TECHNICAL NOTE

USE OF STRAIN GAGES TO MEASURE REMs

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At APSS last year, Bill Baldridge described the use of miniature strain gages to measure REMs. This technique has been used in our lab for over 30 S nights now, with excellent results. This note is to pass along some pointers on their use, which we gained the hard way.

The main advantages of the technique are: (1) the record is clean, showing only REMs and movement artifacts. No confusion of REMs and EEG. (2) It is at least twice as sensitive as the EOG technique, our output signals from REMs often being over 200 microvolts. This could probably be increased by increasing the bridge voltage across the gage, but observe the power and heat limits of the gage. (3) The gage can be applied in less than a minute and taken off as quickly. The principal disadvantages are: (1) You lose direction of REMs (2) Occasionally pulse or respiration artifacts show up, but they can be eliminated by using EMG time constant on the Grass EEG machine.

The semiconductor strain gages we have used are made by the Kulite-Bytrex Corp., 50 Hunt St., Newton 58, Mass. We have used both their type DB-103 and DB-109. These must be purchased in lots of 4 at $90/lot.

We've broken three gages, but think we've finally learned how to handle them properly. (1) Use a heat sink when soldering leads to the gages. (2) Use very flexible wire, such as regular EEG lead wire. (3) Cover the gage and the exposed leads with two pieces of Scotch electrical tape, back-to-back, as in Figure 1, to reduce the stress on and flexing of the gage and leads. (4) Always handle

the gage so as to minimize flexing of the gage and leads. (5) Run leads of gage off the eyelid as in Figure 2, below. (7) Remove the gage gently in the morning.

The gage is used as one arm of a conventional Wheatstone bridge.

We have attempted to measure slow eye movements by DC coupling the output of the bridge, but so far the inherent noise level of the batteries has been too great for a decent recording.

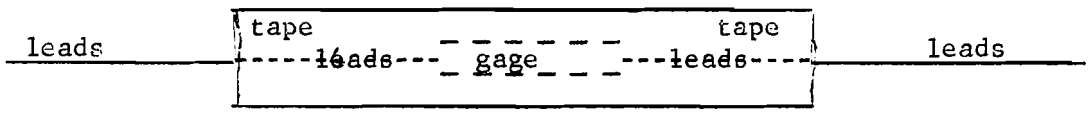

Figure 1

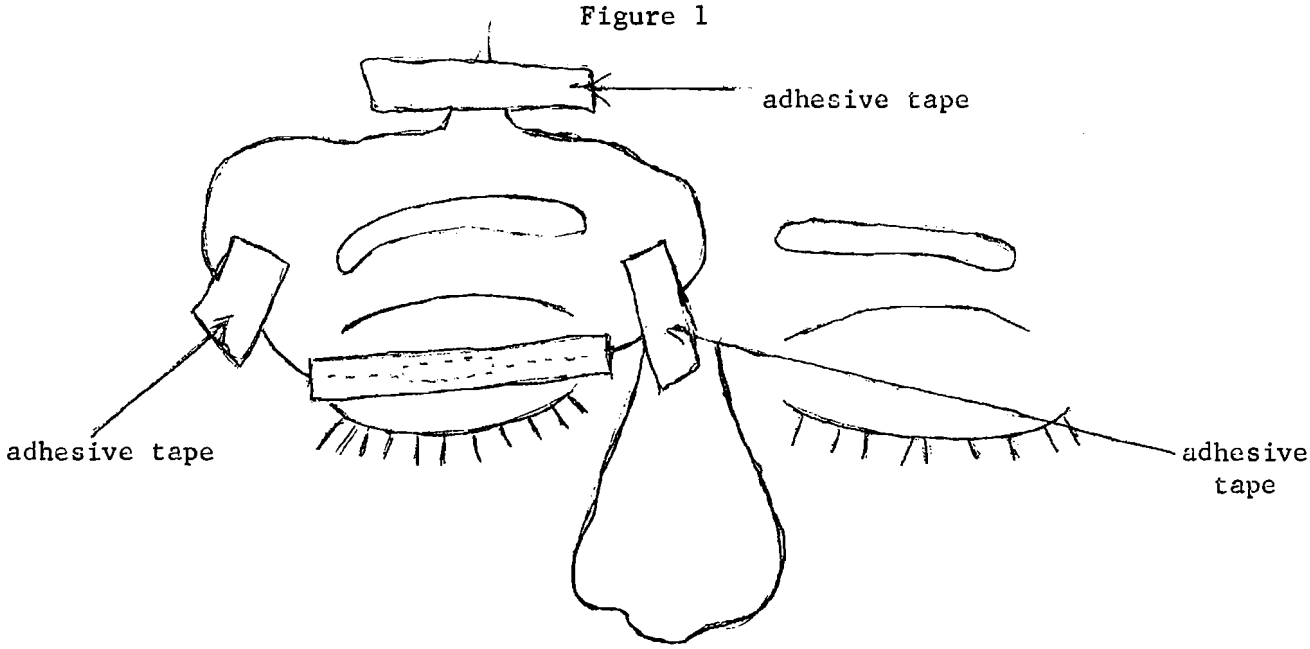

Figure 2

Application of gage to eyelid