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A BATTERY-POWERED MICROSCOPE ILLUMINATION SYSTEM

by

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One of the difficult problems faced by the malaria eradication programme of East Pakistan has been the provision of adequate accommodation, with suitable illumination facilities for microscopy, to house the Zone Malaria Evaluation Laboratories. Fortunately, the programme of electrification of the country has, to a great extent, kept pace with the expansion of the malaria eradication programme into the various districts of the Province. However, there are still some towns where laboratories have to be set up and where there is no mains electricity supply or, if there is, no suitable accommodation is available in the electrified areas of the town.

The practice successfully adopted by some malaria eradication programmes, e.g., Ceylon, of using natural illumination, is impracticable in East Pakistan on two accounts: the physical impossibility of providing from 12 to 24 microscopists with unobstructed window space, and the low level of natural illumination on the many days of the year when it is raining or the sky is heavily overcast.

In an attempt to solve these difficulties, a trial battery-operated microscope illumination system was installed at Tangail Evaluation Laboratory in May 1964. The system became fully operative in September 1964.

Description of the battery system

The light sources are standard illuminators as supplied with the microscope (in this case "Microstar Starlite" A.O. model 612B) modified to take 6-V, 5-W, automobile bulbs. This illuminator has a socket for a screw-in 220-V, 15-W bulb. This bulb is replaced by a brass ferrule which screws into the socket and is itself socketed to take the 6-V bulb (Fig. 1).

The power source is a standard 6-V lead/acid battery with a capacity of 154 Ah.

The wiring installation is made up of 12 standard 220-V, 3-A, two-pin sockets connected, in parallel, to the battery with 6-mm motor-vehicle cable. This cable was selected because of its low resistance. The negative circuit is a common one made by joining the negative of the two-pin socket, via a short length of 6-mm wire, to a 25 mm x 0.8 mm copper strip nailed along the back of the benches. The positive circuits are brought together and soldered to a heavy duty "crocodile" clip which is fastened over the positive terminal post; the circuit is completed by a second crocodile clip soldered to the end of the copper strip and clamped on the negative pole. (Actually electrical polarity is not important and has only been used here to aid the description.) A detailed wiring diagram is given in Fig. 2.

Power consumption, and thus battery capacity, is determined by the number of microscopes required and the number of hours they will be used. Each microscope consumes in one hour:  $6\text{ V at } 5\text{ W} = 0.86\text{ A}$ .

In the laboratory at Tangail there are 12 microscopes which are used for six working hours per day. Therefore, the maximum total daily consumption is:  $0.86\text{ (amps)} \times 12\text{ (microscopes)} \times 6\text{ (hours)} = 60.2\text{ A}$ . Accordingly, this laboratory requires a battery of 61 or more Ah capacity. However, the manufacturers recommend that in order to ensure long life, a battery should not be more than half discharged before recharging. Thus a 121-Ah battery is required in this case. The closest to this available on the local market at the time the system was installed, was one of 154 Ah. Two were purchased and used on a rotation system; discharged one day and recharged the next. Fortunately, recharging facilities for motor-car batteries are found in all the district towns, and most of the smaller towns of the Province.

The capacity of the batteries required for any laboratory can be calculated from the following formula:  $\text{Number of microscopes} \times \text{consumption/microscope/day} \times 2 = \text{capacity in amp/hours}$ .

The largest capacity battery now available in East Pakistan is one of 230 Ah - sufficient for 22 microscopes. Similar, or higher capacities, should be available almost everywhere. However, in the event that large capacity batteries are not available, two or more circuits using lower capacity batteries could be installed.

Results

The Tangail laboratory of the malaria eradication programme in East Pakistan has functioned for eight months using the battery-powered system of microscope illumination as described. As a result of its success a second system has been installed at Gouripur Evaluation Laboratory.

All the materials required for installation of the system were available in the local market and no foreign exchange was involved, and the cost of running the system, exclusive of maintenance (none has yet been required) is that incurred in recharging the batteries; in Tangail, on contract, approximately 100 Pakistan rupees per month.<sup>1</sup>

The system could also be usefully employed where voltage fluctuation or total breakdown in tension are common during working hours in a public electric supply system. In such situations the microscopists are provided with illumination from the battery system during the day and at night the batteries are recharged from the mains supply.

