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Successful Intraoral Radiography addresses radiographic errors commonly seen in intraoral radiography. This publication includes suggestions for correcting the errors as well as hints that will help professionals avoid similar problems in the future. For your convenience, an image showing the problem appears at the top of the page. For similar information on common radiographic problems seen in panoramic radiography, please see KODAK Publication N-406 entitled “Successful Panoramic Radiography.”

Causes of Intraoral Radiography Problems
Intraoral radiographic errors frequently fall into one of three categories: exposure errors, processing errors, and film handling and storage errors. On occasion, multiple errors stemming from all three categories occur simultaneously on one radiograph. While problems are frequently categorized into one of these three areas, problems can and do occur in other areas. For example, improper housekeeping habits or faulty equipment can also cause radiographic problems.

Exposure errors occur from the time the film packet is inserted in the mouth to the time it is brought into the darkroom. Processing errors can be traced from the point where the film processing begins to when it ends with the drying stage. Film handling and storage errors can occur before, during or after any one of these two categories, but are usually not related to exposure or processing errors.

How the X-ray Tube Functions
In order to fully appreciate the multiple elements involved in correcting an error, the reader needs a basic review of the operation of the x-ray tube.

An x-ray tube is comprised of a sealed glass envelope from which the air has been evacuated. Two principal components inside the tube are the cathode and the anode. The cathode is the source of the electrons and the anode contains the target at which the electrons are directed. As depicted in Figure 1, the cathode is a cup-shaped holder containing a coiled tungsten-wire filament. As the filament is heated by the electric current, electrons are emitted. The quantity of electrons is controlled by the temperature of the cathode filament—the higher the temperature, the more electrons emitted. Electron emissions are determined by the electric current sent through the filament. It is measured in milliamperes \((mA)\). One milliampere is equal to 1/1000 ampere. Milliamperes control the number of electrons produced per second, which affects the number of x-rays produced. Increasing the mA increases the number of electrons emitted at the cathode, which increases the number of x-rays produced (i.e., quantity).

![Diagram showing how an x-ray tube operates.](image)
The focusing cup of the cathode focuses the electrons into a stream directed on the target of the anode. The anode is usually formed of copper because of its high heat conductivity. A block of tungsten is centered in the face of the anode. This block is called the target. The small area of the target that the electrons strike is the local spot. This is the source of x-rays. Most of the energy is transformed into heat--x-rays constitute about one percent of the energy produced.

The cathode is negatively charged; the anode is positively charged; the voltage between them is expressed in peak kilovolts (kVp). One kilovolt is equal to 1000 volts. Kilovoltage controls the speed of the electrons. Increasing the kVp increases the speed of the electrons that strike the target; this, in turn, increases the energy of x-rays produced (i.e., quality).

The controls are located outside the glass envelope but connected to it. A timer controls the number of seconds that electrons are produced at the cathode. The total number of electrons that are produced and stream from the cathode to the anode is the product of the milliamperes (mA) and the exposure time in seconds (s) -- (mA x (s) or mAs.

The beam of radiation is created by allowing some x-ray beams to emerge through a port window in the metal housing surrounding the tube. The beam is composed of x-rays of different wavelengths and penetrating powers that are determined by the kVp selected for the exposure. The total number of x-rays in the beam depends on the mA, time, and kVp selected.

The wavelength determines the x-rays' energy, hence their ability to penetrate an object. Shorter wavelength x-rays, those produced at a high kVp setting, have more penetrating power than longer wavelength x-rays. X-rays that penetrate an object form the image on film. X-ray beams that enter the patient have a uniform distribution of various wavelengths. The x-rays are then absorbed or transmitted, depending on what tissue they encounter, and a specific pattern of x-rays exits from the patient (referred to as differential attenuation). The distribution of x-rays that result carries all of the diagnostic information about the patient. This information is then captured on film. (See Figure 2)

**Figure 2:** Differential attenuation of x-rays.

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**Areas to Consider First**

As is evidenced by the number of components involved in creating an x-ray beam and subsequent radiographic image, there are some areas to consider first when problem solving.

**Timer:** Any variance in the timer will vary the number of electrons that stream toward the target and, as a result, not expose the film properly. Timers need to be checked and adjusted routinely, as suggested by the manufacturer.

