Phase sensitive triggered gate

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C. THE INFLUENCE OF A LEAKAGE BETWEEN EARPHONE AND EAR

The sound pressure at the entrance of the auricular canal was compared with the sound pressure measured in a 6 cc coupler (ASA) for a dynamic telephone (Telephonics TDH 39). The cushion was a type MX 41/AR which very frequently is used in connection with audiometers. This cushion has an unavoidable leakage when fitted to the ear. The effect of this leakage is shown in Fig. IV-6, where the response in a 6 cc coupler is shown together with the difference between this response and the sound pressure measured at the entrance of the auricular canal (for different subjects) by means of a probe microphone. The difference is very marked at lower frequencies. A peak is seen around 500 c/s where the sound pressure at the entrance of the auricular canal is higher than in the coupler. This peak was assumed to originate from a resonance between the leakage and the cavity between telephone and ear (including the impedance of the ear seen from the auricular canal and of the telephone).

The dotted line shows the difference in response in a 6 cc coupler when the cushion made a normal airtight fitting and when a leakage was introduced in the connection. The cushion was simply lifted in one side so that an open slit appeared between the cushion and the coupler. It is seen that the difference in sensitivity due to this for lower frequencies is similar to what is seen between the sound pressure measured in a coupler and at the entrance of the auricular canal when the earphone is applied to the ear.

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D. PHASE SENSITIVE TRIGGERED GATE

A gating apparatus for audio frequencies has been developed. A burst of the input signal can be released by a trigger and the length of the burst as well as the time for onset and decay can be controlled. The burst can also be made to start only when the input signal goes through zero or at a following preselected point in
Fig. IV-6 Upper curve: Sound pressure level in a 6 cc ASA coupler for constant voltage on a TDH 39 dynamic telephone.

Lower curves: The difference between calibration of the dynamic earphone in the 6 cc coupler and results of measurements of the sound pressure at the entrance of the auricular canal. The dotted lines show the difference in sound pressure in the 6 cc coupler when leakage is introduced between the telephone and the coupler.

Fig. IV-7 Block diagram of the phase sensitive gate.
time. Thus tone bursts can be started within a selected phase. The length of the burst can be varied between 0.5 msec and 1 sec which makes it possible to select for instance a single period of a sine wave up to 2000 c/s with optimal starting phase.

The trigger starts a 10 msec multivibrator the output of which opens a gate. The input to that gate is the squared and differentiated input signal. When the first positive pulse arrives after the MV is triggered a variable length MV is triggered and the rear of this pulse is used to start the main gate. The front of this pulse activates a suppression circuit in the squaring amplifier which has a time constant larger than 10 msec. This avoids more than one start of the main multivibrator for one triggering (see Fig. IV-7).

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