

Air Techniques ScanX® Phosphor Storage Plates (PSP) - Reversed Image Prevention (8/08)

In early 2008, [DECS reported the potential for radiographs to be inadvertently reversed when using the Air Techniques ScanX® Phosphor Storage Plate \(PSP\) system](#). Air Techniques PSPs have two sides: a non-sensitive black side with printing, and the radiographic sensitive side with a blue (intraoral PSP) or white (panoramic) hue. Images exposed from the non-sensitive or black side of these PSPs are indistinguishable from images properly exposed, thus creating the potential for a wrong site surgery/procedure. DECS recently completed an evaluation to prevent inadvertent reversed imaging by applying copper tape, as an external radiographic marker, to the non-sensitive side of the Air Techniques PSP. DECS found that application of this tape provides an adequate radiopaque marker to alert dental practitioners that an image has been inappropriately exposed with the x-ray beam directed through the wrong side of the PSP. The accompanying [PowerPoint \(PDF file\) presentation](#), Phosphor Storage Plate (PSP) Reversed Image Prevention, provides recommendations for using this marker system in U.S. Air Force Dental Clinics.

DECS tested multiple shapes and different layers of copper tape applied to intraoral size 2 and panoramic PSPs. One layer of copper tape in an “X” shape provided the most practical and visible marker for intraoral imaging. Many of the shapes were obstructed by natural radiopaque anatomy or tended to blend into anatomical features and thus were not reliable markers. The legs of the “X” crossing the majority of different radiographic densities on the intraoral image provided the most consistent marker. Placement of the “X” in the ascending area of the ramus provided a reliable location for the marker on panoramic images. However, one layer of the copper tape for panoramic imaging was deemed inadequate as a marker; thus two layers of tape are required as a minimum and clinics may elect to use three layers (see PowerPoint). Intraoral images were taken with a Planmeca Intra unit at recommended “Adult” settings ranging from 60-63 kV, 8 mA, 0.32 seconds. The panoramic images were made on a Planmeca PM 2002 EC Proline unit (68vp, 0.08mA, 18 seconds) using a cassette with no intensifying screens. Results may vary with different intraoral and panoramic x-ray units. Testing on a “phantom” with reduced time as required for pediatric settings resulted in slightly better radiopacity of the copper tape.

The copper tape applied to the PSP appears compatible with disinfection and the required processing through the ScanX® unit. With careful attention to “burnishing” the edges of the tape on the PSP there appears to be little risk of the tape separating in the processing unit. Large segments of tape were purposely loosely applied to the surface of the PSP and did not separate in multiple trials in the DECS laboratory; the tape simply folded back onto the surface of the PSP after transport through the scanner. Three minute CaviCide® and CaviWipes® disinfections of the copper tape/PSP combination were alternated, dried and then processed through the ScanX® for a total of 20 trials (60 minutes total disinfection time). The PSPs were soaked and overly saturated with the CaviCide® to create a “worst case” evaluation. Minimal separation of the tape from the PSP surface was seen during these trials. Although it appears unlikely that the copper tape will detach from the PSP into the ScanX® unit during processing, clinics should closely monitor the tape and replace it at the first sign of any separation from the PSP surface.

It is recommended that clinics purchase the same copper tape that was used in DECS testing. Most clinics should require only one roll of tape. Guidance for purchasing the tape is listed below.

Copper Tape Source: Foxtronix Incorporated

Description: Copper foil, conductive adhesive version 1.5"

Part Number: CCH-36-101-0150

Price (includes shipping and 3% credit card surcharge):

1 roll of tape @ \$130.00/each

2 rolls of tape @ \$95.00/each

3 rolls of tape @ \$85.00/each

Order by phone or FAX with IMPACT Card (billable at time of shipment)

Phone Number: (937) 866-2112

FAX: (937) 866-3371

Shipment in CONUS by UPS Ground with delivery expected within 1-2 weeks

Shipment OCONUS by U.S. Postal Service to APO/FPO address (shipping costs may be higher)

The following is an Alert that was posted on the DECS Web site in February 2008:

Potential Problem with Air Techniques ScanX® Phosphor Storage Plates (PSP) (2/08)

Summary: The AF Dental Service has recently become aware of a potential for radiographs to be inadvertently reversed when using the Air Techniques ScanX® Phosphor Storage Plate (PSP) system. Images exposed from the reverse (back side) of these PSPs are indistinguishable from images properly exposed, thus creating the potential for a wrong site surgery/procedure. This situation occurs on both the intraoral PSPs as well as panoramic plates. A non-reversed "a" symbol or non-reversed "R" and "L" markers on the digital image are no guarantee that the image was properly exposed. Dental providers are urged to take extreme care when viewing PSP-derived dental radiographs to ensure correct viewing orientation. The AF Dental Service is working closely with the manufacturer to develop a solution.

Background Information: At the request of the AF Dental Service, Force 3, Inc developed the document entitled [*AF DDRS Phosphor Storage Plate Placement Guide: Mitigating the Risk of Wrong Site Surgery Using Air Techniques Phosphor Storage Plates \(see attachment\)*](#). This confirms previous preliminary Air Force trials which showed that incorrect placement and radiographic exposure of an Air Techniques PSP could result in a reversed/mirrored image. Although the Air Force is not aware of any "wrong-site" dental procedures associated with Air Techniques PSPs, there appears to be significant risk for such an occurrence.