**Switch Control:** Older x-ray units have two-pole switches. The poles make contact one after the other, as pressure on the button is increased. If pressed too lightly, only one contact is made. While the machine makes all the right sounds, and the milliamperc needle fluctuates appropriately, the output of x-rays is so slight that the film is underexposed.
**Tube Movement:** Since the x-ray beam is created by a bundle of x-radiation escaping through a small opening in the metal housing surrounding the x-ray tube, tube vibrations or movement would blur the image.

**Cone Cutting:** As depicted in Figures 3A and 3B below, if the beam is misaligned with the film packet, it results in a portion of the film not being reached by the radiation. PIDs (position indicating devices) combined with an indicator rod, are helpful in insuring proper alignment. The problem can occur with either circular or rectangular collimation. See page 11 for radiographic examples.

![Figure 3A and 3B](image)

**Figure 3A and 3B:** A simulation of a "cone cut error" that occurs when a circular or rectangular PID is misaligned with the film packet.

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**Radiographic Quality**

The quality of the final radiograph is actually the result of the relationship between several elements. The first occurs during the exposure stage and is the relationship of milliampere seconds (mAs) to peak kilovoltage (kVp). It is a relationship of quantity (mAs) to quality (kVp).

The response of the film depends on the number (quantity) and energy distribution (quality) of the x-ray beams striking the film. Quality of the final radiograph is often evaluated by density and contrast. Both kVp and mAs affect density and contrast.

*Density* is the degree of blackness created by the amount of developed silver in any area of a radiograph. It is measured by the ability of the developed silver to stop light from passing through that area. Density is measured along a continuum that varies according to the type of film. In intraoral dental films, the range is from a minimal point (called D-min) of 0.2 to a maximum point (called D-max) of 5.0 or greater. In order to evaluate a particular radiograph, a viewer will usually choose a density that he or she likes. That personal choice then becomes a reference point to which all other radiographs are compared. Before judgments like "the radiograph is too light or too dark" can be made, the reference point must be established. In this publication, a background density level of 1.6 was selected as the optimal mid-range level from which to evaluate the quality of other radiographs. If density is too great, objects within the image cannot be visually separated from each other and contrast suffers.

*Contrast* is the relative difference in densities, i.e., between the lightest and darkest parts of a radiograph, and refers to the ability to separate the objects seen in a radiograph. Contrast in the final radiograph results from three factors: subject contrast, film contrast, and processing.

1. **Subject contrast** is the result of differential attenuation of the x-ray beam. If all the x-rays generated by the source were to pass directly to the film, the final radiograph would be black. Conversely, if all the x-rays were absorbed before they reached the film, the radiograph would be clear. Therefore, a radiographic image is created through differential attenuation of the x-rays (see Figure 2), or a mixture of absorption and transmittance of the x-ray beam caused by the varying densities of tissue, bone and/or teeth. The result is a range of tones from white to black on a final radiographic image. Subject contrast is altered by adjusting the amount of kVp. As kVp is increased, contrast is lost.
2. *Film* contrast is a characteristic of the film itself and is accomplished by preparing the emulsion in a special way during film manufacture.

3. *Processing* involves several variables - development time, processing temperature and chemical activity. After the film has been exposed and brought into the darkroom for processing, radiographic contrast (and density) can still be affected by each one of these variables.

### Processing

**Temperature**
- Too High: Image too dense
- Too Low: Image too light

**Development Time**
- Too Short: Chemical Activity Low
- Too Long

Figures 4 and 5 have been included to show how contrast and density are affected by exposure and processing in the dental office.

Figure 4 illustrates the influence of kVp. Subject contrast is relatively higher in the lower kVp range than it is in the higher kVp range. In order to compare the impact of kVp on subject contrast, mAs has been adjusted for the different kVp levels to match the background density of the two images below.

**Figure 4**: Exposure series showing the influence of kVp.

- **Low kVp** (e.g., 60 kVp)
  - When kVp is low, subject contrast is comparatively high.

- **High kVp** (e.g., 90 kVp)
  - When kVp is high, subject contrast is comparatively low.
Figure 5 shows the effect of development time on density and contrast. Processing was done at the recommended temperature and with properly replenished developer.

Figure 5: Images showing the influence of development time at 68 F (20 C).

Under Development
2 minutes

Less than recommended development time of only two minutes results in low contrast and density.

Under Development
5 minutes

The recommended 5 minutes of development results in the optimization of both density and contrast.

Over Development
8 minutes

More than recommended development time of 8 minutes results in a highly dense image with low contrast.
Problem:
Image is too light; washed out; very little detail.

