Part of the horn section of the Detroit Symphony orchestra, above. Radio distorts the tone of these instruments unless they are played very "mellowly." . . . At right, Eugene Goossens, director of the Cincinnati Symphony, who discovered a disconcerting echo when his orchestra first went on the air waves.

RADIO gets a HEADACHE out of its SYMPHONIES

By Norman Siegel

THE broadcasting of symphonic music is an exciting and serious business. It offers one of the knottiest problems the radio networks have to face.

To begin with, most symphonic programs are "remote control" broadcasts. That is, when you hear the Cincinnati, Cleveland, Boston or Detroit Symphonies you are not hearing them from radio studios in those cities, but you are hearing them from concert halls under conditions which are often bad for broadcasting.

Some of these orchestra halls were built long before the days when anything was known about acoustics, much less radio broadcasting. Of course the age of an auditorium may not mean that it is not acoustically perfect. The Academy of Music in Philadelphia, for instance, which was built in 1847, is considered by experts to be one of the finest halls for symphonic concerts in America. New York's Carnegie Hall, too, is an ideal concert hall, and that's an old standby of the Metropolis.

However, when the broadcasters move in and begin setting up their wires and microphones, they run into a number of problems. In planning for the Cincinnati Symphony series under the direction of Eugene Goossens, Columbia engineers discovered that their microphones picked up a disconcerting echo in the Cincinnati Music Hall.

It seems that the walls and ceilings of the hall are of hard plaster construction, causing the sound waves to bounce back instead of being absorbed. The microphone hanging somewhere about row H would catch these sound waves on the rebound about three seconds after they originally came from the orchestra. At the same time new sound waves from the orchestra would be coming into the microphone. The result was a hazy waving distortion of tone.

THIS might have been corrected by placing the microphone closer to the orchestra, something that's often done to escape an echo. But they couldn't get too near the Cincinnati Orchestra, for in concert arrangement it spreads out over a radius of 65 feet. A microphone placed too close would pick up only the central section and miss the outskirts.

Therefore, there was only one solution to this problem—a new type of microphone. It is known as the "uni-directional microphone," and is now also used on Detroit Symphony and Andre Kostelanetz Orchestra programs.

The mike is closed at the back. Unlike the "bi-directional" microphone which picks up sound waves at both front and back, it has a pick-up angle of but 120 degrees. That means that spreading over the front and sides of this microphone is an area of sensitivity in shape something like a crescent slit across the front of a bomb. This curve faces the orchestra, thereby eliminating all echo.

The Detroit Symphony programs on Sunday night offer another problem. During this broadcast, which originates at Masonic Temple in Detroit, the audience is part of the program. In most other symphonic broadcasts the audience merely listens and applauds, but in Detroit, the audience of almost 5000 persons stands up and sings some famous and familiar hymn at the end of the program.

This means that the engineer handling the broadcast has to worry about several different "live areas." When the orchestra is playing, he turns on the "uni-directional" microphone. When a soloist is playing or singing with the orchestra, he has to blend the soloist's mike with the "uni-directional" one of the orchestra. When the audience chorus is singing, a number of other microphones are turned on to pick it up.

LEOPOLD STOKOWSKI'S Philadelphia Orchestra broadcasts its weekly Friday night program from a small hall in which there is a minimum of audience. It is the small chamber music auditorium for students at the Curtis Institute of Music.

Here the greatest difficulty is the width of the room. The musicians occupy the space where the audience would normally sit, for there is not enough room on the stage. Unless they are all seated correctly their instruments will play into the wall, or will be facing so as to cause reverberation.

In an effort to eliminate this, Stokowski spreads the orchestra out in a sort of wide battalion.

Carnegie Hall, where the New York Philharmonic broadcasts its programs, presents few problems to the engineer on the job. The acoustics are so good that an ordinary microphone is used to pick up the program. The microphone, hung about 25 feet above the stage level and inclined at an angle of about 15 degrees downward and five degrees toward the first violins, registers the concert as it would sound to a man seated in the choicest seat in Carnegie Hall—about Row H Center.

Another problem that faces radio in airing symphonic programs is the matter of the set-up of the orchestra.

The audience witnessing these concerts expects to see the orthodox orchestral arrangement. As a result the microphone has had to adapt itself to the exigencies of this set-up. It has only been in the past season that the orchestral set-up of the Philharmonic has been varied for broadcasting.

The basses and timpani, instead of running along the back of the orchestra, have been pushed to the farther side of the stage.

Engineer A. B. Chamberlain claims the acoustical reason for this change is that basses, timpani, and bassoons emit a low frequency vibration which is non-directional. These sound waves don't travel in a straight line but sluggishly spread out in all directions. They are bound sooner or later to hit a hard surface somewhere which causes distortion and spoils the entire concert.

Many other instruments could well be moved around and rearranged, were it not for the presence of the audience. The piano has to be carefully watched for broadcasting purposes. The same is true of the harp.

THEN there is also the problem of timing the concert. The broadcaster can attend the rehearsal of the orchestra but he can not be exactly sure of the timing, for at such rehearsals the conductor is working over the music, stopping and starting again, and it is seldom that the piece is rehearsed through without a number of interruptions.

As a result of not being able to clock the program before it goes on the air, the broadcasters use the intermission of the program as a safety valve against running over or under the program's allotted time.

Symphonic broadcasting is still in the research state. Engineers have made great stride in the last few years in reproducing with greater and greater fidelity the pure quality of the instruments, in eliminating echo, in overcoming the difficulties of the concert hall. But there is still much to be done.

For instance, the full volume of the symphony orchestra can not yet be carried by the airwaves. It is too immense, too powerful. If the engineers tried to transmit it all, the broadcasting equipment would be so overloaded as to cause terrible distortion and damage to the large water-cooled tubes in the transmitting plant.

The present solution of the problem has been to compress the volume of the original orchestra to the volume which the radio equipment is capable of carrying. This is left to the engineer who handles the program.