# Module 5: Routine/Preventative Maintenance of Equipment

## Key Message …

My lab maintains equipment to provide uninterrupted service.

## Desired Outcome

Equipment functioning all the time to ensure uninterrupted and quality service.

# Laboratory Equipment

Well maintained equipment is critical to the operations of any laboratory

- Assures testing is accurate and reliably available for patient care needs
- Prevents instrument failures and prolongs life of the instrument

# No patient results should be reported until:

- Maintenance is performed, acceptable and documented
  - Daily maintenance procedures
  - System checks
- Quality control is performed, acceptable, and documented

# Tasks

- 5.1 - Consolidate and post equipment service information at site
  - Contact
  - Service frequency
  - Dates
- 5.2 - Ensure proper preventative maintenance on instruments when used
  - Cleaning
  - Proper shutdown
- 5.4 - Review and sign maintenance logs to ensure regular preventative maintenance and timely repairs

Not documented, not done!

# Creating a Maintenance and QC Log

# Operator's Manual

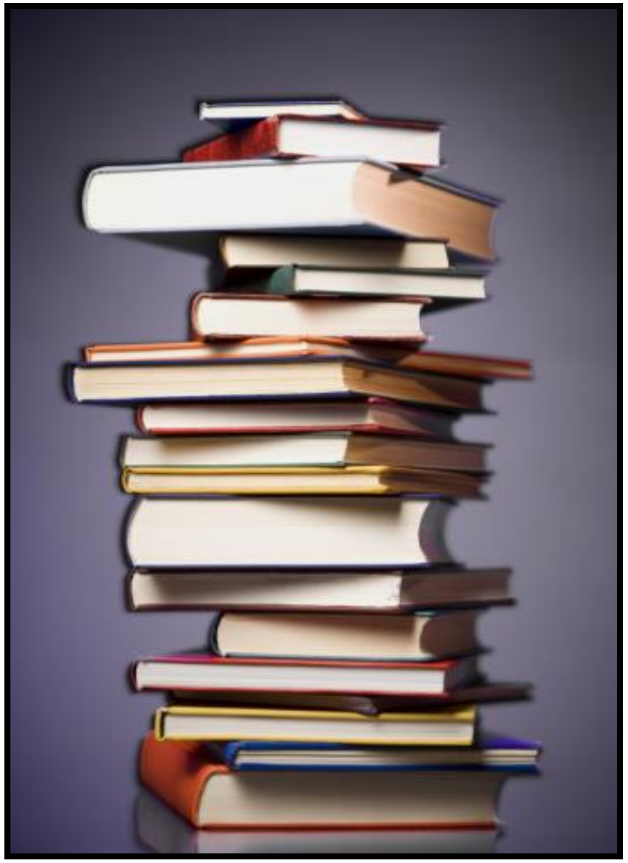
- Preventative maintenance procedures and schedules are indicated
- Frequently includes maintenance logs that can be photocopied
- Step-by-step instructions are provided to perform maintenance, system checks and basic troubleshooting.
- Explanation of error codes and alerts

# Standard Operating Procedures (SOPs)

- Current
- Easily accessible at the workbench
- Available for all tests performed
- Customized to reflect site-specific instructions
- Provide step-by-step instructions

# Instrument Records

- Maintenance Logs
  - Daily
  - Weekly
  - Monthly and Periodic
  - Calibration
  - Corrective Action
  - Quality Control Logs
- Service Logs



# Reagent Log

- Documents the reagents on-board
- Should include:
  - Opened date
  - Manufacturer's expiration date
  - Lot number
  - On-board expiration date
  - Initials

# Activity: Creating a Maintenance and QC Log

## Purpose

To create an instrument log

## What will you need?

- Handout 1: Reflotron Operator's Manual Excerpts
- Worksheet: Creating a Maintenance/QC Log

## What will you do?

Work in pairs (groups of 2)

- Read Handout 1
- Create a Maintenance and QC log (Worksheet) for the Reflotron based on information supplied in the Handout 1

15 minutes

# Roche Reflotron Plus


Photograph from Reflotron Plus Operator's Manual. Roche Diagnostics, November 2007
Permission granted for use May 5, 2009

