

d. SHADOWLESS THEATRE LAMPS

1. Purpose of Equipment

To provide very bright lighting without shadow over an operating or treatment table.

2. How the Equipment Works

Shadowless theatre lamps may be fixed or mobile. The mobile type is used mainly as a reserve lamp. It has a battery and can be moved around the hospital as and where needed.

a. Fixed lamp

A fixed theatre lamp is suspended from the ceiling of an operating theatre or treatment room, directly over the centre of the table. It can be positioned by moving the lamp head and its outreach arm (Figure 38).

It has at least four units which produce a very high level of light without shadow. Usually the light is produced by high intensity tungsten halogen bulbs which are similar to the headlight bulbs of motor cars. Voltage of these bulbs varies depending upon the design but it is either 12 or 24 volts AC or 12 or 24 volts DC. This is a safety measure to prevent electric shocks.

At the back of the lamp there is a polished metal reflector which reflects the light and directs it where it is needed. In front of each bulb there are two glass plates which break up the light and spread it evenly. They also prevent glare and filter the heat given off by the bulbs.

The lights are well sealed by rubber gaskets and bezel plates (see Figure 40). The lamp can be thoroughly washed without water entering the electrical circuit.

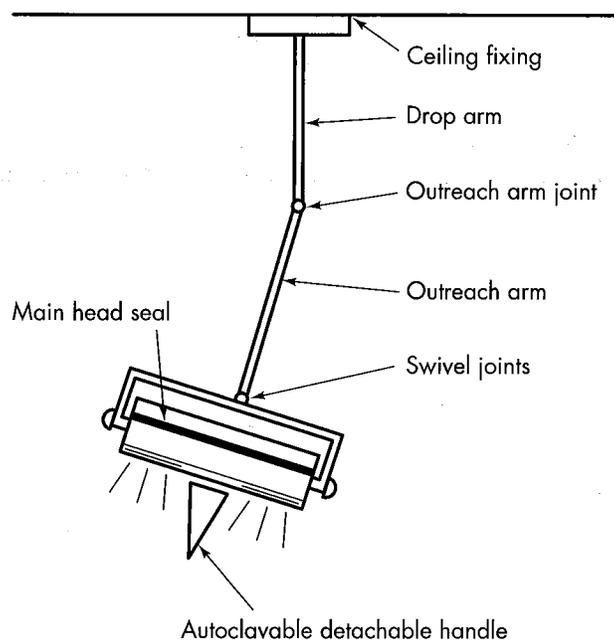


Figure 38: Fixed theatre lamp

b. Mobile Lamp

The mobile lamp works in the same way as the fixed lamp (Figure 39). It is built onto a mobile trolley. It has a battery and charger compartment which can provide power if the main electricity supply fails or if the fixed lamp breaks down. It has a maximum of four light bulbs.

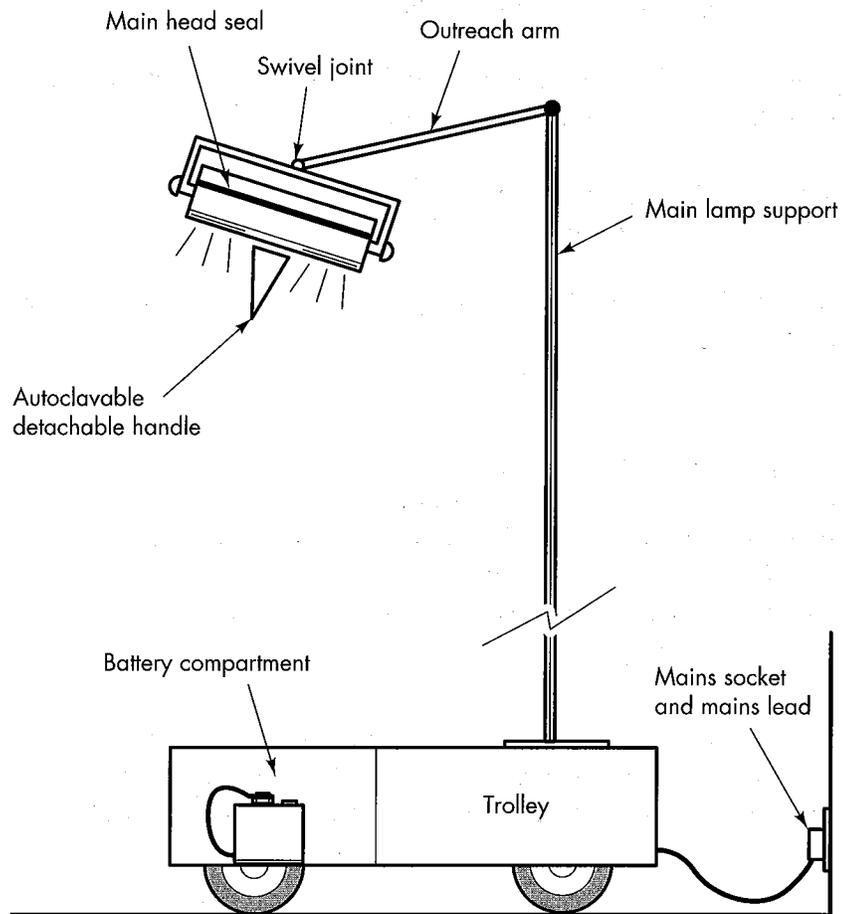


Figure 39: Mobile theatre lamp

3. Routines and Safety

i. Routines

Fixed Lamp

This should be fixed to the ceiling according to the manufacturer's directions. It is heavy and constant repositioning during surgery increases metal stress. It is very important that it is FIXED VERY SECURELY INDEED.

