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# NASA TECH BRIEF

## *Manned Spacecraft Center*



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### **Man-Machine Communication: A Transparent Switchboard for Computers**

The ability of a computer to report information and for a man to respond quickly depend upon the control system. Conventional input controls use punch-cards, paper or magnetic tape, light-pens and switches; conventional outputs are given by means of punch cards, written lists, magnetic tape, light bulb displays, paper tapes or cathode ray tubes (CRT). These are adequate for most applications but a more direct dialogue results from a single man-machine interface.

In a device designed for NASA, a pattern of transparent contact "touch" points is put on a CRT screen. The computer-driven CRT displays information alongside the contact points and the operator's touches are translated by low frequency capacitor couplings into decoding logic which tells the machine what points have been touched.

An array of contact points is etched into a transparent glass plate coated with tin oxide. This plate overlies the CRT. A touch on one of the contacts is related by electronic sensing circuits to the computer in the form of a logic compatible command.

A tin oxide coating is used as the medium for the contact points because it bonds strongly to glass, is resistant to mechanical use and chemical action, and is transparent in thicknesses up to 50  $m\mu$ . The etching process is similar to that used in the production of copper plated printed circuit boards.

A touch point system compels a more precise and unambiguous communication between man and machine than is possible with any other means, and it speeds up

operation responses. Because the NASA system uses a low conductance frequency measurement a positive touch is needed. This precludes false inputs from an unsteady operator's hand.

#### **Note:**

Requests for further information may be directed to:

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Reference: TSP71-10263

#### **Patent status:**

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