

very slight alterations of the phase or the amplitude of the periodic impulse the fundamental could be heard separately in the sound again.

Contrary to expectation the objective and the subjective settings practically coincided, which means that no subjective fundamental of

WAVE FORM

SPECTRUM

A. PERIODIC IMPULSE



B. PERIODIC IMPULSE WITHOUT FUNDAMENTAL



C. PERIODIC IMPULSE OF DOUBLE FREQUENCY



Fig. 6. Various periodic impulses and their Fourier spectra.

Waveform A: periodic impulse of finite width. Frequency 200 cycles. The spectrum contains all harmonics in gradually increasing intensity.

Waveform B: same as A. The fundamental tone is suppressed.

Waveform C: periodic impulse of double frequency (400 cycles).

appreciable intensity is formed in the ear. The amount of the subjective fundamental for pressure amplitudes of the same order as those used in the experiments with a pure tone is certainly less than 3%.

We shall, however, leave this part of the matter aside for the present and turn to another surprising phenomenon. No matter whether the fundamental is generated in the ear or not, the subjective fundamental can be made to vanish completely. This can be corroborated by means of the method of beats. If an additional tone of 206 periods is presented to the ear, 6 beats per second are distinctly heard at random settings. These beats, however, disappear completely at the setting obtained above. We are, therefore, justified in concluding that indeed no fundamental tone is present in the ear at that setting.

The pitch ascribed to this tone (waveform B), however, is the same as the pitch of the periodic impulse with fundamental tone (waveform A) and is an octave lower than the pitch of a periodic impulse of frequency 400 (waveform C).

It is not without interest to analyse the sound impressions obtained from the three waveforms somewhat further. By concentrating the attention (the difficulty of which has been so adequately formulated by