**Manual Conventions**

For the purposes of this user’s guide, the following naming conventions are used.

COBAS MIRA Classic Analyzer = Classic  
COBAS MIRA S Analyzer = S  
COBAS MIRA L Analyzer = L  
COBAS MIRA Plus Analyzer = Plus  
COBAS MIRA Plus CC Analyzer = Plus CC
# Table of Contents

Overview .................................................. 1  
COBAS MIRA Software Versions .................. 3  
Daily Startup – Summary ................................. 5  
Calibration and Control – Classic, S, and L ........ 7  
Quality Control Files .................................. 11  
Worklist ................................................... 13  
Start and Stop ............................................. 15  
Deleting Worklists ..................................... 17  
COBAS MIRA Maintenance ......................... 19  
ISE Maintenance ....................................... 29  
COBAS MIRA Troubleshooting ...................... 35  
Troubleshooting for the ISE Module ............. 39  
Troubleshooting for Probes and Pipettors ....... 49  
Flags and Messages .................................... 51  
Error Codes .............................................. 55  
Non-Routine Procedures ............................ 57  
COBAS MIRA Spare Parts List ..................... 59  
Interfacing to COBAS MIRA Systems .......... 61
Overview

1. The 40-Character printer is mounted in the upper left side of the chassis on the L, S, and Plus modules. The Classic printer is located on the cover of the instrument.

2. Z Needle Carriage Assembly contains the sample tip, reagent head assembly, and probe.

3. Transfer Arm Assembly holds the 100 µL sample pipette, 1,000 µL reagent pipette, and the Z needle carriage assembly.

4. The CRT is mounted to the right of the printer. The intensity control is located to the left of the mainpower switch.

5. The Analyzer Assembly contains six segment chambers and the photometer optics.

6. The Automatic Cuvette Changer is only found on the S and the Plus CC.

7. The rack plate Assembly on the S and Plus CC analyzer is refrigerated. The Classic, L, and Plus rack plates are not refrigerated.
COBAS MIRA Software Versions

**Classic**

Software version 8735 or 8847

**S, L**

Software version 8847

**Plus, Plus CC**

Software version 9215

To verify the software version of the instrument, press <Program> <6> <6> Instrument configuration and view the System Program information.
Daily Startup — Summary
(For details see COBAS MIRA Maintenance and ISE Maintenance sections.)

Daily Operation
1. Switch on the COBAS MIRA analyzer.
2. Enter “Operator Code” and “Password” if required.
3. Perform daily maintenance (COBAS MIRA System and ISE) according to the maintenance log sheet. (See Maintenance section.)
4. Prepare reagents as needed. Place in appropriate positions on the reagent racks.
5. Prepare CAL-CS rack: replace tip cleaner; replace controls.
6. Program worklist (see pages 13-14).
7. Prepare sample cups and place in appropriate sample rack position.
8. Place racks on the rack platform. (With rack cooling, place refrigerated reagents to the left and room temperature reagents to the right).
9. REMOVE ALL REAGENT CAPS.
10. Replace cuvette segments if necessary.
11. Press <START>.

Daily ISE Module Startup
The ISE Module should always be left on.
1. Check Standards and Reference Solutions; swirl bottles to remove inside condensation. Replace the bottles if almost empty.
2. Switch on the COBAS MIRA analyzer.
3. Prime the ISE module, standards, and mixtower.
4. Provide serum on CAL-CS 8 rack for activation and fluid adjust. (This rack position is defined under <PROG> <6> <1>.)
6. Place samples and controls on appropriate racks. Program the worklist.

Daily Shutdown – Plus, S/L, and Classic (Software Version 8847)
1. At the end of the day, perform a needle/tube clean with a 1:4 dilution (25%) of Clorox brand bleach (unscented). Place a full 4 mL container of 25% Clorox in the tip cleaner position of the Cal/CS 8 rack. Press <INFO> <6> <9> <F1> Start.
   Set the screen as follows:
   - Number of sequences: 4
   - Prime Time: 300 S
   - Reagent: ON
   - Sample: ON
   This procedure takes approximately 6 1/2 minutes. Press <ESCAPE> when complete.
Daily Startup

Daily Shutdown – Plus, S/L, and Classic (Software Version 8847) (cont’d)

2 Classic (Software Version 8735G)
   1. Prepare three sample cups with 25% Clorox.
   2. Prepare 10 mL reagent container with 25% Clorox.
   3. Request on worklist the CLRX test five times on each sample cup.
   4. Press <START> (allow to run).
   5. Prime for 5 minutes afterwards.

NOTE Z-position DOWN.
Calibration and Control – Classic, S, and L

Calibration Requests

1. Press <ROUTINE>. In place of sample cup position, type “PC” to calibrate without assaying patients. This orders controls at the same time.

2. Select appropriate test(s) to be calibrated and press <ENTER>. The request leaves the screen and can be reviewed under <INFO> <3> Calibration Control. Precalibration requests flash. Control requests flash in <INFO><4> Quality Control.

3. Place calibrator(s) in appropriate position(s) on calibrator rack. Press <START> when ready to calibrate.

- An alternative to the PC request is CA. This form of calibration request is only started if patient requests for the test are on the worklist. Controls must be requested by the “CS” command below.

- A precalibration request can be changed to a calibration request (SW ≥8847.AB). This removes the precalibration request from the worklist if no patients are ordered. The “PC” command may not be used for the ISE tests.

Control Requests

Perform the following in place of sample cup position on the Routine or STAT worklist.

1. Type “CS.” Controls will be assayed if patient requests for the tests are ordered on the worklist.

2. Select the appropriate test(s).

3. Press <ENTER>. Request leaves the screen and can be reviewed under <INFO> <4> Quality Control. Controls requested by this method are displayed as green letters on a black background.

- If controls are not defined in the test parameters, run controls as patients. Defined controls run automatically after each precalibration request or as programmed.
Calibration and Control

Calibration and Control – Plus

Calibration Requests
1. Press <ROUTINE> <F3> Action.
2. Type “PCA” to calibrate without assaying patients.
3. Select appropriate test(s) to be calibrated and press <ENTER>. The request leaves the screen and can be reviewed under <INFO> <3> Calibration Control. Precalibration requests flash.
4. Place calibrator(s) in appropriate position(s) on calibrator rack. Press <START> when ready to calibrate.

<i>Note</i>
An alternative to the PCA request is CA. This form of calibration request is only performed if patient requests for the test are on the worklist.

<i>Note</i>
A precalibration request can be changed to a calibration request (SW > 8847.AB). This removes the calibration request from the worklist if no patients are ordered. The “PCA” command may not be used for the ISE tests.

Control Requests
2. Type “PCS” to assay controls without patients.
3. Or type “CS” to assay controls and patients.
4. Select the appropriate test(s) for controls and press <ENTER>. The request leaves the screen and can be reviewed under <INFO> <4> Quality Control. Precontrol requests flash. Control requests are not highlighted.
5. Place controls in appropriate positions on calibrator rack. Press <START> to assay.

<i>Note</i>
A precontrol request can be changed to a control request. This removes the control request from the worklist if no patients are ordered. If controls are not defined, run controls as patients. The “PCS” command may not be used for the ISE tests.

For all COBAS MIRA Analyzers:

Changing Calibrator Values
1. Press <PROG> <5> Racks.
2. Select CAL/CS rack.
3. Press <F3> STD.
4. Type position of the STD to be changed. Press <ENTER>.
5. Press <F1> Change STD.
6. Select the desired test key, or press <SPACE> to change all calibrator values for all tests using this calibrator.
7. Enter the new value. Press <↓> to go to the next test.
8. Press <ESCAPE> when all values have been entered.
Changing Control Values

1. Press <PROG> <5> Racks.
2. Select CAL/CS rack.
3. Press <F2> CS.
4. Type the position of the control to be changed. Press <ENTER>.
5. Press <↓> or <↑> to find desired test.
6. Press <F1> Change Control. Select the appropriate test, or press <SPACE> to change values for all tests using the control.
7. Enter new values. Press <↓> to advance to the next test.
8. Press <ESCAPE> when all ranges have been entered.

Naming Calibrators or Controls

1. Press <PROG> <5> Racks.
2. Select CAL/CS rack.
3. Press <F1> Change Name.
4. Type the cup position of the calibrator or control.
5. Press <ENTER>.
6. Type in the name.
7. Press <ENTER>.
8. Type in the lot number.

Changing Date and Time

1. Press <PROG> <6> System Parameters.
2. Press <5> Set-up Parameters.
3. Press <F1> Modify.
7. Type in “Hour” (24-hour clock). Press <ENTER>.
8. Type in “Minutes.” Press <ENTER>.
9. Press <F2> Time Set to store new time.
Quality Control Files

Closing QC Files

Close the QUALITY CONTROL files on a regular basis to ensure adequate storage capacity for TEST RESULTS, PATIENT FILE, and CALIBRATION CONTROL. The data stored in QUALITY CONTROL may be deleted selectively by test or in its entirety. Closing QUALITY CONTROL causes the automatic printout as defined in OUTPUT MODE, <PROGRAM> <6> <3>. The Monthly Report Parameter under <PROGRAM> <6> <5> must be set to ON. The QC Auto Mode parameter under <PROGRAM> <6> <3> determines the printouts that are generated. STATIST prints statistics only. PLOT prints statistics and plot the data. VALUES prints statistics, a plot, and the daily mean values. All control levels for the specified test are closed.

Ensure that there is an adequate supply of paper on the instrument.

CLOSE QUALITY may be selected from the following areas:

• QUALITY CONTROL assignment table for closing ALL tests. Press <INFO><4> and <F2> CLOSE QUALITY. Confirm by pressing ENTER.

• DAILY or MONTHLY REPORT for closing SINGLE tests. Press <INFO> <4>, select the appropriate test key and press <F4> CLOSE QUALITY. Confirm by pressing ENTER.

• <PROGRAM> <5> <RACKS> CAL-CS 8/30 for closing either all or selective tests.

Change of Control

The change control function is only accessible with an operator priority level 4 defined under <PROGRAM> <6> <4>. For tests with existing MONTHLY QC REPORT, the test file cannot be accessed to change control ranges without first closing the QUALITY CONTROL. Instead, the control ranges may be modified using the CAL-CS 8/30 RACK program section. This updates the ranges in the test file automatically.

Procedure

• Press <PROG> <5>, and the screen displays the different types of racks.

• Press the corresponding number of the desired rack type (CAL-CS 8/30). The screen changes to show the CAL-CS 8/30 assignment table.

• Press <ENTER> or <↓> to move to the following pages or <↑> to review preceding pages. Programmed names and lot numbers for the calibrators/standards and controls are listed next to the corresponding cup position.

• Press <F2> CS and the CONTROL POSITION prompt appears.

• Type in the desired cup position and press <ENTER>. The tests using this control with the assigned values is displayed.

• Press <ENTER> or <4> to move to the following pages or <1> to review preceding pages.

• To change a control range, press <F1> CHANGE CONTROL and the TEST prompt appears.
Quality Control Files

Change of Control (cont’d)

• **Changing only one test:** Select the desired test key (with test level if required). The test and the assigned value is displayed. The value is changed by entering a new concentration. Press <ENTER> to update the corresponding test file.

**Changing more than one test:** Press <SPACE> ALL. The first test and the assigned value are displayed. Type in the new values followed by <ENTER> to the test. Press <↓> and the display changes to show the next test. Repeat until all the tests have been changed. If some tests are not going to be changed, press <↓> until the required test is displayed.

• Press <ESCAPE> and the CAL-CS 8/30 assignment table appears.
Worklist

Programming a Worklist with Patient ID OFF (Classic, S, L)
1. Press <ROUTINE>.
2. Type the cup position where the sample is placed.
3. Press <ENTER>.
4. Select appropriate test(s). Use <F4> Test Level to select tests, profiles, or ratios from different levels.
5. Press <ENTER>.
6. Repeat steps for each patient. Use <F2> To for groups of patients with the same test(s).

**NOTE**  
STAT requests are programmed using the <STAT> key. Remember to press the <START> key after ordering a STAT or adding to the ROUTINE worklist.

Programming a Worklist with Patient ID ON (Classic, S, L only)
1. Press <ROUTINE>.
2. Type the cup position where the sample is placed.
3. Press <ENTER>.
4. Type the patient identifier.
5. Press <ENTER>.
6. Select appropriate test(s). Use <F4> Test Level to select single tests (Levels 1 - 4), profiles (Level 5), or ratios (Level 6) from different levels.
7. Press <ENTER>.
8. Repeat process for each patient.

