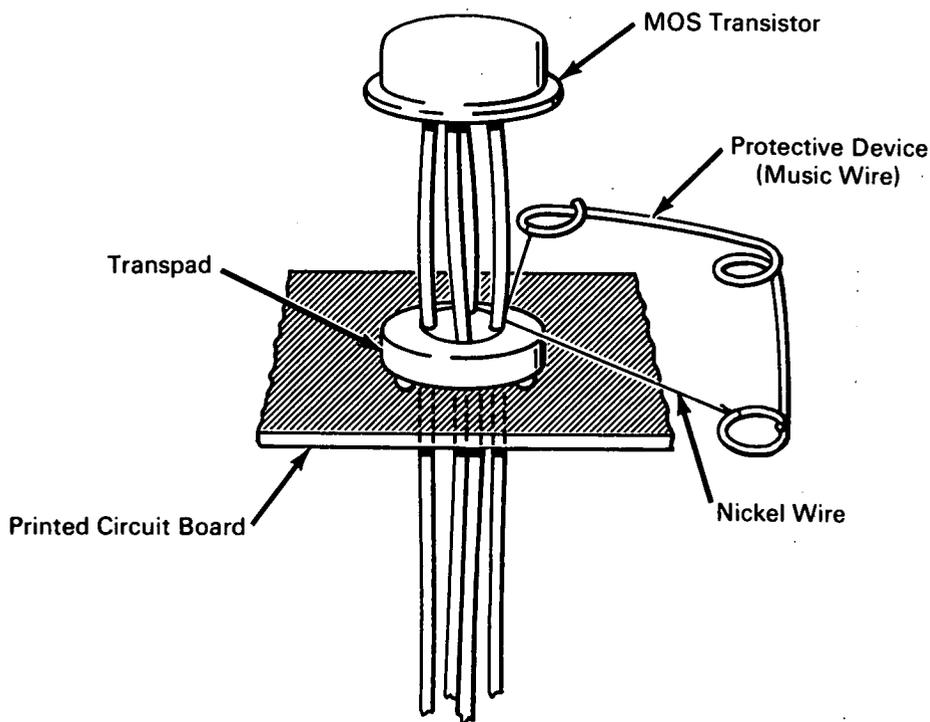


# NASA TECH BRIEF



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## Metal Oxide Silicon (MOS) Transistors Protected from Destructive Damage by Wire Device



### The problem:

To protect MOS transistors from the destructive damage that can be done when an electrostatic potential is applied even momentarily to the transistor leads when they are not shorted together. Sufficient electrostatic potential to be damaging can be generated by simple handling. Adequate protection during storage and shipping is provided by soldering the leads together or by shorting the leads together with a wrap-around piece of foil. Neither soldering nor foil

is adequate, however, when the MOS transistor is ready to be placed in a circuit where the leads must be separated for assembly.

### The solution:

A loop of flexible, small-diameter, nickel wire attached to a music-wire spring can be slipped over the MOS transistor case and released so that the music-wire spring tensions the loop of nickel wire around all the transistor leads, shorting them together. This permits the leads to be handled without damage to the

(continued overleaf)

transistor and makes it possible to assemble the transistor in the circuit.

#### **How it's done:**

The device consists of two short pieces of music and nickel wire. The music wire, 0.033-inch diameter, is bent to form a spring. The nickel wire, 0.007-inch diameter and long enough to form a single loop near the center of its length, is then fastened to the two outer loops of the music wire by twisting and soldering.

To attach the device to an MOS transistor, the spring is squeezed so that the loop is slipped over the MOS transistor leads until it touches the case. When the spring is released, all leads are electrically shorted to each other by the now taut nickel wire. The protective means provided by the manufacturer, e.g., twisting the leads, wrapping foil around the leads, or by soldering all leads together, may now be removed without damage to the transistor, because it is now protected by the shorting nickel wire. A transpad, which is a small disk having holes in it spaced to suit the transistor leads and which is commonly used in the construction of transistor circuits, is slipped over the leads to serve as a retaining disk.

The MOS transistor can now be soldered into a printed circuit board or into circuits using other types of construction techniques. If the circuit configuration allows, the protective device can be removed without cutting the nickel wire and thus used over again. If necessary, the nickel wire can be cut and replaced.

#### **Notes:**

1. The protective device can be used on MOS transistors having any number of leads. The leads always lie in a circle, which is convenient for the shorting action required.
2. The protective device can be replaced on the transistor to protect it should it be necessary to take it out of the circuit.
3. Inquiries concerning this innovation may be directed to:

Technology Utilization Officer  
Ames Research Center  
Moffet Field, California 94035  
Reference: B66-10419

#### **Patent status:**

No patent action is contemplated by NASA.

Source: G. J. Deboo and E. J. Devine  
(ARC-65)