Quality Reception from Long Distance

How it may be Secured

IS it possible to obtain good quality in the reception of distant stations? I say emphatically, Yes, states R.W.H., in "World Radio," provided that one has the right type of receiving set and knows how to use it. This does not mean that any station, no matter where it may be situated or what its power, is receivable with first-rate quality; nor would I go so far as to claim that to a really critical ear loudspeaker reproduction of even the best of foreign stations is absolutely as good as that which we associate with the local station. To hear wireless programmes to perfection the receiving aerial should be situated at a comparatively short distance from the transmitter; as the range increases there is always bound to be a certain falling-off in quality.

This falling-off is not necessarily very great, and if one sets about it in the right way it is possible to obtain from a number of Continental stations reception that is genuinely worth listening to. It must, of course, be borne in mind that on the broadcast band (200m. to 550m.) fading sets in at distances greater than those of the order of 80 to 100 miles no matter what the power of the transmitter.

The local station scores heavily by being able to force itself upon one, so to speak, to a great extent. What I am driving at is that do what you will the tuning, when it is being received, must always be somewhat broad. The energy reaching the aerial is so great that unless you resort to quite extraordinary expedients it is difficult to cut down sidebands sufficiently to mar the full beauty of the transmission. With the distant station matters are rather different.

One can hope for really good reception only if the transmission that is coming through is powerful enough to exercise a certain amount of wipe-out upon those on either side of it. When this is so the sidebands are not lost to any serious extent, provided that the receiver is not over-selective, and good quality results.

IT is a common belief that all reception from a distance is not worth listening to. It has been asserted that the only justification for DX reception is the logging of elusive foreigners. But this is not necessarily the case, as a correspondent to "World Radio" asserts. There is a charm in listening to foreigners, even if not a word can be understood, while the reception of the Americans is, from a point of view of our relations with them, really worth while. Unless the distant programme can be clearly received it is not worth while. The accompanying article tells how this may be realised.

Sets for DX are Over-selective.

THE trouble with many sets designed for long distance work is that, from the quality point of view, they are over-selective. Here we are brought face to face with a difficulty. The long-distance enthusiast wishes his receiving set to be sensitive, for otherwise he will not be able to pick up when he wishes to do so the weak signals that come from distant stations. To obtain the requisite degree of sensitiveness a reasonable amount of genuine high-frequency amplification must be used, and not infrequently this is eked out by the misuse of a spurious form of amplification.

"'Eke out?' 'Spurious?' I can see what the man's getting at; he means reaction." Quite true; reaction properly used is a real blessing to the long-distance man; badly used or over-used it is responsible for a whole host of evils. It leads to a cutting of sidebands, to noisy and mushy reception and not infrequently to a good deal of interference, not only with one's own pleasure, but also with that of one's neighbours.

For long-distance work the use of reaction is almost essential for one very good reason. We are almost bound in such sets to employ the grid-leak and condenser rectifier owing to its remarkable sensitiveness to weak signals. This kind of rectifier depends for its working upon a flow of current in the grid circuit, and such a flow necessarily leads to the introduction of damping in that circuit. By using reaction the damping can be counteracted to a great extent, which means that tuning is sharpened. But reaction must not be overdone; we must depend, if we want quality, more upon genuine high-frequency amplification.

The Use of Grid Screen.

IN the old days at least two stages of high-frequency amplification were required, and one was doing well if he obtained quite a small amount of magnification from each. To-day the screen-grid valve enables us to get from one high-frequency stage almost as much amplification as is normally obtainable from two triodes. With two such valves in cascade the very limit of H.F. amplification is reached. This means that with either one or two screen-grid valves as H.F. amplifiers we can apply to the grid of the rectifier reasonably strong impulses.

THE gridleak and condenser rectifier scores only when the impulses reaching it are weak. With strong impulses we can substitute the anode bend rectifier, in whose grid circuit no current flows, and therefore decrease the amount of damping present without having recourse to reaction.

To do without reaction altogether is perhaps a Utopian ideal; nor do many people use two screen-grid valves in cascade. But a single stage of high-frequency amplification with the help of a valve of this type, followed by an anode bend rectifier, means that very little reaction is required as a general rule to attain the desired degree of sensitiveness and selectivity. In a word, reaction is there when for some purpose we require an extra amount of selectivity, but in the ordinary way we do not need to make any great use of it since we already have sufficient genuine high-frequency amplification to bring in at good strength such stations as are really worth hearing.

Not all stations are worth hearing. When quality is desired it pays handsomely to select only those stations whose transmissions come through strongly, for it must be realised that no station can be well heard unless its power is sufficient to drown mush, small atmospherics, and other forms of interference that are nearly always present in long-distance reception. If signal strength is only just equal to that of whatever interference there may be, then both the desired signal and the undesired noises will be equally brought out. Choose, therefore, for good quality only those stations which are easily received.

Once a good station has been tuned in and brought up to good volume, see whether you cannot slacken the reaction coupling to some extent. Quite often it is possible to do so without reducing the volume unduly, and usually there is a big gain in quality.

Rely for long-distance work upon high-frequency rather than upon low-frequency amplification.

It is quite possible to obtain a very big overall magnification by the use of two or even three efficient low-frequency stages. But generally the use of these will add to a number of evils. The set is likely to become distinctly microphonic; if atmospherics are about the interference that they cause will be unduly brought out, and if the batteries are not right up to the mark any defects will be very badly shown up.

The conclusion that we come to is this:—

Really good reception is possible from distant stations provided that they produce reasonably strong signals; genuine high-frequency amplification is necessary; too much reliance should not be placed upon reaction; signals of good telephone strength can be brought up to loudspeaker volume by means of low-frequency amplification, but it is not sound practice to endeavour to magnify at low-frequency a very weak output from the rectifying valve.