**NOTE**  
Use <F2> Copy Last for test selection if the patient being programmed has the exact test request as the previous one.

**NOTE**  
STAT requests are programmed using the <STAT> key. Remember to press the <START> key after ordering a STAT or adding to the ROUTINE worklist.

Programming a Worklist with Sample ID OFF, Barcode OFF (Plus, CC)
1. Press <ROUTINE>. Type the sample position, and press <ENTER>.
   The patient is identified only by the sample rack position.
   - Position #1 on the first Sample 30 rack is 1.
   - Position #1 on the first 16A rack is 601.
   - Position #1 on the first 16B rack is 1101.
2. Select tests/profiles/ratios.
   Choices are displayed at the bottom of the screen. Press <F4> Next Set for more choices. Switch to a different level by pressing the level number. Levels 1 - 4 contain single tests; Level 5 contains profiles, and Level 6 contains ratios. The screen remains at the last level selected.
3. Press <ENTER> to store the sample ID and test requests.
   The sample position automatically advances to the next available sample position.
   <F2> To is available for ordering tests on a series of samples.
Programming a Worklist with Sample ID ON, Barcode OFF

1. Enter Sample ID.
2. Enter sample position.
   - Position #1 on the Sample 30 rack is 1.
   - Position #1 on the first 16A rack is 601.
   - Position #1 on the first 16B rack is 1101.
3. Select test/profile/ratio.
   - Choices are displayed at the bottom of the screen. Press <F4> Next Set for more choices. Switch to a different level by pressing the level number. Levels 1 - 4 contain single tests; Level 5 contains profiles, and Level 6 contains ratios.
4. Press <ENTER> to store the sample ID and test requests.
   - The Sample position automatically advances to the next consecutive number if defined as numeric (PROG 6 5).
5. Repeat 1-4 for the next patient. Copy previous test request(s) with <F3> Copy Last.
6. To review the worklist, press <F1> Display.

Programming a Worklist with Sample ID ON, Barcode ON

1. Place the barcode label on the primary tube.
2. Select the corresponding worklist by scanning the instruction ROUT or STAT on the barcode table. The CRT displays the worklist.
3. The IDENTIFICATION prompt appears. Using the barcode pen, scan the barcode label on the primary tube to identify the sample.
4. The prompt "TESTS" appears on the screen. Scan the barcode on the table corresponding to the test, profile, or ratio you wish to run. Complete the request by scanning ENTER.
5. Controls and Calibrations (PC, CAL, PCS, and CS) may also be selected using the barcode table and pen. Scan the action request followed by the tests and ENTER. The "On Request" options are executed when the <START> key is pressed. The Copy Last function may be used by first scanning the primary tube barcode followed by the Copy Last instruction.
6. Press <F1> Display to view the worklist. "****" refers to non-identified sample positions. When <START> is pressed, the barcode reader located in the transfer arm reads all of the primary tubes in the 16A and 16B racks and assigns the sample positions.

Sample positions can be entered manually for samples without barcode labels, with labels that are difficult to read, or specimens in sample cups on a Sample 30 rack.

1. Identify the patient.
2. Press <F2> Sample position. Enter the position using the barcode table or manually through the keyboard.
   - Position #1 on the first Sample 30 rack is 1.
   - Position #1 on the first 16A rack is 601.
   - Position #1 on the first 16B rack is 1101.
3. Select the test(s) and press <ENTER>.
Start and Stop

START and STOP Functions

**Beginning a run** - provide samples, reagents (remove the caps), cuvettes, and press `<STATUS>` and `<START>`.

**Interrupting a run** - use if racks need to be changed, or reagents or samples added. Press `<STOP>` and wait for transfer to go into standby on the status screen before handling racks. Press `<START>` to reinitiate transfer.

**Starting a STAT** - program in STAT worklist; press `<STOP>`. Wait for transfer to go into standby on the status screen before handling racks. Press `<START>` to reinitiate transfer and the STAT processing.

**Terminating the run** - Press `<STOP>` and then `<F1>` Abort to terminate the transfer and analysis run. Requests will be returned to their respective worklists and be repeated the next time `<START>` is pressed.
Notes
Deleting Worklists

To Delete a Complete Worklist

1. Press <INFO>.
3. Press <F1> STAT to delete from the STAT worklist. Press <F1> Interim Report.
4. Press <F4> Delete.
5. Select the specific cup number or press <ENTER> to delete all cups. Select the specific test to be deleted or press <SPACE> for all tests.

If samples remain, press <PRINT> to obtain the tests that have not been run.

To Delete an Incomplete Worklist

1. Press <ROUTINE> (or <STAT>).
   For the Plus, press <F1> Display.
2. Press <F3> Delete.
3. Select the specific cup number or press <ENTER> to delete all samples.
4. Select specific test to be deleted or press <SPACE> to delete all incomplete tests.

<table>
<thead>
<tr>
<th>Status</th>
<th>Text</th>
<th>Highlighter</th>
</tr>
</thead>
<tbody>
<tr>
<td>To Be Done</td>
<td>Green</td>
<td>None</td>
</tr>
<tr>
<td>In-Process</td>
<td>Black</td>
<td>Bright Green</td>
</tr>
<tr>
<td>Completed</td>
<td>Bright Green</td>
<td>Dim Green</td>
</tr>
</tbody>
</table>
Deleting Worklists

Notes
COBAS MIRA Maintenance

Daily Maintenance

1. Dispose of any water remaining in the water reservoir and fill with reagent grade type 1 water.
2. Empty the waste container. Add 300 mL of Clorox bleach to the waste container. Replace both containers on the instrument.
3. Check for an adequate supply of paper on the printer. Change if necessary.

Procedure:
Remove old roll:
1. Remove paper cover from top of instrument.
2. Pull up on old roll and tear off roll with spindle.
3. Remove plastic spindle and save.
4. Press <PAPER> until the rest of paper from the old roll comes out the front of the printer.
   DO NOT PULL PAPER THROUGH THE PRINTER.
5. Release paper lever on right-hand side, and pull out remainder of paper.

Feed in new roll:
1. Put plastic spindle through the new roll.
2. Cut a pointed arrow head at the end of paper by cutting the corners at an angle. Remove all paper glue and jagged edges.
3. Release the printer lever.
4. Hand feed the angled edge through the opening at the top of the printer.
5. When edge of paper comes out of the front of the printer, check to see that the paper is straight.
6. Close the paper lever to hold the paper in place.
7. Press <PAPER> to feed.
8. Test paper by pressing <PRINT>.

The printer uses thermal paper which is heat sensitive on only one side. The print on this type of paper fades over time. Photocopy all printouts to be kept for permanent records.

4. Inspect sample needle and reagent probe.

Use care when handling sharp sample needle.

1. Remove the needle cover.
2. On Plus analyzer, lower the sample needle and reagent probe so they can be easily seen.
3. Visually inspect for bends and discoloration.
4. Check for burrs in the sample needle by wiping the tip with a dry cotton swab. If any of the cotton threads become attached to the needle, replace it.
Daily Maintenance (cont'd)

5. If any wear or damage is noticed, replace the needle or probe. On the Plus analyzer, replacement of the needle or probe requires a Transfer Adjust.

CLASSIC ONLY: Visually inspect the seating and color of the sample tubing loop. You may want to remove the plastic cover.

Acceptable Tubing:
1. Tubing must be colorless and fitted into the groove above the sample needle.
2. Tubing should be replaced monthly or if discoloration is noticed (refer to page 24).

5 Prime the reagent probe and sample needle.

Procedure:

For Plus analyzer: sample and reagent primes are done in TWO separate steps:

1. Press <INFO>, <6> SYSTEM CHECKS, <1> PRIME.
2. Select Z-POSITION: UP-SAMP and PIPETS: ON.
3. Press <F1> START.
4. Inspect the sample syringe and water stream coming out of the sample needle. There should be no air bubbles and the stream should be steady.
5. Press <F1> STOP when you have finished observing the prime.
7. Press <F1> START.
8. Inspect the reagent syringe and water stream coming out of the reagent probe. There should be no air bubbles and the steam should be steady.
9. Press <F1> STOP when you have finished observing the prime.

If air bubbles exist after priming, prime with the PIPETS: OFF. If bubbles persist it is necessary to remove the syringe and refill it with water. It may also be necessary to replace the syringe tip or glass barrel.

For other COBAS MIRA systems: sample and reagent primes are combined in one step:

1. Press <INFO>, <6> SYSTEM CHECKS, <1> PRIME.
2. Check the screen to make sure that it looks like the one below.
3. Press <F1> START.
4. Inspect the syringes and water streams coming out of the probes. There should be no air bubbles and the water stream should be steady.
5. Press <F1> STOP when you have finished observing the prime.

If air bubbles exist after priming, prime with PIPETS: OFF. If bubbles persist, it is necessary to remove the syringe and refill it with water. It may also be necessary to replace the syringe tip or glass barrel.
Daily Maintenance (cont’d)

6 Replace tip cleaner.
   1. Empty the tip cleaner from its reagent container and refill half-way with fresh solution.
   2. Place the new tip cleaner in the CL position on the CAL-CS 8 rack.
   3. Once a week, replace the container with a new one.

7 Check cuvette supply.
   Procedure:
   1. Ensure cuvette segment supply is adequate for the anticipated number of tests. Each segment can hold 12 tests.
   2. Remove new cuvettes from their protective plastic coverings and handle at the top. Do not touch the optical pathway.
   3. If no cuvette changer is present, lift analyzer turntable cover, remove used cuvette segments and replace with new segments. Segments click into place when properly loaded.
   4. If the cuvette changer option is present, fill the left side of the changer with unused cuvettes. Remove used cuvette segments from the right side.
   5. Discard all used cuvettes in a biohazard container.

   Roche cuvettes are intended for a single use only. Do not wash or reuse cuvettes.

8 End of day - sample and reagent needle tube cleaning.

   **Software versions 8847 and 9215:**
   Procedure:
   1. Place 4 mL of 25% Clorox solution in the CL position on the CAL-CS 8 rack.
   2. Press <INFO>, <6> SYSTEM CHECKS, <9> NEEDLE/TUBE CLEANING
   3. Check the screen to make sure that it looks like the screen displayed below.
   4. Press <F1> START to begin the cleaning process. DO NOT lift analyzer cover during this process.
   5. This procedure lasts for approximately 6 1/2 minutes. The needle/tube cleaning is completed when the probes rise out of the washtower and the drain pump stops pumping.
   6. Remove and discard the Clorox when completed.

   **Software version 8735 (Classic only)**
   1. Prepare three sample cups with 25% Clorox.
   2. Prepare a 10 mL reagent container with 25% Clorox and place it on the programmed rack position.
   3. Request that the CLRX test five times for each sample cup.
   4. Press Start. Allow to run.
   5. Prime for 5 minutes afterward.
Weekly Maintenance

1. Clean the tube holder/stepper foot. (Plus and Plus CC)

   **Procedure:**

   ![Warning]

   - Use care when working near the sharp sample needle.
   - 1. Remove all racks from the rack platform.
   - 2. Move transfer arm into center of platform.
   - 3. Dip a cotton swab in isopropyl alcohol and clean bottom and top of tube holder/stepper foot. DO NOT pull on the stepper foot.
   - 4. Discard swab in a biohazard container.

2. Clean the external water reservoir.

   **Procedure:**

   - 1. Empty water from external water reservoir.
   - 2. Pour 300 mL of Clorox bleach into the reservoir.
   - 3. Empty the Clorox and rinse the reservoir thoroughly with tap water.
   - 4. Rinse the container with Reagent Grade, Type 1 water.
   - 5. Fill the Reagent Grade, Type 1 water.

3. Perform P150/P250 precision tests.

   **Acceptable Results:**
   The test measures precision by CV% (coefficient of variation) of the replicates of two different dye concentrations.