In countries where a wide fluctuation of voltage may occur, transformer units may burn out quickly. These are expensive to replace. A voltage stabiliser prevents this wide fluctuation and, in the long term, is cost effective.

The lamp head should be moved carefully. Damage can result in gaps around the main seal through which moisture can enter.

Always switch off the lamp immediately after use. This will lengthen the life of the bulbs and also reduce the room temperature.

Use only water and detergent for cleaning. Do not use abrasive powders, scouring pads or bleach.

Daily:

Before an operating session begins:

- switch on lamp to make sure it is working
- check that the head swivel and outreach arm joints move easily
- check for damage, including broken glass
- check lamp was thoroughly washed after previous use

Weekly:

- apply a smear of vaseline to the joints of the arm and swivel head
- check head seal is in position and undamaged. Sometimes if the lamp is knocked, the seal comes out of position. This is easily re-fitted

Yearly:

- a qualified technician should carry out a full electrical test and confirm earthing is satisfactory

Mobile Lamp

The battery compartment should be locked to prevent the battery being stolen. When not in use the unit should be plugged into the mains supply and re-charged.

Daily:**Before the day's work begins:**

- make sure that the unit is on charge and ready if required
- check all bulbs are working
- switch off/unplug the unit from the mains
- check all bulbs are working from the battery
- leave switched on for 5 minutes
- check if there is any dimming of light during that time. If so, the battery is low or has a fault. It must be checked
- check mains lead and plug for damage
- check outreach and swivel arm joints move easily
- check lamp has been cleaned after previous use. This is important as dust, if allowed to accumulate, can fall onto the patient being treated

Weekly:

- apply a smear of vaseline to outreach and swivel arm joints
- check main head seal for damage
- check specific gravity of battery
- check acid level of battery
- check trolley wheels for wear and mobility

ii. Safety

Do switch off lamp and allow bulbs to cool before carrying out any maintenance work

Do unplug the mobile lamp before carrying out maintenance

Do use a clean cloth when handling bulbs

Do protect eyes and wear gloves when handling lead acid batteries

Do keep lead acid batteries in an upright position

Do apply clean cold water immediately to the skin or eyes if acid is spilt. Also seek medical attention at once

Do clean up spilt acid with plenty of water

Do make sure mobile unit is stored and recharged in a well ventilated area

Do NOT handle bulbs with bare hands

Do NOT smoke while working on or near a lead acid battery

Do NOT wear jewellery when working on or near an acid lead battery

4. How to use the equipment

Always use the manufacturer's instructions for specific advice on the equipment you are using. The following guidelines are general.

Before the operating session begins, switch on the fixed lamp to make sure all bulbs are working.

At the same time, check the mobile lamp in case it is needed.

Adjust lamp to surgeon's requests.

When replacing a theatre lamp bulb always hold it in either a clean soft cloth or tissue paper. This will prevent it coming into contact with the hand and avoid damage from impurities on the skin.

Many differing types of bulb are used but mainly they are either screwed in, plugged in or pushed and turned in. Take care when removing the old bulb to note which type you are dealing with.

Do not over tighten the screw-in type, turn it gently until it comes to a stop.

Bulbs can easily break when they are being removed especially if they are tight. Take great care and wear protective gloves if possible.

Remember to SWITCH OFF MAINS SUPPLY before working on the theatre lamp.

