

PART IV

**Automatic
film processor**

MODULE 11.0

Automatic film processor**Aim**

The aim is to provide routine maintenance procedures for the automatic film processor. This module presents a series of regular maintenance schedules. When used with sensitometry techniques, this module can be used to implement a quality control programme. Repair procedures for the processor are provided in module 11.1 page 199.

(Note: Reference module page numbers refer to the title page.)

Objectives

A processor maintenance schedule should be followed regularly. Performing this maintenance will ensure optimum quality of processed films, and allow detection of problems before they become serious. On completion of this module, the student will be familiar with maintenance procedures for the automatic film processor. These procedures should be used together with the maintenance instructions in the operators' manual. A routine maintenance check-sheet is provided in appendix 'D' page 186.

Note: This module is based on the procedures previously presented in the 'Quality assurance workbook'. As reference is made to sensitometry techniques, this section from the WHO Quality assurance workbook is included in appendix 'A' page 163.

Contents

- a. General precautions
- b. Preparation for maintenance
- c. Daily maintenance
- d. Weekly maintenance
- e. Monthly maintenance
- f. Quarterly maintenance
- g. Annual inspection and service
- h. Replacement parts schedule

Equipment required

- An accurate thermometer (alcohol or electronic).
- Hydrometer.
- Sensitometer. (Or pre-exposed sensitometry film). *
- Densitometer. (Or processed reference film for comparison purposes). **
- Chemical stirring rods. These may be stainless steel or PVC. Important; the rods should be labelled 'developer' and 'fixer' to prevent cross contamination of chemicals.
- Measuring cylinder. Graduated 100 ml glass or plastic container.
- Sodium hypochlorite bleach. (For monthly maintenance).
- Tank cleaning brushes, one each for developer and fixer tanks.
- Scouring pads. (Plastic or nylon type).
- Clean disposable cloths.
- Clean hand towels.
- Plastic bucket.
- Mop.

* A packet of pre-exposed sensitometry films may be obtained from the film supplier.

** A previous processed sensitometry film may be used as a reference.

a. General precautions

- **Before removing any panels, ensure the processor power is switched off. The processor power isolation switch should also be turned off.**
- All adjustable settings of the processor should be recorded. This especially applies to microprocessor-controlled systems. These have a large number of settings, or options, and may develop an error. For example, after a power failure, or due to incorrect adjustment.
- The following items should be available for personal protection.
 - i. Plastic apron.
 - ii. Coat to protect clothing from chemical splashes.
 - iii. Rubber gloves.
 - iv. Protective glasses and mask, to protect the face from chemical splashes.
 - v. An emergency eye kit should be available in the darkroom.
- Do not wear long loose clothing; this may become caught in the rollers.
- Ensure that the darkroom is adequately ventilated.
- Clean up any spills or splashes.

b. Daily maintenance

● Before start up.

This assumes shutdown procedure was not performed, or the processor has been idle for some time.

- i. Remove processor lid.
- ii. Remove crossovers, and wash in warm water, with a sponge or plastic cleaning pad. **(Always do developer first, then fixer, to avoid contamination of developer.)**
- iii. Wash tank covers and splash guards.
- iv. Wipe over all rack rollers that are above solution levels.
- v. Clean interior exposed surfaces.
- vi. Check replenishment tanks/bottles levels. Check for unusual colour or smell.
- vii. Check replenishment hoses for possible leaks or kinks.
- viii. Replace the water drain standpipe, if appropriate.
- ix. Ensure the wash water drain valve is closed. (Some processors may be fitted with an automatic drain valve)
- x. Turn on water, and check that wash tank is filling. Time water flow if necessary.
- xi. **Note.** Depending on make and model, water flow will not commence until the unit is powered up.
- xii. Replace crossovers, and tank lids.

● On start up.

- i. With the top cover removed, switch on the processor.
- ii. **Note.** Some processors have sensors, or microswitches, to ensure the cover is correctly fitted. With the lid off, you will need to activate these switches manually.
- iii. Listen for any unusual noise or vibration.
- iv. Check film transport system. Ensure all rollers are operating normally.
- v. If not previously filled, check that wash water is now filling correctly.
- vi. Check replenishment system is working.
- vii. Replace processor lid.
- viii. Feed in one unprocessed 35 × 43 cm film as a clean-up film.

