**UW Medicine - Pathology**

400-07-01-03

Instrument Maintenance

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| Adopted Date: 08/91Review Date: 09/05Revision Date: 08/12 |

PURPOSE

To maintain instruments and ensure they are in good working condition. Preventative maintenance and repairs for all non-maintenance contract equipment is done by Scientific Instruments division (543-5580).

PROCEDURE

1. Records
	1. All operating manuals are either in the manuals drawer outside of room AA-108E or in close proximity to the instrument. Please read carefully before operating any of the instruments.
	2. Every component of an instrument ages and deteriorates with use; so a complete quality control program must include regular preventative maintenance (PM). A written schedule for Preventative Maintenance is set up for each instrument by Scientific Instruments. They record each maintenance or function check, any defects detected, and all corrective measures. Records of these inspections are kept in Anatomic Pathology (BB-210), except for records on refrigerators, freezers, incubators, laminar flow hoods and autoclaves, which are kept in the lab (Equipment Notebook located in Supervisor’s Office).
	3. Access to records of individual devices can be retrieved from Scientific Instruments at 543-5580.
	4. Any work done by lab personnel or outside maintenance personnel should be recorded in Equipment notebook under Lab Equipment Maintenance tab.

### Procedures

Regular maintenance and routine function checks for the instruments should be carried out as follows:

1. ***Autoclave:*** Autoclaves used by the Cytogenetics lab must have accurate temperature and pressure gauges for control of sterilization procedures. Records should verify the operating efficiency of autoclaves as checked by spore controls done every week and sent to Microbiology (records of testing are in equipment record book) and by indicator change methods (tape to be used at every autoclaving). Any failure is followed up with corrective action and retested before it is used again. Maintenance is assumed by Operations and Maintenance at (206) 543-3010.
2. ***Balances:*** All balances should be protected against temperature variation, vibration and humidity. Knife edges must be smooth and the pans kept clean. All balances should be checked and serviced annually (Scientific Instrument Division, (206) 543-5580).
3. ***Centrifuges:*** Each centrifuge must be kept in proper mechanical condition by an annual maintenance program providing for regular lubrication, changing of brakes and brushes and detection and replacement of worn bearings (Scientific Instrument Division, (206) 543-5580). Every week, centrifuges should be cleaned with 70% ethanol inside and out by Lab Tech I.
4. ***Incubators:*** Each culture is split among 2 or 3 incubators. The temperature is recorded every day on a sheet on the door of the incubator, then collated in a logbook. The CO2 levels are recorded on the same sheet as the temperature each day and recorded in a logbook. Should be checked daily. If the temperature has deviated from 37°C by 0.5°C, the incubator should be emptied and recalibrated. The water level in the jacket should be checked every month. The water containing Spantabs in the incubator pan is changed every week. Incubators should be kept clean and uncluttered.

Once every 6 mo the incubators should be emptied and cleaned thoroughly with hot water, 70% ethanol and dried. All removable shelves and shelf supports should be autoclaved. Heraeus incubators should go through the decontamination cycle (see incubator manual). The Thermo Forma models should have the HEPA filter changed.

In case of spill on a shelf, replace with a clean autoclaved shelf. The CO2 tank should be checked daily (also see Alarm Systems). Instructions for changing tanks are posted. A system of audible and visible alarms must be attached and monitored 24 hr/day. Instructions for what to do in case of alarm are posted. Switchboard will call Supervisor or faculty on-call (Maintenance by Scientific Instrument Division, (206) 543-5580.)