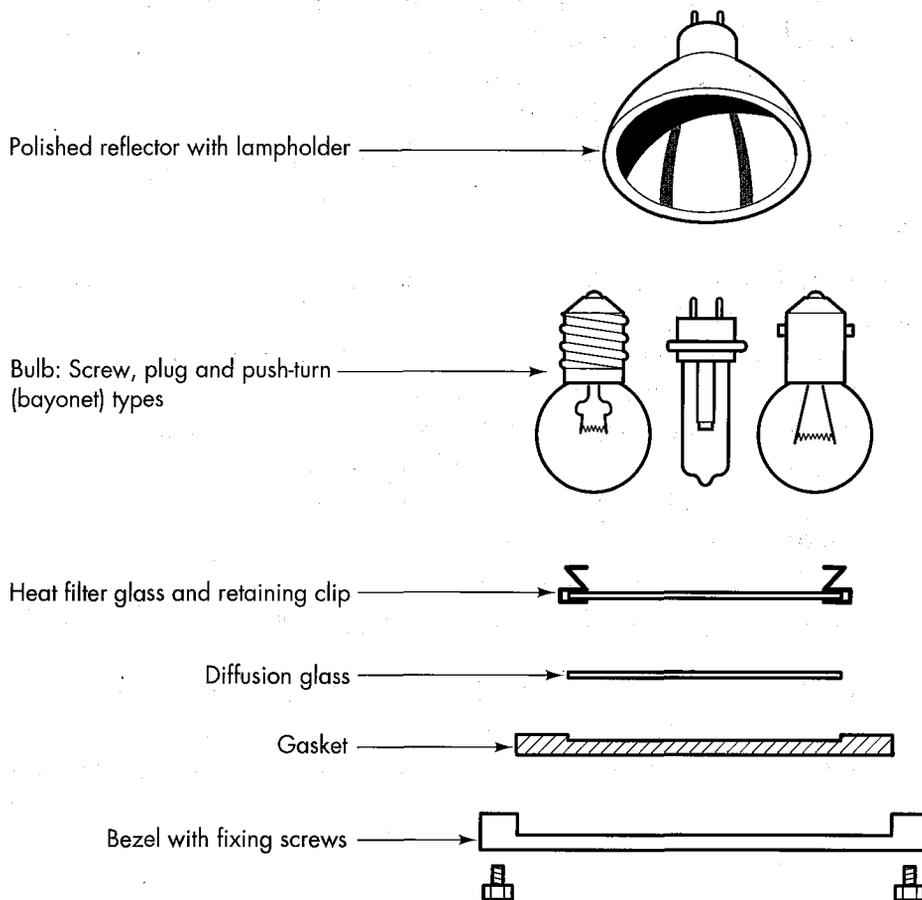


Figure 40: Bulb replacement

5. Simple fault-finding and maintenance

Example:

Bulb does not work:

- switch off the lamp (if using the mobile model, unplug from the mains supply)
- allow the lamp to cool
- unscrew the bezel plate (Figure 40)
- remove the bezel plate, gasket and outside glass
- unclip inside glass and remove
- remove the faulty bulb
- clean the polished metal reflector with cotton wool
- remove the new bulb from packing USING GAUZE TO PROTECT YOUR HAND AND THE BULB
- fit the bulb into the holder
- wash the glasses in warm water and detergent and dry well
- refit the glasses
- switch on the lamp

If bulb does not work in fixed lamp:

- call a qualified technician to find the cause

If bulb does not work in mobile lamp:

- check socket outlet

If satisfactory:

- check mains lead

If satisfactory:

- switch off and unplug from mains supply
- check battery connections

REFER TO CHAPTER 6, BATTERY MAINTENANCE

If satisfactory:

- check output fuse. This is usually enclosed in a small glass cylinder. Flick it and note whether wire is broken
- replace fuse if necessary

If lamp still not working:

- check lead acid level

6. Spares

For fixed lamp:

- transformer or rectifier. This must be fitted by an electrician

For mobile lamp:

- battery (unfilled) and acid (to be filled and charged by qualified technician when needed)
- distilled water
- hydrometer
- thermometer
- vaseline
- spare trolley wheel

For both lamps:

- bulbs
- bezel plate
- bezel gasket
- inner glass
- outer glass
- head gasket
- clean cloth for handling bulbs
- allen key tool for changing bulbs
- spare autoclavable detachable handle

7. User Checklists (to be displayed near the equipment)

Always refer to the manufacturer's instructions

Daily:

- i. check all bulbs are working on fixed and mobile lamps
- ii. check all lamp joints move freely
- iii. check for damage and broken glass
- iv. make sure the lamp has been cleaned since previous use

Mobile lamp:

- v. when checking bulbs make sure there is no dimming of light over a five-minute period if operating on battery power
- vi. check trolley moves easily

Report to Maintenance Officer:

- any visible damage
- any fault

Follow these SAFETY points:

Do switch off lamp and allow bulbs to cool before carrying out any maintenance work

Do unplug the mobile lamp before carrying out any maintenance work

Do use a clean cloth when handling bulbs

Do protect eyes and wear gloves when handling lead acid batteries

Do keep lead acid batteries in an upright position

Do disconnect one battery lead at a time

Do make sure leads do not come into contact with each other until both are disconnected

Do make sure correct terminals are used when reconnecting leads

Do check again before switching lamp on

Do apply clean cold water immediately if acid is spilt on skin or eyes.

Also seek medical attention at once

Do clean up spilt acid with plenty of water

Do make sure mobile lamp is stored and recharged in a dry, well ventilated area

Do NOT handle bulbs with bare hands

Do NOT smoke while working on or near a lead acid battery

Do NOT wear jewellery when working on or near a lead acid battery

Do NOT lift batteries by their terminals

WORK ON BATTERIES SHOULD BE CARRIED OUT ONLY BY TRAINED PERSONNEL. THE ABOVE APPLIES TO USERS WHO ASSIST THE MAINTENANCE STAFF MEMBER.