

Possible Causes of Fading and Distortion

The Part of the Monitor in Governing Modulation

By "M.J.R.E."

THE question of fading and distortion of broadcast signals has long been, and is still, a vexed one in New Zealand, as well as in other parts of the world. Due to the fact that there is only the one company in New Zealand, and they are looked upon as a monopoly, they have come in for severe criticism. Putting aside the question of whether the power, wavelengths, and location of the stations are strictly technically right (and such a question bristles with technicalities, both radio and commercial, and is one which the saying concerning the fools and the angels is applicable), the fact remains that in certain districts, where good, reliable signals from the nearest station might have been reasonably expected by listeners, there have been disappointing results. The transmitting stations have come in for the blame, and in most cases they have been as blameless as a lighthouse giving its usual output, but blinded by fog or clouds from giving its light to passing shipping. The nature of the fog or clouds which blind a radio transmitting station will be briefly outlined, but before dealing with this question the possibilities of the transmitting apparatus or personnel being blameworthy will be discussed.

THE MONITOR'S DUTIES.

AS is well known, there is in the studio of the broadcasting station a sound pick-up device called a microphone, which converts air waves into electrical impulses. The air waves, of course, represent the sounds of music or speech created by the artist or speaker. The electrical impulses are taken into a control room, in which is located electrical apparatus for the purpose of checking the purity and strength of signals, and the duty of the operator or attendant there (who is usually called the "monitor") is to maintain the purity of signal delivered from the microphone, and check its issue from the transmitter. He has in his charge amplification apparatus and a volume or "monitoring" control whereby the output from the studio and the input to the actual transmitting set (which may be a mile or more away and con-

nected by wires) may be varied at will.

NOW, the monitor can vary the power of the transmitter from zero to maximum by a simple rotation of the volume control in the monitoring room and by a turn of a switch he can listen to the purity and volume of signals anywhere up to the time they leave the monitoring room as well as after they leave the transmitter as ether waves because a standard radio receiver is installed in the monitoring room.

It is a fact which is very seldom appreciated that the power of a broadcast station is not the power of the carrier wave, but is the depth or amount of modulation applied to the carrier of a transmitter of a certain capacity. For instance a transmitter rated at 100 kilowatt emits a carrier wave of a certain amplitude or strength, and this carrier wave is capable of travelling large distances. If it were possible in practice to modulate this carrier wave 100 per cent., then the whole energy of that carrier wave would be devoted to carrying the broadcast signals to maximum distance. Actually in practice a depth of modulation of 70 to 80 per cent. can be obtained, and this means at once that the actual telephonic power available on the carrier wave is that due to an expenditure of 70 to 80 kilowatt instead of the 100 k.w. used in setting up the carrier. If the telephonic input to the transmitter is cut down to such an extent that the depth of modulation is 1 per cent. only, then the equivalent signal strength in a receiver tuned to the 100 k.w. carrier is only the equivalent of a 1 k.w. station fully modulated.

THE question might be asked whether the 100 k.w. station's carrier would travel further than that of the 1 k.w., and that the 1 per cent. modulation of the former would deliver a greater signal strength than that of the 100 per cent. modulation of the 1 k.w. carrier with its limited range. Actually in practice other factors would have to be considered, and the results would be problematical, but theoretically the expenditure of telephonic power is the same, and the results would be approximately the same so far as signal

strength in the receiving aerial is concerned.

SUBSIDIARY CONTROLS.

IT is seen therefore that the power output of the transmitter is in the hands of the monitor because the carrier wave is maudlin in the receiver (providing the receiver is correctly adjusted), and merely provides the connecting link between transmitter and receiver just as though a wire were joined between the two as in the case of ordinary telephony. Whatever the monitor allows to be put into the carrier becomes available in the receivers tuned to that carrier. The monitor is consequently a very responsible link in a broadcast system.

IT will be seen at once that any lack of attention on the part of the monitor to his job may result in fading or distortion. If the input to the transmitter is cut down during an item an apparent "fade" at relatively distant points will be noticed. If in changing from studio to relay, or vice versa certain necessary readjustments are not made to compensate for different strengths of pick-ups, then fading or blasting will result so far as observations at distant points are concerned.

Sometimes there is a sub-monitor engaged in the case of an outside relay, and the operator in charge of the transmitter has the ability in an emergency of regulating the input to his transmitter. In a properly regulated broadcast system neither the sub-monitor nor the transmitting operator should tamper with volume controls, and this duty should be strictly confined to the regular monitor while programmes are being transmitted.