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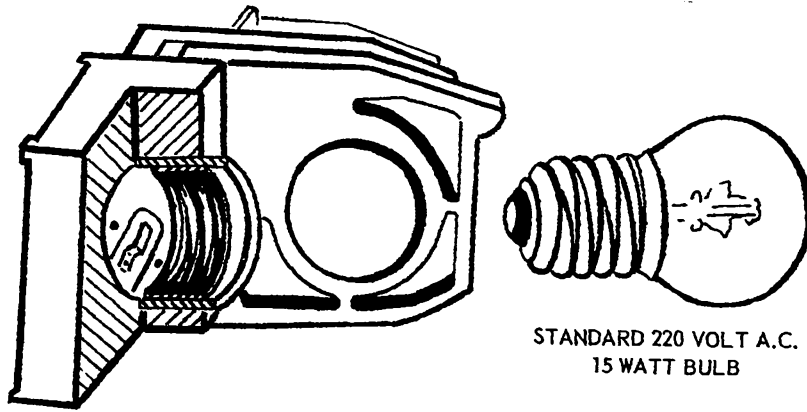
<sup>1</sup> i.e. US \$21

RESUME

Description d'un éclairage de microscope par batterie.  
Utilisé dans le programme d'éradication du paludisme en cours au  
Pakistan oriental, ce système est de nature à intéresser les  
laboratoires qui ne sont pas raccordés à une ligne électrique.

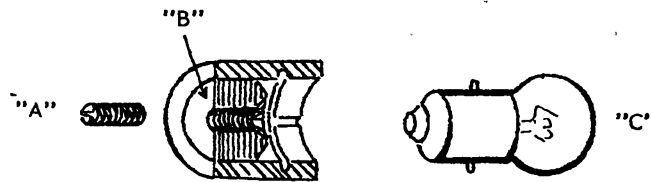
FIG. 1

MODIFICATION OF STARLITE (AMERICAN OPTICAL) ILLUMINATOR FROM SCREWTYPE  
220 VOLT AC 15 AMP BULB TO BAYONET TYPE 6 VOLT DC 5 AMP BULB

