



### RETOUCHING MUSIC

*Leopold Stokowski, noted orchestra conductor (center), enhances a symphonic production by electrical means, while Dr. Harvey Fletcher of the Bell Telephone Laboratories (left) looks on and W. B. Snow monitors the electrical currents.*

stereophonic music of the Philadelphia Symphony Orchestra was transmitted over telephone wires from Philadelphia.

Two years later Leopold Stokowski used stereophonic reinforcement of his music in order to allow 25,000 people in the open air to hear with ease a program of vocal and instrumental music. This year's stereophonic accomplishment by the Bell Telephone engineers results in there being captured upon motion picture film the faithful record of whatever is presented to an audience: music, drama, speech.

A 2,000-foot reel of motion picture film will hold 22 minutes of recording, enough for nearly any single piece of music. On the same film are impressed photographically the sounds picked up by the three microphones, translated into electricity, then amplified and converted into light by a photoelectric cell as a trace of variable widths on the film, much as is done in sound motion pictures.

#### Two Refinements Possible

There are two refinements in stereophonic recording not used in ordinary sound pictures. The sound records on film have a limited range of volume. It was therefore necessary for the engineers to reduce the louder sounds before recording and to increase those sounds by a like amount in reproduction.

For this reason before the sound reaches the device that modulates the light which shines on the film, the sound current is measured automatically and instantaneously. Whenever this sound

current exceeds a predetermined amount, it is reduced so that the recording current never exceeds a certain level. At the same time that measurement of the sound current is made, an alternating current is recorded on the same film and the amount of this current is proportional to the reduction that it is necessary to make in the sound. In reproduction these control currents are used to vary the amplification of the sound currents so that the sound regains its original volume.

#### Can Modify Recordings

Whenever a conductor like Stokowski wishes to refine or modify or "gild" a recording of his orchestra from the standpoint of volume of sound, this can be done without reassembling the orchestra and repeating the performance. The engineers arrange a performance with the conductor as audience. As he listens he makes volume and even tonal changes by electrical control. Simultaneously a new stereophonic record is made of the music as thus "enhanced." This is the record which would go before the audience.

How stereophonic recording will be used in the future is not yet decided. Symphonic music could be taken to much smaller audiences and smaller communities that cannot now afford to maintain or import a symphony orchestra. The audience would have to gather in an auditorium in order to listen to the music just as they do in the case of a symphonic concert with live talent. The il-

lusion of sound perspective cannot be obtained in a small room or over the radio.

The combination of stereophonic recording with motion pictures is another possibility. Motion pictures are now available in color. When invention progresses to the point where motion pictures can practically be made three dimensional or stereoscopic, in addition to color being presented to the eye and stereophonic music to the ear, the recreation of a concert or stage performance—or even the recreation of a historical occasion—may come to practical reality.

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#### ECONOMICS—POPULATION

### How Large Families Make Ends Meet

**T**HE MORE children there are in a family in the United States nowadays, the larger is the part of the budget spent for food, and, by irony of fate, the lower goes the nutritional level.

So the Population Association of America was told at its meeting in Chapel Hill by Prof. Frank Lorimer of the American University, who reported an investigation of the economic problems of families of varying sizes.

As the urgency of eating to live presses more intensively on budgets of families with more children, these families meet the food problem by curtailing their spendings on such things notably as house furnishings, equipment, and transportation, recent analysis shows.

In United States cities, recent figures indicate that over 60% of families with five or six children, and over 90% of families with seven, eight, or nine children under sixteen years of age are in the lowest income classes.

From the standpoint of population policy, concerned with equalizing the economic situation of varying-sized families, one baffling problem is that the larger the family, the smaller the earnings of a working wife, Prof. Lorimer pointed out.

There is a strong tendency in contemporary society for many women to continue working after marriage, so long as there are no children in the family, but to drop employment and thus sacrifice the economic contribution as they become mothers, he stated.

In Negro families, the high proportion of working wives is attributed to poverty resulting from meager earnings of men, he has concluded from evidence that the proportion of Negro wives who work drops sharply when husbands' earnings rise above \$1,000 a year.

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