   - Acceptable CV% P150 = <1.5%
   - P250 = <2.5%

   **Procedure:**

   - 1. Fill the sample cups:
     - Place 30 empty sample cups on the Sample 30 rack #1.
     - Add 5 drops of P150 precision dye to cups in positions #1-15. Close the lids.
     - Add 5 drops of P250 precision dye to cups in positions #16-30. Close the lids.
   - 2. Fill a reagent container:
     - Fill a 10 mL reagent container with Reagent Grade, Type 1 water. Add 2 drops of Tip Cleaner, and place it in the position assigned to P150/250 on the reagent rack.
   - 3. Delete all worklists.
   - 4. Power Patient ID off:
     - Press <PROG><6> SYSTEM PARAMETERS <5> SET UP PARAMETERS.
     - Use the down arrow key to find the page with “PATIENT” at the top.
     - Press F1 MODIFY.
     - Use the down arrow to move the cursor to:
       - “ID of SAMPLE” for Plus. Press <2> OFF.
       - “PATIENT ID” for other analyzers. Press <2> OFF.
Weekly Maintenance (cont'd)

5. Create the worklist:
   - Press <ROUTINE>. The screen displays sample position #1.
   - Press <1>, <F2>, TO, <15>, <ENTER> Select P150, <ENTER>. Cups 1-15 will now have P150 ordered on the worklist.
   - Press <16>, <F2> TO, <30>, <ENTER> Select P250, <ENTER>. Cups 16-30 will now have P250 ordered on the worklist.
   - Press <F1> DISPLAY.
   - Press <PRINT>.

6. Press <STATUS> and then <START>.

7. Obtain and review the statistics from the run:
   - Press <INFO>, <1> TEST RESULTS, <F1> DATA, <F2> STATISTICS.
   - For test, choose P150.
   - Press <PRINT>.
   - Repeat these steps and choose P250 for test.
   - Is your CV% acceptable?
     
     **Remember:**
     
     **Acceptable CV%:**  
     
     P150 = \( \leq 1.5\% \)  
     P250 = \( \leq 2.5\% \)

8. If CV% is too high:
   - Check absorbance readings for outliers that may have been caused by air bubbles in the cuvette. Repeat precision run.
   - Replace syringe tips. Repeat precision run.
   - Replace syringes (only if precision does not improve after replacing tips). Repeat precision run.
   - Before repeating the precision run, power off and then power on analyzer to clear the <INFO>, <1> TEST RESULTS file.

9. When completed, delete the worklist and turn on the Patient ID.

   ![NOTE]
   
   Record CV% and mean absorbance from the runs on the maintenance log. Attach the precision printouts to your maintenance log.
Monthly Maintenance

1. Replace the reagent probe

Procedure:

- Use care when working near the sharp sample needle.

1. Remove old probe:
   - Power the system off.
   - Remove all racks from the platform.
   - Move the transfer arm into the middle above the rack platform.
   - Remove the probe cover.
   - Pull the reagent probe spring-lock holder to the right, away from the probe.
   - Pull the probe straight down.

2. Put on new probe
   - Hold the spring-lock out.
   - Position the new probe with cut-out facing to the right.
   - Push the new probe up into position and release the spring-lock to hold the probe in place.
   - Replace the probe cover.

3. Switch on system power.

4. Plus only: Perform transfer adjust <INFO> <6> <7> <1>

5. Prime the system <INFO> <6> <1>


2. Replace the syringe plunger tip

Procedure:

1. Switch off system power.

2. Remove the transfer arm cover by loosening the thumb screw located at the back left side of the transfer arm and then pull the cover straight out.

3. Loosen the black knurled knob on the syringe (turn to left).

4. Hold the syringe on the silver collar and turn to left to loosen and then remove the syringe.

5. Pull the syringe plunger out of the glass barrel.

6. Remove the old tip. You may need pliers.

7. For reagent syringe plunger only: Place a black O-ring on the tip of the plunger. The sample syringe plunger does not have an O-ring.

8. Place a new syringe tip into the tip replacement tool, open end facing up.

9. Gently push the plunger straight down into the new tip. There should be a fingernail’s gap between the end of the plunger and the new tip.

10. Fill the syringe with water. Eliminate bubbles.

11. Place syringe back on the transfer arm. Turn to the right to tighten the syringe and knurled knob.

12. Replace transfer arm cover.

13. Power on and prime using INFO <6> <1>. (Make sure there are NO AIR BUBBLES!)

14. Perform P150 and P250 Precision tests.
Monthly Maintenance (cont’d)

3 Plus only – replace the washtower foam

Procedure:
1. Switch off system power.
2. Move the transfer arm to the right end of the rack platform.
3. Use tweezers to remove the old washtower sponge.
5. Insert a new sponge into the wash tower. The cut edge should be facing the back of the tower. Gently push the sponge to the bottom of the wash tower.

4 Classic only: replace sample needle/tubing

Procedure:

Use care when handling the sharp sample needle.

1. Remove the old tubing and needle:
   - Switch off system power.
   - Remove all racks from the rack platform.
   - Disconnect the tubing from top fitting.
   - Pull tubing out of its curved track.
   - Pull up on brass collar. Tubing with collar should be disconnected from the probe now.
   - Pull back (to the right) on the spring-lock holder.
   - Pull down on the sample needle.
   - Discard the probe in a puncture-proof biohazard container.

2. Attach new tubing to the brass collar:
   - Remove the brass collar from the old piece of tygon tubing. SAVE THE COLLAR.
   - Cut a new piece of tygon tubing 11 inches long.
   - Cut one end of the tubing to form a long angle (approx. 1 inch)
     - Feed the angled end of the tubing through the narrow end of the brass collar. Pull the tubing through until the angle is completely through the collar.
     - Cut off the angled end so that there is a straight edge even with the brass collar.
   - Trim the tubing to equal 8 5/8 inches (22 cm).

3. Attach the tubing and sample needle to Classic:
   - If a stylet is present, remove it.
   - Attach the sample probe to the spring-lock holder.
   - Attach brass collar end of the tubing to fitting on top of the sample needle.
   - Press the tubing into its groove.
   - Attach end of tubing on top fitting.
   - Replace plastic cover.
Monthly Maintenance (cont’d)

4. Prime the system <INFO> <6> <1>
   • Switch on system power.

5. Perform P150 and P250 Precision tests.

Six Month Maintenance

1. Replace the sample needle (S, L, Plus)

   Procedure:
   
   **Plus analyzer:**
   1. Remove the old needle:
      • Switch off system power.
      • Remove all racks from the rack platform.
      • Move the transfer arm to the front and middle of the rack platform.
      • Move transfer head forward. Remove metal needle cover by pulling straight up.
      • Unscrew black knurled knobs at both ends of the sample tubing. (Loosen B first, allow residual water to drain out the bottom of the needle, unscrew B completely, then unscrew A.)
      • Lift needle straight up.
      • Discard sample needle in biohazard sharps container.

   2. Put on new needle.
      • Insert a new needle into the opening.
      • Screw into place both ends, A then B.
      • Adjust the tubing height using the loop so that it is approximately 5 mm below the white level detection cable. (See diagram below.)
      • Replace needle cover.

   ![Diagram of Plus analyzer needle](image)

   3. Switch on system power.

   4. Prime the system <INFO> <6> <1>.

   5. Perform transfer adjust <INFO> <6> <7> <1>.

   6. Perform P150 and P250 Precision tests.
Six Month Maintenance (cont’d)

*L, S analyzers:*

![Warning] Use caution, the sample needle is very sharp!

1. Remove the old needle:
   - Switch off system power.
   - Remove all racks from the rack platform.
   - Move the transfer arm to the front and middle of the rack platform.
   - Remove plastic needle cover.
   - Unscrew silver screw at the top of the needle assembly.
   - Pull down on sample cassette.
   - Discard sample cassette in biohazard sharps container.

2. Put on new needle:
   - Line up new cassette with pin.
   - Tighten top screw.
   - Replace needle cover.

3. Power on system.

4. Prime the system:
   - Perform P150 and P250 Precision tests.

5. Inspect the back of the instrument for dust.
   - Use damp paper towels to clean off the air intake screen on the back panel of analyzer.
   - Vacuum the air intake screen on the back panel of analyzer.

6. Replace the diluent filter.
   - Locate the diluent filter on the white tubing leading from the external water reservoir to the back of the analyzer.
   - Remove the diluent filter using pliers, if necessary.
   - Install a new filter. Make sure that the water flow arrows on the filter are directing water into the analyzer.
   - Perform a system prime.

As Needed Maintenance

1. Clean washtower.
   - *Classic, L, and S*
     1. Switch off system power.
     2. Move a transfer arm away from the washtower.
     3. Use a Phillips head screw driver to remove the three screws from the top of the tower.
     4. Pull straight up on the top plate to remove it and soak in 10% Clorox for 10 minutes.
     5. Use a cotton swab to clean the inner opening of the top plate.
     6. Thoroughly rinse the plate with Reagent Grade, Type 1 water.
     7. Place the top plate back on the washtower and screw it down.
As Needed Maintenance (cont’d)

b. Plus

1. Remove the foam insert from the washtower.
2. Press <INFO> <6> <1> <PRIME> <F1> <START>. While the probes are priming, add 25% bleach to the washtower with a full transfer pipet twice.
3. Replace the foam insert with the notch to the back.

2 Perform transfer adjust/R-S Needles Adjust (Plus only).

Procedure for transfer adjust:
1. Before beginning the TRANSFER ADJUST procedure, check to make sure that:
   • all metal contact surfaces are dry and clean
   • reagent probe and sample needle are parallel
   • all reagent and sample racks are removed from the rack platform.
2. Press <INFO>, <6> SYSTEM CHECKS, <7> TRANSFER, <1> TRANSFER ADJUST.
3. Place Reagent 5S number 1 rack on rack position 1.
4. Place Sample 16A rack on rack position number 3. Make sure that the transfer adjust tool is in place in positions 4 and 5 on the rack.
5. Press <F1> START.
6. This procedure takes approximately 5 minutes and stops automatically. If the transfer adjust was not successful, the message “FIRST ADJUST R-S NEEDLES” is displayed. In this case, perform the R-S NEEDLES ADJUST procedure, followed by another TRANSFER ADJUST.

Procedure for R-S Needles Adjust:
1. Press <INFO>, <6> SYSTEM CHECKS, <7> TRANSFER, <2> R-S NEEDLES ADJUST.
2. Place Reagent 5S number 1 rack on rack position 1.
3. Place Sample 16A rack on rack position number 3. Make sure that the transfer adjust tool is in place in positions 4 and 5 on the rack.
4. Verify that position 4 of the rack platform is empty.
5. Press <F1> START.
6. When the message “CURSOR-KEYS ACTIVE” appears, use the arrow keys to center the reagent probe over the cross on the transfer tool.
7. Press <F2> SAMP and check the position of the sample needle.

Do not use the cursor keys to adjust the sample needle.

8. Press <F3> ADJUST to move the sample needle into position 4 of the rack platform. Correct the position 4 of the rack platform. Correct the position of the needle by carefully bending the needle directly below the tube holder (stepper foot).
9. Press <F3> CHECK to check the position of the sample needle again.
10. Repeat <F3> ADJUST/CHECK if necessary.
11. Press <F1> STOP when completed.
12. Repeat the TRANSFER ADJUST <INFO> <6> <7> <1>.
ISE Maintenance

Daily Maintenance

1. Swirl the Standards 1 and 2 and Reference solution bottles to remove any condensation. Replace bottles if almost empty.

2. Switch on the analyzer, if necessary.

   1. Press <INFO> <6> System Checks, <6> Module, <1> Prime.
   2. Select the desired solution to prime by pressing <1> Standard 1, <2> Standard 2, <3> Reference, or <4> Mixtower. Begin with Standard 1.
   3. Press <F1> Start to initiate priming.
   - Check the flow of Standard Solution 1 by removing metal straw until an air bubble is introduced into the tubing. Watch the bubble move through the tubing until it passes through the electrodes. Repeat this process for Standard 2.
   4. Press <F1> Stop to halt priming.
   5. Repeat steps 2-4 for Standard 2.

   **NOTE**
   - For reference solution, do not remove the metal straw. Instead, look in the Reference electrode to verify the string of pearls effect.

4. Prime the mixtower.

   **Procedure:**
   1. Remove the CAL-CS 8 rack and the black mixtower shield.
   2. Press <INFO><6> SYSTEM CHECKS, <6> ISE MODULE, <1> PRIME SYSTEM <F4> NEXT SET.
   3. Press <4> MIXTOWER.
   4. Press <F1> START.
   5. Observe:
      - The water level should not rise above the air nozzles.
      - The mixtower should rinse and drain three times and have a white etched appearance after drying.
      - There should not be any dried serum or dirt in the mixtower.
      - Insufficient water results in carryover between samples.
      - Too much water results in samples becoming diluted.
   6. Press <F1> STOP to halt printing.
   7. If necessary, remove and clean the mixtower with a cotton swab wetted with 25% Clorox solution. Rinse with copious amounts of deionized water, dry, and replace.
   8. Replace the black mixtower shield and CAL-CS 8 rack.