THE OBJECTIVES AIMED AT.

OBVIOUSLY the ideal the monitor is aiming at is to put out the maximum amount of power compatible with purity. The check on signal purity is made by observing the radio signals returning from the transmitter, and the monitoring adjustments are always made using the radio signals as a guide. If distortion is noticeable, a turn of a switch enables the monitor to check the

input to the transmitter. If the input to transmitter is right and the output distorted, while the strength of input is normal, then it is the duty of the monitor to call the transmitting operator's attention to the fact. The operator should have noticed the trouble as soon as it occurred in any case, as he is in a position to listen to the input and output of his transmitter.

WITH modern apparatus very little trouble should be occasioned by distortion actually in the electrical portion of the transmitting system. Particular and constant attention has to be paid to the studio, where the studio attendants have to arrange the relative positions of artists and microphone. Naturally the monitor can give material assistance in increasing the flexibility of the system by compensating for errors on the part of the studio by an increase or decrease of amplification.

The monitor attendant has to be on the job the whole time, and has to be experienced to enable a professional finish to be imparted to the material broadcast.

OTHER FACTORS AT WORK.

THE foregoing has given some idea of possibilities of distortion and fading likely to be traceable to the actual transmitter. To the casual reader it may be likely to appear as though the possibilities are so great that the percentage of "fades" observed are very largely the result of slips on the part of the monitor, while the number of times the signals become mushy are merely due to the fact that the transmitter attendant is sucking his thumb instead of attending to his job.

In reality the blame definitely traceable to variations from the transmitter is an extremely small proportion, the majority being due to atmospheric conditions, which will form the subject matter of this column next week. Of course, the broadcasting company are alive to the necessity of minimising unnatural fades, and a constant check is kept on the station output.

It is the practice in many modern stations to use mechanical or electrical instruments to check the station output, and to keep photographic records of modulation percentages taken

periodically. At the same time, visual indications of average modulation percentages may be constantly available in the transmitting room, monitoring room, and also in the studio manager's control room.

ALL PARTS LINKED UP.

NATURALLY every section of a broadcast system is in quick telephonic communication with every other section, and in the case of the studios, control room, and monitoring room, not only is there quick communication, but by means of large plate-glass windows it is possible to see everything that is going on. Even artists awaiting their turn to perform can see what is going on in the particular studio in operation and by means of a loudspeaker also hear the performance.

ALL that organisation and electrical and mechanical devices can do is done in a modern broadcast station to cut out human error and the minimising of the latter is naturally dependent on quality of personnel.

So far as New Zealand is concerned, there is a much greater necessity for care than in other countries, where more stations are available per head of population or per square mile to be covered. Owing to absence of population, and large areas to be covered, the very most has to be made of the power available from the four stations, and if listeners close to the stations notice a certain amount of furriness of signals, due to slight overloading of the transmitter, in order to make the most of the power available, and get programmes into distant parts of the country, they should sympathise with the ambitions of the monitor in this direction. Nevertheless, it is naturally most desirable to limit the modulation of the station to such safe limits as to ensure faithful reproduction over a limited area, rather than take the edge off good music, and make it available over larger areas.

In next week's issue, therefore, an attempt will be made to explain in as popular a manner as possible the cause of fading and distortion, as well as the reason that signals transmitted on the standard broadcast wavelength carry to greater distances in the night than during the day.

Our Mail Bag

Relays and Other Things.

"Quite Contented" (Dunedin).—I notice in the mail columns of your excellent paper, "Radio Record," that daylight saving seems to be annoying some listeners-in, especially in the country. I notice also that someone suggests the relaying of stations. Well, I would like you to have my opinion on both these subjects. I wish to say, first, that daylight saving doesn't bother me in the least where New Zealand stations are concerned. I have been enjoying the benefits of radio for three years now, and I fail to see how one hour is making a difference. Naturally, the Aussies aren't quite the same, but why worry? The New Zealand concerts are just as good as the Aussies'. I think it is just that "distance-getting ability" that is worrying some folks to-day. My set is a four-valve Browning-Drake, which I built myself, and gives excellent results. I had the set with me at Queenstown during Christmas; the daylight reception from there was perfect, 8YA and 4YA being the stations listened to. Now for the relaying of stations. I see it is a Wellington suggestion. Well, all I can say is this: that I hope 4YA doesn't attempt it. I have heard 8YA relaying quite nicely, but 4YA's relay of the Maori page-

ant was very poor. I am sure there is room for improvement in 4YA. My aerial is two miles from 4YA. I get 3YA and 2YA good during the day. 3YA fades rather badly at night, whilst 2YA and 1YA are good. 4YA, of course, doesn't fade here, but he stops quite a lot for adjustments. However, taking radio reception as it is, it's not bad. I for one would be absolutely lost without it; it takes us old chums to appreciate the improvements, so here's to wishing the B.C.C. the best of luck.