Possible Causes:
Exposure: • X-ray beam energy level (mAs setting) is too low and not producing enough x-rays to properly expose film. • Intraoral packet irradiated backwards. • Low-contrast film.
Processing: • Processing time in developer is too brief. • Processing temperature of developer is too low. • Chemicals are old or exhausted. • Working solutions have not been replenished.

How to Correct:
Exposure: • Check the exposure settings. Compare the manufacturer’s recommended exposure settings with the kVp setting on the equipment. • Recall how the packet was positioned in the mouth. If the intraoral packet was irradiated backwards (i.e., the “tube side” of the packet was facing away from the x-ray tube), the lead foil included within the packet on the “back side” to reduce radiation “backscatter,” (i.e., reflections from irradiated tissues) reduce the number of x-rays reaching the film. • After other possible causes have been ruled out, the timer switch should be considered. Check the timer switch used in making the exposure. A faulty switch could be a cause of improper film exposure. • If an underexposed radiograph only occurs occasionally, check the exposure button on the x-ray unit itself. When making an exposure using a mechanical timer, be sure to press the timer button firmly. • If the timer switch or exposure button is suspect, trained service representatives should be contacted.

Manual Processing: • Check the equipment you are using to time film development (the unit may be malfunctioning). • Check the temperature of the processing solutions, particularly the developer. A temperature that is too low will slow down the action of the developer. • When removing film from developer tank, minimize the amount of excess solution that drains back into the tank or transfers into the fixer tank. This will allow correct replenishment.

Automatic Processing: • Check the speed setting for the film transport system. A fast speed will reduce the processing time in the developer. Slowing down the rate or raising the temperature of the developer are options, but must be done according to the manufacturer’s recommendations.

Replenishment for Manual Processors: • Allowing for dilution, oxidation and chemical exhaustion, correct replenishment for normal processing in a one-gallon tank is 8 ounces (236 mL) of developer replenisher and 8 ounces (236 mL) of fixer replenisher each day even if no film is processed. A daily replenishment habit will help ensure radiographs of optimal image quality.

Replenishment for Automatic Processors: • The correct replenishment rate for automatic roller-type processors containing one gallon of each solution is 8 ounces (236 mL) per day for the developer and fixer solutions. • Manufacturers of automatic non-roller type processors recommend that all solutions be changed every two weeks. • However, a minimum of 8 ounces (236 mL) of replenishment solution should be added daily even if no film is processed. • All chemicals should be stored according to the manufacturer’s recommendations. Most chemicals, when stored in concentrate form at 40 - 80°F (4 - 26°C), will have a shelf life of 18 months.

Hints:
• Exposure settings are based on average-size patients. Whenever the patient is heavier than average, there is a good chance that an average exposure setting will create a light image. Adjustments must be made to avoid light images. Pre-adjust the exposure accordingly. • If processing chemicals are not replenished daily, the “aging process” slowly destroys the developer’s ability to process exposed silver grains. Even if solutions are replenished daily, all processing solutions should be replaced every 15 working days. • All intraoral film packets essentially are assembled in the same way. The “tube side” of the packet, the surface that faces the x-ray tube, is white paper or plastic and has a smooth or slightly textured surface to prevent slippage. The tube side also has a small embossed identifying dot near one of the corners. This dot is embossed in the same position on each film and can be used as a positioning aid to distinguish between the patient’s right and left side.
PROBLEM:
Image is too dark (black); anatomical structures cannot be seen readily; image is flat and low in contrast.

POSSIBLE CAUSES:
Exposure: • X-ray beam energy level is producing too much radiation and overexposing the film; mAs setting too high or kVp is too high.

Processing: • Processing temperature of developer is too high. • Development time may be too long in manual processing. • The speed of the film transport system may be too slow in an automated processing system. • Developer solution is contaminated with fixer.

HOW TO CORRECT:
Exposure: • Check your exposure settings. Compare your settings with the manufacturer’s recommended exposure settings. • After other possible causes have been ruled out, the timer switch should be considered. Check the timer switch used in making the exposure. A faulty switch could be a cause of improper film exposure. A dense image would result if the timer were set for a longer-than-normal time interval. • If the timer switch or exposure button are suspect, trained service representatives should be contacted. • If the final radiograph is too flat (lacks contrast), lower kVp. High kVp decreases subject contrast and flattens the overall image. • Compare the manufacturer’s recommended exposure settings with the kVp setting on the equipment.