Note. Do not use processed film, as these are harder, and contain fixer.
- ix. Inspect processed 'clean up film'. Feed in a second film if necessary.
- x. Clean exterior surfaces, including feed tray and receiving bin. **Pay extra attention to the feed tray.**
- xi. Wipe over all darkroom surfaces.
- xii. When the processor has reached normal operating conditions, a routine sensitometry test may be carried out. See **appendix 'A', page 163.**

● Normal working.

- i. **Follow manufacturers operating instructions. (Read the manual.)**
- ii. Be aware of any changes in operation, noises, leaks, or deterioration of processed films.
- iii. Do not pull processed films out till they are clear of the rollers.
- iv. Always wait for the 'ready' signal or light before feeding the next film.
- v. When feeding films, insert the wide side as the leading edge. The film should be lined up against one side of the tray, not in the centre.
- vi. Do not allow anyone to stand next to, or lean on, the processor.
- vii. Ensure the darkroom ventilation is correct, and there is no build up of humidity or fumes. This especially applies where a bench top processor is used.

● On shut down.

- i. Remove processor lid.
- ii. **Note.** Some processors have sensors, or microswitches, to ensure the cover is correctly fitted. With the lid off, you will need to activate these switches manually. Some processors have several lid safety switches. Please refer to the operating or service manual.

- iii. Observe transport system.
- iv. Listen for any abnormal noise or vibration.
- v. Observe level of solutions and wash water.
- vi. Switch off.
- vii. Look for any leaks.
- viii. Remove and wash all crossovers, splashguards and tank lids.
- ix. Wipe over all rack rollers above solution level. (Always do developer first, then fixer, to avoid possible contamination of developer.)
- x. Inspect and wash roller drive-cogs and drive mechanism where appropriate.
- xi. Replace tank lids. (Do not install crossovers.)
- xii. Turn off wash water, if appropriate.
- xiii. Remove water drain standpipe, if appropriate.
- xiv. Wash off all chemical splashes on interior exposed surfaces.
- xv. Wipe any splashes from exterior surfaces.
- xvi. Replace processor lid. Leave it slightly raised at one end, to avoid build up of fumes and condensation.
- xvii. The darkroom door should be left open, with the ventilation fan operating. (Depending on power constraints.)
- xviii. Place crossovers on top of processor, with drain standpipe if appropriate, and cover with a cloth; or store in a cupboard set aside for that purpose.
- xix. Observe levels of replenishment tanks. If required prepare a fresh solution.
- xx. Observe stocks of films, chemicals, or other depleted supplies. Restock or order as required.
- xxi. Record all restocking.
- xxii. Report any problem or fault areas. See **module 11.1 page 151**.
- xxiii. Update the logbook

c. Weekly maintenance

- **Follow manufacturers' recommendations.**
- Perform a sensitometry test. (For best control, this should be performed as a daily routine.)
- Check solution temperatures, in particular developer temperatures. This is usually around 34–36 degrees Celsius
 - i. **Note.** Allow time for the temperature to fully stabilize first.
 - ii. Compare with any readout on the processor panel, and manufacturers' recommendations.
 - iii. If outside the specified temperature limits, compare to results previously recorded in the logbook. Adjust if necessary.
 - iv. In case a drift of temperature is observed, investigate further. Use the manufacturers

maintenance manual as a guide. See **module 11.1 page 151**.

- Check replenishment rates.
 - i. Remove processor lid
 - ii. Locate lid safety switches, if fitted. Place a small weight, or else a small packing piece held with tape, to keep these switches operated.
 - iii. Switch processor on.
 - iv. Divert the developer inlet to the tank, into a 100ml measuring-cylinder.
 - v. On some bench top processors, this may not be possible. In which case divert the flow of used developer from the tank, which would otherwise go to the waste tank or the drain. However, pass a least one film in first, to ensure excess developer has commenced to flow. Discard this initial measurement.
 - vi. Pass five 35 × 43 cm fresh films through the processor. Do not use previously processed films, as these are harder, and contain fixer.
 - vii. Divide the measuring cylinder contents by five, to find the replenishment rate.
 - viii. **Note.** The above procedure is required for some processors, which may not add individual replenishment for each film inserted. This especially applies for microprocessor-controlled units, which calculate several other factors besides film size.
 - ix. Repeat the above for the fixer tank.
 - x. Record the results.
 - xi. Check with previous results for any significant variation, or drift.
 - xii. Adjust if necessary.
- Remove and wash all deep rack rollers in warm water
 - i. Particularly for the developer section, the rollers may develop a layer of chemical crystals. A nylon or plastic cleaning pad will assist in the removal of these crystals, or 'encrustation'.
 - ii. Inspect for correct function, wear or damage.
 - iii. Rinse and install.
- Check main drive shaft and chains or drive belt.
- Carry out any other maintenance recommended by the manufacturer.
- Report any problem or fault areas. See **module 11.1 page 151**.
- Update the logbook

