

# SUMLOCK

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## ON FATIGUE

ADVICE TO SUMLOCK OPERATORS

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## TO ALL SUMLOCK OPERATORS

**T**HE instructions contained in the following pages should be carefully studied by all SUMLOCK operators and every endeavour should be made to put them into practice.

The instructions are based on many years of experience of calculating machine operation associated with a close study of the problem by an eminent member of the medical profession.

The application of the principles laid down will enable operators to carry out their work with a minimum of fatigue and a maximum of efficiency.

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## Introduction

**T**HE relationship of the human body to a machine or mechanical instrument which it is called upon to operate, may be expressed in terms of work. Work involves the expenditure of muscular and nervous energy through an effort. This loss of energy, generally speaking, is proportionate to the amount of body work in a given unit of time. It must be restored to the body by periods of rest, that is recovery of energy. Unless these periods of recovery are again proportionate to the previous loss, there follows exhaustion. The first evidence and symptoms of exhaustion, that is, that more energy is expended than recovered, is indicated by fatigue. Fatigue is, therefore, the first step towards exhaustion.

Two conclusions follow from these considerations; first, to prevent waste of body energy in reducing nervous and muscular efforts necessary to operate a machine to a minimum compatible with efficient service, in other words, preserve body energy as much as possible. Secondly, to recover this loss by corresponding periods of rest. An excellent illustration may here be seen in the normal function of the heart. This continues (unless abnormally exercised or diseased) throughout a person's life without fatigue. Here, also, work is carried on in normal conditions of heart activity without excessive loss of energy. It is, moreover, compensated for each part of the heart by periods of rest in the rhythmically timed stimulation and contractions of its chambers.



Fig. 1



Fig. 2



Fig. 3



Fig. 4

Having thus laid down these general principles, we may proceed to apply them to operating the SUMLOCK Calculating machine:—

## I. *General Body Position and Attitude*

**I**T is a common error, especially for the beginner, to place the body in a position which in itself is easily fatiguing (figures 1 and 2). The operator sits too far forward on the chair, the arms are held too elevated, far apart from the body, the wrists consequently are high above the machine which obliges the wrists, hands and fingers to point sharply downward. This faulty position requires not only a constant and considerable muscular and nervous effort to maintain, but also increases the difficulty of working the keys. Moreover, it obliges the operator to lean forward with tendency to curve the spine and narrow and compress the chest.

Reference to figures 3 and 4 will make the proper body position clear. This should be natural and easy. The whole of the body rests on the seat which is thereby stabilised to give a firm, easily carried support to the whole body, the arms are held near the sides of the chest and forearm, wrists and hands with fingers in a straight line towards and over the keyboard of the SUMLOCK. (Somewhat similar to the attitude in piano playing.) Such a position requires the least effort and muscular action, is more easily maintained, preserves a considerable degree of strength and, last not least, is a convenient one to operate the keyboard.

## II. *Special Hand and Finger Movements*

THESE arise with natural ease provided the general body position, described above, is assumed. They are illustrated by figures 5 and 6. In manipulating the keys bend the hand slightly at the wrist towards the key-board, holding it flat open with uniformly extended fingers, ready to strike the keys downward by a forcible movement sufficiently strong to obtain the necessary recoil. (Compare here the faulty position of figures 7 and 8 with the correct position of figures 5 and 6).



Fig. 5

## III. *Comments*

WHILE these rules are laid down as a guidance for the use of the SUMLOCK, it should be appreciated that the operator has to consider them in the light of his or her physique and mentality. Individuals differ in these respects to the advantage of some and disadvantage of others. But a good deal may be accomplished by the individual helping himself or herself over certain difficulties which may arise. There are certain body



Fig. 6



Fig. 7



Fig. 8

exercises which may be followed in daily life which are here of value. Two of these are playing tennis and playing the piano. These develop the muscular power of arms, wrists and fingers and the spread of the hand. The latter (piano playing) is in this respect particularly useful. In the absence of these, simple hand, wrist and finger exercises with or without an implement (not too heavy or clumsy) may, as in morning or evening exercises, do a good deal to keep these body limbs in good supple condition.

