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G. W. Stewart

State University

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AN EXTENSION OF ACOUSTIC WAVE FILTER THEORY

G. W. STEWART

It was anticipated that if acoustic filters were used at frequencies whose wave lengths were comparable to the length of the acoustic conduit of one section, thus violating one of the assumptions of the original theory, the computations concerning attenuation would be incorrect and that, indeed, transmission would occur at frequencies where the simple theory would specify high attenuation. This is found to be the case with the low-frequency-pass and single band filters previously described. In both cases a series of bands are transmitted at higher frequencies. It is now found that if the conduit at these higher frequencies is assumed to possess both inertance and capacitance in series and if the values of these are obtained by assuming them the same as at resonant frequencies and corresponding changes made in the original theory, the number and frequency limits of these additional bands are determined with a satisfactory degree of approximation. Moreover, if the formulae specify a very narrow band, experiment shows that it is practically non-existent. Thus by correct design the cut-off region of a filter can be made very much more extensive than would at first seem possible.

STATE UNIVERSITY.