d. Monthly maintenance

- **Follow manufacturers' recommendations.**
- Perform weekly maintenance.
- Inspect all racks and component parts during cleaning.

- Clean filters.
- Drain all and clean all tanks.
 - i. Pay special attention to the wash water tank.
 - ii. The tanks may be filled with a dilute concentration of 0.5% hypochlorite solution. An alternative is a system-cleaner chemical kit. This is a two-part mix, plus a neutralizer, which is added to the water when flushing out the cleaner.
 - iii. Let the solution sit in the system for no longer than 30 minutes.
 - iv. Rinse the solution from the system, and dislodge 'bio-growth' or algae. Use a clean stiff brush or other recommended tools to clean the surface.
 - v. Rinse the system thoroughly.
 - vi. Caution. Do not allow concentrated sodium hypochlorite to come in contact with fixer or developer. Dangerous fumes can result.
- Do not forget to add starter to the developer tank.
- Manufacturers recommend replacement of all chemicals on a monthly basis. This will especially apply to developer, where oxidation continues even when not in use. If recharging is not economic, then inspect the condition of the solutions in the replenishment tanks, and change as felt necessary.
- Carry out any other maintenance recommended by the manufacturer, or felt necessary.
- Report any problem or fault areas. See **module 11.1 page 151**.
- Update the logbook.

e. Quarterly maintenance

- **Follow manufacturers' recommendations.**
- Perform weekly and monthly maintenance.
- Discard remaining chemicals in replenishment tanks.
- **Note.** This especially applies to developer, which may be oxidised. The developer will start to turn brown.

- Dispose of chemicals as required by local regulations. *Do not flush down the drain. Especially do not discard so that seepage may end in a well, or in the irrigation water.*
- Wash out replenishment tanks, and flush hoses.
- Mix a fresh solution of developer and fixer.
- **Note.** Only mix sufficient developer to suit short to medium term requirements. This will reduce deterioration due to oxidation.
- Do not forget to add starter to the developer tank.
- Remove processor panels. Inspect carefully for any leaks around pumps.
- Check overall condition of processor.
- Report any problem or fault areas. See **module 11.1 page 151**.
- Update the logbook.

f. Annual inspection and service

Even if you do not have a maintenance contract with a service company, it is advisable to have the unit fully inspected and serviced at least once each year. This service should ensure that the processor is performing to full specification. In addition, wear items such as pump valves, especially for the fixer pump, can be replaced. This service will also enable a new set of reference sensitometry films to be obtained. Prior to such service, it is recommended to have a fresh supply of chemicals available. If film has been stored in suspect conditions, a fresh pack of film should also be on hand, to allow accurate calibration.

g. Replacement parts schedule

Manufacturers usually recommend replacement of items subject to wear or deterioration. This should be carried out at regular intervals. A typical example of these items is provided in table 11-a.

Table 11-a. A typical replacement parts schedule

Replace	Each month	Three months	Six months	Each year
Chemicals, developer and fixer.	●			
Replace fixer rack roller-springs.			●	
Replace entry, developer, wash and drying rack roller springs.				●
Replace developer rollers.				●
Replace 'poppet' valves in replenishment pumps.				●
Developer filters.				●
'E' rings.				●

MODULE 11.1

Automatic film processor**Aim**

Many problems with the automatic film processor are avoided by routine maintenance. Unfortunately, routine maintenance may not be performed properly, or not at all. This module provides a list of common problems that may occur, and their solutions. Routine maintenance procedures for the processor are provided in module 11.0 page 147.

(Note: Reference module page numbers refer to the title page.)

Objectives

On completion of this module, the student will be familiar with film processor problems, and what to look for when correcting these problems. In the event of a problem, look also in the operation manual, for the manufacturers advice.

(Task 16. 'Films appear too dark', and task 17 'Films exhibit symptoms of low fixer', should be attempted on completion of this module).