# Suggested Format Example

Reflotron Plus Maintenance and QC Log

Month _____ Optic Check | Precinorm U | Bilirubin Test Strips | Creatinine Test Strips

Year _____ lot number _____ | lot number _____ | lot number _____ | lot number _____

exp date _____ | exp date _____ | exp date _____ | exp date _____

| Date | Initials | Clean | Optic Check | | | Precinorm U | | Notes |
|---|---|---|---|---|---|---|---|---|
| | | | 642 nm | 567 nm | 951nm | Bilirubin (umol/L) | Creatinine (umol/L) | |
| | | *acceptable range* | | | | | | |
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Supervisor Review/Date: _____

Reflotron Plus Analyzer M/QC: #1-October 8, 20XX

# Applied Log Example

Reflotron Plus Maintenance and QC Log

Month March | Optic Check | Precinorm U | Bilirubin Test Strips | Creatinine Test Strips

Year 20XX | lot number 1234 | lot number A231 | lot number B32 | lot number C84

exp date 15/1/20XX | exp date 15/4/20XX | exp date 5/30/20XX | exp date 6/30/20XX

| Date | Initials | Clean | Optic Check | | | Precinorm U | | Notes |
|---|---|---|---|---|---|---|---|---|
| | | | 642 nm | 567 nm | 951nm | Bilirubin (umol/L) | Creatinine (umol/L) | |
| | | acceptable range | 630 - 650 | 631 - 651 | 622 - 642 | 14.5 - 15.5 | 55-65 | |
| 1/3/20XX | TU | | | | | 14.3 | 55 | |
| 2/3/20XX | AM | ✓ | 632 | 633 | 628 | 15.1 | 62 | |
| 3/3/20XX | LS | | | | | 14.9 | 57 | |
| 4/3/20XX | AM | | | | | (15.8) | (68) | excessive serum noted on holder, cleaned transporter |
| 4/3/20XX | AM | ✓ | 640 | 639 | 631 | 14.8 | 61 | performed check, repeated QC; check & QC acceptable |
| 5/3/20XX | AM | | | | | 15.2 | 60 | |
| 6/3/20XX | TU | | | | | | | |
| 7/3/20XX | AM | | | | | 14.8 | 60 | |
| 8/3/20XX | BW | | | | | 14.7 | 63 | |
| 9/3/20XX | TU | | | | | 15.2 | | |
| 10/3/20XX | TU | | | | | 15.1 | 61 | |
| 11/3/20XX | BW | ✓ | 641 | 639 | 632 | 14.8 | 60 | new bottle Optic; same lot number |
| 12/3/20XX | BW | | | | | 14.6 | 58 | |
| 13/3/20XX | LS | | | | | 14.8 | 59 | |
| 14/3/20XX | AM | | | | | (15.7) | (67) | excessive serum noted on holder, cleaned transporter |
| 14/3/20XX | AM | ✓ | 640 | 641 | 630 | 15.1 | 59 | performed check, repeated QC; check & QC acceptable |
| 15/3/20XX | BW | | | | | 14.7 | 63 | |

Supervisor Review/Date: CCL 7/3/20XX CCL 14/3/20XX

Reflotron Plus Analyzer M/QC: #1-October 8, 20XX

# Tasks

- 5.3 - Perform and record troubleshooting on malfunctioning equipment
- 5.5 - Take corrective actions or issue repair orders and record all issues
- 5.6 - Follow-up on all corrective action
  - See if equipment is properly functioning
  - Observe for trends
  - Determine training needs
- 5.7 - Communicate to upper management equipment specifications and maintenance needs

# Activity: Making a Service Call

## Purpose

To make a service call, document it, and follow-through until the issue is resolved.

## What will you need?

- Handout: L-J Chart
- Worksheet: Corrective Action Log

## What will you do?

- Review the Handout to understand the instrumentation issue presented in the scenario
- Document the corrective action on the Worksheet
- Role-play calling the instrument's service contact number.

