

## HETERODYNE FILTER.

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A versatile bandpass filter has been in preparation for one and a half year. It functions according to the heterodyne principle, which has been utilized for this purpose by Fant (1), i.e. the entire audio signal is transposed (by successive modulations) to two different high frequency bands, and the highpass and lowpass filtering is carried out by filters operating at fixed frequencies adjacent to these frequency bands. This method makes it possible to obtain a sharp filtering with continuously variable cutoff frequencies, since the exact location of the high frequency bands relatively to the filters can be varied by changing the carrier frequencies of the modulators (i.e. by tuning two oscillators).

A problem with this kind of filter is that it is expensive and difficult to build. However, most of the ingredients are circuits in general use in carrier telephony. It seems, therefore, an attractive solution to try to compose a filter almost entirely of commercially available equipment of this kind. Systems for carrier telephony include a number of sharp filters serving under normal circumstances to separate different telephone "channels" (or groups of channels) occupying the same line and differing only in frequency. By using one such channel and tuning the carrier oscillators off their proper frequencies one can reduce the transmitted frequency band by highpass or lowpass filtering. We have been - and still are - experimenting with this kind of solution.

In 1965 the Danish Post and Telegraph Department generously deposited with us some equipment manufactured by Siemens & Halske Ltd. (all transistorized) for our experiments along this line. In principle the setup came to work well, but the inherent bandwidth limitation of the carrier telephony system (transmitting only the frequency band 300-3400 c/s), which was difficult to do away with, obviously makes it inadequate for several purposes. In December 1966, however, the said institution lent to us a modulator (also manufactured by Siemens & Halske) designed for transmission of the entire speech range (50-10,000 c/s), and this is now being incorporated into the setup. It is our intention that the filter shall - in its ultimate form - allow us to filter out any portion in the frequency range 50-10,000 c/s.

References:

- (1) G. Fant, The Heterodyne Filter (Stockholm, 1952).



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