ELIMINATION OF SHOCK PRODUCED ELECTRICAL NOISE FROM PSYCHOPHYSIOLOGICAL RECORDINGS

ARNOLD E. KAUFMAN

UNIVERSITY OF WISCONSIN—MILWAUKEE

In an experimental procedure designed to investigate changes in basal skin resistance while human subjects responded under shock punishment, a persistent problem occurred in attempting to keep the shock pulse from completely engulfing the relatively small signal produced by changes in skin resistance. While the tissue resistance monitor operated by passing a 20 μ constant current through the subject's hand, shock currents of up to 15 ma at 2400 v ac were used as punishing stimuli.¹ At shock intensities above 2 ma, the meters of both an Esterline Angus and Texas Instruments recording galvanometer deflected to their maximum readings with each punished response. This problem persisted even though the recording electrodes were placed on the left hand while the shock electrodes were placed on the right ankle.

The shock-produced noise was completely eliminated and undisturbed recordings were obtained under conditions in which responses, each punished by a 50 msec shock at 15 ma, oc-

curred at the rate of 3 per sec. The technique is simple and extremely inexpensive. A standard roll of aluminum foil, 12 in. by 25 ft., obtainable in any grocery store, is used to make a flexible molded band about 5 in. wide by 1 ft. long. This is done by tearing a 15 in. strip from the roll and folding it into thirds, thus providing a triple layer which is flexible but unlikely to tear. One surface of the band is then coated with electrode jelly (Redux, made by Sanborn) and the band is wrapped around the subject's upper calf, above the shock electrodes, with the coated surface touching the skin.² The band may be molded to the contour of the subject's leg, and is held in place with a perforated rubber strap of the type used in holding EKG electrodes in place. The strap is anchored on the projecting portion of an EKG electrode, the contact surface of which is coated with electrode jelly and placed on the aluminum foil band. A lead is then run from the EKG electrode to a water pipe or similar ground. Since the skin surface contacted by the aluminum foil band is quite large, apparently all of the radiated potential drifting upward from the shock electrodes can be picked up by it and grounded. In recordings obtained from approximately 40 subjects since the band was put into use, there has been no evidence of any noticeable meter deflection when shock is delivered.

¹Extreme precautions are necessary when utilizing voltages as high as 2400 v ac, to insure the safety of the subject. We have used a minimum resistance of 150,000 ohms in series with the subject and have employed fuses rated at 30 ma between the output transformer and the subject. As the electrodes are always placed on opposite sides of the ankle or finger, the danger of applying current directly across the cardiac area has also been eliminated. Care should also be taken to insure that no other part of the subject's body can come into contact with a large metal surface, which could serve as a ground.

²The use and placement of the aluminum foil band were suggested by Dr. Thomas Stern, Columbia University School of Engineering.