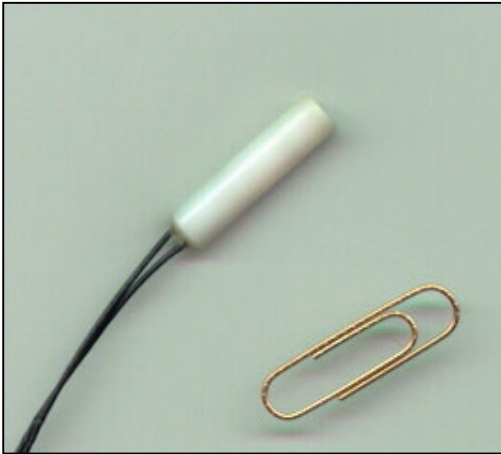


R-1 Rototactor



The Rototactor is a sub-miniature vibrotactile transducer for tactile displays. A tactile display consists of an array of vibrators (often called “tactors”) applied to the user’s skin. By controlling the timing, frequency, and intensity of these tactors, information is transmitted to the user through his body’s sense of touch. For some applications a single tactor may be useful, such as for an alarm. But for other applications, the user is fitted with an extensive array. For example, current prototype displays for fighter pilots transmit flight information through 96 tactors dispersed over the torso and upper limbs.

Tactile displays are a cutting edge technology for improving the man-machine interface. Tactile displays are intrusive on the user’s consciousness, yet they can remain stealthy to outside observers. They can convey both directional and quantitative information. They are becoming important in enhancing situation awareness for flight crew and other vehicle operators. They will be used in linking dismounted infantry to GPS-based navigation systems.

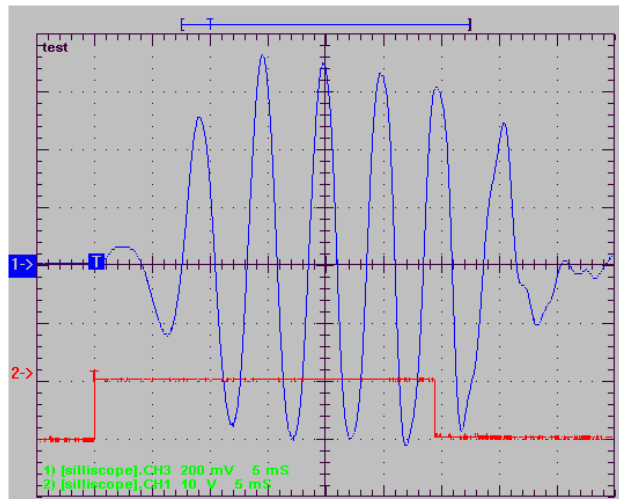
Tiny size and weight make the Rototactor easily to integrate into clothing, straps or bands, or adhesive patches. It may be operated in any orientation. The Rototactor is not easily damaged, and it is hermetically sealed. The tactile signal strength is excellent, and the operating frequency is optimized for perception. The Rototactor is electrically driven. Voltage and current requirements are minimal, so Rototactors should be considered for both vehicular and portable applications.

Driver circuits are available for your computer interface. Steadfast also has circuits for addressable two-dimensional arrays, to reduce the number of leads required for larger tactile displays. Circuits to sense whether the Rototactor is being applied correctly to the user’s skin are also quite practical, an important feature with respect to knowing whether the user is receiving the signal.

Specifications

Size	6.4 mm (¼”) dia. 25 mm (1”) long
Weight	2 grams
Operating Voltage	10 Volts DC
Operating Current	170 mA
Vibrating Frequency	200 Hz
Response Time	10 ms
Tactile Signal Strength	1.3 Ruperts nominal
Tactile Wave Form	Sinusoidal
Duty Cycle	20% max.

Performance



The oscilloscope plot above shows the R-1 Rototactor responding to a short 29 ms, 10 volt pulse, i.e. the red line. The blue line shows the pressure wave generated by the Rototactor in a standard skin and flesh simulator. Note the 10 ms response time and the sinusoidal tactile signal waveform. Also note the 200 Hz vibration frequency, and the signal strength of 1.3 Ruperts peak-to-peak, delivered by a tactor weighing just 2 grams.

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