5. Perform a Fluid Adjust
   1. Press INFO <6> <6> <4> FLUID ADJUST. Fill a sample cup with a strongly colored serum, and place it on CAL-CS 8 rack in indicated Cups-Pos.
   2. Remove the plastic ISE cover and safely place the standard bottles on the module platform. Flip up the Faraday cage cover to reveal the electrodes.
Daily Maintenance (cont’d)

3. Press <F1> Start to initiate sequence. Watch the head of the serum as it moves from the mixtower.
4. When the cycle is finished, check whether the head of serum segment can be seen in the middle of the chloride electrode.
5. If the sample is not correctly positioned, change the transfer factor. Press <ENTER> to store the new factor. Press <F1> Start to repeat the Fluid Adjust.

   A lower factor moves the segment to the left; a higher factor moves the segment to the right.

6. When satisfied with the position of fluid segment, press <ESCAPE> to exit the procedure. Record the final transfer factor on the ISE log. The ISE Module is automatically rinsed.

6 END OF DAY - Clean, Etch (if required), Activate

1. Clean Procedure
   a. For Plus or Plus CC, keep the 25% Clorox in the tip cleaner position from the Needle tube clean procedure (Daily Startup section, Daily Shutdown procedure).
   b. For Classic, L, or S, fill a sample cup with 25% Clorox and place in the ETCH position on the ISE bridge. Press <INFO>, <6> System Checks <6> ISE <5> Electrode Treatment <2> Cleaner. Press <F1> Start. The procedure automatically terminates. Discard the 25% Clorox when complete.

2. Place a sample cup with Etcher Solution in the etch position on the analyzer.

3. Press <INFO>, <6> SYSTEM CHECKS, <6> ISE, <5> ELECTRODE TREATMENT, <1> ETCHER. Press <F1> START (approximately five minutes).

4. Perform an activation. Make sure that there is a cup of serum in the Fluid Adjust position. Press <INFO>, <6> SYSTEM CHECKS, <6> ISE, <5> ELECTRODE TREATMENT. <F1> START.

   Perform these etch and activation procedures daily at the close of the day if 20 or more specimens are run per day. Perform these procedures weekly if 20 or fewer specimens are run over the course of the day.

   There is no indication on the screen to display the completion of the ISE cleaning procedures. Press <STATUS> and view the ISE status in the lower right corner of the monitor. If it says ISE: SYSTEM CHECK, the procedure is still in process; it changes to ISE: STAND-BY when the procedure is complete.

Monthly Maintenance

1. Replace the Standard 1 and 2 and Reference bottles.
Six Month Maintenance
Change ISE Tubing

1. Remove Standard 1, Standard 2, and Reference solution bottles.
2. Drain the ISE module. Press <INFO> <6> <6> <2>; drain Standard 1, 2, and reference solution.
3. Place a beaker of distilled water on the plexiglass cover and insert the three metal tubes.
4. Press <INFO> <6> <6> <1> to access PRIME SYSTEM.
5. Perform a priming to rinse the fluid system with water. Select Standard 1, Standard 2, and reference.
6. Remove the beaker of water.
7. Perform a drain procedure to empty the fluid system <INFO> <6> <6> <2>.
8. Remove the plexiglass cover from the ISE module.
9. Press <INFO> <6> <6> <3> to access VALVE DISENGAGEMENT.

The valves should not be lifted for more than a few minutes because they can overheat.

10. Press <F1> START to open the valves.
11. Move the tubing over the valves.
12. Press <F1> STOP to close the valves.

The valves are also closed by pressing the ESCAPE, RETURN, or any other program key.

13. Release the peristaltic pump clamp by pulling up the silver knob located on the left of the pump.
14. Remove tubing clamps from the posts on both sides of the peristaltic pump. Systematically remove and replace all tubing. Refer to the chart included with the tubing set. Use the expander tool supplied with the ISE module to spread the ends of tubing “D” before placing on connectors. Be careful not to puncture any tubing. Clean up any spills.
15. Replace tubing clamps. Close peristaltic pump. Replace cover and the solutions in the appropriate positions. Replace the straws in the standards.
16. Prime the system <INFO> <6> <6> <1>. Prime Standard 1, 2, and Reference Solution.
17. Check the fluid adjust <INFO> <6> <4>.
18. Perform a serum activation to wet the sample tubings <INFO> <6> <6> <5> <3>.
As Needed Maintenance

Electrode Maintenance

Perform Electrode Maintenance Procedure weekly (at the end of the day) if 20 or fewer ISE samples (on average) are assayed each working day; or perform the procedure daily (at the end of the day) if more than 20 ISE samples (on average) are assayed each working day.

See page 30, Daily Maintenance, step 6, End of Day Maintenance for details.

1. Clean the electrodes (25% dilution of regular Clorox bleach).
2. Etch the electrodes with the Roche ISE Etcher Solution (Order #42374).
3. Serum-activate the electrodes.

A serum activation must be performed by pressing INFO <6> <6> <5>, or the ISE activation does not automatically occur until the first ISE sample is assayed. It is important to perform the serum activation shortly after the ETCH procedure is performed. Use of patient specimen, not control material, is recommended.

Do not use bleach that has been stored for more than 1 year. According to the Clorox Company, up to 20% of its potency is lost after one year. Make fresh weekly, a 25% bleach solution for cleaning procedures on an ISE module and store in the refrigerator protected from light.

The shunts, tubing, and Mixtower can clog with fibrin. Routinely priming the Mixtower for 5 minutes at the end of the day can reduce the incidence of overflows.

Electrode Replacement

1. Remove the Standard 1, Standard 2, and Reference solution bottles and the plexiglass cover.
2. Perform a drain procedure to empty the fluid system <INFO> <6> <6> <2>. Drain Standards 1, 2, and reference solutions.
3. Unlock the electrodes by pressing the upper black part on the left side of the Faraday cage.
4. Remove electrode, wipe chamber with dry tissue, and insert new electrode. When replacing the electrodes, the O-rings must be on the left side of the electrode and seated properly.
5. Lock the electrodes by pressing down on the lower end of the black part.
6. Close the electrode housing.
7. Replace cover and the solutions in the appropriate positions.
8. Prime the system <INFO> <6> <6> <1>. Prime Standards 1, 2, and Reference Solution.
9. Check the fluid adjust <INFO> <6> <6> <4>.
10. Perform an electrode treatment etching <INFO> <6> <6> <5>.

Record the four-digit QC number and electrode installation date on the ISE Maintenance Log sheet.
Electrode Replacement – Sodium Electrode

1. Etch with new Etcher (well within the expiration date).
2. Activate with patient serum 3X.
3. Calibrate and run QC.
4. Record slope.
5. If QC and slope are okay, run patients.
6. If slope and QC are low, widen the slope range and QC ranges.
7. Run 30 patient serum samples.
8. If still low, clean with reagent tip cleaner 3X.
9. Recalibrate and record slope.
10. If still unsuccessful, clean with 25% bleach 2X.
11. If still unsuccessful, replace electrode and call Customer Technical Support at 1-800-428-2336.
Notes
## COBAS MIRA Troubleshooting

### Chemistry Problems

<table>
<thead>
<tr>
<th>Causes</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transfer out of alignment</td>
<td>Run RS Needles adjust &lt;INFO&gt; &lt;6&gt; &lt;7&gt; &lt;2&gt; and transfer adjust &lt;INFO&gt; &lt;6&gt; &lt;7&gt; &lt;1&gt; to realign (Plus only). Observe that sample and reagent are picked up and pipetted into the cuvette. If this does not occur, call Customer Technical Support at 1-800-428-2336.</td>
</tr>
<tr>
<td>No sample pick up</td>
<td>Press &lt;INFO&gt; &lt;6&gt; &lt;1&gt;. Prime sample needle in Up position and look for steady stream. Check for bent, clogged, or missing sample needles. Clear or replace the needle. Check the sample cup level. Check for air bubbles in the sample syringe.</td>
</tr>
<tr>
<td>Contaminated/expired standard</td>
<td>Use fresh calibrator/standard.</td>
</tr>
<tr>
<td>Contaminated/expired reagent</td>
<td>Use fresh reagent.</td>
</tr>
<tr>
<td>Reagent not stable for expected time</td>
<td>Store reagent in closed bottle at the temperature indicated on the label when not in use.</td>
</tr>
<tr>
<td>New lot of reagent</td>
<td>Recalibrate with a new lot of reagent. Record calibration date and compare previous factor to the new factor. Note on control sheet when a new lot is used.</td>
</tr>
<tr>
<td>Incorrect program parameters</td>
<td>Verify test parameters under &lt;PROGRAM&gt; &lt;2&gt; with the package insert. Press &lt;F1&gt;. Modify to make corrections. (Worklist and QC file for this test must be empty.)</td>
</tr>
<tr>
<td>Incorrect temperature</td>
<td>Check temperature on status screen. Instrument temperature is programmed under &lt;PROGRAM&gt; &lt;6&gt; &lt;1&gt; and should be set to 37.0 °C.</td>
</tr>
<tr>
<td>Temperature erratic</td>
<td>Check room temperature. If temperature is extreme, it may cause enzyme results to be higher or lower. If the problem cannot be resolved, call Customer Technical Support at 1-800-428-2336. Check status screen for rotor temperature. The rotor temperature should read between 36.9 - 37.1 °C. If the temperature fluctuates more than ±0.1 °C, call Customer Technical Support. Check analyzer and rotor temperatures &lt;INFO&gt; &lt;6&gt; &lt;3&gt;.</td>
</tr>
<tr>
<td>Poor pipetting precision</td>
<td>Perform P150-250 precision tests. Check sample cups and syringes for bubbles. Replace syringe tips if not done in the last four weeks.</td>
</tr>
<tr>
<td>Contaminated water in analyzer</td>
<td>Check the integrity of the water source. Use reagent grade type 1 water only. When filling the water reservoir at the beginning of the day, pour out old water before refilling.</td>
</tr>
</tbody>
</table>
Chemistry Problems (cont’d)

Causes
Improper mixing

Action
Observe syringes and needle movement during mixing at the rotor. If mixing is not carried out properly, call Customer Technical Support at 1-800-428-2336.

Cuvettes Rejected/Not Available

Causes
No empty cuvettes in analyzer
Faulty photometer (Classic only)

Action
Load cuvettes.
Listen for a flash sound at beginning of run. If the problem cannot be resolved, call Customer Technical Support at 1-800-428-2336.

Poor Precision

Poor precision, upon performing the P150/P250 precision tests or poor precision on more than one chemistry, may be caused by one or more of the following:

Causes
Bubbles in the pipetting system
Bubbles clinging to syringe plunger
Worn syringe plunger tips
Obstructed sample needle
Bubbles at bottom of sample cups
Contaminated water and tubing

Action
Prime lines.
Remove syringe and prime until air bubbles are removed. Clean syringe with deproteinizer solution, or one part 5% Clorox and three parts reagent grade water. Rinse thoroughly with reagent grade type 1 water. Check tubing connections for tightness.
Replace plunger tips monthly.
Perform needle/tube cleaning (see Maintenance section). If the problem cannot be solved, replace the sample needle.
Refill sample cups, or tap closed cups gently against smooth surface. Use of Roche sample cups only is strongly recommended. Poor design of generic cups has caused precision problems.
Contact the Customer Technical Support at 1-800-428-2336.
No Suitable Racks Found

1. Run a RACK reader check, <INFO> <6> < 2>.
2. Check the racks that are on the instrument against the racks listed on the display. If they match, go to step 3. If they do not match, clean the rack reader and the holes at the end of the racks with a lint-free tissue and retry. Call Roche Response Center Customer Technical Support at 1-800-428-2336 if they still do not match.
3. Check <INFO> <3> and <INFO> <4>, all test levels, to see if a test is blinking. If a test is blinking, a PCA or PCS has been requested, perhaps accidentally. Change the request to CA or CS under Routine to take it off the worklist if no patients are ordered for the test.
4. Check the sample rack number. Does it match with the sample cups that are ordered?
5. Have there been recent changes to test parameters? Changes under Program 2 result in an automatic calibration; reagent and calibrator must be provided.
6. Have control/calibrator values been revised? Check cup positions for errors. The instrument may be looking for a Cal/CS 30 rack for a double-digit cup position.
7. Check reagent rack programming under Program 5.
8. Delete worklists and order the tests individually until the test causing the error is found.

