A Simplified 60 Cycle Carrier System Capable of Measuring Low Pressures.* (19317)

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Amplification systems for the recording of pulsatile pressure changes using a transducer device have had disadvantages in our hands in ease of operation, stability of the recording mechanism and lack of sensitivity. Previous investigators(1-3) have demonstrated the fidelity and accuracy of resistance wire manometers in the registration of pressure changes derived from intracardiac catheterization technic. Recently, West and associates(4) have described an "inexpensive" carrier amplifier for use with a resistance wire-type manometer and indicated the advantages of such an A.C. amplification system. The following section describes a greatly simplified 60-cycle carrier system of markedly increased sensitivity, which can be phase sensitive and has given satisfactory biological records using a direct recording device without optical magnification.

Description of system. The components of our recording equipment are a Statham P23 A† pressure transducer, a 60-cycle carrier supply system, the balancing network, amplifier, power supply and recorder. Circuit diagrams (Fig. 1 and 2) present the arrangement and design of the apparatus. The power supply is the conventional 400 volt nonregulated and 250 volt regulated type. Line frequency of 60 cycles is fed into the transducer by means of a filament transformer. The transducer output is then fed into a 500 ohm line to grid transformer coupling to a high gain,

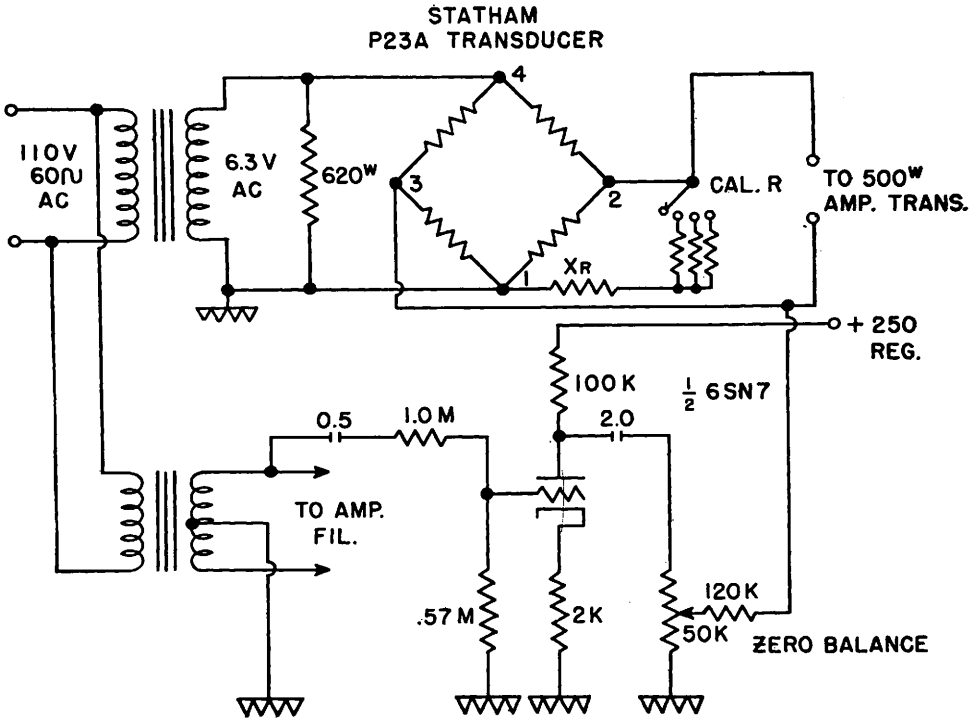

FIG. 1. Circuit showing 60 cycle carrier system and P23 A Statham Transducer with phasing and balancing network.

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† Statham Laboratories, Inc., 9328 Santa Monica Blvd., Beverly Hills, Calif.

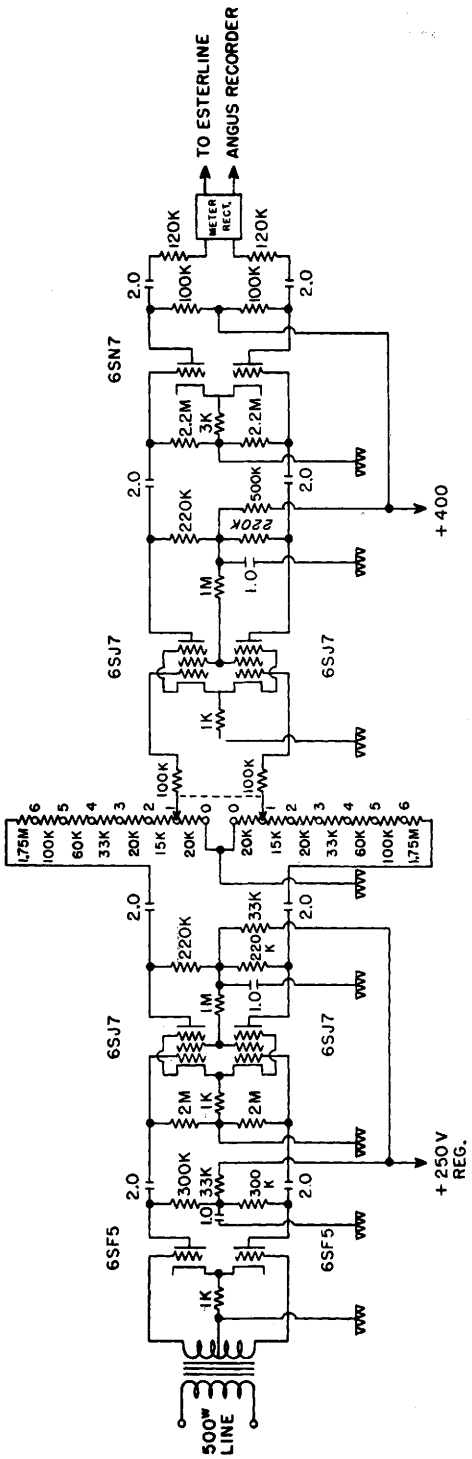

FIG. 2. Amplifier.