25 minutes

# Levey-Jennings (L-J) Chart

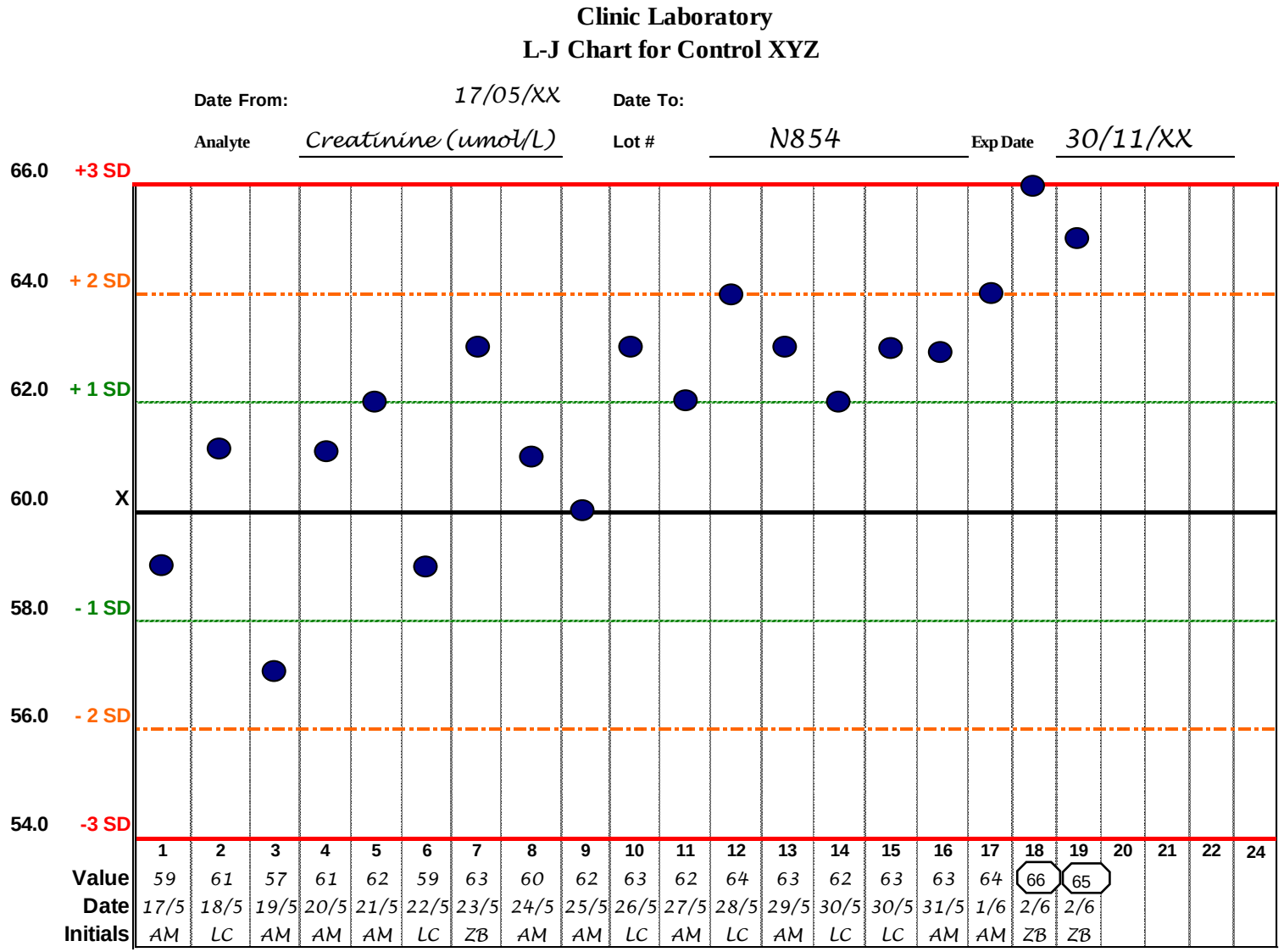


Photo from Cape Regional Medical Center

# Tool Kits

- Provided by manufacturer
- Includes specific tools to perform maintenance and troubleshooting
- Stores commonly needed spare parts (bulbs, filters, probes, and tubing)

Photo from Cape Regional Medical Center

# Activity: Workstation Set-up

## Purpose

To create and organize an efficient and productive workstation using elements developed from each module.