Test/Rack Programming Error

There is an error in the test parameters or rack programming. After receiving the error for detail of the issue, press <ESCAPE> immediately. The specific test/rack programming message displays.
Notes
Troubleshooting the ISE Module

Mixtower Overflowing

**Step 1**  Check the function of the ISE waste pump.

- Perform Drain Standard 1 <INFO><6><6><2>. Lift the straw out of the Standard 1 bottle. Press <F1>, Start. Listen for the waste pump.
- If pump is not cycling, check/replace ISE fuse 5 (5 amp slo blo) on back of ISE Module. Power down before removing the fuse (toggle switch above the power cord). If pump is still not cycling, or the Mixtower is still overflowing, there is a possible waste pump failure. Call the Roche Response Center Customer Technical Support at 1-800-428-2336.

**Step 2**  Clean Mixtower; check replace tubing.

- Remove the black cover of the Mixtower and remove any remaining water.
- Using a cotton tipped applicator, swab out the Mixtower with 25% dilute Clorox bleach. Prime Mixtower <INFO> <6> <6> <1> <F4> <4> <F1> Start.
- If Mixtower is still overflowing, remove and clean the Mixtower using a transfer pipette and 25% bleach. Note the tubing connection assembly before disconnecting (see diagram on following page). Push the bleach solution through the small opening at the bottom of the Mixtower. Rinse well with reagent grade water and shake dry.
- Drain Standard 1 and 2 solution tubings dry <INFO><6><6><2>. Lift the straw at the STD bottle and press <F1> Start.
- Perform Valve Disengagement <INFO><6><6><3><F1>. Remove and check tubings "F," "J," "K," "L," and "M" for clogs or cuts. Clean or replace tubings as necessary. Valves can overheat; therefore, do not leave valves open for more than a few minutes.
- Remove both ISE Shunts. Clean out the shunts using a transfer pipette and 25% dilute Clorox bleach. Rinse well with reagent grade water. Reinstall the Mixtower and shunts.
- Prime Mixtower <INFO><6><6><1><F4><4>. If still overflowing, proceed to Step 3.
Mixtower Overflowing (cont’d)

**Step 3  Clean Waste Fitting W1**

- Disconnect tubing “L” from waste fitting “W1.”
- Fill a 10 mL syringe with 25% bleach. Use a “butterfly” that has the needle end cut off to connect the syringe to waste fitting “W1.”
- Perform Drain Standard 1 <INFO><6><6><2><1>. Use moderate pressure on the syringe plunger to clear internal blockages. Reconnect tubing “L.”
- Insert the Standard 1 straw into a beaker containing 100 mL of 25% dilute Clorox bleach. Press <INFO> <6> <6> <2> <1> <F1> START to drain 100 mL reagent Clorox bleach to clear internal blockages. Follow with 200 mL reagent grade water.
- Prime Mixtower; if still overflowing, proceed to Step 4.

**Step 4  Clean the Rear Waste Line**

- Remove the Quick Disconnect waste fitting at the back of the ISE Module by holding the silver body stationary while grasping the checkered collar and turning it clockwise. Inspect the fitting and waste tubing for blockage. The fitting and tubing can be cleaned with 25% dilute bleach. Reconnect the fitting.
- Prime Mixtower; if still overflowing, call Customer Technical Support at 1-800-428-2336.

---

Sodium Controls Low or Sodium Slope Low

**Step 1  ETCH** with ISE Etcher (order #42374) <INFO><6><6><5><1><F1>.

- Check ISE Etcher SOLUTION expiration date. Use tip cleaner solution if etcher is expired.
- Serum Activate. <INFO><6><6><5><3><F1>. If sodium results are still low, proceed to Step 2.

**Step 2  CLEAN** with Reagent Tip Cleaner (order # 42282) <INFO><6><6><5><2><F1>.

- Perform up to three times. Serum Activate. If sodium results are still low, proceed to Step 3.
Sodium Controls Low or Sodium Slope Low (cont’d)

Step 3  Drain Standard 1 and 2 tubings dry. Remove the Sodium Electrode from the Faraday cage. Open the cage and unlock the electrodes by pressing the upper black part on left the left side of the cage. Lift out the electrodes. Dampen the spongy section of “Oral B brand - Super Floss” with ISE Etcher and pass the stiffened end through the electrode capillary several times from both directions. Reinstall the electrode, Etch with Etcher, serum activate, and recalibrate. For stubborn problems repeat this procedure using the Reagent Tip Cleaner. If sodium results are still low, proceed to Step 4.

Step 4  Replace the Sodium Electrode (order #1029371).

Unstables and/or Overrange

These errors are usually caused by air leaks or clogs in the ISE sample pathway.

Step 1  Check Fluid Adjust.

• Repeat the Fluid Adjust two times. Verify that the sample position is stable. The head of the sample segment must stop inside the chloride electrode position. It is permissible for a few leading bubbles to be in the beginning of the sample “slug.” The remainder of the sample “slug” should not be broken up with air bubbles.

• Reset the Fluid Adjust if the sample position is stable but not in the electrode. Decrease the factor to move the sample to the left, increase the factor to move the sample to the right. Remember to press <ENTER> to change the value. If Fluid Adjust is erratic, see “ISE TROUBLESHOOTING” sheet ‘Fluid Adjust Problem.’

Step 2  Check the priming of the ISE Standards and Reference Solution.

• Prime Standards 1 and 2. Pull the straws from the Standard 1 and Standard 2 bottles while priming to introduce an air bubble.

• Prime Reference. Observe the lower tubing to the right of the electrode cage. A constant flow of droplets exiting the lower tubing must be seen. This flow of droplets resembles a string of pearls effect.

Step 3  Perform Routine Electrode Treatments.

Perform the treatments in the following sequence:

• Clean the electrodes with 25% bleach (deproteinizes the sample pathway).

• Etch with ISE Etcher (increases the sensitivity of the Sodium electrode).

• Serum Activate (conditions the tubing and electrodes).
Troubleshooting ISE Module

Unstables Occurring on Quality Control or Patient Samples but not ISE Calibration

**Step 1**  
**Clean and check the Mixtower.**
- Using a cotton tipped applicator, swab out the Mixtower with 25% dilute Clorox bleach.
- Prime the Mixtower. Using a transfer pipette, dispense about 2 mL of 25% bleach into the Mixtower during its drying cycle. Repeat for about six cycles.
- Prime the Mixtower for about 1 minute. The water level should not rise above the air nozzles inside. Be sure a white, etched appearance is visible and no moisture is seen at the bottom of Mixtower between primes. Listen for three “swishing” sounds between prime cycles. If the Mixtower is not priming, check the “B” tubings under the bridge which is screwed onto the analyzer. They may be crimped.
- Remove the Mixtower and check for hairline cracks. Reinstall the Mixtower. Be careful not to crimp the tubings.

**Step 2**  
**Remove and clean the ISE Shunts and Electrode Spacer.**
- Drain Standard 1 and Standard 2 tubings dry. Pick the straw up from the standard bottle and slide the tubings out from under the valves. Press <F1> <STOP>.
- Perform Valve Disengagement. Start. Remove both ISE Shunts. Do not allow the valves to remain in the up position; they will overheat.
- Open the Faraday Cage by pressing the upper black part on the left side of the cage. Remove the electrodes and Electrode Spacer located at the left of the Chloride electrode (remove from the tubing). Using an isopropyl alcohol wipe, clean out the Faraday cage. Dry the cage with a lint-free tissue (Kimwipe).
- Clean out the shunts and Electrodes Spacer using a transfer pipette and 25% dilute Clorox bleach. Rinse well with reagent grade water and shake dry.

The shunts can be scrubbed by passing “Oral B brand - Super Floss” through each fitting.

**Step 3**  
**Replace ISE Tubing.**
- Remove the Standard 1, Standard 2, and Reference solutions. Drain Standard 1 Standard 2 tubings dry.
- Perform Valve Disengagement. Start. Release the tubings from under the pinch valves. Press <F1><STOP>. Do not allow the valves to remain in the up position; they will overheat.
- Replace tubings – “K,” “J,” “F,” and “H” (refer to ISE Tubing Set diagram).
- Replace Full ISE Tubing Set if necessary.

Unstables Occurring on ISE Calibrations

**Step 1**  
**Clip the tubing at the Standard Level 1 and 2 straws.**
- Prime Standard 1 <INFO> <6> <6> <1> <F1> Start. Pick the straw up from the Standard 1 bottle and watch for air to come through the tubing. Press <F1> Stop.
- Replace the straw in the Standard 1 bottle. Remove the tubing from the straw. Clip about 1/8 inch from the end of the tubing and replace it on the straw.
- Reprime the Standard. Repeat the procedure with Standard 2. Request a calibration under Routine.
Unstables Occurring on ISE Calibrations (cont’d)

Step 2  Clean the large ISE Shunt, Electrode Cage, and tubings.

- Remove the Standard 1, Standard 2, and Reference solutions. Drain Standard 1 and Standard 2 tubings dry <INFO> <6> <6> <2>.
- Perform Valve Disengagement <INFO> <6> <6> <3>. Move the tubing out from under each pinch valve. Remove the large Liquid Shunt. Do not allow the valves to remain in the Up position for more than a few minutes; they will overheat.
- Clean out the shunt using a transfer pipette and 25% dilute Clorox bleach. Rinse well with reagent grade water.

The shunt can be scrubbed by passing “Oral B brand - Super Floss” through each fitting. Reinstall the shunt.

- Remove the electrodes. Do not disconnect the Reference Electrode tubings from the electrode or the pump posts. The Reference electrode can be “folded over” to the right of the Faraday Cage. Remove and clean the Electrode Spacer located to the left of the Chloride electrode. Use an isopropyl alcohol wipe and lint-free tissues to clean and dry inside and around the Faraday Cage. Reinstall the spacer and electrodes.

Step 3  Prime tubings and replace ISE Standards and ISE Tubing Set.

- Insert each of the two metal straws of Standard 1 and 2 in separate containers filled with warm reagent grade water. Prime Standard 1 and Standard 2 tubings with reagent grade water for two minutes each. Be sure to check that all tubings are priming. Follow by priming air for at least one minute. Wipe the straws dry with a lint-free tissue.
- Replace the ISE Standards with newly opened solutions.
- Replace the ISE Tubing Set if necessary.

Low Results or Poor Precision

Cleaning the Mixtower may resolve this problem. If sodium results (only) are low, see ISE Troubleshooting “Sodium Quality Results Low or Sodium Slope Low.”

Step 1  Review History of Complaint.

- Compare current quality control results to established quality control means. Has there been a lot number change in QC material?
- Review recent ISE maintenance. Has the ISE Tubing Set been changed in the last 6 months? Did problems occur after a tubing change? Are the electrode treatments performed at the recommended intervals? (Refer to Electrode Maintenance Schedule.)

Step 2  Check ISE parameters.

- PROG <2> TESTS – Conversion Factor set to 1.0000 and Offset 0.0000 for each ISE test.
- INFO <3> CALIBRATION CONTROL – displays current Calibration Slopes and programmed Standard concentrations. Check that the programmed standard values match the concentrations on the ISE standard bottles.
Troubleshooting ISE Module

Low Results or Poor Precision (cont’d)

Step 3 Perform Fluid Adjust <INFO> <6> <6> <4>.
- Repeat the Fluid Adjust to verify that the sample position is stable. The head of the sample segment must stop inside the chloride electrode position. It is permissible for a few leading bubbles to be in the beginning of the sample “slug.” The remainder of the sample “slug” should not be broken up with air bubbles.
- If Fluid Adjust is erratic, see ISE TROUBLESHOOTING “Fluid Adjust Problem.”

Step 4 Perform Routine Electrode Treatments <INFO> <6> <6> <5>.
Perform the treatments in the following sequence:
- Clean the electrodes with 25% bleach (deproteinizes the sample pathway).
- Etch with ISE Etcher (increases the sensitivity of the Sodium electrode).
- Serum Activate (conditions the tubing and electrodes).

