

100 to 5,000 Cycle Range Called Sufficient for AF

How good is "good?" What are the requirements of a good amplifier?

It will be readily conceded by all that a perfect amplifier is one which will cause a reproducer to set up in a room exactly the same combination of sound waves as existed in the room where the transmitter microphone was placed.

The reproduced sounds depend on a great many factors besides the amplifier, and the original sound may be changed either before it enters or after it leaves the amplifier.

Before reaching the receiving audio amplifier, the sound passes through a microphone, several amplifiers, often several hundred miles of telephone line, a few or hundreds of miles of space, the radio frequency amplifier and detector.

Much Chance for Change

Each successive element of the system has an opportunity to alter the characteristic of the original sound, and most of them take advantage of it to a greater or less degree. The composite effect of these elements in the system includes both addition and subtraction.

In considering the amplifier, we are then confronted by the fact that the product delivered at the amplifier input terminals is no longer capable of reproducing the sound waves existing at the microphone. Even a "perfect" amplifier per se, then, can not deliver a perfect output. The amplifier cannot replace that which has been lost. Possibly, however, it can partly remove the sounds which have been added, without removing any of the original sound.

Many of the noises added to the signal as it traverses the transmitting and receiving systems occur at relatively high frequencies, about 5,000 cycles. The experiments of Dr. Harvey Fletcher of the Bell Telephone Laboratories have demonstrated the fact that frequencies above 4,000 or 5,000 cycles may be eliminated from speech any music without noticeable effect.

Cutoff at 5,000 Cycles

It seems then desirable that the amplifier be so designed as to cut off at about 5,000 cycles, and that such an amplifier would give more nearly perfect results than a "perfect" amplifier.

Under present conditions, says the General Radio "Experimenter," the signal probably suffers more between the time it leaves the amplifier and the time it strikes the ear than it does before reaching the amplifier. That is to say, the loudspeaker is probably a greater source of frequency distortion than all the rest of the system.

The loss of the lower frequencies is due principally to the inability of many loudspeakers to reproduce frequencies much lower than 200 cycles. It does not seem to be generally realized how high this actually is.

The sensitivity at low frequencies of two of the best types of present day speakers was checked at 60 cycles, by means of an oscillograph. The oscillograph was first connected to the input and the input signal adjusted for an exactly sinusoidal wave form. The oscillograph was then switched to a pickup and the sound wave in the room was seen to be of 120 cycles frequency. A stiff connection was made between the speaker and the pickup, and a 60-cycle wave appeared, showing that while the speaker was vibrating at 60 cycles, no measurable energy was being radiated at that frequency. Another test with a different type of speaker showed that the full out-

put of a UX-210 tube was required to get an audible sound at 60 cycles.

A Practical Problem

Someone has made the suggestion that since reproducers are more or less peaked at the middle or upper frequencies, transformers should be designed to have a corresponding hollow. This is upsetting the perfect amplifier with a vengeance. It would seem more logical, however, for the loudspeaker manufacturer to equip his instrument with a filter to cut off the peaks of the curve in somewhat the same manner as telephone lines are "equalized." If the amplifier were made to match the speaker, it would be necessary to discard the entire amplifier every time an improvement was made in reproducers.

To the manufacturer of coupling units, the problem of "how good is good" presents itself in a very practical manner. How far down in the low frequency region is it reasonable to go? How much of this band, which does not now exist in the input to the amplifier, and could not be reproduced if delivered to the speaker, should the amplifier be capable of passing?

Question of Economy

It boils down to: "Is the public willing, and justifiably so, to pay more for a transformer that will amplify as low as 30 cycles than for a transformer capable of amplifying frequencies of the order of 100 cycles, when no actual gain in quality of reproduction results from the higher cost?"

Fortunately, the low frequencies that our present reproducers will not radiate are not lost. These frequencies are reproduced in the ear from their harmonics and the fundamental pitch of the note is not lost, although if the cut-off of the amplifying and reproducing systems is too high, it loses "naturalness." It is to the detector action of the ear that most of the bass notes we hear are due, and they come from no farther out the "vasty" ether than the ear of the listener.

WILLARD HAS AB SUPPLY

A combination of the Willard A power and B power supply, with an automatic control to change from charger to current supply and vice versa, as the radio set switch is thrown on or off, has been announced.

20,000 Ft. of Buried Wire New Station's "Ground"

Milwaukee Wisconsin has a new station, WTMJ, owned by The Milwaukee "Journal," soon to go on the air. Upon completion of the new station the "Journal," following the suggestion of the Federal Radio Commission, will discontinue broadcasting over WHAD, which it has operated jointly with Marquette University since 1923. Marquette will retain the license of WHAD and operate as the station of an educational institution.

"Journal" officials also announce the purchase of WKAF. WTMJ will replace the old call letters.

A location outside the city was selected to conform to the Federal Radio Commission's recommendation that transmitting

Visitors Talk to Australia

Pittsburgh.

Eight members of the Australian industrial delegation to the United States, which went to Pittsburgh for a three-day visit, participated in two special broadcasts to Australia through KDKA. One morning at 4 o'clock Eastern Standard Time, the delegates gave five-minute talks, which were broadcast on 62.5 meters. In the evening at 5:45 o'clock a 15-minute program was given.

Broadcasting stations in Melbourne and Sydney had been informed. Several programs from KDKA have been successfully rebroadcast by Australian stations during the last three years.

Four o'clock A. M. here corresponds to 7 P. M. in the greater part of Australia, and 5:45 P. M. here to 8:45 A. M. there.

The delegation has been touring the country for several months under the auspices of the United States Department of Commerce.

Radio and Aviation Combined for Show

Communication through the air may mean either by means of radio or aviation. It is this connection between these two new fields of endeavor which has caused Sheldon H. Fairbanks, managing director of the Seventh Annual Boston Radio Exposition, to hold New England's first airplane show in conjunction with the radio show, week of September 26.

The aeronautical exhibit will be held in the exhibition hall, while the radio show will be staged in the grand hall of the building.

JAPAN PROGRESSIVE

In Japan, a visitor said, he found radio already very popular, five government-owned stations furnishing programs regularly to a large audience. Nearly every house has an antenna, according to the visitor, but in Japan there is a tax of about 50 cents per month on all listening sets. Similarly, in the Philippines the government imposes a tax on listening, amounting to about 5 cents a month, in addition to collecting import duties on radio sets brought in, he added.

NEW JOBBER APPOINTED

The Telephone Maintenance Company, 123-5 So. Wells St., Chicago, has been appointed Freed-Eisemann distributor in Chicago and surrounding territory.

stations be removed, so far as is practicable from centers of population.

WTMJ's new transmitter, a Western Electric, has been purchased, together with the towers. The towers will stand 500 feet apart. So far as can be determined, this distance is the longest between the towers of radio stations anywhere and, according to radio engineers, this spacing will aid materially in providing excellent radio transmission.

A special feature of the transmitting efficiency, made possible by the removal of the equipment to a rural location, is the "ground" of the transmitter. This will be an extensive system of heavy copper wires, 20,000 feet in all, underground. This installation requires about an acre of ground.