## REPORTED ABROAD [a]

### PROSTHETIC HAND DISCOVERED ON 2000-YEAR-OLD EGYPTIAN MUMMY

During a routine radiological check in the Gulbenkian Museum of Oriental Art, England, a prosthesis was discovered on a 2000-year-old mummy (Fig. 1).

The mummy, which was taken to the Dryburn Hospital in Durham for a series of tomographs, revealed that an artificial hand with fabric fingers was fitted over a deformed forearm. It seems that the ancient Egyptians also knew how to make and fit artificial limbs.

### IMPROVED "CYBERNETIC" FOREARM

Purporting to incorporate most of the advantages and eliminating some of the disadvantages of the Soviet and British arms, Dr. Walter Horn, Director of the Institute for Advanced Prosthetics at the Ospedale Maggiore, Vercelli, Italy, has designed an improved "cybernetic" prosthesis.

One of the shortcomings of the previous models was interruption of contact between skin and electromyographic signal electrode pickups. Dr. Horn said this is overcome in the present model by a very high input impedance amplifier. This also dispenses with the need to prepare the skin before applying the prosthesis by ensuring good function even when contact between skin and electrodes is poor.

Another drawback in previous models is interference from spurious signals or "noise." Patients wearing the Soviet model were unable to approach fluorescent lamps, electric typewriters, or radio sets without the risk of the prosthesis failing to operate. In reference to his prothesis, Dr. Horn stated, "Thanks to the high-rejection mode of my model, the patient can use it in an electric power station if he wants."

The normal hand, in the natural physiological process, responds almost instantaneously to directives from the brain. The prosthesis, however, passes through two stages for this process: Electronic amplification of the "balanced" signal reaching the electrodes on the patient's stump and a servo action for finger positioning and "feel." The servo action employs two feedback mechanisms. The hand, opening as it moves quickly towards an object, does so as the result of velocity transmission of power (or transduced EMG signal) from a small electric motor to a system of levers. The

[a] Based chiefly on translations by Dr. Gabriel Rosenkranz, Medical Consultant to the VA Prosthetics Center.

patient then closes his hand. Switchover to torque transmission takes place as soon as the closing fingers come up against resistance. A torque multiplier then provides pinch or grasp force with a maximum development of 18 lb., although, according to Dr. Horn, 10 to 15 lb. is usually sufficient.

Motor feed is cut off automatically when the hand is closed and no further force is exerted. This reduces battery drain on the six miniature silver zinc cells (ordinary flashlight batteries can be used).

The prosthetic hand, which weighs only slightly more than the normal hand, is designed in three sizes: for children, for teenagers, and for adults. Dr. Horn feels that it will be particularly suitable for phocomelics and bilateral amputees because a "mental dependence on a surviving hand has not been able to develop."

FIGURE 1. Photograph shows artificial left hand found on mummy. Note that wrist of sound right hand was cut away to enable the prosthesis to be removed (University of Durham, Gulbenkian Museum of Oriental Art and Archaeology).