1. ***pH Meters:*** A manual describing the proper handling and care of electrodes and the preparation, standardization and operation of the pH meter is available at the bench. Individuals using this equipment must be familiar with the maintenance of electrodes and proper preparation of buffers for calibration. The operator must be constantly alert for deviation from the linearity due to amplifier failure and other problems. (Maintenance by Scientific Instrument Division, (206) 543-5580.)
2. ***Computers:*** See computer notebook (on shelves outside of AA108E) and Computer System. Laboratory office (non-imaging system) computers are maintained by Pathology Computer Support (221-5790).
3. ***Microscopes:*** Microscopes must be clean. Objectives and oculars should be protected against scratching, etching and cracking. Oil immersion objectives should be cleaned with lens cleaner daily after use. Organic solvents should be applied to objectives sparingly and with caution. Mechanical stages should be properly adjusted and lubricated. Condensers should be easily adjusted, free from scratches and clean. Light sources must be of sufficient intensity to provide adequate adjustable illumination. Cleaning and maintenance of all microscopes should be performed annually by a specialist (Scientific Instruments Division, (206) 543-5580).
4. ***Refrigerators and Freezers:*** All refrigerators and freezers must be maintained in a proper working order with regular inspection and maintenance schedules for compressor and fan. The temperature range should be determined daily by a maximum and minimum thermometer to confirm proper operation temperatures. For a refrigerator, the temperature must be maintained between 2°C and 6°C with a range of fluctuations of no more than 2°C. For a freezer, temperature is –20°C with fluctuations to –10°C. The temperatures are checked every day and recorded on a sheet on the door of the instrument. The freezers are on an alarm system (see Alarm Procedure III). The storage of food or other extraneous items in laboratory refrigerators is strictly forbidden. Maintenance is done by Refrigeration Shop (call Facilities Services at (206) 598-4911.) For the Thermo ultra-low freezer, the correct temperature is –73°C +/- 2°C. The Lab Tech 1 is responsible for keeping the pressure equalization vent clear of ice monthly.
5. ***Waterbaths and Dry Heat Blocks:*** Waterbaths and dry heat blocks must be kept clean and must have an accurate thermometer to monitor temperature range and stability. Waterbath and dry heat blocks should be checked regularly with certified thermometers. The temperature should be recorded each day of use. Thermometers in dry heat blocks should be immersed in a nonvolatile liquid. (Maintenance by Scientific Instrument Division, (206) 543-5580.)
6. ***Thermocycler for PCR:*** Clean with alcohol. This instrument is tested and yearly preventative maintenance by Scientific Instruments (206-543-5580) for accurate temperature function.
7. ***Laminar flow hoods [Biosafety Hood (BioGard)]:*** Lab personnel are required to keep the working surface of the hood clean using 70% Ethanol after set up of each specimen, culturing or harvesting. A thorough cleaning using 5% bleach and vacuuming the area under the work surface should be done every 6 months. Environmental Health and Safety provides yearly testing and certification (but not PM) about every Spring. Records of certification and maintenance are kept in the lab in the Equipment Records Notebook. They recommend replacing filters when their testing indicates it (about every 4 years). They sterilize whenever the filters are changed. EH&S 411 Hall Health Box 354400 VM:206-685-9343, PH: 206-543-9510, FX: 206-616-3360. Filters can be purchased from AAA Aircare Inc. 206-367-8600.
8. ***Imaging systems (Applied Imaging and Applied Spectral Imaging):*** AI (Cytovision system) maintenance contract must be evaluated and renewed yearly
9. ***Thermotron:*** This is maintained by Scientific Instruments but needs to be routinely filled with H2O and cleaned by laboratory personnel.
10. ***Micropipettes:*** Scientific Instruments machine shop does a yearly Preventative Maintenance and calibration; currently by Eric Strakbein at 616-5074 choice #2 or 685-0360. Micropipettes can also be cleaned and calibrated outside of the scheduled PM by request. Records are kept in Equipment notebook under the calibration tab. Any micropipettes not meeting the proscribed error after repair and calibration are replaced. The Laboratory supervisor or his/her designee will check all instruments every September to see that the yearly PMs have been done.
11. ***Thermometers:*** All thermometers used in the Cytogenetics laboratory should be non-mercury when possible (current exception is all Incubator thermometers) and NIST certified or NIST traceable. Only the Ertco Min/Max thermometers are not NIST certified and should be calibrated by comparison with a NIST standard device before use. Once a year calibration is done for all thermometers using a reference standard thermometer from Lab Medicine. Any thermometers that have greater than 0.8% error over their range (>0.3° C) are replaced.

Written By: Director Approval:

(Signature and Date) (Signature and Date)

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Cytogenetic Supervisor