#### IV. *Periods of Rest*

**I**F the rules laid down in the preceding paragraphs are observed, the expenditure of energy involved in operating the SUM-LOCK will be reduced to a minimum. But as has been explained, it is necessary from time to time to recover this loss by periods of rest, thus preserving elasticity of mind and body. It is not possible to give here an exact statement of time, as it depends upon the operator's individual physical and mental endowment. Experience has shown, however, that, generally speaking, a period of about 10 minutes' relaxation after or within two hours of work will suffice for this purpose.

## *Holding a Pencil*

**T**HE correct way to hold a pencil is shown in figure 9. A pencil is always held by the operator whilst adding, and in as many operations as possible.

It should be held lightly between the thumb and base of forefinger, so that there is no waste of time in writing down a result after a calculation has been performed.



Fig. 9

## *The Spread of the Hand*

**F**IGURE 10 illustrates an exercise on the SUMLOCK for improving the spread of the hand. All operators' hands must be supple to enable them to hold and depress as many figures as possible in one operation. This can be aided by trying to hold figures which appear awkward and depressing them several times in succession and increasing in speed.

If you play the piano this will strengthen the fingers and the rhythm helps in the speed on the machine.

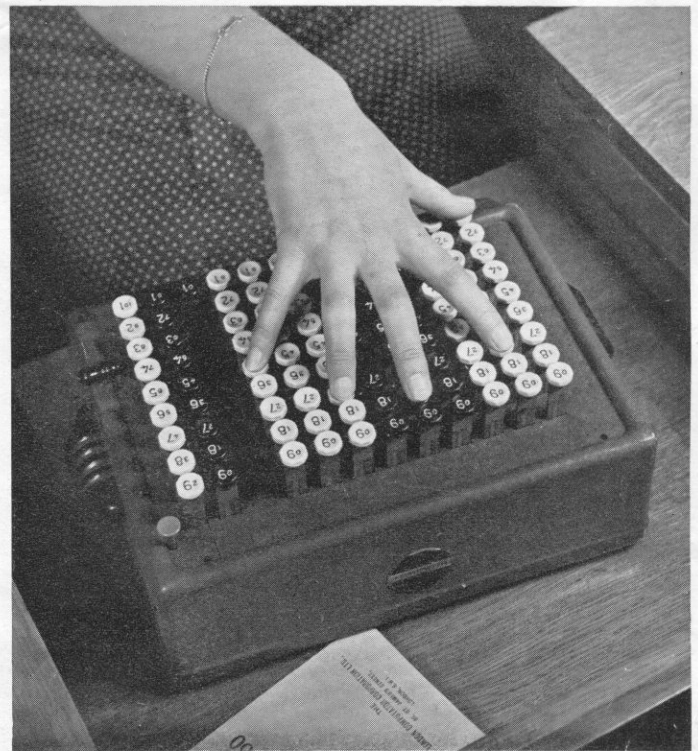


Fig 10

## SCHOOLS for the Training of SUMLOCK OPERATORS

are established at

No. 1 ALBEMARLE STREET, LONDON, W 1.

and at the following Provincial addresses:—

BIRMINGHAM	King Edward House, New Street, 2.	<i>Midland 2515/6</i>
BELFAST	29-31, Ocean Buildings, Denegall Square East.	<i>Belfast 23936</i>
BRISTOL	8, St. Paul's Road, Clifton.	<i>Bristol 37698</i>
CARDIFF	7, High Street.	<i>Cardiff 217</i>
GLASGOW	45, West Nile Street,	<i>City 6031/2</i>
LEEDS	7, Greek Street.	<i>Leeds 25001</i>
LEICESTER	56A, London Road.	<i>Leicester 65686</i>
LIVERPOOL	61A, Bold Street.	<i>Royal 1075</i>
MANCHESTER	21, Spring Gardens.	<i>Blackfriars 2781</i>
NOTTINGHAM	Wellesley House, 11, Wellington Gardens.	<i>Nottingham 42941</i>
NEWCASTLE	Barras Buildings, Barras Bridge.	<i>Newcastle 21482</i>
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