Manual Processing: • Check the temperature of the developer; the action of the developer increases if the temperature is too high. The higher the temperature, the shorter the process. • Check the timer setting and the equipment used to time the development process; it may be malfunctioning. Processing times and processing temperatures vary according to each system (manual or automatic). • The developer solution may have been contaminated with fixer. Check the position of the fixer processing tank; if it is too close to the developer, fixer may be splashing into the developer tank. • Insure that all film hangers are washed after each use, before reusing them in the developer. Clips should be free of film particles. • Developer must be discarded and replaced with a fresh solution if it has been contaminated.

Automatic Processing: • The speed of the film transport system may be too slow. A slow speed will increase the processing time in the developer to produce a dark image. Increasing the transport speed or lowering the temperature of the developer are options, but must be done according to the manufacturer’s recommendations. • The developer solution may have been contaminated with fixer. If using a roller-transport system, be sure that all clean-up films are discarded and are not reused after completing the roller clean-up process. Reuse contaminates the developer solution. Developer must be discarded and replaced with a fresh solution once it has been contaminated.

HINTS:
• Exposure settings are usually based on average-size patients. If the patient is smaller than average, there is a good chance an average exposure will create a darker radiographic image. Pre-adjust your exposure accordingly.
• To avoid retaking a specific radiograph, increasing the intensity of the viewing light can compensate for an overly dense radiograph.
PROBLEM: Image is blurred; image lacks sharpness.

POSSIBLE CAUSES:
• Blurred images on radiographs are the result of motion during exposure.
• The patient or the x-ray head moved.

HOW TO CORRECT:
• After adjusting the x-ray head, wait a few seconds before making the exposure to give it a chance to stop all movement.
• Remind the patient to remain perfectly still during the exposure. An anxious patient who is unfamiliar with the procedure may move as a nervous reaction.

HINTS:
• If this is the patient’s first radiograph, take time to explain the procedure.
PROBLEM:
Radiograph is fogged; restorations appear gray.

POSSIBLE CAUSES:
- Secondary exposure from a worn or cracked safelight or filter, other radiation sources or exposure to light.
- Use of outdated film.
- Improper film storage conditions.
- Faulty processing.

HOW TO CORRECT:
- Check the date of expiration on film packets. Buy film in quantities that can be used within 1 to 2 months.
- Check storage temperature. Film should be stored between 50 70°F (10-20°C).
- Check the safelight. The KODAK GBX-2 Safelight Filter can be safely used with intraoral dental film speed groups D and E. If the safelights are old, conduct a quality control test for safelight conditions. • Note the position of the safelight filter to see if it is reversed. The name of the filter should be readable on the outside of the filter. When the filter is reversed, the screen cracks, allowing unfiltered light to pass through. • A lead-lined container or dispenser should be used to store film. • Check the processing and/or film loading room for light leaks. • Do not leave exposed or unexposed film packets in the same room as the x-ray head. Secondary exposure can occur as successive exposures are made in the room. • Chemical fog can cause gray-like shading in light areas of a radiograph. Chemical fog can occur when film is developed for too long a period, when developer temperature is too high, when developer is too old or exhausted, when solutions are improperly mixed, or when developer solution is contaminated with fixer.

HINTS:
- Safelight recommendations: In the U.S.A., use a 15W lamp at 4 feet (1.2 m) using a standard 110 V system. In the United Kingdom, a 25W "pearl" lamp at 4 feet (1.2 m) using a 220-240 V system is recommended. In Europe, a 15W lamp at 4 feet (1.2 m) using a 220-240 V system is recommended. • The glow of a cigarette, the "power on" light from a coffee pot, or the lighted button from a multi-line telephone can also fog film. • After each film packet is exposed, place the packet in an area protected from x-radiation scatter.

Checking Your Storage Conditions
To check if a particular batch of stock film has been improperly stored or exposed to a secondary source of radiation, process one piece of film from the open stock and one from the newest film stock. Pencil a small “x” on one of the two films so the new or old stock can be identified after processing. Place the dry, processed films side by side on the viewbox and compare them to see if the older stock has been fogged.

Checking Your Safelight Conditions
To check if film is receiving a secondary exposure from the safelight, remove a film packet from the working box of film. Open the packet under usual darkroom conditions, and place the film on the counter top, exposing the film to the same conditions as an exposed packet while it is being prepared for processing. Quickly cover one half of the film with an opaque card and leave the film on the counter for two minutes. Process the film in the usual manner and compare both halves to see if the uncovered portion of the film is darker than the covered portion.
Figure 11: Radiograph showing the result of partial immersion in developer.

