

MUSIC FOR THE RADIO

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THE mere fact that we consider the possibility of music written especially for the radio indicates a belief that music is, or ought to be, specifically related to the instrument for which it is composed. But the radio is not an instrument for producing sound, like a violin or an electronic piano. It is an apparatus which is intended to capture sound vibrations and disseminate them to all parts of the world.

Radio broadcasting uses the following units of electric transmission: microphones, special volume controls for each microphone, a general volume control, and a sending apparatus. But the music transmitted is usually played on well-known sound producing instruments, such as flutes and violins, and is music conceived and composed to be heard in *direct* audition, whether it is *Der Ring des Nibelungen* or the most brilliant bits of swing.

Research has been directed toward perfecting the method by which this music, composed to be played and heard in a concert hall, may be picked up by microphones and launched into space in the most appropriate and adequate form. Music for one or two performers presents no serious difficulties. But the transmission of large instrumental ensembles offers a problem which sound-engineers have not completely solved. No difficulties would arise if the violins were always permitted to dominate, the trumpets to be heard forte, and the basses and cellos to play a secondary role. But that is not the case, since each passage in a score demands its own special, distinct balance.

A first step toward solution of this problem of proportion is the placing of the microphone to best advantage. Then comes the management of the volume controls. As the sound engineer must direct these controls, the orchestra conductor is deprived of one of his basic functions — that of giving balance to the different individual and group sounds. A conductor may achieve a fine sound-balance in the studio, but his effect will be trans-

mitted through the air wholly, or even partially, only if the manipulation of the amplifying panel is also good. Equally, if the balance in the studio is bad, the sound-engineer may remedy the defect if he knows how to place his microphones and control his amplifiers.

What we understand by *good balance* is what most closely approximates the intention of the composer, creates the effect he intended in direct audition of his music. If the intention of a Mozart score is to give primary importance to a theme played by cellos and basses, while the violins and violas sustain in tremolo a harmony of secondary importance, the amplifier of each microphone should obviously be manipulated to carry out these musical purposes.

There are, then, two special problems: the placing of the microphones and the manipulation of the volume controls. At first thought, it might seem that a single microphone, placed close to our ears, would gather and transmit exactly the same sounds that we hear. If that were true, manipulation of the volume controls would be unnecessary. A good or bad performance would be taken in by the microphones exactly as a faithful mirror reflects a panorama. This is a theoretical possibility, but it has not been achieved in practice. The use of a single microphone has never proved adequate.

In transmission from concert halls, the use of two microphones has generally been found the most satisfactory. The places at which can be gathered the clearest image of the original and reflected sounds our ears take in, are sought and then fixed. In making records, on the other hand, experiments have been undertaken with more than two microphones. (The process of electric transmission is identical for broadcasting and for the making of records or sound-films.) Whatever the results, and whatever criticisms there may be, the thing to note is that the need for manipulation of the amplifiers increases in direct ratio to the number of microphones used. Strictly speaking, the need for adjustment of the microphones (high, middle, and low frequencies) likewise increases. There is also a proportionate decrease in the balancing function of the ensemble director as we enlarge that of the manipulator or sound-engineer.

Personally, I am inclined to believe that the use of numerous microphones is the ideal theoretical solution. Not only should microphones be adjusted to the three basic groups — high, middle and low frequencies — but each section — strings, woodwinds, and brass — should have as many microphones of each special adjustment as necessary. Further, it is evident

that the good effect of differentiated microphones will be greatly augmented if the group of instruments corresponding to each is acoustically isolated from the rest. Without a doubt, the establishment of balance can, by these means, be brought to a high degree of perfection. But this arrangement meets almost insurmountable practical difficulties: it requires a mixing panel with ten or more dials, and the presence of one or more control manipulators absolutely in sympathy with the intentions of the conductor.

Without going to such an extreme, and with a comparatively modest apparatus, I have myself demonstrated that it is possible to obtain good results with only three microphones plus adequate cooperation at the panels. In certain passages it was necessary to move either a performer or a microphone during the performance. We fixed the degree of amplification of each microphone after hearing each passage several times with different degrees and forms of amplification; the entire score was then marked with indications of the amount of amplification needed for each section, and the general result was tried out by means of playbacks. During the performance, a musician and an engineer who had worked in close contact with me managed the controls.

The steady improvement in electric acoustic engineering gives us constantly better facilities. But even the best practical solution of this problem will not change the purpose it is designed to meet — that is, a faithful transmission by electricity of something originally conceived to be heard directly. It is a problem of adaptation, not of creation.

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Now let us move on from the question of the best electric transmission for, say, the symphonic music of Beethoven or Wagner. This, as I have pointed out, is a problem of adaptation. There remains the completely distinct matter of utilizing electric transmission as an instrumental medium for musical creations — that is, the problem of a functional radio music.