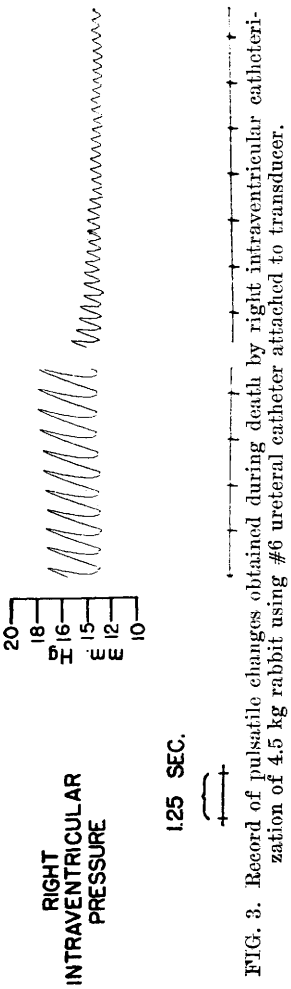

FIG. 3. Record of pulsatile changes obtained during death by right intraventricular catheterization of 4.5 kg rabbit using #6 ureteral catheter attached to transducer.

push-pull amplifier. A zero balancing system is also fed into this coupling transformer which acts to balance out the output of the transducer when no pressure is being applied. The signal is picked off the filament transformer used to operate the amplifier filaments. Proper phase is determined by interchanging the primary leads. The zero balancing control is a potentiometer on the output of the balancing amplifier tube. By unbalancing this control or zero set in the proper direction either positive or negative pressures may be recorded; this makes the system phase sensitive.

Calibrating resistors may be selected to give adequate calibrating points when the gain switch of the amplifier is turned through the various ranges. The amplifier used in this system gave the following full scale linear readings: Scale 1, 100 mm Hg; Scale 2, 60 mm Hg; Scale 3, 40 mm Hg; Scale 4, 20 mm Hg;

Scale 5, 10 mm Hg; and Scale 6, 6 mm Hg. The output of this amplifier is then fed into a meter type copper oxide rectifier coupled to a one milliampere direct current Esterline Angus recorder which is capable of giving a direct graphic record.

Remarks. This carrier system is markedly improved over those previously described in that it has a simplified A.C. source for the transducer, a phase sensitive balancing network and greater sensitivity. Operation is uncomplicated by instability and readings as low as 0.05 mm Hg can be recorded.

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Free Amino Acids in the Developmental Stages of the Mosquito.* (19318)

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The relatively few studies on the amino acids of insects have largely dealt with a single developmental stage, usually immature, and the hemolymph has been the principal body fluid subjected to analysis. Consequently, very little is known concerning the changes in amino acid levels that occur during proteolysis throughout the life cycle of an insect. Since the mosquito has a relatively short life span and exhibits very rapid growth, it was felt that this insect would afford both appropriate and interesting material for the study of the variation in free amino acids occurring during metamorphosis.

Materials and methods. The mosquito species employed were *Culex quinquefasciatus* and *Aedes aegypti* which were reared in the laboratory. Egg rafts, 4th-stage larvae, pupae, adult males and females were used. The larvae were fed a standard diet consisting entirely of finely powdered dog chow. The larvae and pupae were washed with several changes of distilled water and the excess removed with blotting paper prior to weighing. Unfed adult male and female mosquitoes were collected 2 to 3 days after emergence and lightly anesthetized with chloroform. Approximately 200 mg of each stage was weighed and homogenized in a tissue grinder with 1 ml of water. The material was centrifuged and the supernatant retained. Protein precipitation was carried out by adding one volume of 95% ethanol to about 5 ml of sample and centrifuging. The supernatant was treated with 3 volumes of chloroform (15 ml) with subsequent centrifugation at a low speed, and the aqueous fraction was removed for amino acid determinations.

The paper chromatographic method(1) was employed for determinations of free amino acids in the mosquito extracts. Whatman filter paper No. 4 was used with water-saturated phenol as the first solvent and 2,4-lutidine (3 parts to 1 part water) as the second. Standard amounts of extracts were delivered to the filter paper for the one-dimensional chromatograms and represented 12.5 mg or approximately 6 mosquitoes, while 40 mg was used for the 2-dimensional runs. The amino acids were revealed by spraying the filter paper with a solution of 0.2% ninhydrin in water-saturated butanol and heating it for approximately 15 minutes at 80°C.

Results. Free amino acids found in the eggs, larvae, pupae and adult mosquitoes are

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