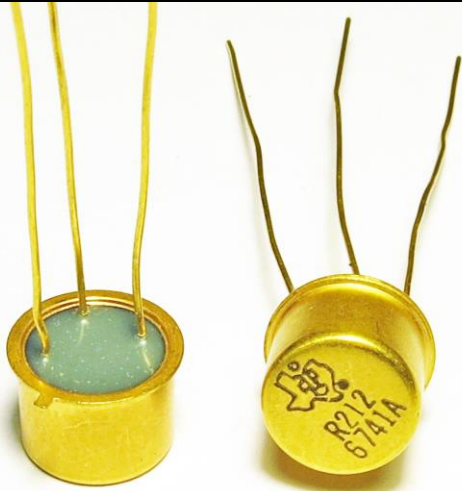
#### **R212 TRANSISTOR HISTORIC NOTES**

By the mid-1950s, transistor technology had just matured to the extent that the military was interested in utilizing these unique devices in "mission-critical" defense programs. One of the first documented large-scale military use of transistors was the Polaris missile program, which was initiated in 1956 when the Navy began funding a program to develop a ballistic missile that could be launched from a submerged submarine. The inertial guidance computer carried onboard each Polaris missile was developed at the MIT Instrumentation Laboratory, and these first versions used discrete transistor components, such as the R212, while later systems, including the follow on Apollo Guidance Computer, used integrated circuits as this new technology became available. Hundreds of Polaris missiles were produced until 1972, when the Poseidon missile was deployed as a replacement. Texas Instruments was the major supplier of the R212, with RCA and Tung-Sol as secondary sources. Germanium transistor technology was largely obsolete for military use by the mid-1960s.

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### POLARIS MISSILE - R212 TRANSISTOR



#### HISTORIC SEMICONDUCTOR DATA

**Device ID:** TI R212

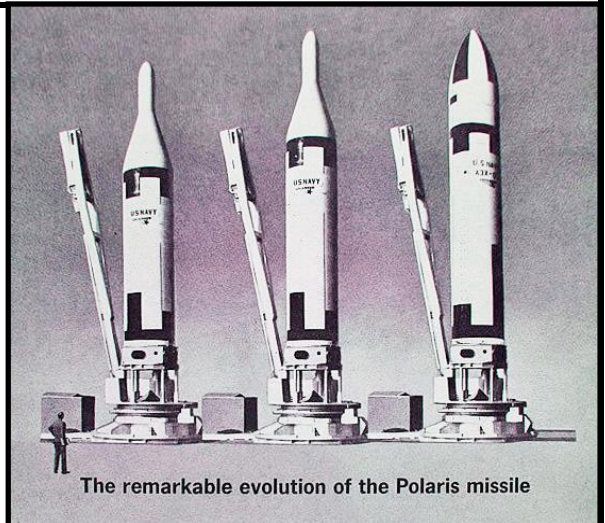
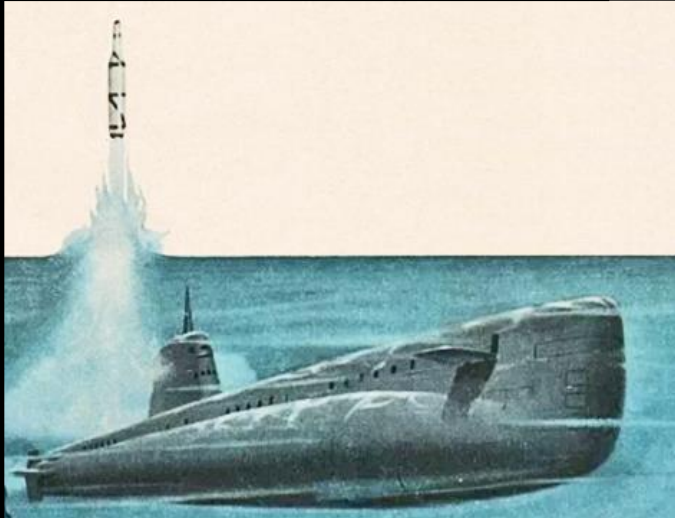
**Type:** Germanium PNP alloy junction transistor

**Case Color/Style:** Gold plated metal TO-5

**Vintage/Date Code:** Late 1950s-1960s

**Use:** Polaris Missile Guidance Computer

**Notes:** These units are examples of highly reliable and rugged germanium transistor technology. The devices in this kit were manufactured in the 1960s by Texas Instruments for the Polaris missile program.



### THE R212 TRANSISTOR AND POLARIS

The above scans are sections of early 1960s ads documenting the impressive technology and successful deployment of the Polaris missile technology. At right is shown the evolution of Polaris from the initial A-1 in the late 1950s through the A-2 and A-3 into the 1960s. Each successive model had larger payload capability and range (1200 miles for the A-1 and 2500 miles for the A-3). The remarkable development of the R212 germanium transistor as well as other related early semiconductor device progress is well documented in this article by Eldon C. Hall: "From the Farm to Pioneering with Digital Control Computers: An Autobiography", IEEE Annals of the History of Computing, April-June, 2000.