

## SUPPLEMENT TO PEAK KILOVOLTAGE DETERMINATION PROCEDURE

### ROUTINE COMPLIANCE TESTING

### PEAK KILOVOLTAGE DETERMINATION

### RADIOGRAPHIC SYSTEMS

(Test Procedure KVB - Use Form FDA 3068)

### 1.0 GENERAL GUIDANCE

#### INSTRUCTIONS FOR USING THE MINI-X/TIME KVP METER

The MINI-X kVp/Time meter is a self contained, non-invasive kVp meter that can measure x-ray tube potential with an accuracy of  $\pm 2.0\%$ . Since it employs a digital similar to the MDH 1015, the kVp can be determined almost instantaneously during an exposure. Since this involves a departure from the copper filtration method in the compliance test procedures, the following procedure should be used instead:

- 1.1 This kVp test procedure is applicable to single and three phase, stationary and mobile radiographic, medical and dental x-ray equipment with a tungsten anode. It is not applicable to capacitor discharge x-ray equipment.
- 1.2 The kVp test procedure is intended to be used in conjunction with an Abovetable Radiographic (ARA), Mobile Radiographic (MRA), or Dental Radiographic (DRA) Field Test.
- 1.3 This test is only valid for reproducible systems. If it is suspected that the system under test has a reproducibility noncompliance, this test should not be performed.
- 1.4 Record a "B" at data item 1.
- 1.5 Record the five digits, which appear preprinted on the general information test record, into the box in the upper right hand corner of the peak kilovoltage determination test record. Since the test is performed in conjunction with abovetable radiographic, dental radiographic, or mobile radiographic tests, add the same letter designator as on the radiographic test record. Thus test records for an abovetable radiographic/undertable fluoroscopic system would be identified as follows: "G12345" - general information; "AR12345A" - radiographic; "KV12345A" - peak kilovoltage; and "UF12345B" - fluoroscopic.
- 1.6 Turn on the kVp meter with the ON/OFF button (labeled "⊙/○●"). Make sure that the meter is set in the mode to measure the kVp.
- 1.7 The meter is equipped to measure the exposure time in a manner similar to the MDH 1015. If the display has a ":" at the end of the liquid crystal display (LCD), then the meter is in the exposure time mode and has to be switched to the kVp mode. Push the button labeled "kVp/Time" once and the ":" should disappear. The meter is now ready to measure kVp.

## 2.0 TEST SETUP AND PROCEDURE

- 2.1 Place the kVp meter on the table underneath the diagnostic source assembly (DSA).
- 2.2 Make sure that the x-ray beam axis is perpendicular to the kVp meter.
- 2.3 If testing a dental x-ray system, go directly to step 2.7.
- 2.4 The blades of the beam-limiting device should be open wide enough so that the detectors are completely within the x-ray field.
- 2.5 If the x-ray system is equipped with a light localizer, turn it on. On top of the kVp meter, there is a circle labeled "SENSOR AREA". This is the portion of the meter where the radiation detectors that measure the kVp are located. Position the kVp meter in the light field so that the detector area is in the center of the x-ray field. Make sure that the DSA is perpendicular to the face of the kVp meter.
- 2.6 If the filtration in the beam-limiting device is adjustable, adjust it to the value used during the radiographic field test.
- 2.7 Dental Systems: Center the tube head above the circle labeled "SENSOR AREA" so that the end of the cone is in contact with the surface of the kVp meter.
- 2.8 Select the kVp that was used during the BEAM QUALITY test. It must exceed 45 for an accurate measurement. Record at data item 2.
- 2.9
  - a) If independently selectable, choose values of tube current and exposure time that will result in a least 25 mR to the detector. An exposure time setting of 0.100 seconds or greater and an mA of approximately 100 or greater should be sufficient.
  - b) If only mAs is selectable, then a value of 10 mA or greater should be sufficient.
- 2.10 After the exposure is made, the LCD display on the kVp meter blinks for several seconds and stops. The reading the remains after the blinking stops is the measured kVp value.
- 2.11 Record the kVp reading at data item 7. As an example, the data could be entered as "102.40."

NOTE: The following notes pertain to specific error codes that the kVp meter might display. The display codes have the following meanings:

- Er. 1 Low signal.

The detector signal is too low. Increase mA or decrease the distance between MINI-X and the tube.

- Er. 2 High signal.  
The detector signal is too high. Decrease mA or increase the distance between MINI-X and the tube.
- Er. 3 Low kVp.  
The measured kVp is lower than 45 kV.
- Er. 4 High kVp.  
The measured kVp is higher than 155 kV.
- Er. 5 Short exposure time.  
The exposure time is too short, MINI-X cannot calculate a correct kVp-value.
- Er. 6 No exposure time can be calculated.  
Incorrect calculation of exposure time due to a false trigger of the timer. Try with a longer exposure time or a different mA - setting.

If the MINI-X at any time indicates an error that will not disappear after appropriate changes, it would be advised to try a longer exposure time, shorter SID, or higher mA.