CLINICAL ELECTROCARDIOGRAPHY WITH AN ELECTRO-ENCEPHALOGRAPH.

By WALTER FABISCH, M.D.Berlin, M.R.C.P., D.T.M.&H., D.P.M.,
Senior Registrar,

and

E. G. WILLIAMS,
Senior Technician, Dept. of Encephalography, Mapperley Hospital, Nottingham.

A multiple channel electroencephalograph permits the simultaneous recording of several leads in electrocardiography. In order to utilize for this purpose the electroencephalograph installed in this hospital, a method has been worked out to record in groups of three the 3 standard leads, the 3 augmented unipolar limb leads, and 3 unipolar precordial leads consecutively, changing over from one group to the other simply by turning a switch. The technique here described is used in connection with a four-channel Marconi electro-encephalograph.

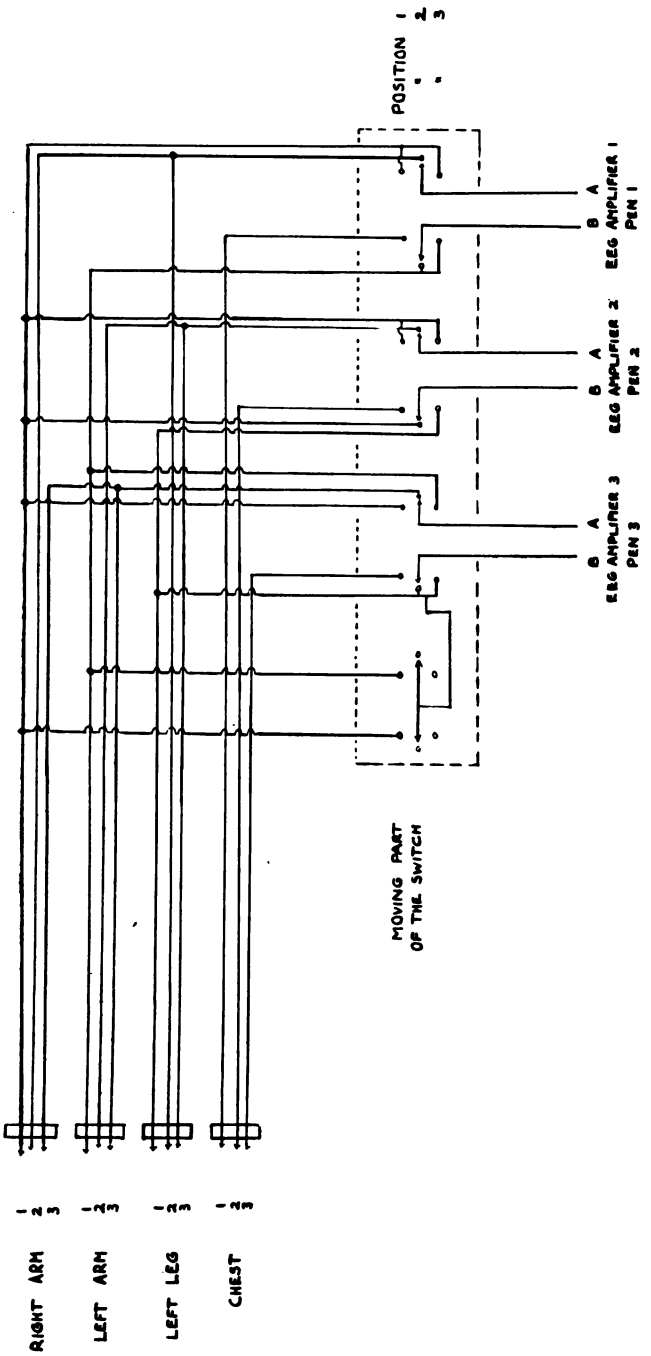
Three electrodes are placed on each of the 3 conventional limbs, i.e., the right arm, the left arm, the left leg, and on the chest. For convenience of spacing, the limb electrodes are applied to the upper arms and to the calf of the leg. On a normal chest of an adult, 3 precordial electrodes can be placed at the same time in positions 1, 2 and 3, or 4, 5 and 6 without difficulties in spacing and without interference. Three electrodes on each limb are necessary because in recording the augmented unipolar limb leads, each limb enters the circuits singly as well as in two different combinations paired with one and the other of the remaining two limbs. For each of these 3 circuits a separate electrode is required.

The electrodes are connected with a Yaxley wafer type switch with 4 banks, 24 contacts and 3 positions. The switching for standard and augmented unipolar limb leads is done by 18 contacts on 3 banks. Of the last bank of 6 contacts, 2 are utilized in the third position of the switch for unipolar precordial leads to combine one electrode on each limb to form the indifferent electrode. On the diagram, the bottom position (1) of the switch is that used for the standard leads, middle position (2) for the augmented unipolar limb leads, and top position (3) for unipolar precordial leads.

The 6 wires leaving the switch are connected with Nos. 1–6 on the head set, and the pens of the recording unit are connected with these 6 contacts in the following way :

Pen 1	A	to No. 1 on the selector.
	B	,, 2 ,, ,,
Pen 2	A	,, 3 ,, ,,
	B	,, 4 ,, ,,
Pen 3	A	,, 5 ,, ,,
	B	,, 6 ,, ,,

https://doi.org/10.1192/bjp.97.409.812 Published online by Cambridge University Press



https://doi.org/10.1192/bjp.97.409.812 Published online by Cambridge University Press

The pens are used to write as shown below :

	Switch position (1) : standard leads.	Switch position (2) : augmented unipolar limb leads.	Switch position (3) : unipolar precordial leads.	
Pen 1	I	. aV_L	. V_1	V_4
Pen 2	II	. aV_R	. V_2	V_5
Pen 3	III	. aV_F	. V_3	V_6

It is obvious that any desired combination of 3 locations for the chest electrodes can be used. If more than 3 chest leads are to be recorded, the electrodes are moved on the chest and, after changing their locations, the recording is continued without altering the position of the switch. Since we use as a routine leads V_1 to V_6, two sets of chest leads are written, i.e., first V_1, V_2 and V_3, and after shifting the electrodes to new positions, V_4, V_5 and V_6.

The fourth pen can be used to duplicate any of the other tracings with the same or with a different amplification. Pens 1, 2 and 3 are always calibrated in the usual way so that 1 millivolt gives a deflection of 10 mm. The time constant is set at 0·3 seconds, and the input selector placed in the " independent" position.

The following points should be observed in order to obtain smooth working of the arrangement :

The 3 electrodes on the limbs and on the chest should be at least about 2 cm. apart from each other and no contact through electrode paste should occur between them. The resistance across dry skin is so high that the 3 electrodes on each limb and on the chest act independently if these precautions are observed.

Connections between different parts should be soldered where possible.

Wires connecting the electrodes with the switch and the switch with the head set should run without crossing unnecessarily and should not be twisted together.

The method described has been in use for clinical electrocardiographic work in this hospital for about one year, and, with standard Cossor limb and chest electrodes, has given satisfactory service.

We wish to thank Dr. D. Macmillan, Physician Superintendent, for permission to use the electroencephalograph and to publish this paper.

https://doi.org/10.1192/bjp.97.409.812 Published online by Cambridge University Press