Note: Detailed instructions for sensitometry are provided in the 'WHO Quality assurance workbook'. If sen-

sitometry is regularly performed during maintenance, then deviations from the recorded characteristic curve will aid diagnosis of film problems. The sensitometry section from the WHO Quality assurance workbook is included in appendix 'A' page 210.

Contents

- a. Electrical precautions
- b. Plumbing precautions
- c. Suggestions for processor service or repair
- d. The processed film appears dirty
- e. Pressure marks on the film
- f. Film is scratched or jammed
- g. Film appears under developed
- h. Uneven developing across the film
- i. Film has high base fog and excessive contrast
- j. Films appear poorly fixed
- k. Films are discoloured. May appear 'sticky'
- l. Insufficient or uneven drying
- m. Bands across the film, perpendicular to the film transport direction
- n. Film 'fogging'
- o. Static electricity marks

a. Electrical precautions

- **Before removing any panels, or performing any internal repair, ensure the processor power is switched off. The processor power isolation switch should also be turned off.**
- **An electrician or electronics technician should perform any electrical tests or adjustments.**
- If testing or replacing a fuse, see **module 5.0 page 65.**
- To make adjustments, it may be necessary to remove a module or printed circuit board (PCB), and reconnect it with an extension board. This should only be attempted on advice from the service department.
 - i. **Take care that power is switched off, before proceeding.**

- ii. Before removing a module or PCB, touch the processor frame. This is to discharge any static electricity.
- iii. Take note of plugs or sockets that may need to be removed or reconnected. Do not rely on memory. Make a diagram of the connections. If connections or wires are not marked, attach a temporary label.
- iv. When a PCB is fitted to an extender card, take care not to bump or dislodge it once power is restored. Damage can result.

b. Plumbing precautions

Many plumbing problems in a processor may be attended to, providing due care is taken. This can include:

- Attention to plumbing or piping leaks.
- Replacement of replenishment-pump valves.
- Replacement of replenishment or recirculation pumps.

Before attempting any repairs where the internal piping or plumbing may be disconnected, take the following precautions.

- Ensure the relevant processor tank has been drained of any solution.
- Flush the system to remove any residual solution.
- **Ensure the power is turned off, also at the power isolation switch.**
- Turn off the water supply to the processor.
- Make a diagram of piping connections before removing. Attach labels for identification.
- Take care when disconnecting piping, not to lose small 'O' rings. These can be hidden inside the connection, and fall out later.
- When piping is disconnected, residual flushing water will drain out. Be prepared, and place cloth, or a towel, under the pipe before disconnecting.
- Have a bucket, or container, available for any unexpected problem.
- Wear suitable protection clothing and gloves. See **module 11.0 page 147.**

c. Suggestions for processor service or repair

- When diagnosing a problem, refer also to the operators or service manual for the processor. If in doubt of the cause of a problem, request advice from the manufacturers service division.
- **Hint.** When trying to locate a part in the processor, refer to the diagrams in the parts manual.
- When replacement of a part is required, include any auxiliary components that may be required. For example, if replacing a faulty recirculation pump, include replacement 'O' rings for the piping connections.
- Place any small screws or parts in a container, to avoid loss.
- All adjustable settings of the processor should be recorded. This especially applies to microprocessor-controlled systems. These have a large number of settings, or options, and may develop an error. For example, after a power failure, or due to incorrect adjustment.

d. The processed film appears dirty

- The processing tank rollers are dirty.
 - i. Carry out the recommended weekly maintenance.

- Dirt or algae contamination of the wash water.
 - i. Replace wash water.
 - ii. Ensure wash water trough is clean.
 - iii. Examine the water supply filter, and either 'back flush', or exchange the filter element.
 - iv. Check the water flow rate.
 - v. Check operation of the automatic drain valve. (This is not fitted to all processors)
- Dirt or contamination of the processor solutions.
 - i. Carry out a complete cleaning procedure. See **module 11.0 page 147.**
 - ii. Replace processor solutions. Make up a complete fresh batch. Ensure filtered water is used. Do not forget to add starter.
 - iii. Developer and fixer recirculation filters may be fitted on some processors. These should be cleaned weekly as part of routine maintenance.
 - iv. Some processors have a separate developer filter, not installed in the tank. Depending on processor make or model, this filter should be changed each year. If suspect, change immediately.
- A cleaning-film procedure has not been carried out.
 - i. This should be carried out each morning.
 - ii. Use a full size unprocessed film.
- The feed tray is dirty.