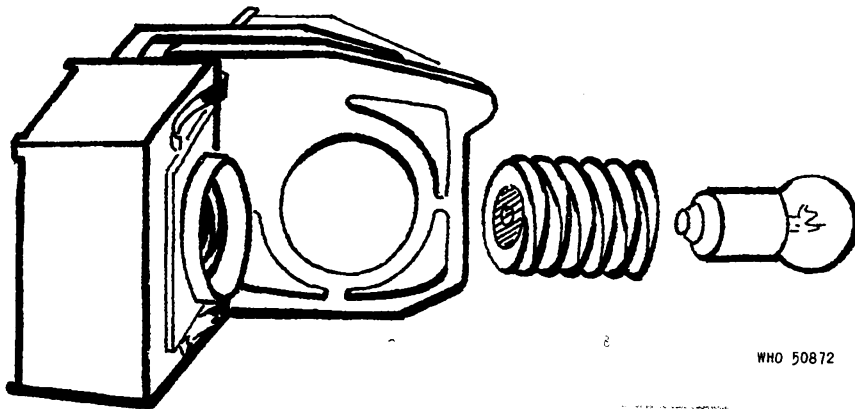


STANDARD 220 VOLT A.C.  
15 WATT BULB

LAMP HOUSING IN SECTION SHOWING SCREW  
TYPE HOLDER AND CONTACT SPRING



SECTION OF ADAPTER SHOWING THREADED BRASS  
CONTACT "A" TAPPED INSULATING BUSH "B"  
AND 6 VOLT 5 AMP. BAYONET TYPE BULB

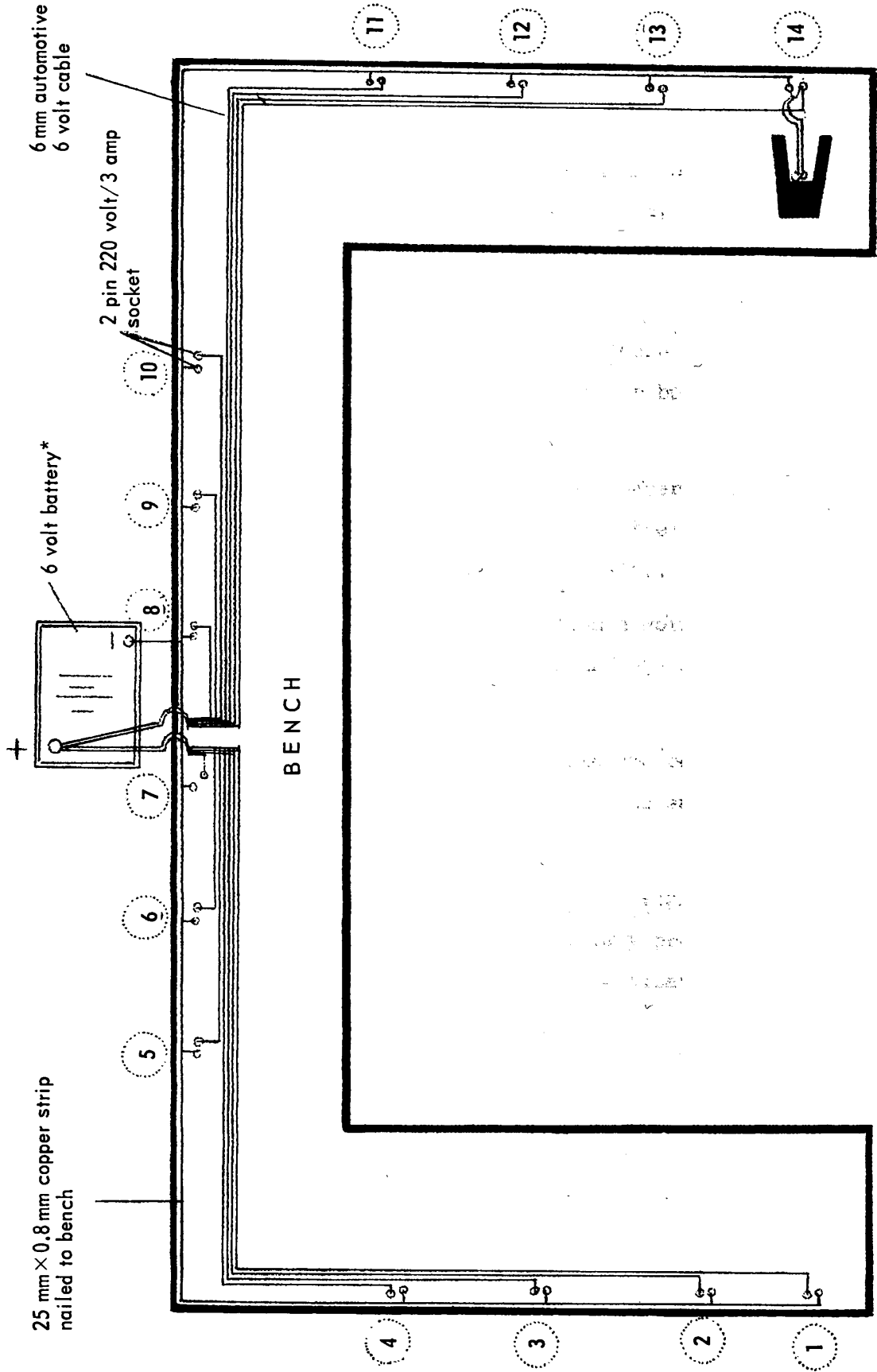


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ARRANGEMENT OF ADAPTER AND BULB AND LAMP HOUSING

FIG. 2

WIRING DIAGRAM ZONE MALARIA LABORATORY - 14 MICROSCOPES



\* In this system minimum capacity would be 140 amp. hours

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