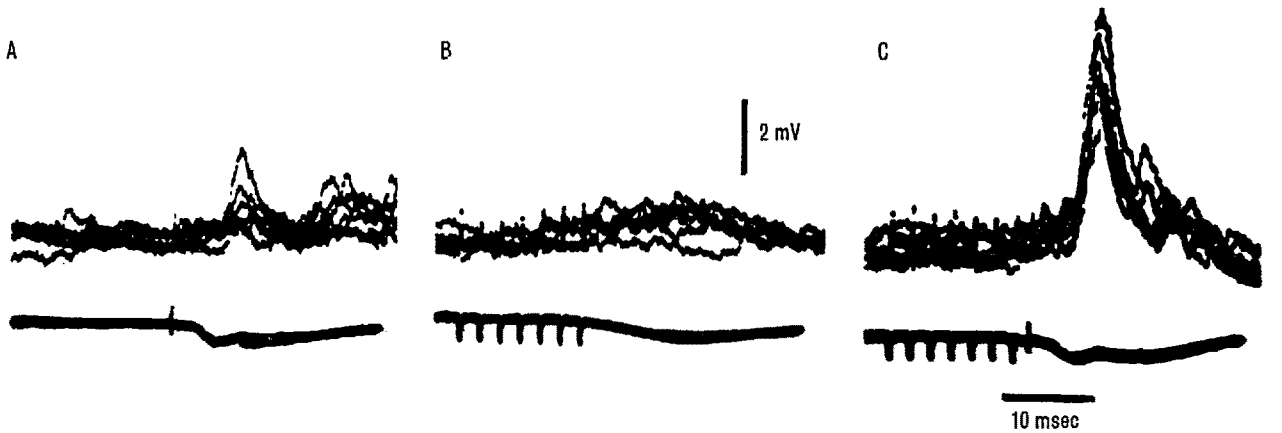


Fig. 2. These intracellular records (upper traces) are from a motoneurone of the posterior biceps-semitendinosus nucleus. Lower traces were recorded from the L7 dorsal root entry zone. The sural nerve was stimulated in A and C at a strength of 1.12 times threshold chosen to give the minimal excitatory postsynaptic potential in A. In C the sural volley was preceded by stimulation of the contralateral post-cruciate gyrus. The effect of cortical stimulation alone is shown in B.

increased by cortical stimulation. The same holds true for the excitatory actions evoked in flexor motoneurones by these afferents, as is illustrated in the intracellular records of Figure 2 for the excitatory action evoked by a suarl volley in a posterior biceps-semitendinous motoneurone. A shows the effect of the sural volley alone, B of cortical stimulation, and C of combined stimulation of cortex and the sural nerve. It is apparent that the excitatory post-synaptic potential increases markedly after cortical stimulation. Hence all these classes of interneurones are faciliated. This faciliatory action from the sensory-motor cortex was found to disappear after section of the pyramid just rostral to the crossing, but to remain after a section of the brain stem sparing the pyramids. Hence it is mediated by the pyramidal tract.

Activation of interneurones of reflex arcs is presumably an important part of the function of the pyramidal tract and probably also in part accounts for the excitability changes evoked in motoneurones by pyramidal activity. Excitatory effects were regularely more prevalent with flexor than with extensor motoneurones, and in some cats inhibition dominated in extensor motor nuclei, a finding which may be correlated with the dominance of excitatory spinal reflex pathways to flexor and of inhibitory to extensor motoneurones.

These results provide further indication of the importance of suprasegmental control of spinal reflex arcs, through facilitation or inhibition of their interneurones. Reflexes from different receptor systems may presumably be mobilized or inhibited according to need. It seems likely that regulation of motor performance in the cat is, to a considerable extent, exerted in this fashion.

Résumé. La stimulation du cortex sensori-moteur chez le chat facilite toutes actions synaptiques – excitatrices ou inhibitrices – qui sont provoquées dans les motoneurones par l'intermédiaire d'un ou de plusieurs interneurones. Ces actions peuvent prendre naissance dans des fibres afférentes d'origine musculaire I-a, I-b, II ou III, d'origine cutanée ou dans des fibres à seuil élevé provenant d'une jointure.