Staff Review Recommendations: Air Force dental facilities are highly encouraged to review proper PSP placement within the barrier envelopes and proper intraoral positioning with the entire dental team. Techniques for proper placement of the panoramic plates within the cassettes should be reviewed. Dental officers are encouraged to maintain a high degree of vigilance to ensure that digital radiographic images coincide with dental anatomy, previous restorations and any other anatomical landmarks which could indicate a reversed image.

Product Design/Potential Placement Errors: Air Techniques PSPs have two sides: a



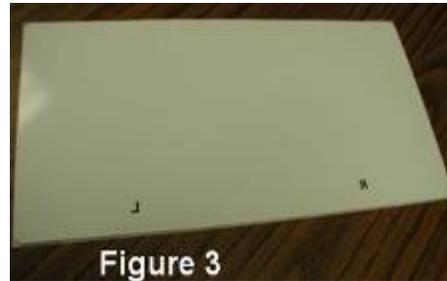
non-sensitive black side with printing, and the radiographic sensitive side which has a blue hue (Figure 1). The intraoral plate is properly placed into a barrier envelope with the printed side visible through the transparent side of the envelope (Figure 2). The PSP is then correctly placed in the mouth when the black, non-transparent side of the barrier envelope is oriented toward the tubehead of the x-ray unit and the transparent side with the underlying printing on the PSP is toward the tongue. If the plate is reversed in the mouth or is incorrectly placed in the protective barrier,

the potential for a reversed/mirror image exists. There is no radiographic marker (e.g., lead foil in conventional x-ray film) on the non-sensitive side of the PSP which would alert the viewer that the image has been taken improperly. An orientation letter "a" is



printed on the intraoral PSP and according to the manufacturer "may be used for reference as you would use the dot on an intraoral x-ray film." However, since the [Air Techniques scanner always scans the image from the sensitive side](#), the "a" will always appear in the appropriate orientation, even if the image was exposed from the wrong side ([Click here](#) for additional information).

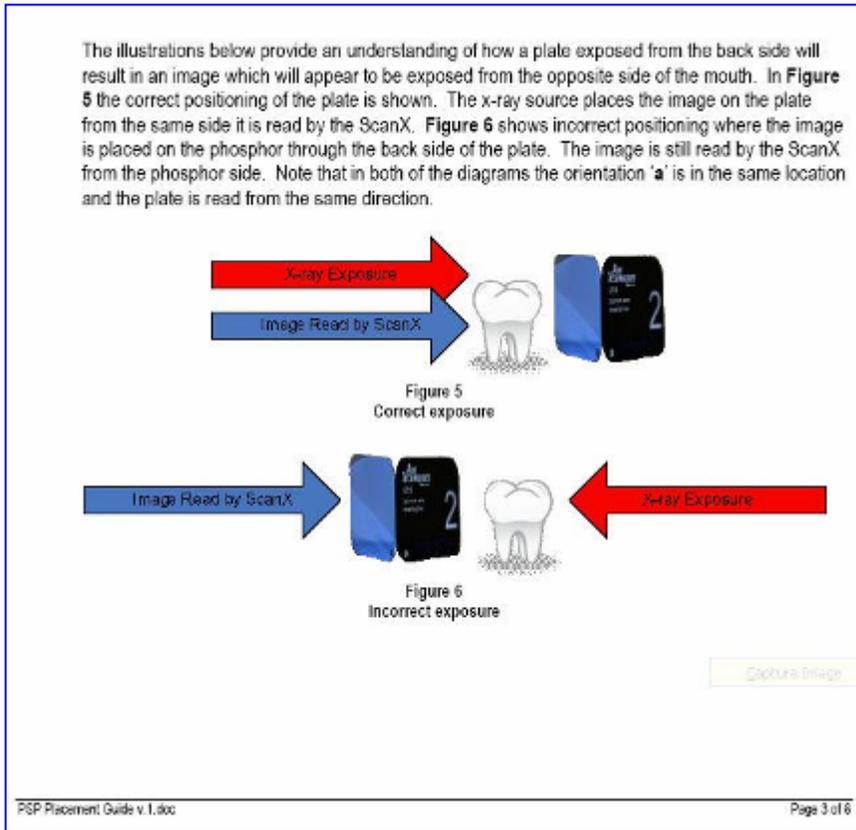
Recent testing of Air Techniques PSP panoramic digital images using a Gendex, Orthoralix 9000 unit, revealed the same potential for reversed images. Since the "R" and "L" radiographic markers are imbedded in the plate on the sensitive side, the same problem occurs as described with the "a" on the intraoral PSPs (Figure 3).



Problem Resolution: The AF Dental Service and DECS are working closely with Air Techniques to reduce the potential for reversed images. A solution devised by Air Techniques would appear to require reengineering the intraoral and panoramic PSPs with permanent radiographic markers on the non-sensitive side of the plates or applying company-approved external markers which are compatible with scanning devices.

UPDATE For the results of a DECS evaluation using copper tape to prevent inadvertent reversed imaging [click here](#).

From the PSP Placement Guide



Air Techniques scanner always scans the image from the sensitive side