e. Pressure marks on the film

- Clean the film rollers.
- Pay special attention to developer rollers.
- Replace any rollers that do not have a smooth surface, after cleaning.
- A pair of developer or fixer rollers may have developed a flat, or uneven, area.
 - i. Test by slowly rolling along a flat surface. Feel for any 'bumps' as the roller is rotated.
 - ii. Place a light behind the roller. Move the roller along a flat surface. Look for any gaps as the roller is rotated.

f. Film scratched or jammed

- With the top cover removed, feed a test film through the processor.
 - i. Listen carefully for any unusual noise.
 - ii. Does the film jerk, or not move smoothly in any area?
 - iii. Does the film exit partly rotated?
- Racks incorrectly installed.
 - i. Check the position and seating of the racks. Pay careful attention to guide marks or grooves.
 - ii. Check that racks are not distorted, or bent out of shape.

- Loose or damaged roller pressure springs.
 - i. These are coiled springs shaped in the form of a loop. They pull the rollers together, and provide the correct pressure on the film.
 - ii. If springs are damaged, or have uneven tension, then the rollers can feed the film at an angle.
 - iii. Compare the suspect spring to other springs. Replace with a new pair, one on each side of the rollers.
- Film crossover guides not properly installed or faulty.
 - i. Examine the area around the guides for any sharp edges, or scratched sections.
 - ii. Check the rollers. Ensure free movement of the rollers.
 - iii. Check crossover alignment. *Ask the service department for advice, before making any adjustment.*
 - iv. Check crossover guides are correctly seated, no distortion or cracks.
- Damaged gears.
 - i. A previous jammed film may result in broken or damaged gear teeth. This can cause erratic or stopped rotation of the rollers.
 - ii. A gear is not sitting in the correct position on the shaft. Check for a missing retaining clip. (Circlip). This fits in a groove of the shaft, to keep the gear in position. Some gears have a plastic retaining clip as part of the gear moulding. If broken, the gear must be replaced.
- Incorrectly set drive shaft.
- Timing belt or chain incorrectly installed or broken.
- Sharp or damaged edges in the film entrance table.
- Incorrectly adjusted film entrance table.
- On systems with a micro-switch for film size sensing, the actuation lever may be damaged.
- Films are fed too close together.
 - i. Does a warning light operate, until ready for the next film?
 - ii. Does a chime sound when the processor is ready for the next film?

g. Film appears under developed

- Operator error.
 - i. Wrong X-ray exposure setting.
 - ii. Incorrect cassette. Detail instead of normal screens.
 - iii. Excessive starter was added after service.
- Insufficient developer replenishment. Check the replenishment flow rate.
 - i. Replenishment pump not working.
 - ii. A leaky valve in the replenishment pump.

- iii. The replenishment feed line is blocked. (Or twisted and 'kinked')
 - iv. Faulty film size detection.
- The developer supply is oxidized or depleted.
 - i. Replace the developer supply, if more than one month old.
 - ii. Test specific gravity. Use the temperature correction chart, Fig C-1 page 177.
 - Incorrect developer temperature.
 - i. Compare the temperature to the previous recorded value, when the processor was last serviced.
 - ii. Monitor developer temperature during the day. Look for excessive temperature drift.
 - Film transport speed has increased.
 - i. Check for incorrect settings in the processor computer.
 - ii. Measure film transport time.
 - iii. **Note.** If transport speed is incorrect, this will also affect fixing and drying.

h. Uneven developing across the film

- Recirculation pump not working.
- Partially blocked developer filter. Clean as part of weekly maintenance.
- Damaged or blocked recirculation pipe lines.

i. Film has high base fog and excessive contrast

- Operator error
 - i. Starter was not added after service. (Or insufficient starter.)
 - ii. Add starter.
- Incorrect developer temperature.
 - i. Compare the temperature to the previous recorded value, when the processor was last serviced. Reset if required.
 - ii. Monitor developer temperature during the day. Look for excessive temperature drift.
- Developer over concentrated.
 - i. Check supply specific gravity. Use the temperature correction chart, Fig C-1 page 177.
 - ii. Check replenishment rate.
 - iii. Add starter.
- Film transport speed has decreased.
 - i. Operator error. The speed adjustment was left on low speed, after processing single emulsion films.
 - ii. Check for incorrect settings in the processor computer.
 - iii. Measure the film transport time.