Step 5 Clean and check the Mixtower.
- Using a cotton-tipped applicator, swab out the Mixtower, with 25% dilute Clorox bleach.
- Prime the Mixtower. Using a transfer pipette, dispense 25% bleach into the Mixtower during its drying cycle. Repeat with bleach for about six cycles.
- Prime the Mixtower for about 1 minute. The water level should not rise above the air nozzles inside. Be sure that a white, etched appearance is visible and no moisture is seen at the bottom of Mixtower between primes. Listen for three “swishing” sounds between prime cycles. If the Mixtower is not priming, check the “B” tubings under the Sample Entry Bridge. They may be crimped. (Refer to ISE Tubing Set diagram).
- Remove the Mixtower and check for hairline cracks. If the Mixtower is cracked, it must be replaced.
- Reinstall the Mixtower. Make sure tubing connections are correct.

Step 6 Remove and clean the ISE Shunts and Electrode Spacer.
- Remove the Standard 1, Standard 2, and Reference solution bottles. Drain Standard 1 and Standard 2 tubings dry <INFO> <6> <6> <2>.
- Perform Valve Disengagement <INFO> <6> <6> <3>. Remove both ISE Shunts. Do not allow the valves to remain in the Up position; they will overheat.
- Clean out the shunts using a transfer pipette and 25% dilute Clorox bleach. Rinse well with reagent grade water and shake dry.
- Open the Faraday Cage. Remove the Electrode Spacer located to the left of the Chloride electrode. Clean with 25% Clorox bleach. Rinse well with reagent grade water and shake dry. Reinstall.

Step 7 Clean Waste Fitting W1.
- Disconnect tubing “L” from waste fitting “W1” (see ISE Tubing Set Diagram).
- Fill a 10 mL syringe with 25% bleach. Use a “Butterfly” tubing that has the needle end cut off to connect the syringe to waste fitting “W1.”
- Perform Drain Standard 1 <INFO> <6> <6> <2> <1> <F1> <START>. Use moderate pressure on the syringe plunger to clear internal blockages. Reconnect tubing “L.”
- Insert the Standard 1 straw into a beaker containing 100 mL of 25% dilute Clorox bleach to clear internal blockages. Press F1 Start. Follow with 200 mL reagent grade water.
Low Results or Poor Precision (cont’d)

PLUS - Proceed to Step 9.

**NOTE**

**Step 8** Turn off Level Detection <PROG> <6> <5>.
- If results are OK, replace reagent probe.
- If results are not OK, proceed to Step 9.

**Step 9** Perform <INFO> <6> <6> <6> CALIBRATION and MEASUREMENT.
- DO <INFO> <6> <6> <6> Calibration first to establish a slope for the diagnostic measurement.
- DO <INFO> <6> <6> <6> Measurement of both ISE Standards as samples four times each for Na, K, and Cl. This is a quick check of precision. Place a sample cup containing a standard in the cup position indicated on the display.

<table>
<thead>
<tr>
<th></th>
<th>Na</th>
<th>K</th>
<th>Cl</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard 1</td>
<td>148 - 151</td>
<td>2.9 - 3.1</td>
<td>135 - 140</td>
</tr>
<tr>
<td>Standard 2</td>
<td>97 - 103</td>
<td>6.8 - 7.1</td>
<td>89 - 95</td>
</tr>
</tbody>
</table>

Typical recovery is:

If recovery on any one measurement is outside of ranges perform the following:
- Replace Standards Set.
- Replace ISE Tubing Set.
- Replace sample needle.
- Replace tygon tubing loop (Classic).
- Replace electrode(s).

“Fluid Adjust Problem”

**Step 1** Check/replace ISE tubing.
- Remove the Standard 1 and Standard 2 solutions. Drain Standard 1 and 2 tubings dry <INFO> <6> <6> <2>. Pick the straw out of the bottle to drain the standard.
- Check air segmenting tubing “K” for cuts or poor fit.
- Check air input tubings (2), “M” for cuts or poor fit.
- Check all tubing connections at ISE shunts and under pinch valves.
- Check the peristaltic pump tubings. Tubing “G” may be flattened.

**Step 2** Clean the sample pathway.
- Using a cotton applicator, swab out the Mixtower with 25% dilute Clorox bleach.
- Prime the Mixtower. Using a transfer pipette, dispense 25% bleach into the Mixtower during its drying cycle. Repeat with bleach for about six cycles.
- Prime the Mixtower for about 1 minute. The water level should not rise above the air nozzles inside. Be sure a white, etched appearance is visible and no moisture is seen at the bottom of the Mixtower between primes. Listen for a “swishing” sound between primes.
Troubleshooting ISE Module

“Fluid Adjust Problem” (cont’d)

Step 3  Check the Electrode O-Rings and Electrode Spacer.
- Remove the Standard 1 and Standard 2 solutions. Drain Standard 1 and 2 tubings dry.
- Open the Faraday Cage and be sure all electrodes are installed correctly. An O-ring must be on the left side of each electrode. Replace the O-rings if any leakage is visible between the electrodes.
- Remove the plastic Electrode Spacer to the left of Chloride electrode from the tubing. Use a transfer pipette to push 25% bleach through the spacer. Repeat with reagent grade water.

Step 4  Replace the ISE Tubing Set.

Step 5  Check waste fitting “W2” for blockage.
- Fill a 5 mL syringe with 25% bleach. Use a “Butterfly” that has the needle end cut off to connect the syringe to Waste fitting “W2.” Use moderate pressure to clear blockages.

Step 6  Check the peristaltic pump.
- Remove the peristaltic pump tubings. Use a stylet to clean out any deposits inside the tubing fittings at the pump wheel.

“ISE Module No Response” Message

The ISE interface is controlled by the COBAS MIRA analyzer. The RS-232 cable interfaces the two units together. Line power fluctuations or interruptions can break off communication between the two instruments. This analyzer will exhibit the following error, “ISE No Response.” The ISE is no longer accessible through the analyzer software. This error can be resolved by taking the following steps.

Step 1  If there are any test results that are printed, go to <INFO><2>, <F2> Interim Report and press <PRINT>. (Results that are not printed are lost when the instrument is powered off.)

Step 2  Power off the analyzer and ISE. The ISE power switch is located around the back left side of the module above the power cord. Perform “ISE Power Up Sequence.” Wait 1 minute; switch on the ISE; wait another minute; then power on the analyzer. The ISE initializes in about 10 seconds.

Step 3  If Step 2 is unsuccessful, power off the analyzer and ISE. Check, reseat the analyzer to ISE Module interface (grey) cable. Perform ISE power up sequence.

Step 4  If Steps 1-3 are unsuccessful, power off the analyzer and ISE and unplug the instrument. Check the main power fuses FS1 and FS2, which are located just above the power switch in the back of the module. Pry the small, black flap and open with a flat blade screwdriver. If the orange Indicator Light on the front of the ISE Module is not illuminated when the ISE power is on and the bulb not burned out, replace the fuses. Remove and check FS3 and FS4; replace if necessary. Perform “ISE Power Up Sequence.” If the ISE does not initialize, contact the Customer Technical Support at 1-800-428-2336.
## Slope Range

The 2-point calibrated slope is lower/higher than the programmed limit.

1. Check programmed slope limits (<PROG> <6> <1>). Modify if necessary.

<table>
<thead>
<tr>
<th></th>
<th>Low</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>Na</td>
<td>45</td>
<td>68</td>
</tr>
<tr>
<td>K</td>
<td>50</td>
<td>65</td>
</tr>
<tr>
<td>Cl</td>
<td>-60</td>
<td>-30</td>
</tr>
</tbody>
</table>

2. Prime (<INFO> <6> <6> <1>) Standards 1 and 2 and Reference Solution. Lift straw out of Standard bottle to introduce an air bubble and watch it prime through the line. Change standards/tubing if necessary. Repeat 2-point calibration by pressing <START>.

3. Standards are empty or contaminated. Replace solutions and prime. Repeat calibration.

4. Slow response on electrodes:
   - **Slope Range on Sodium:**
     Perform Etch. (Check expiration date of Etcher Solution; use tip cleaner if necessary.) Follow with an Activation and 2-point calibration.
   - **Slope Range on Potassium or Chloride:**
     Perform Clean with 1:4 dilution of Clorox bleach. Follow with an Activation and 2-point calibration.
   - **Slope Range on all electrodes:**
     Perform an Etch using human serum as the solution.

## CALC Error

The 2-point calibrated slope of the electrode is zero.

1. Prime (<INFO> <6> <6> <1>) Standards 1 and 2. Pick the straw up out of the standard bottle to pull up an air bubble and watch it move through the tubing. While priming, check the standard tubing under the pinch valves for salt crystals. Roll the tubing between your fingers to break up the crystals. Change standards/tubing if necessary. Repeat 2-point calibration by pressing <START>.

2. Replace electrode(s); repeat calibration.

3. If problems persist, call Customer Technical Support at 1-800-428-2336.

## Leakage in Electrode Cage

Drain the Standard 1 and 2 lines dry, Info, 6, 6, 2.

Open the Faraday Cage by pressing the upper black part on the left side of the cage. Remove the electrodes and check each one for an intact O-ring that is seated properly. Clean out the cage with a lint free tissue and a little reagent grade water, dry, and wipe out the cage with an alchohol prep and allow it to air dry.

Reinstall all electrodes and lock the cage. Prime Standards.
### Troubleshooting ISE Module

#### Slope on Chloride Electrode Incorrect

<table>
<thead>
<tr>
<th>Causes</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrode must be reactivated</td>
<td>Clean of the electrodes with 25% bleach solution.</td>
</tr>
</tbody>
</table>

#### Too Low or Non-Reproducible ISE Results

<table>
<thead>
<tr>
<th>Causes</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrode over conditioned</td>
<td>Reduce frequency of etching procedures from daily to weekly if less than 20 samples are run per day. Perform Serum Etch to bring the Na slope down. (Use serum rather than ETCHER solution.)</td>
</tr>
<tr>
<td>Incorrect adjustment of the sample</td>
<td>Check fluid adjust. (See segment in the electrode channel Maintenance section.)</td>
</tr>
<tr>
<td>Mixtower not drying thoroughly</td>
<td>Follow Mixtower Overflow procedures.</td>
</tr>
<tr>
<td>Contaminated standard or reference</td>
<td>Place new standard 1, standard 2, and reference bottles on the ISE module. Prime.</td>
</tr>
<tr>
<td>Contaminated sample needle/tubing</td>
<td>Regularly perform daily maintenance including the needle/tube cleaning. Replace the sample needle and tubing on the transfer arm. (Classic)</td>
</tr>
<tr>
<td>Contaminated tubing on the ISE</td>
<td>Regularly perform daily maintenance including cleaning of the electrodes. Replace the ISE tubing on the ISE module, if necessary. This is a 6-month maintenance procedure.</td>
</tr>
<tr>
<td>Invalid flow of reference electrolyte</td>
<td>Check flow by priming <code>&lt;INFO&gt;</code>&lt;6&gt;&lt;6&gt;&lt;1&gt;PRIME SYSTEM. Choose 3 for the reference solution and observe the pearl chain effect at the electrode. Refer to page 6.40 in the COBAS MIRA Plus Operator’s Manual for help.</td>
</tr>
</tbody>
</table>

#### Too High ISE Results

<table>
<thead>
<tr>
<th>Causes</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>No water flow during mixtower prime</td>
<td>Check tubing under the bridge from the analyzer to the ISE; it may be crimped shut. Unscrew the black knurled screw and lift the bridge to check the tubing.</td>
</tr>
</tbody>
</table>
**Troubleshooting for Probes and Pipettors**

**Classic, Plus, L, and S Pipette Drive Assembly**

Dirt building up on the pipette drive assembly or a lack of lubrication can cause P (Reag. Samp) Step Errors and P (Reag. Samp) 0 Pos Errors. These errors can be resolved by cleaning and lubricating the following assembly.

1. Remove the cover to the syringe assembly. Locate and clean the metal pipette guide rods with an alcohol prep.
2. Dry the rod assemblies with a tissue or lint-free tissue.
3. Lightly lubricate the guide rods with WD-40 or another light lubricant.
4. Check operation of instrument under prime, `<INFO> <6> <1>`, Z POSITION: UP, PIPETS: ON.
5. Change syringe tips if errors occur.
Flags and Messages

Common Flags and Error Messages with Possible Solutions

SIGN

No reaction or reaction was detected in the opposite direction as programmed.

1 Air bubble or fibrin in sample cup – remove or repour. Check prime of sample needle. Press \textless \text{INFO}\textgreater \textless 6\textgreater \textless 1\textgreater.

2 Out of start (second) reagent or sample – replace.

3 No analyte detected, negative (Bilirubins, Alcohol, etc.) – report as such.

4 Wrong reagent in reagent rack – replace.

5 Substrate exhaustion (enzymes) – dilute and reassay.

\textgreater \text{SAMPLE LIMIT}\textless

Difference in absorbance between sample cuvette and reagent blank cuvette at the defined reading exceeds the programmed limit.