## What will you do?

- Participate in the classroom's discussion
- Integrate key concepts from earlier activities

## What will you need?

Laboratory Accreditation Preparedness Checklist

15 minutes

# Information and Supplies at the Instrument's Workstation

- Operator's manual
- SOP for the analyzer
- Supplies to perform maintenance and testing
- Instrument logs
- Toolkit
- Contact information
- Supplies (gloves, waste receptacle)
- Extra Reagents (if space permits)


Photo from Cape Regional Medical Center

# MICROSCOPE WORKSTATION MONTHLY MAINTENANCE LOG

Reviewed by / date:
AM 4/5/XX
AM 11/5/XX
AM 18/5/XX

month/year May 20XX

| | | KOH | NaCl |
|---|---|---|---|
| Chemtreck Wright Stain | | | |
| lot # | WS0845A | SA#73 | SA#1123 |
| exp date | 12/09/XX | 13/07/XX | 21/06/XX |

| DAY | WRIGHT STAIN | | CENTRIFUGES | EYE WASH STATION | WORK SURFACES | 10% KOH | | 0.9% NaCl | | MICROSCOPE | INITIALS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | no ppt/ quality O.K. (each day of use) | changed (weekly) | cleaned (weekly) | checked & flushed; caps cleaned with 10% bleach (weekly) | cleaned with 10% fresh bleach sol'n (daily) | no ppt or contam. (each day of use) | changed (weekly) | no ppt or contam. (each day of use) | changed (weekly) | oil removed with lens paper, 10x objective in position, light source off, covered (after each day of use) | |
| 1 | ✓ | | | | ✓ | | | | | ✓ | RSM |
| 2 | ✓ | | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | RSM |
| 3 | ✓ | ✓ | | | ✓ | ✓ | | | | ✓ | TY |
| 4 | ✓ | | | | ✓ | ✓ | | ✓ | | ✓ | TY |
| 5 | | | ✓ | ✓ | ✓ | | | | | ✓ | RSM |
| 6 | | | | | ✓ | ✓ | | | | ✓ | RSM |
| 7 | ✓ | | | | ✓ | | | | | ✓ | RSM |
| 8 | ✓ | | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | RSM |
| 9 | ✓ | ✓ | | | ✓ | | | | | ✓ | LLC |
| 10 | | | | | ✓ | | | | | ✓ | RSM |
| 11 | ✓ | | ✓ | | ✓ | ✓ | | ✓ | | ✓ | RSM |
| 12 | ✓ | | | ✓ | ✓ | ✓ | | | | ✓ | TY |
| 13 | ✓ | | | | ✓ | ✓ | | | | ✓ | LLC |
| 14 | ✓ | | | | ✓ | | | | | ✓ | RSM |
| 15 | ✓ | ✓ | | | ✓ | | | | | ✓ | RSM |
| 16 | ✓ | | | | ✓ | | | | | ✓ | RSM |
| 17 | ✓ | | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | RSM |
| 18 | ✓ | | ✓ | ✓ | ✓ | | | | | ✓ | TY |
| 19 | ✓ | | | | ✓ | ✓ | | ✓ | | ✓ | TY |
| 20 | ✓ | | | | ✓ | ✓ | | ✓ | | ✓ | TY |

Date: Initials:

| | | |
|---|---|---|
| 16/05XX | replaced microscope bulb | RSM |
| 19/05/XX | biomed engineer checked rpm's and timer on centrifuge; service report filed | TY |

