

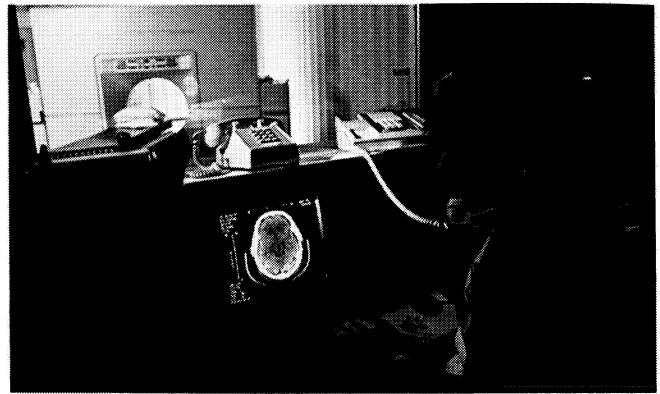
## Slow Scan Telemedicine

In the upper photo, CT (computer tomography) technician Glenn Gray of Washington Adventist Hospital, Takoma Park, Maryland is transmitting a CT scan of a patient over a standard telephone line. The lower photo shows radiologist Dr. James Nelson viewing the image on a TV monitor in his home at Burtonsville, Maryland. The rapid transmission of medical information allows Dr. Nelson to make an immediate preliminary diagnosis, for use by the attending physician at the hospital, without making the half-hour trip to the hospital—a time saving that could be vitally important to an emergency patient and one that is also important to the productivity of hospital staff and consulting physicians.

Washington Adventist Hospital and Dr. Nelson use equipment manufactured by Colorado Video Inc., Boulder, Colorado, a pioneer in Slow Scan TV. This technology, which originated in the U.S. space program, permits transmission of still video images inexpensively and conveniently over telephone lines, or over radio, microwave and satellite channels. In commercial television, a viewer sees 30 pictures per second. Slow Scan TV—also called narrowband video and “freeze frame”—takes 30 seconds to a minute to transmit a single still frame, but the motion factor is not a requirement in most medical applications. Slow Scan employs a standard closed circuit camera connected to a device called a scan converter, which slows the stream of images to match an audio circuit, such as a telephone line. Transmitted to its destination, the image is reconverted by another scan converter and displayed on a monitor; Dr. Nelson’s brief case unit shown in lower photo is a portable converter, usable wherever there is a telephone and a power source.

Because 30 redundant pictures per second are not transmitted, narrowband transmission costs represent only a fraction of wideband, full-motion transmission costs; Slow Scan operating costs are little more than the expense of a phone call. The cost factor, together with the availability and convenience of telephone networks, has inspired wide acceptance of Slow Scan among the medical community. In addition to CT scans, the technique allows transmission of x-rays, nuclear scans, ultrasonic imagery, thermograms, electrocardiograms or live views of a patient. Such transmissions enable extension of physicians’ and specialists’ services to remote communities, through paramedics or nurse practitioners at Slow Scan-equipped clinics. Slow Scan also allows consultation and conferencing among medical centers, general practitioners, specialists and disease control centers. Colorado Video’s equipment is easily installed and easily operated with minimal training. One phone circuit serves both conversation and picture transmission, and the receiving unit may be connected to a hard copy machine for a permanent record of the images transmitted.

Medical facilities in more than 20 states and some foreign countries are using Colorado Video Slow Scan equipment. But use of the technology goes far beyond telemedicine. Its major employment is in the business/industrial community for a wide range of applications, among them teleconferencing, cable TV news,



transmission of scientific/engineering data, security, information retrieval, insurance claim adjustment, instructional programs, and remote viewing of advertising layouts, real estate, construction sites or products. Slow Scan also has utility in such remote sensing activities as weather observation, ship movements and highway traffic monitoring.

Colorado Video’s Slow Scan equipment traces its origin to the early days of the U.S. space program, when NASA sought a means of acquiring visual information from lunar and planetary spacecraft. Existing TV systems were considered prohibitive in terms of size, weight and power requirements. Therefore, Jet Propulsion Laboratory initiated a program aimed at use of narrowband transmission from deep space missions; one contractor was Ball Brothers Research Corporation, Boulder, Colorado. An early highlight result was Mariner 4’s 1965 transmission of pictures from Mars, the first closeup views of another planet; since then, narrowband video has been used extensively on NASA planetary missions. Ball Brothers continued development of narrowband video technology under a series of NASA contracts and under company-funded programs. In 1965, Colorado Video was formed as a Ball Brothers spinoff company to pursue development of Slow Scan TV for both government and commercial markets. Today, the company lists scores of major users of its equipment including—in addition to medical institutions—government agencies in the U.S. and abroad, universities and some of the largest corporations in the U.S.