Figure 12: Radiograph showing the results of contact with another radiograph during processing. Arrow A points to one of several darker, irregular shaped artifacts which are pieces of emulsion from another radiograph. Arrow B indicates an area where fixer acted on undeveloped film emulsion. The emulsion was not developed because of contact with the side of the tank or another film during development. The remaining emulsion in a dual-emulsion film often shows a lighter version of the image. However, because the area involved in this radiograph is of a low-density crown, not enough detail remains. Arrow C indicates developer splash on the film just prior to processing.

Figure 13: Radiograph with part of the emulsion lost due to a prolonged wash period.

**PROBLEM:**
Image is totally or partially missing.

**POSSIBLE CAUSES:**
- Partial immersion in developer.
- Separation of emulsion from film base.
- Contact with other films during processing.
- Premature or prolonged contact with processing solutions.

**HOW TO CORRECT:**
**Processing Errors:**
- Solution level is low. When the developer solution level is low, only the portion immersed in the developer will have an image. If the fixer solution is at the correct level, the fixer clears the unprocessed portion of the film during fixing. In automatic processors, if the developer level is too low, the film may emerge with only a partial image (depending on the system used) or it would appear underdeveloped because it would not have been immersed in sufficient developer solution to achieve the recommended development time.
- If films are left in the rinse water for prolonged periods, such as overnight or over a weekend, the film emulsion may separate from the film base.
- In manual processing, be sure films are kept separate. Films can adhere to each other or to sides of the tanks, causing incomplete development of the image or causing a portion of the emulsion to separate from the base.
- Localized contact with developer and/or fixer solutions either prematurely or for prolonged periods can result in small light or dark areas.

**HINTS:**
- Check solution levels daily. Levels drop due to evaporation and absorption by films.
- Overwashing radiographic film will eventually loosen the emulsion from the film base and cause it to slip off completely or in pieces.
- When manually processing with more than one film hanger at the same time, immerse hangers separately and maintain some distance between them during processing.
PROBLEM: Portion of radiograph is unexposed.

POSSIBLE CAUSE: 
- Portion of film packet partially outside of exposure area.

HOW TO CORRECT:
Exposure Errors: 
- The edge of the rectangular or circular lead-lined PID (position indicating device) appears on the film due to an alignment problem. (See diagrammatic explanation on page 3).

HINTS: 
- Use PID with a metal indicator arm. This enables the radiographer to direct the PID vertically and horizontally and avoid alignment problems.
PROBLEM: White marks on the final radiograph.

POSSIBLE CAUSES:
- Air bubbles.
- Contact with dry or liquid fixer.
- Pre-exposure bending, kinking or crimping of intraoral film packet.

HOW TO CORRECT:
Manual Processing: • When film is processed manually, air bubbles can cling to the surface of the film, preventing the developer from reaching the emulsion beneath. An air bubble allowed to remain on the film causes a white (unprocessed) spot on the radiograph. To avoid a problem with air bubbles, strike film hanger on edge of tank as it is immersed into the developer and move films up and down in the solution a few times. • Contact with dried fixer on a counter top or with fixer splashes before processing will also show up as a white spot on the final radiograph. • If films touch one another or the sides of the tank during processing, the finished radiograph will show white or brown spots depending on the processing state in which they occurred. • If film packets are bent forcefully to conform with the patient’s mouth, the stress placed on the film’s emulsion can cause a white, crescent-shaped crimp mark to appear on the radiograph.

HINTS:
• Keep darkrooms clean.
• Clean up all chemical splashes immediately.
• Handle film and film packets carefully.
• Avoid physical strains such as pressure, creasing, or buckling.
**Figure 19A:** Streaking marks on radiograph due to dirty rollers in automatic processor. The dense central portion of the radiograph is believed to have been caused by dirty material on the rollers.

**Figure 19B:** Surface markings that appear on radiograph shown in Figure 19A (seen through reflected light). Streaks were caused by a dirty processor.

