

# Methods sought to restore locomotion to *Paralysed lower limbs*



Dr. Morris Milner (left) and Arthur Quanbury attach footswitch electrodes to the foot of a subject at the start of a gait characteristics study.

*Le Dr Morris Milner (à gauche) et Arthur Quanbury fixent des électrodes de contact au pied d'un sujet dont ils vont étudier la démarche.*

Joan Bryan admits to being somewhat self-conscious whenever visitors to the Control Systems Laboratory of the National Research Council of Canada catch her setting out on a walk.

The 21-year-old NRC secretary is one of several volunteers in a gait characteristics study being conducted by Division of Mechanical Engineering bioengineers Dr. Morris Milner and A. O. Quanbury. The study forms part of a larger research project for exploring the feasibility of restoring locomotion to persons with totally paralyzed lower limbs through applying programmed electrical stimuli directly to muscles or to the motor nerves of the afflicted limbs.

The two NRC bioengineers feel there is an important need for an instrument which would allow a clinician to readily observe and record the actual joint trajectories from a walking patient. Such an instrument, they say, should be useful in determining gait abnormalities or gait changes in patients recovering from an affliction or in those fitted with prosthetic devices.

Miss Bryan's task in the experiments is to try to walk under various conditions created by Dr. Milner and Mr. Quanbury in their efforts to develop a system for the computerized analysis of human locomotion.

In bandaged bare feet and wearing a minimum of clothes, she marches back and forth atop a 20-foot metallic strip, which is a portion of a 60-foot walk-way, to the measured cadence of an electronic beep that, together with a moving cart with which she must keep abreast, sets her predetermined pace. Each time metal pads affixed to her heels and toes make contact with the metal strip, signals are transmitted along wires running up her legs and pass through a junction box carried by a belt around her waist. Electrical signals generated by selected active muscles are picked up with special electrodes whose connectors also pass through the box. A digital computer will facilitate automation of the analysis of all these data. The box in turn is linked by a multi-core cable to equipment on the trolley car running on tracks immediately alongside the walk-way. From here, 16 millimeter film records her limb movements against a coded background. →