New Telephones Designed For Handicapped

News of Customer Equipment Development

Bell Labs is developing a telephone that will let deaf persons see messages as coded flashes of light and blind persons feel them as vibrations of a finger pad. The new phone is called the Code-Com set. It is one of two new phones being developed as part of the Bell System's continuing effort to furnish special services and equipment for the handicapped; the other is a set with a volume-control receiver for public coin telephones. Both sets were developed by the Telephone Laboratory at the BTL location in Indianapolis, Indiana.

The Code-Com set is for people who are completely deaf, deaf and blind, or deaf and mute. It consists of a conventional telephone and a signal unit. The latter contains a light bulb, a vibrating disk, and a sending key.

A conventional telephone converts the sound energy of speech to electrical impulses. These impulses are transmitted to the other end of the connection, where another telephone converts them back to speech sounds. The Code-Com set, however, converts the impulses into flashes of the light bulb and vibrations of the disk. Thus a deaf or deaf and blind person can "read" simple messages by using a question and answer system. A prearranged code, such as Morse code, makes more complex communications possible. Using the sending key like a telegraph key, a person without normal speech can send light and vibration signals to another Code-Com set or coded sound signals to an ordinary telephone.

In addition to voice sounds, the user of the Code-Com set can identify a dial tone, a ringing tone at the other end of the line, a busy signal, clicks when the switchhook is opened or closed, and some background sounds in the vicinity of the phone. The set also responds to changes in the amplitude of the signal. Thus, sound of greater amplitude produces brighter flashes of the bulb and stronger vibrations of the finger plate.

The Code-Com set can be used with a separate signal control unit, which is connected to the ringing circuits of a conventional telephone. Instead of the telephone ringing, the control unit switches a light, an electric fan, or some other light-duty appliance on or off to signal the person who can't hear ringing.

Field trials of experimental models of the Code-Com set have been held in Indianapolis, Indiana; Columbus, Ohio; and New York City, with the aid of handicapped persons and local telephone companies. After a bit of practice with Morse code, users could send and receive up to about 10 words per minute.

The volume-control handset is being developed for public telephones, where it must serve customers with normal hearing as well as those with impaired hearing. A three-position switch on the handset lets customers with impaired hearing increase the volume of sound from the receiver. Persons with normal hearing can use the phone at normal volume, though amplification may be a welcome convenience in noisy locations.

The switch positions permit 10-dB and 20-dB increases over normal volume. (A dB is about the smallest difference in loudness ordinarily detectable by the human ear. The average voice, heard over the telephone, is about 80 dB above a barely audible sound.) More than 17 million Americans suffer hearing losses of 20 dB or more.

Volume-control phones used in private homes can be adjusted for a suitable volume. The volume remains the same until the set is readjusted. In the new handset, which is designed for public phones, the spring-loaded slide switch must be held in position for one of the three available levels of amplification. The switch returns to the normal-volume position when released.

During trials conducted in selected phone booths at O'Hare Airport in Chicago, customers used the amplification in about 14 percent of all calls.

Bell Labs' work on these two telephones is only part of a widespread effort to make telephone service more fully usable by handicapped persons. For example, the Western Electric Company is now manufacturing a dual-frequency tone ringer which produces a sound that is more audible to persons with partial hearing ability than the standard bell. This ringer produces louder signals in two lower-than-usual frequencies (750 and 1500 Hz). Since most people with hearing impairments are affected more at high frequencies, these signals are helpful in alerting them to incoming phone calls. The signals are also 10 dB louder than the conventional telephone ring.

Other special signal devices include bells that ring louder or in different frequencies, an 8-inch gong, a buzzer, and a signal lamp. Other Bell System aids to the handicapped include the Electronic Larynx for persons with speech loss, the Bone Conduction Receiver for persons with conductive hearing loss, and the Watchcase Receiver. The latter device permits a third person to listen in on a call and repeat the message for a deaf person who can read lips.

The new Code-Com set for the deaf is demonstrated by Miss Janine Sliwa of the Indianapolis Laboratory. The set, connected to a conventional telephone, will allow a deaf person to "see" phone messages in coded flashes of light or "feel" them in the vibrations of a finger pad. Light flashes come from a recess (black rectangle) in the center of the raised portion of the set. The circular vibrating pad is on the left. The sending key, used like a telegraph key, is on the right.

The volume-control handset is demonstrated by Mrs. Peggy Ballard of the Indianapolis Laboratory. A switch in the handle can be used by customers with impaired hearing to amplify sound coming from the receiver. The spring-loaded slide switch returns automatically to a normal setting so the handset is always ready for normal use.

Dye Sharpens Image In Photographic Plates

News of Chemical Research

A dye process for increasing the sharpness of the image in photographic plates used for integrated circuit mask-making has been demonstrated at Bell Labs.

In standard, high-resolution photographic plates, degradation of fine image detail may be caused by out-of-focus, diffracted, or scattered illumination being recorded by the emulsion. Each of these effects is exaggerated when the depth-of-focus of microprojection systems and of monochromatic photorepeaters is less than the thickness of the emulsion of the photographic plates. The new process limits the effective depth of the emulsion to the top few microns, thus minimizing these effects.

As reported by Robert E. Kerwin of the Chemical Process Technology Department at the Kodak Photoresist Seminar in Philadelphia, the dye used may be any of several available nonphotosensitive, nonfluorescing, water-soluble materials. It must be specifically absorbing at the wavelength of interest, capable of uniform absorption by the emulsion, and totally removed during development processing. For a wavelength of 436 nanometers, such dyes are Tartrazine and Naphthol Yellow S, two food dyes, and Metanil Yellow, an acid-sensitive, indicating dye. Uniform dyeing of Kodak High Resolution Plate emulsion was obtained by a 5-minute immersion of the plate in a gently rocking aqueous solution of the dye, with a nonionic wetting agent.