# Ancillary Equipment

## Require Periodic Maintenance and Service

- Maintenance logs
- Service orders
- Replacement parts and supplies

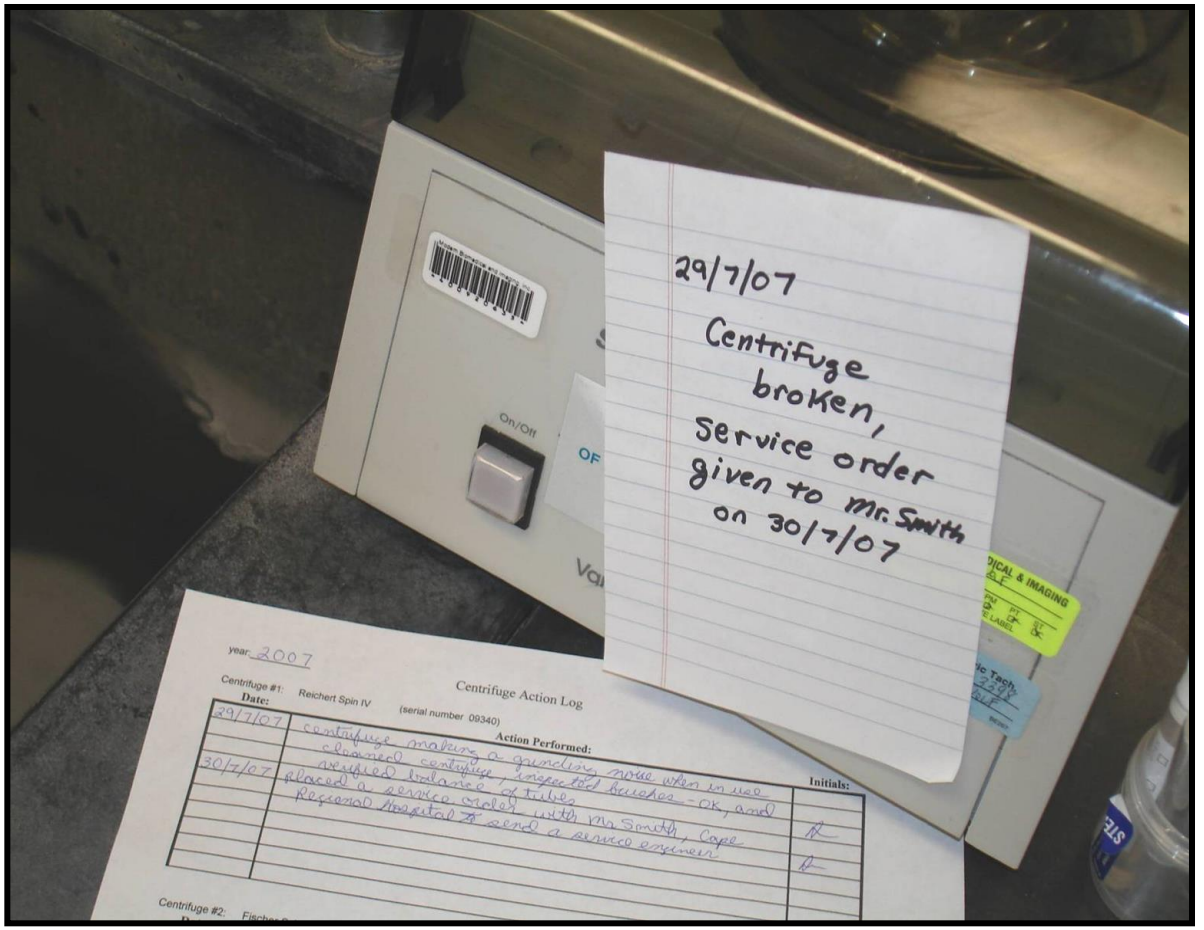


Photo from Cape Regional Medical Center


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# Activity: What Would You Do?

## Purpose

To integrate the module's lessons and apply them to the case scenario.

## What will you need?

Handout: Case Study Scenarios

## What will you do?

Divide into groups of 4-5

- Select a spokesperson for your group
- Formulate specific action steps to address the scenario from the Handout.
- The group's spokesperson presents the proposed steps during the 2 minute class report.

5 minutes

# What Would You Do?

Upon monthly review of the maintenance and temperature charts, it appears documentation was missed on most days.

How will you address:

- The staff member who is responsible for performing and documenting the activities?
- The staff member who says they forgot or did not know it was expected?
- The staff member who explains that at the beginning of the month, the past month's charts were still posted and the new month's charts were not available?

# Tasks

- Consolidate and post equipment service information at site
- Ensure proper preventative maintenance on instruments when used
- Review and sign maintenance logs to ensure regular preventative maintenance and timely repairs
- Perform and record troubleshooting on malfunctioning equipment
- Take corrective actions or issue repair orders and record all issues
- Follow-up on all corrective action
- Communicate to upper management equipment specifications and maintenance needs