L'effet observé dépend de la mise en action du faisceau pyramidal qui facilite le fonctionnement de tous les interneurones intercalés dans les arcs réflexes mentionnés.

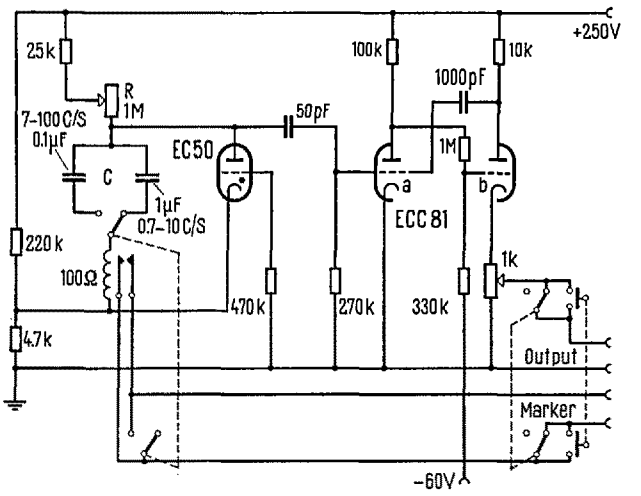
A. Lundberg and P. E. Voorhoeve

Institute of Physiology, Lund (Sweden), September 12, 1960.

PRO EXPERIMENTIS

A Simple, Sturdy, and Inexpensive Stimulus Generator for Nerves and Muscles

Introduction. Most laboratories use induction coils for the stimulation of nerve-muscle preparations in physiology class experiments. Yet, on close inspection, these coils are thoroughly unsatisfactory for any really quantitative work. Firstly, the calibration of output voltage in terms of distance between coils is far from linear. Secondly, the coils give damped oscillations rather than single peaks. The frequency of these oscillations depends very strongly on resistance and capacity of the stimulated preparation. Finally, and worst of all, the amplitude of consecutive 'pulses' varies by as much as 30%, both when the coil is hand-operated and when the magnetic interruptor is used[1,2]. Therefore we developed the following simple and sturdy square wave generator which can replace the induction coil.



[1] H. Klensch, *Einführung in die biologische Registriertechnik* (Georg Thieme Verlag, Stuttgart 1954), p. 188.

[2] P. E. K. Donaldson, *Electronic Apparatus for Biological Research* (Butterworth Scientific Publications, London 1958), p. 602.

Circuit. The circuit consists of two parts. In the first stage, (with a Philips gas filled triode EC 50), a sawtooth of variable frequency is generated in the following way: a capacitor C is charged over a resistance R until the striking voltage of the gastriode is reached, whereupon the capacitor rapidly discharges over the triode. After that the same cycle commences anew with recharging of the capacitor. The frequency is easily varied, 1. by varying the resistance R (the smaller R, the faster the capacitor is charged), 2. by changing the capacitor (the smaller its capacity, the earlier the striking voltage of the EC 50 will be reached). With the combinations of R and C given in the diagram, frequencies are obtained ranging from 0.7–10 c/s and from 7–100 c/s.

A 100 Ω relay in series with C is actuated by the discharge of C over the low resistance of the gastriode, but not by the much smaller charging current of C, which is limited by at least 25 KΩ. This relay can be used to switch a stimulus marker. As the relay is too slow to follow the pulses of the high frequency range, its contacts are shorted when this range is used, so that the marker is simply controlled by the output switch alone.

In stage two, a Philips double triode ECC 81 is connected as a univibrator. One half (b) of this tube is biassed to cut-off by a voltage divider between the plate of the other half (a) and a negative potential of -60 V. Half a is conducting. This stable state is maintained until a's grid receives a negative pulse.