- iv. Motor speed may be reduced due to incorrectly fitted racks.
- v. Or motor speed may be reduced due to stiff bearings. Lubricate the bearings. (The bearings may be noisy).

j. Films appear poorly fixed

- Insufficient fixer replenishment.
 - i. Check the replenishment flow rate.
 - ii. Adjust the flow rate or pump operation time.
 - iii. Replenishment pump not working. Some processors have two fixer replenishment pumps working in parallel. One may be faulty.
 - iv. Faulty 'Poppet' valves on the replenishment pump. Replace.
 - v. Replenishment feed line blocked. (Or twisted and 'kinked')
 - vi. Faulty film size detection.
- Fixer supply incorrectly mixed. Check specific gravity.
- Fixer is contaminated, replace with a fresh solution.
- Fixer temperature too low. This may apply where the processor has separate heaters for fixer and developer.
- Poor 'squeegee' action of rollers as film exits the developer tank. This leaves excessive developer on the film, preventing proper contact with the fixer.
 - i. Clean the rollers.
 - ii. Examine the roller compression springs; ensure correct fit and tension.
 - iii. Some processors have a 'mini wash area', with the crossover rollers, where the film is transported between tanks. Ensure water level is correct, and is circulated.

k. Films are discoloured. May appear 'sticky'

- Fixer temperature too low. This may occur if the processor has separate heaters for fixer and developer.
- Fixer is depleted. See 'Films appear poorly fixed'
- Wash water temperature too low.
- Film transport speed has increased.
 - i. Check for incorrect settings in the processor computer.
 - ii. Measure the film transport time.
 - iii. **Note.** If transport speed is incorrect, this will also affect developing and drying.

l. Insufficient or uneven drying

- Incorrect temperature setting. Temperature may need to be increased if humidity level is high.

- The drying heater is faulty.
 - i. If more than one element, an element may be burnt out.
 - ii. Faulty operation of the over-temperature safety thermostat.
 - iii. Power fuse to the heater is open circuit.
- The drying fans are faulty. Possible failure of one fan only.
- The drying thermostat is faulty.
- Fixer may be depleted, or at too low a temperature.
- Wash water temperature low.

m. Bands across the film, perpendicular to the film transport direction

- Dirty rollers
 - i. Clean the rollers. The rollers may develop a layer of chemical crystals. A nylon or plastic cleaning pad will assist in the removal of these 'crystals', or encrustation.
 - ii. Replace any rollers that do not have a smooth surface after cleaning.
 - iii. Check for damage or flat areas on the rollers.
 - iv. Test by slowly rolling along a flat surface. Feel for any bumps as the roller is rotated.
 - v. Position a light behind the roller. Move the roller along a flat surface. Look for any gaps as the roller is rotated.
- Rollers do not rotate smoothly. They stop and start.
 - i. The drive belt or chain may be loose. Adjust according to the maintenance manual.
 - ii. Incorrect positioning of rack or rollers.
 - iii. A bearing may require cleaning, or lubrication.
 - iv. Damage to a gear tooth.
- Film is slipping in the rollers.
 - i. Examine roller compression springs; ensure correct fit and tension.
 - ii. Look for missing springs.

The following film problems may not be due to the processor.

n. Film fogging

- Darkroom safe light is faulty.
 - i. Test by leaving film on bench for a short time, then processing. Next, place film directly into processor, but keep safe light off.
 - ii. Aim the light upwards, away from the work-bench or processor film table.
 - iii. Has the globe been replaced with a wrong type?
 - iv. Has the film been changed to orthochromatic film? Contact the film supplier for advice. Obtain correct filters for the safe light.