Sidey Time.

F. Carter (Bay of Islands).—I have been waiting for someone from this district to write to the "Record" on the question of "Sidey" time in regard to reception by country listeners. I have yet to hear of a five-valve set that can get 2YA in this district before 7.30 p.m. That is to say, speaker strength and intelligible. Personally, I have got a five-valve set, with a 60 foot aerial and 40 feet high, and a good earth, and at 7.30 p.m. I can just hear 2YA on the speaker, and only just, but I certainly couldn't write down what the announcer was saying. Although it is bad for wireless, I hope "Sidey" time has come to stay, on account of its advantages to the great majority of workers in New Zealand. In this week's "Record" I see there is a suggestion by "43349 Wellington" re a "dictionary column." I would

like to congratulate your correspondent for his suggestion, as I think it is a splendid idea for beginners, like myself. I notice also that some of your readers have been asking for the "silent nights" to be done away with. Surely, Mr. Editor, the station staffs are entitled to one night off out of seven?

Bad Reception.

C.F.S. (Shannon): As reception from 2YA continues to be mushy and distorted, I would be pleased to know if the new land line that was spoken of shortly after the opening of 2YA, has ever been installed, and if so, when? Until about a month ago the station was fairly successful as a source of entertainment during the afternoon (though useless, at times, of a night). Latterly the afternoon session reception is the most distorted. Doubtless, the class of artists employed leaves little to be desired, but the type of music played by the best, the famous trio, is not altogether appreciated. "Home, Sweet Home" was never too humble for Dame Melba to sing. "Killarney," etc., etc., are pieces that the multitude understand and appreciate. A few of such as the pieces mentioned, or even more recent ones, would be hailed with delight. This locality would welcome a visit from someone in authority from 2YA to report on its reception here, and a dozen machines of six or seven makes, would be at the disposal of such a representative, as it is the desire of local listeners to assist all we know how in the endeavour to improve on what seems at present a waste of good music as far as here is concerned. Just one more point I would like to touch on. About twelve months ago, a special programme was broadcast from 1YA, a sample of

what we were to expect when the licenses reached 40,000 in number. Special attention was drawn to the fact that only one artist appeared on the programme twice (or was it two artists?). As the number of licenses is now in excess of the above-mentioned number, local listeners are asking each other when do we get the programmes promised. I cannot believe that the Broadcasting Co. made the undertaking lightly, but it would be interesting to know when to expect the change. A musical comedy was also broadcast from 1YA about twelve months ago, and it was announced that there was a likelihood of more such relays. When?

[We would welcome reports from other districts regarding reception of 2YA, so that it may be determined whether this is a local or general trouble. What adjustments were necessary in regard to equalising equipment have been made.—Ed.]

Sydney Heard.

Mr. D. W. White, Elizabeth Street, Wellington, reports increasingly good reception of Sydney. This was particu-

larly the case on February 14, when 2YC was received at good loudspeaker strength on 4 valves. The major part of the programme was listened to with great interest. Other listeners report increasingly good reception of Australian stations, with the lengthening of the hours of darkness.

SPORTING

CRICKET NEXT WEEK

March 2 and 3—Australia v. Canterbury (subject to permission C.C.A.)—3YA.

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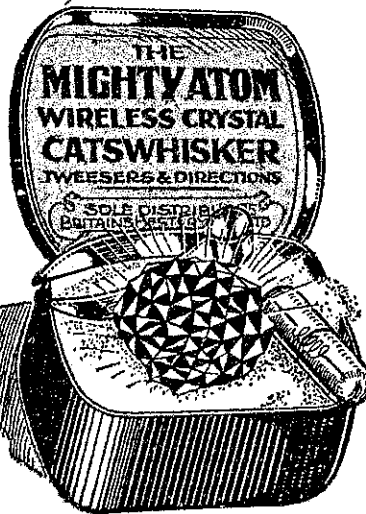


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