1 Caused by hemolyzed, icteric, and lipemic specimens – check integrity of specimen and note. The instrument considers the result valid. Follow your lab protocol for evaluating and reporting the result.

2 If flag occurs frequently on one assay, check reagent stability. If flag continues to be prevalent, recalibrate the assay with fresh reagent to store a new reagent blank.

\textless \text{Down Arrow}\textless

Automatic post-dilution. The initial value was greater than the test range of the assay. The instrument performed a post-dilution. The new value was multiplied by the dilution factor and is the reported result.

\textgreater \text{Reaction Limit}\textless

Change in absorbance between a first reading and defined point are not within the programmed limit.

Very high enzyme concentration in sample – Repeat with diluted sample (automatically done if post-dilution is programmed.)

\textgreater \text{or} \textless \text{TEST RANGE}\textless

Result is outside the linear range.

1 High samples – Repeat with diluted sample (automatically done if post-dilution is programmed).

2 Low samples – Report as lower than test range; or if post-concentration is programmed, a larger sample volume is reassayed automatically.

CALC ERROR

Calculation program cannot calculate a result.

1 Check parameters and math model in test parameters.

2 Ensure calibrator was prepared per package insert. Prepare fresh calibrator as directed.

3 Reassay using fresh reagents.
**CALC RANGE**

Commonly seen on the highest or lowest standard of a non-linear calibration curve. The calibration is acceptable unless the message is printed for another level of calibrator other than the highest or lowest. (Refer to the Data Analysis section of the appropriate analyzer operator's manual.)

> or < **REAGENT RANGE**

- On calibration, reagent blank does not fall within programmed absorbance limits.
  1. Old reagents – prepare fresh.
  2. Reagents are not allowed to sit long enough after reconstitution – prepare fresh as directed.
  3. Reconstituted incorrectly – prepare fresh as directed.
  4. Check the water used to reconstitute for bacterial contamination. Prepare reagent with reagent grade type 1 water from a different source.
  5. Verify that all maintenance has been performed recently. Check for bacterial contamination in water reservoir or washtower. Verify that new cuvettes are being used. Do not use washed cuvettes.

> or < **BLANK RANGE**

- On calibration, there is an absorbance change (reaction) outside the programmed range.
  1. Contaminated reagents – prepare fresh.
  2. Contamination on system – check reagent probe, washtower, water reservoir, cuvettes, and maintenance performed.
  3. Reagents are not allowed to sit long enough after reconstitution – prepare fresh and allow to sit as directed.
C (Confidence) Error Report

Calibration Error

Follows results on tests with unacceptable calibrations or controls.

1. Check test parameters. Correct if necessary. Verify that the calibrator value is correct for the lot number used. For endpoint assays, check the factor against the factor range.
2. Reconstitute fresh reagent and calibrator. Reassay.
3. Check P150 and P250 if error reoccurs.
4. Obtain raw data: INFO <1> Test Results, F1 Data, F3 Raw Data, ENTER for all samples, select the test, PRINT. Data must be requested immediately after a run is completed.
5. If the error remains, call Customer Technical Support at 1-800-428-2336.

Control Error <or> Confidence Range

1. Check programmed ranges for the lot numbers of controls used. Correct if necessary under PROG <5> Racks, select the Cal/CS rack, F2 Controls, F1 Change Range.
2. Check the calibration factor against the factor range for an endpoint assay. Recalibrate with fresh reagent and calibrator if necessary. If the factor is correct, reconstitute fresh reagent and control. Reassay.
3. Check P150 and P250 if error reoccurs. Perform maintenance if necessary.
4. Obtain raw data: INFO <1> Test Results, F1 Data, F3 Raw Data, ENTER for all samples, select the test, PRINT.
5. If the error remains, call Customer Technical Support at 1-800-428-2336.

To Accept Flagged Results

1. Press INFO.
2. Press <1> Test Results.
4. Select sample cup number, or press SPACE for all samples.
5. Select test to be accepted. Results will be marked with an "A."

For software versions <8735, press INFO <1> <F1> Conv, select samples and tests and correct flagged parameters. Then press F2 Calc, review recalculated results and press F3 Accept Patient if acceptable.

To Reactivate Results

You can reactivate either flagged results (single or multiple) or unflagged results depending on the function key selected.

<F3> React

Select specific or all samples and tests. Results and/or flags are removed, and the request is reactivated on the worklist.

For Software version > 9215, <F3> React only affects flagged results.

<F4> React All (Software version >9215)

Selection applies to all results, flagged or valid. Results and/or flags are removed, and the request is reactivated on the worklist.
Flags and Messages

Reservoir Bottle Empty or No Water Available
Fill reservoir and empty waste container. Press <TEXT> key to clear the message and activate pumps. If message continues, remove in-line filter on external reservoir bottle. “Black“ filters have a fine mesh screen that can be removed and cleaned. Unscrew the base of the filter to get to the mesh screen. Clean with 25% bleach. Rinse well with reagent grade water and reinstall with the base (wider end) closer to the reservoir. “Transparent“ filters are disposable and must be replaced.

Level Detection (LD Errors)
Check reagent probe placement - remove probe and clean contact, or try new probe. Check connections in the transfer arm. Plus only – LD (Reag, Sample), KHZ value:
  a) low KHZ (4.8, 5.2 etc), moisture issue. Dry probe/needle housing with lint-free tissue, canned air.
  b) KHZ value near 70, reagent probe or sample needle installed incorrectly.

Transfer Area Blocked or XYZ
Remove any obstruction (reagent caps, elbows, misplaced racks, etc.) Once corrected, press <START>.

Worklist Not Empty
Routine or STAT worklist is not empty. The worklist must be deleted before a modification is possible. Check Info 3 and Info 4 for any tests that are blinking. This indicates that a precalibration or precontrol has been ordered. Go to Routine to change the request to CA or CS to take the requests off the worklist (without any patients ordered).
## Error Codes

Obtain hardcopy of data that has not yet printed under INFO <2><F2> and press print.

![Warning](image)

Before removing ANY covers off of the analyzer, power off the instrument and unplug the power cord.

<table>
<thead>
<tr>
<th>Error Code Numbers</th>
<th>Action</th>
</tr>
</thead>
</table>
| 1-14 In addition for these errors: 1, 11, 12, 13 | - Power off/on, reseat Photometer PCB  
- Switch off overhead lights  
- Cover rotor lid with dark paper, provide hole for pipetting into cuvette  
- Reseat Motor Control 1 PCB |
| 9 | - Power off/on  
- Reseat Motor Control 1 PCB |
| 15-17 | - Power off/on  
- Reseat flat gray cable on Motor Control II PCB |
| 18, 21, 31 | - Power off, rotate rotor manually, remove cuvettes and check for obstructions  
- Blow air on sensor at 9:00 position on ring  
- Reseat Motor Control 1 PCB |
| 20 | - Check for obstructions in left to right direction  
- Clean off X guide rails  
- Blow air on sensor on left side of instrument  
- Power on/off  
- Reseat Motor Control 1 PCB |
| 23, 24, 25, 27, 28, 33, 34, 35 | - Check for obstructions in the corresponding direction  
- Lubricate appropriate drive shaft  
- Power off/on  
- Push down on Z drive mechanism and retry (Classic, S/L only) |
| 35, 38, 39 (Plus/Plus CC ONLY) In addition for: 25 and 28 | - Clean and lubricate THK rails under orange belt.  
- Check for wires, tangles with barcode reader |
| 40 | - Power off/on  
- Reseat Motor Control 1 PCB |
| 41, 42 | - Power off/on  
- Reseat Motor Control II PCB |
| 43 (Classic only) | - Power off/on  
- Reseat CRT Control PCB |
| 44 (Classic only) | - Power off, clean and lubricate printer drive assembly and power on.  
- Power off, reseat keyboard cable, power on |
| 46 | - Power off/on  
- Call Customer Technical Support |
| 47 | - Power off/on  
- Check flashbox fuse  
- Check fuses in back of Classic only |
<table>
<thead>
<tr>
<th>Error Code Numbers</th>
<th>Action</th>
</tr>
</thead>
</table>
| 48                 | • Dry reagent probe and temp head  
|                    | • Blow air on interconnect board  
|                    | • Check for water leakage on interconnect board  
|                    | • Check for bleach in water system  |
| LD error S/R = XkHz|        |
| Touch Error        |        |
| S/R Empty          |        |
| 49                 | • Clear paper from printer and re-feed paper  
|                    | • Press the TEXT key  
|                    | • Power off/on  |
| 50, 51             | • Power off/on  |
| 52                 | • Power off/on  
|                    | Plus/Plus CC only:  
|                    | • Blow air on interconnect board  
|                    | • Reseat cables on temp head  |
| 56                 | • Power off analyzer and external computer  
|                    | • Reseat and check cable connections  
|                    | • Power up computer then analyzer  |
| 57                 | • Check PROG <6> <3> and verify they match the computer  
|                    | • Power off and then computer on and then analyzer  |
| 59 (S/L Plus/Plus CC only) | • Power off/on  
|                    | • Reseat Communications Control PCB  |
| 65                 | • Memory is corrupted, page service  |
| 74                 | • Power off/on  
|                    | • Clean and lubricate associated guide rails  |
| 75, 76, 77, 78     | • Clean and dry sample and reagent probes  
|                    | • Run RS needle adjust (INFO <6><7><2>)  
|                    | • Verify analyzer cover/switch is closed  |
| 99                 | • Clean rack reader  
|                    | • Power off/on  |
| 110                | • Page service  |
| 132, 133, 134, 135, 136, 137 | • Check analyzer for obstructed cuvettes  
|                    | • Manually remove all cuvettes from analyzer  
|                    | • Run INFO <6><8>, Load/Unload commands  |
| 138, 139           | • Power off/on  
|                    | • Reseat the Changer/Cooler Control PCB  |
| 144, 145           | • Power off/on  |
| 148                | • Check for transfer arm obstructions  
|                    | • Clean rack reader  
|                    | • Verify placement of R5s#1 and 16A racks in positions 1 and 3 of rack plate  
|                    | • Run RS needle adjust  
|                    | • Power off/on  |
Non-Routine Procedures

To Accept an Out-of-Range Control

Accept out-of-range controls only with appropriate justification.

1. Press <INFO>.
2. Press <1> Test Results.
3. Press <F1> Data. (Skip this step if software version <8735.)
4. Press <F1> Convert.
5. Press <ENTER>.
6. Select appropriate test.
7. Press <F3> Calc Check=Off.
8. Press <F4> Enter Test.

To Obtain Raw Data

1. Press <INFO> <1> Test Results.
2. Press <F1> Data. (Skip this step if software version <8735.)
4. Press <ENTER>.
5. Select appropriate test or press <SPACE> to select all tests.
6. Press <PRINT> for a printout of raw data.

Deletion of Tests From Profile and Test Menu

To delete a test file name and parameters, proceed as follows: (QC must be closed first)

1. Press <PROG><2> to access the TESTS program. The screen displays the assignment table for test level 1.
2. To change the display to another test level, press <F4> TEST LEVEL and select the corresponding number (1 to 4).
3. Select the test key (A to Z) to be deleted. The first page GENERAL of the test parameters appears.
4. Press <F1> MODIFY. The cursor appears at the first parameter.
5. Press <F2> DELETE TEST. The message CONFIRM BY ENTER appears. Press <ENTER>. The entire test file is then deleted, and the screen displays the test assignment table. The test is also deleted from any profile to which it was assigned. Select another test or press <ESCAPE> to exit the TEST section.
Total and Direct Bilirubin Calibration Procedure

Obtain a new calculation factor monthly, when a new lot number of reagent is used, or controls indicate a need to calibrate.

1. Provide fresh calibrator and reagents for Total and Direct Bilirubin in the proper rack positions.
2. Order precalibration (PCA or PC) for TBIL
3. Press <START> to begin the calibration.
4. The new calculation factor prints next to “*F.” Verify that the factor is in range for the assay.
5. Modify the Direct Bilirubin Factor Parameter under Program 2 with the new Total Bilirubin Factor.

