ENGLISH QUALITY AMPLIFIER

Many Interesting Features In Design

FROM time to time the English technical journal, "Wireless World," has featured designs for quality amplifiers for the reproduction of gramophone recordings and for use with radio reception.

About 1935 the "Wireless World" described a quality amplifier designed by W. T. Cocking, and the writer made a point of calling on this designer when visiting England in 1936 and heard this amplifier in operation with a Hartley-Turner speaker. Several versions and modifications of this amplifier have been published from time to time, but now the "Wireless World" has released an entirely new design for a quality amplifier. The design is the work of D. T. N. Williamson, late of the Marconi-Osram valve factory, and embodies several features which we feel sure will be of interest to our readers.

In the introduction to his article, Mr. Williamson lays down the six principal requirements of a good amplifier as:

(1) Negligible non-linear distortion up to the maximum rated output. (The term 'non-linear distortion' includes the production of undesired harmonic frequencies and the intermodulation of component frequencies of the sound wave.) This requires that the dynamic output/input characteristic be linear within close limits up to maximum output at all frequencies within the audible range.

(2) (a) Linear frequency response within the audible frequency spectrum of 10-20,000 c/s.

(b) Constant power handling capacity for negligible non-linear distortion at any frequency within the audible frequency spectrum.

(3) Negligible phase-shift within the audible range. Although the phase relationship between the component frequencies of a complex steady-state sound does not appear to affect the audible quality of the sound, the same is not true of sounds of a transient nature, the quality of which may be profoundly altered by disturbance of the phase relationship between component frequencies.

"(4) Good transient response. In addition to low phase and frequency distortion, other factors which are essential for the accurate reproduction of transient waveforms are the elimination of changes in effective gain due to current and voltage cut-off in any stages, the utmost care in the design of iron-cored components, and the reduction of the number of such components to a minimum.

"Changes in effective gain during 'low-frequency' transients occur in amplifiers with output stages of the self-biased Class AB type, causing serious distortion which is not revealed by steady-state measurements. The transient causes the current in the output stage to rise, and this is followed at a rate determined by the time constant of the biasing network, by a rise in

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