**Suggested Laboratory Exercises for Each Chapter**

**GENERAL INSTRUCTIONS FOR LABS**

**Technique Adjustments for Different Machines and Equipment**

The techniques suggested in each of the experiments in this manual are selected for a THREE-PHASE radiographic unit using 400-SPEED INTENSIFYING SCREENS.

The following gross adjustments are recommended as a starting point if your machine or equipment does not coincide with the above:

1. FOR THREE-PHASE MACHINE WITH 200-SPEED SCREENS: Double mA values or exposure times exactly in half for all labs.
2. FOR THREE-PHASE MACHINE WITH PAR-SPEED SCREENS: Quadruple mA values or exposure times for all experiments.
3. FOR SINGLE-PHASE MACHINE WITH 200-SPEED SCREENS: Quadruple mA values or exposure times for all labs.
4. FOR SINGLE-PHASE MACHINE WITH 100-SPEED SCREENS: Eight times mA values or exposure times for all labs.

Blanks are provided on each experiment for alternate techniques to be written in. Once a needed relative change or percentage of change is determined, you should be able to go through the entire manual adjusting all techniques by this amount and writing the results into the alternate technique blanks.

Whatever adjustments are made, be absolutely sure that you do not alter the *relative* changes that are made in the factor under study for a given experiment. For example, if the experiment is on exposure time, and each listed time identified double the previous one, e sure that your changed times maintain this doubling relationship, and don’t change times at all if the adjustments can be made using mA.

**Common Experimental Errors Leading to Poor Results**

1. Not *zeroing* the densitometer before measuring. Observe the densitometer reading with no film as you turn the zeroing knob all the way up and down the range. Make sure that you are set to the *middle* zero mark. (A-1.0 will read as zero again.)
2. Step-wedge penetrometers do not produce the realistic amount of scatter radiation which a real patient does, so on some labs the penetrometer measurements will be unrealistically low.
3. On radiographs of body phantoms, it is sometimes difficult to place the densitometer light aperture exactly where you had it on another film, which causes some inaccuracy. Always pic large enough density areas with fairly homogeneous densities, such as a compact bone area or joint space. The trabecular small densities in the marrow of a long bone make that a poor spot to measure density.
4. When placing two objects next to each other on a film, don’t forget that one may scatter some radiation into the near side of the other. Take your density measurements away from the side that was close to the other object.
5. For an experiment to be valid, *all* other variables, other than the one under study, must be kept equal throughout the experiment. These are too numerous to list, but the most likely problems you will encounter are:
   1. mA stations are often out of calibration.
   2. Timers are often inaccurate.
   3. Processing temperature and concentration (replenishment) vary considerably. When you can, run two films simultaneously or take several exposures on one 14 x 17 inch film.
   4. Using different screens or film during the experiment, especially if one is older than the other. When the lab has not been used for several days, it is a good idea to load fresh film in the cassettes that you will use.
   5. Changing collimation, distance, or focal spot in the middle of your experiment.
   6. Changing machines or phantoms in the middle of your experiment.
6. When taking contrast measurements, be sure to select two film densities that are quite different (one much lighter than the other), so the contrast will be measurable. Always use medium-level densities, not pitch-black or blank areas.