Electric transmission does not imply transformations in harmonic, contrapuntal, or formal character. The new musical resources and facilities it offers lie in the gradation of sound-volumes and in the establishment of balance between different musical elements. These, in turn, can, up to a certain point, also yield new timbres. Correlatively, electric amplification takes full advantage of those instruments or registers of instruments which, because of weak volume, are not fully expressive in direct audition.

Since the process of transmission is dependent primarily on the microphone, it seems to me inevitable that music written for the radio ought to be planned with that basic consideration. Groups of instruments should be related to an equal number of microphones. In direct audition, the ensemble is made up of as many units as there are instruments playing. In electric transmission, the case is otherwise: the ensemble is created by the microphones, by as many as are used. In turn, each microphone brings together various instrumental units within its area of absorption. For electric transmission the instruments stop being units and are converted into cells of the microphone-unit.

This process involves two steps: making up the microphone-unit of groups of instruments, and making up the ensemble out of microphone-units. Each section of instruments should be grouped by the following criteria: as of equal or similar tessitura, equal or similar sound-possibilities, as solo instruments or instruments of secondary musical function. Preferably, each instrument or group of instruments related to a single microphone should be isolated from the others by soundproof divisions, thus facilitating the establishment of general balance at the mixing panel. The instrumentalists do not need to vary dynamic values over a full gamut; only three degrees of intensity are required for individual performance: piano, mezzo-forte, forte.

All liberty however is not taken from the executant: he can, in a given case, vary the texture as his sensibility dictates. But it will be necessary for each microphone to have special dynamic indications. A given indication of volume — say mezzo-forte — should always correspond to the same number of decibels in all the amplifiers. This means that the amplification for each unit will vary according to the intensity of the instruments playing. The first microphone, with a mark of mezzo-forte, may receive the sound of ten violins playing piano; the second, also with a mark of mezzo-forte, will gather in the sound of a deep flute playing forte. So that both may give an equal sound-volume (an equal number of decibels), the second microphone must be opened much more than the first.

The degree of amplification for each microphone — to produce in each section the number of decibels corresponding to mezzo-forte — should be established in the course of rehearsals. The other shadings, above and below mezzo-forte, will be fixed in relation to it. Finally, it will also be necessary to indicate in the score the general sound-result, the volume of the result of the mixture of all the channels. Thus it should be possible to

achieve a tremendous sound-volume when only one or two instruments are playing, and the obverse, a *pianissimo* with fifty or sixty instruments.

A score well-marked along such lines will still need, as I have already said, a related preparatory job on the part of the sound engineers. They must annotate the exact degree of opening for each microphone channel throughout the score. So that in the course of the performance each section will move across the gamut with the same exactness as the instrument playing the part.

These general ideas are offered merely to suggest a start for practical experimentation. Up to now no compositions have appeared which even begin to use the specific instrumental resources of electrical transmission. Surely, sooner or later, such music must come. Perhaps this generation will see it. But just as it will always be preferable to hear a Beethoven symphony in Carnegie Hall rather than by means of even the best electric transmission, so, it can easily be realized, a symphony *conceived* for radio will not be heard best in the concert hall.

Any creation corresponds to a complex not only of physical, but also of social, and moral conditions. The physical may be defined as the instrument, the place where it is played, the performer's ability, the proportion between the instrument and others playing simultaneously; the social are fixed by the use and significance of the artistic product in the general culture, its relation to previous products and similar present ones; the moral conditions are inherent in the character, education, and personal antecedents of the artist. The sum of all these factors determines the esthetic of a work, and when any one of the components is changed, the esthetic is changed also.

To play by radio a symphony of Beethoven, composed to be heard in direct audition in a theatre of medium size, is in reality to adapt it. The adaptation may be more or less necessary or well done, but it can never be completely satisfactory. The necessity of making such adaptations is only transitory. The creative capacity of man is eternal and constantly growing. We adapt when we do not create. When new creations arrive, adaptations lose their value. Just as there was a Wagner who knew how to use the symphony orchestra to its fullest extent, the future will give us a musician who knows how to take full advantage of our electric resources. It may be said that the resources of the present symphony orchestra are not yet used up. The orchestra of Bach's time is not used up. Yet composers today do not write symphonies for the instruments used in the

Sixth Brandenburg Concerto.

In a sense the problem presents a challenge to the personal character of composers. The new physical means are already at hand. But it is not the same thing for a man to dedicate himself to writing music within well-known practices, learned as a child, as it is to take the first step toward the unknown future where no one knows what difficulties and crises may be encountered. In the first case, he is at the end of a well-known, well-tried road: he is a composer. In the second case, he is setting sail on a turbulent and uncertain sea; he is an investigator and, in most cases, a mere precursor. But that, it is clear, is another story.