**Figure 20:** Plus-density crimp mark resulting from bending or crimping the film after it has been exposed.

<table>
<thead>
<tr>
<th><strong>PROBLEM:</strong></th>
<th>Dark marks on the final radiograph.</th>
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<tbody>
<tr>
<td><strong>POSSIBLE CAUSES:</strong></td>
<td>Dirty rollers in processor. • Post-exposure kinking or crimping of film packet.</td>
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<tr>
<th><strong>HOW TO CORRECT:</strong></th>
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<tr>
<td>• In automatic roller processor systems, run &quot;clean-up&quot; film through the processor every morning after starting system. The clean-up film is specially designed to pick up lint and debris from rollers. • Handle film carefully. Rough handling, bending or creasing of film after exposure may cause a black artifact to appear where stress was placed on the emulsion. The sensitivity of film increases at the site where creased, leaving a black mark sharply defined on the film.</td>
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<tr>
<th><strong>HINTS:</strong></th>
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<tr>
<td>• To avoid stressing the emulsion or creasing or bending film, hold film only at the corners and allow it to hang downward, versus straight out. • Turning the white lights on in a darkroom before the film has completely entered an automated processor can create a black line on the trailing edge of the film.</td>
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PROBLEM:
Black or white fingerprint marks on final radiograph.

POSSIBLE CAUSES:
- Developer solution on fingertips will produce black markings on the final radiograph.
- Some fluorides, notably stannous fluoride, will produce black artifacts on a radiograph if it has contact with exposed but unprocessed film.
- White fingerprint marks can be caused by fixer solution or oily substances on the fingers that prevent the emulsion from developing.

HOW TO CORRECT:
- Once fluoride compound has gotten on the hands, washing with soap and water will not remove the material. Remove stannous fluoride quickly by wiping hands with a mild acid like vinegar or lemon juice.
- White fingerprint marks can be easily prevented by following simple hand washing procedures. Hands should always be washed before handling unpackaged film in the darkroom.

HINTS:
- The use of latex gloves during patient contact will reduce the incidence of contaminated fingers coming in contact with the film, provided the gloves are removed before the film is taken from its protective package and handled in the darkroom.
- In order to avoid handling contaminated packets when not wearing protective gloves, the use of KODAK Intraoral Dental Films with CLINASEPT Barriers or CLINASEPT Barrier Envelopes is helpful. The barrier envelope protects the outer surface of the film packet from oral contaminants while in the mouth. With protective gloves on, the barrier envelope is opened, disposed of properly, and the exposed film packet is dropped into a clean receptacle. After removing the gloves, packets can be moved to the darkroom for safe handling and processing. Kodak does not recommend soaking film packets in cold sterilization fluids before unpackaging film.
PROBLEM:
Tree-like markings on radiograph; black smudge marks on radiograph.

POSSIBLE CAUSES:
• Static electricity markings on film are frequently caused by low humidity or static producing objects. • Some synthetic materials used in uniforms can also be a source of static. • Static electricity can also cause a localized overexposure. The black mark usually appears to be a smudge. Protective latex gloves are one source of static electricity that produces a black, smudge-like image on the radiograph.

HOW TO CORRECT:
• Increase the humidity in the room where the film is stored and used (30-50% is recommended). • Remove film slowly from its protective wrapper. If you pull an x-ray film from its wrapper too rapidly in a dry atmosphere, a small charge of electricity can be released. • Place rubber mats on the floor below where film is unwrapped. • Avoid wearing uniforms made of certain synthetic materials that cause static.

PROBLEM:
Overlapping images.

POSSIBLE CAUSE:
• Two exposures were made on the same film packet.

HOW TO CORRECT:
• Establish a protocol which will prevent packets from being reused before processing. • Create separate sites where you consistently place exposed and unexposed film. To avoid inadvertent secondary exposure of the film, these sites should be located away from the patient exposure area.
### PROBLEM:
Underexposed radiograph with a special or continuous pattern.

### POSSIBLE CAUSE:
- Film packet was positioned backwards and exposed through the back side of the packet.

### HOW TO CORRECT:
- Establish a protocol to prevent packets from being positioned backwards in the mouth.

### HINTS:
- When the packet is positioned so that the back side is facing the x-ray head, the lead foil insert in the packets will leave a pattern on the radiograph or across two edges of the film. This image gives the appearance of having been exposed twice because two images are seen. All intraoral film packets essentially are assembled in the same way. The “tube side” of the packet, the surface that faces the x-ray tube, is white paper or plastic and has a smooth or slightly textured surface to prevent slippage. The tube side also has a small embossed identifying dot near one of the corners. This dot is embossed in the same position on each film and can be used as a positioning aid to distinguish between the patient’s right and left side.