- Damaged cassette, allowing light to enter.
 - i. Test by inserting a film in the suspect cassette, with the safelight switched off. Then place the cassette in different positions, in normal room lighting.
 - ii. Process the film.
 - All films appear fogged.
 - i. The film has been stored under excessive temperature, or humidity conditions.
 - ii. The film has passed its expiration date.
 - Film has intermittent fogging. Artefacts can also be observed.
 - i. Scatter radiation is entering the cassette storage area.
 - ii. Possible fault with radiation shield. Test by placing a test cassette for a while in the suspect area.
 - Film exhibits fogging towards one edge only. All films of the same size have a similar problem.
 - i. The film storage bin has been opened under full lighting conditions.
 - ii. Possible light leak into the film storage bin. Check for proper closing and operation of the film bin.
 - iii. Improper light shielding of films, due to torn packaging etc.
- o. Static electricity marks**
- These appear as 'branched', or 'dotted' areas on the film.
 - i. This is due to a static discharge, as the film is handled.
 - ii. A common cause is dry, or low humidity conditions. Some floor coverings, and type of shoes, can also cause this problem.
 - iii. Before handling the film, discharge yourself by touching the metal tray of the processor.
 - iv. Use anti-static cleaners for the cassette intensifier screens.

TASK 16

Films appear too dark

You have just returned from holidays. On using your normal exposure techniques, the films appear too dark. Your assistant informs you she has also been having a problem, to obtain the correct exposures.

You suspect a problem with the processor. However, list possible reasons, not caused by the processor, which might cause dark films.

Make a list of possible processor problems, which could cause a dark film. Indicate on this list the order in which you would check these items.

Carry out suitable tests. Describe these tests and their results.

What action is needed to correct the problem?

Tutor's comments

Satisfactory/Unsatisfactory

Signed _____

Tutor

Date _____

TASK 17

Films exhibit symptoms of low fixer

After carrying out initial tests, you replaced the fixer, and adjusted the fixer pump. However, as several days go by the problem repeats itself.

You come to the decision that the fixer pump is faulty and requires attention.

What were the original symptoms? _____

Describe the tests carried out, and action taken to correct the problem. _____

The problem has now repeated itself. You have contacted the processor agents, and discussed the problem. They recommend you replace the pump valves, suspected leaking. You now have the replacement valves and are about to affect a replacement.

Describe some important precautions before attempted disassembly _____

Reassembly has been successful. At the beginning you made some adjustments in an attempt to correct this problem. Now with the processor powered up, and charged with fresh chemicals, what adjustment should again be checked? _____

Tutor's comments

Satisfactory/Unsatisfactory

Signed _____

Date _____

Tutor

MODULE 11.2

The film ID printer

Aim

Film ID printers range from basic versions where the film is first removed from the cassette, and then placed in the printer, to motorized versions; which print the film through a 'window' in the cassette. The suggestions made here are for the basic version only.

Objectives

After completion of this module, simple repairs to a basic film printer may be achieved. Assistance from an electrician is recommended.

Contents

- a. Operation of a film printer
 - b. Precautions for replacing the lamp
 - c. Failure to print
 - d. The printing is too light
-

a. Operation of a film printer

The basic film printer consists of a lamp, which delivers a brief burst of light through the paper ID strip onto the film. In its simplest form, a capacitor is charged to a preset voltage. On closing the printer lid, a microswitch connects the capacitor to the lamp, producing a brief flash of light. A potentiometer controls the voltage level on the capacitor, which in turn controls the lamp output. Additions may include pre-heating the lamp filament, or providing a flash timer. Later versions replaced the lamp with a xenon flash tube, similar to those employed in a camera. Due to the simplicity of the design, very little can go wrong. However, some problems may still occur.

b. Precautions for replacing the lamp

Before opening the cover ensure the printer is disconnected from the power point. Take care not to touch any of the internal wiring, as there may be significant voltage stored in a capacitor.

The replacement lamp should have a similar power rating. Depending on the actual mode of operation, changing to a higher rated lamp could produce a lower flash intensity.

c. Failure to print

Before investigating, ensure the printer is unplugged from the power point.

- Is the globe faulty? Try a replacement globe.
- Can you hear a small 'click' as the lid is closed? If not the expose switch may need adjustment. Otherwise the switch may be faulty.
- Does the power cord have a broken connection? Check both at the plug end and where the cord enters the printer. **Repairs to the power cord or plug should be performed by an electrician.**
- Is the power point faulty? Check the printer in a known good outlet.
- Has the print density control developed a bad connection? Try adjusting to a different position.

d. The printing is too light

- Did this occur after changing the globe? Check to ensure the correct type was fitted.
- Has the type of paper used for the patient ID been changed to a different version?
- If the first printing attempt is light, but an attempt at printing shortly after produces better results,

then a pre-heat resistor or adjustment may be faulty. **Have an electrician check for this possibility. Do not attempt this by yourself; there may be a high voltage charge on a capacitor.**

