AD NUMBER
AD006424
CLASSIFICATION CHANGES
TO: **unclassified**
FROM: **restricted**
LIMITATION CHANGES
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AUTHORITY
E.O. 10501 dtd 5 Nov 1953; ONR ltr, dtd 1 Apr 1968

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STUDY OF CERAMIC DIELECTRIC MATERIALS FOR APPLICATION TO DIELECTRIC AMPLIFIERS
(Contract NObsr-63105, Index No. NE-120704)

A literature search on the problem of dielectric amplifiers was made; the few specific references found were obtained from various sources. From such information and from the large background on ferroelectric materials, compositions, and properties, already available, an evaluation of the program was made along the following general lines.

(1) The characteristics expected of a dielectric amplifier are: input capacity (to be designed according to the input frequency range), high non-linearity, low dissipation factor, low temperature coefficient of capacity, non-linearity and dissipation factor. The dielectric material can be used with thermostatic control or within a given temperature range.

(2) The requirement of low dissipation factor involves the use of the dielectric slightly above its Curie point. Three different classes of compositions will, therefore, be studied: one with sharp Curie points, above room temperature, (for applications where thermostatic control is to be used), the second with "broad" Curie temperatures, and the third, with almost "flat" characteristics (for applications where a constant input impedance is required).

Consequently, a material program was set up including, for the first group, mixtures of $BaTiO_3$ and $SrTiO_3$ with minor additions; for the second, mixtures of $BaTiO_3$ and $PbZrO_3$; for the third, mixtures of $BaTiO_3$ and K, Na Ta O_3. This program has been started.

It is planned to measure D.C. resistance, ferroelectric loops, reversible dielectric constant and dissipation factors versus applied field and temperature. Two typical applications will be studied, one involving a tuned, and another an untuned circuit. A thermostated oil bath was built, to operate from room

temperature to at least 150°C, and a push-pull type dielectric amplifier circuit is being developed.

416 man-hours were charged to this contract during December, 1952, as follows:

Eugene Wainer Director of Research	24 hours	Robert Fenity Project Supervisor	56 hours
Renato Bobone Research Specialist	160 hours	Peter Sobczak Research Assistant	176 hours

The total cost for the month of December was approximately $2,350.00.

Peter Sobczak
Peter Sobczak
Research Assistant

Robert D. Fenity
Robert Fenity
Research Supervisor

R. Bobone
Renato Bobone
Research Specialist

Eugene Wainer
Eugene Wainer
Director of Research

HORIZONS INCORPORATED
Cleveland, Ohio
January 9, 1953

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