The sawtooth on the plate of the EC 50 is coupled to the grid of ECC 81 a with a 50 pF capacitor and a grid resistance of 270 KΩ. In this way, the downward slope of each sawtooth results in a negative pulse to the grid of a, which half then ceases to conduct. As a result, the anode potential in a and the grid consequently potentiall in b increase, so that b becomes conducting. The anode potential of b is thereby decreased, and with a coupling capacitor of 1000 pF keeps a biassed to cut-off (even after the effect of the negative pulse to grid a due to the saw-tooth has gone) until the capacitor is discharged to just above a's cut-off potential over the leaking resistance of 270 KΩ. Then half a starts to conduct again, so that its anode potential is lowered and half b is cut off whereby the stable state is restored. On the cathode of half b positive square pulses are available, with a potential of about 10 Volt in respect to ground, and a duration of about 0.9 msec, which are led to the output over a potentiometer. Short circuiting these terminals will not damage the generator.

A switch is included which disconnects the output terminal. With a push-button one can bridge this switch and so choose the pulse, or pulse train, one wishes to send to the preparation. This button switches the marker contacts as well.

It is possible to modify the apparatus to produce negative instead of positive pulses. This, however, has certain disadvantages. Moreover, we find that for physiology class purposes it is inessential for the effect whether positive or negative stimulation is used.

As regards pulse length, this may be altered by changing the coupling capacitor of 1000 pF or taking a potentiometer for the 270 KΩ grid resistance. It is our experience, however, that with pulse lengths greater than about 1 msec electrotonic processes may occur in the preparation, which seriously complicate the outcome of simple experiments.

Zusammenfassung. Es wird ein einfaches und preiswertes Reizgerät zur Nerven- und Muskelreizung mit Rechteckimpulsen von 0.9 msec Dauer beschrieben (Frequenz 0.7 bis 100 Hz und Intensität 0 bis 10 Volt). Synchron mit jedem Impuls, oder bei den höheren Frequenzen bei Impulsserien, wird ein Kontakt geschlossen, der über einen Ausgang zur Reizmarkierung verwendet werden kann.

C. M. BALLINTIJN and L. DE RUITER

Zoological Laboratory of the University of Groningen (Netherlands), July 22, 1960

CONGRESSUS

Canada
VIII International Congress for Microbiology

Montreal, August 19–25, 1962

The VIII International Congress for Microbiology will be held at Montreal (Canada), from August 19 to 25, 1962, under the auspices of the Canadian Society of Microbiologists. Headquarters of the Congress will be at the new Queen Elizabeth Hotel.

There will be five Sections: Structure and Function; Agricultural Microbiology; Industrial Microbiology; Medical and Veterinary Microbiology; and Virology.

Enquiries should be made to Dr. N. E. GIBBONS, VIII International Congress for Microbiology, National Research Council, Ottawa 2 (Canada), Requests to be placed on the mailing list for the Second Circular should be made before January 31, 1961.

Great Britain
Vth International Embryological Conference

London, 18 to 21 September, 1961

The Fifth International Embryological Conference sponsored by the Editorial Board of the Journal of Embryology and experimental Morphology will be held in London at the Middlesex Hospital Medical School from 18th to 21th of September, 1961.

The programme of the conference, details of arrangements for the accommodation of participants, and forms of application for registration and for the offer of demonstrations will be available on request *after May 1, 1961* from Dr. L. BRENT, Department of Zoology, University College, Gower Street, London, W.C. 1 (England).

CORRIGENDUM

D. W. MATHIESON, B. JAQUES, G. T. CHAPMAN, V. P. ARYA, and B. G. ENGEL: *The Structure of Cassamine and Erythrophlamine*, Exper. XVI, fasc. 9, p. 404 (1960).

The formulae on page 405 are to be corrected as follows: Formula II, position 4: In place of $CCOOH_3$, read $COOCH_3$. Formula IX, position 7: In place of =OH, read =O. Formulae IX and X, positions 3 and 4: The point of attachement of the hydroxyl group is misprinted: it should be at position 3 and the hydroxyl group at position 4 is to be replaced by a methyl group.