To modify a parameter, quality control results must be closed for the test, and the worklist must be empty. Check paper supply. Press <INFO><4>. Choose test; press Close Quality. Press Enter.
# COBAS MIRA Spare Parts

<table>
<thead>
<tr>
<th>Spare Part</th>
<th>Analyzer</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sample Needle</strong></td>
<td>Classic (5/pkg)</td>
<td>29274</td>
</tr>
<tr>
<td></td>
<td>Tubing</td>
<td>8089426</td>
</tr>
<tr>
<td></td>
<td>Brass Collar</td>
<td>7300264</td>
</tr>
<tr>
<td></td>
<td>S, L (1 Cassette)</td>
<td>28078289001</td>
</tr>
<tr>
<td></td>
<td>Plus (3/pkg)</td>
<td>8078343</td>
</tr>
<tr>
<td><strong>Reagent Probe</strong></td>
<td>All analyzers</td>
<td>8077347</td>
</tr>
<tr>
<td><strong>Foam Insert-Washtower</strong></td>
<td>Plus</td>
<td>8078653</td>
</tr>
<tr>
<td><strong>Syringes</strong></td>
<td>All analyzers</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Reagent (1000uL)</td>
<td>8078955</td>
</tr>
<tr>
<td></td>
<td>Sample (100uL)</td>
<td>28076812001</td>
</tr>
<tr>
<td><strong>Syringe Plunger Tips</strong></td>
<td>All analyzers</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Tip for Reagent Syringe</td>
<td>8061173</td>
</tr>
<tr>
<td></td>
<td>Tip for Sample Syringe</td>
<td>8061165</td>
</tr>
<tr>
<td><strong>Cuvette Segments</strong></td>
<td>All analyzers</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Case of 500</td>
<td>29894</td>
</tr>
<tr>
<td></td>
<td>For changer; case of 300</td>
<td>44077</td>
</tr>
<tr>
<td><strong>Reagent Containers</strong></td>
<td>All analyzers</td>
<td></td>
</tr>
<tr>
<td></td>
<td>R5S Reagent Container (15mL)</td>
<td>37307</td>
</tr>
<tr>
<td></td>
<td>R5S Reagent Container (35mL)</td>
<td>37293</td>
</tr>
<tr>
<td></td>
<td>Reagent Container (4 mL)</td>
<td>34634</td>
</tr>
<tr>
<td></td>
<td>Reagent Container (10mL)</td>
<td>34626</td>
</tr>
<tr>
<td></td>
<td>Glass Vials/Caps (12 mL, 25/pkg)</td>
<td>44042</td>
</tr>
<tr>
<td><strong>Sample Cups</strong></td>
<td>All analyzers</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Blue</td>
<td>06789</td>
</tr>
<tr>
<td></td>
<td>Red</td>
<td>19449</td>
</tr>
<tr>
<td></td>
<td>White</td>
<td>27115</td>
</tr>
<tr>
<td></td>
<td>Yellow</td>
<td>22016</td>
</tr>
<tr>
<td><strong>Reagent Racks</strong></td>
<td>All analyzers</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Reagent 10 Rack</td>
<td>39630</td>
</tr>
<tr>
<td></td>
<td>Reagent 5s Rack</td>
<td>38036</td>
</tr>
<tr>
<td><strong>Sample Racks</strong></td>
<td>All analyzers</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sample 30 Rack</td>
<td>39631</td>
</tr>
<tr>
<td></td>
<td>Sample 16a Rack</td>
<td>42125</td>
</tr>
<tr>
<td></td>
<td>Sample 16b Rack</td>
<td>42126</td>
</tr>
<tr>
<td><strong>Cal/Cs Racks</strong></td>
<td>All analyzers</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cal/Cs 8 Rack</td>
<td>8078963</td>
</tr>
<tr>
<td></td>
<td>Cal/Cs 30 Rack</td>
<td>39631</td>
</tr>
<tr>
<td><strong>Diluent Filter</strong></td>
<td>All analyzers</td>
<td></td>
</tr>
<tr>
<td></td>
<td>In-line filter on water reservoir tubing</td>
<td>8089086</td>
</tr>
<tr>
<td><strong>Solutions</strong></td>
<td>All analyzers</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Precision Testing Set</td>
<td>44337</td>
</tr>
<tr>
<td></td>
<td>Tip Cleaner</td>
<td>42282</td>
</tr>
<tr>
<td></td>
<td>Reagent Water</td>
<td>47442</td>
</tr>
<tr>
<td></td>
<td>Etcher Solution</td>
<td>42374</td>
</tr>
</tbody>
</table>
## COBAS MIRA Spare Parts

<table>
<thead>
<tr>
<th>Spare Part</th>
<th>Analyzer</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Tubing – ISE</strong></td>
<td>All analyzers</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Tubing Set</td>
<td>8077975</td>
</tr>
<tr>
<td><strong>Electrodes</strong></td>
<td>All analyzers</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Na</td>
<td>1029371</td>
</tr>
<tr>
<td></td>
<td>K</td>
<td>1029355</td>
</tr>
<tr>
<td></td>
<td>Cl</td>
<td>1039415</td>
</tr>
<tr>
<td></td>
<td>Reference</td>
<td>1029398</td>
</tr>
<tr>
<td><strong>Standards</strong></td>
<td>All analyzers</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Standard 1</td>
<td>46997</td>
</tr>
<tr>
<td></td>
<td>Standard 2</td>
<td>46998</td>
</tr>
<tr>
<td></td>
<td>Reference Solution</td>
<td>46999</td>
</tr>
<tr>
<td><strong>Printer Paper</strong></td>
<td>Classic</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Thermal Paper (80 mm)</td>
<td>27180</td>
</tr>
<tr>
<td></td>
<td>S, L, Plus</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Thermal Paper (110 mm)</td>
<td>44019</td>
</tr>
</tbody>
</table>
Interfacing to COBAS MIRA Systems

“Classic” (Serial Numbers below 26-5437)

This instrument model can be identified by the tygon tubing loop over the sample needle.

Requires Universal Interface printed circuit board(s) (Part No. 9490630). If a Classic is interfaced to two components, (for example, the ISE module and a host computer) two boards are necessary. The switches are hard-wired on this board and must be set correctly before communications can take place.

Classic Interface Board – ISE Switch Settings

Set to ON position: Switch numbers
Set to OFF position: Switch numbers
2, 8, 12, 13, 18, 19 1, 3, 5, 6, 7, 9, 10, 11, 14-17, 20-23

Switch #24 - set to position 2.
S4 - position #3 for 2400 Baud rate

Host Computer Switch Settings

Set to ON position: Switch numbers
Set to OFF position: Switch numbers
7, 11 5, 6, 8, 9, 10, 12

Switch #24 - set to position 2.

Switch settings S4 (Baud Rate) and S13-S24 are set to the host computer specifications.

The switches on the board are labelled with S and a number. Refer to the following tables.

Board Configuration – Classic

<table>
<thead>
<tr>
<th>Function Number</th>
<th>Switch</th>
<th>ON</th>
<th>OFF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Address selection</td>
<td>S1</td>
<td>mandatory</td>
<td>mandatory</td>
</tr>
<tr>
<td>Address selection</td>
<td>S2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Address selection</td>
<td>S3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baud rate</td>
<td>S4</td>
<td>9600/4800/2400/1200/600/300/150/110 Baud</td>
<td></td>
</tr>
<tr>
<td>Address selection</td>
<td>S5</td>
<td>refer to Address Definitions, page C-4 of COBAS MIRA Classic Operator’s Manual, Appendix</td>
<td></td>
</tr>
<tr>
<td></td>
<td>S6</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>S7</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>S8</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>S9</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>S10</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>S11</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>S12</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Board Configuration – Classic (cont’d)

<table>
<thead>
<tr>
<th>Function Number</th>
<th>Switch</th>
<th>ON</th>
<th>OFF</th>
</tr>
</thead>
<tbody>
<tr>
<td>OPERATING MODE 1:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CTS*</td>
<td>S13</td>
<td>CTS = 1 (no handshake)</td>
<td>Handshake enabled</td>
</tr>
<tr>
<td>Operating Mode</td>
<td>S14</td>
<td>Hardware enabled</td>
<td></td>
</tr>
<tr>
<td>Echo*</td>
<td>S15</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parity bit*</td>
<td>S16</td>
<td>disabled</td>
<td>enabled</td>
</tr>
<tr>
<td>Parity check*</td>
<td>S17</td>
<td>ODD</td>
<td>EVEN</td>
</tr>
<tr>
<td>Data format*</td>
<td>S18</td>
<td>7 bits</td>
<td>8 bits</td>
</tr>
<tr>
<td>Stop bit*</td>
<td>S19</td>
<td>1 bit</td>
<td>2 bits</td>
</tr>
<tr>
<td>Line Termination (COBAS Output only)</td>
<td>S20</td>
<td>CR, LF</td>
<td>LF</td>
</tr>
<tr>
<td></td>
<td>S21</td>
<td>CR, LF, XOFF</td>
<td></td>
</tr>
<tr>
<td></td>
<td>S22</td>
<td>CR, LF, XOFF, DEL</td>
<td></td>
</tr>
<tr>
<td></td>
<td>S23</td>
<td>CR, LF, XOFF, DEL, DEL</td>
<td></td>
</tr>
<tr>
<td>Transfer mode</td>
<td>S24</td>
<td>U:RS-232-C (switch pos 2)</td>
<td>I: 20mA current loop</td>
</tr>
</tbody>
</table>

* refer to page C-3 of the COBAS MIRA Classic Operator’s Manual, Appendix

<table>
<thead>
<tr>
<th>Function Number</th>
<th>Switch</th>
<th>ON</th>
<th>OFF</th>
</tr>
</thead>
<tbody>
<tr>
<td>OPERATING MODE 2:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not used</td>
<td>S13</td>
<td>XON/XOFF</td>
<td></td>
</tr>
<tr>
<td>Operating Mode</td>
<td>S14</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not used</td>
<td>S15</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parity bit*</td>
<td>S16</td>
<td>disabled</td>
<td>enabled</td>
</tr>
<tr>
<td>Parity check*</td>
<td>S17</td>
<td>ODD</td>
<td>EVEN</td>
</tr>
<tr>
<td>Data format*</td>
<td>S18</td>
<td>7 bits</td>
<td>8 bits</td>
</tr>
<tr>
<td>Stop bit*</td>
<td>S19</td>
<td>1 bit</td>
<td>2 bits</td>
</tr>
<tr>
<td>Line Termination* (Output)</td>
<td>S20</td>
<td>CR, LF</td>
<td>LF</td>
</tr>
<tr>
<td>CR-Killer* (Input only)</td>
<td>S21</td>
<td>enabled</td>
<td>disabled</td>
</tr>
<tr>
<td>Not used</td>
<td>S22</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not used</td>
<td>S23</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transfer mode</td>
<td>S24</td>
<td>U:RS-232-C (switch pos 2)</td>
<td>I: 20 mA current loop</td>
</tr>
</tbody>
</table>

* refer to page C-3 of the COBAS MIRA Classic Operator’s Manual, Appendix
S, L, Plus

ISE Communication

This requires the “Multi-Interface” printed circuit board, part number 9001340 (nonEMC) or 8069263 (EMC). Refer to the diagram below for the proper location of the ISE interface cable.

Host Communication

Plug an RS-232 cable into the RS-232/HOST port of the CPU as indicated above.

<PROGRAM> <6> <3> (Output Mode) parameters are set to correspond with the host computer.

Under the Interface heading on the first screen, the status parameter is set to “on.” This turns on the RS-232 interface.

Refer to the “Programming” section of the operator’s manual for the list of parameters and options for the S, L, and Plus.
## Interfacing

### RS-232 Cable

#### 25-25 Pin Configuration

<table>
<thead>
<tr>
<th>(PC) Host</th>
<th>TxD 2</th>
<th></th>
<th>3 RxD</th>
<th></th>
<th>COBAS MIRA analyzer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Com 1 or Com 2</td>
<td>RxD 3</td>
<td></td>
<td>2 TxD</td>
<td></td>
<td>Interface Connector</td>
</tr>
<tr>
<td>Sub D 25 Female</td>
<td>RTS 4</td>
<td></td>
<td>8 DCD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sub D 25 Female</td>
<td>CTS 5</td>
<td></td>
<td>6, 20 DTR</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>DTR 6, 20</td>
<td></td>
<td>5 CTS</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>DCD 8</td>
<td></td>
<td>4 RTS</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>GND 7</td>
<td></td>
<td>7 GND</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### 9-25 Pin Configuration

<table>
<thead>
<tr>
<th>(PC) Host</th>
<th>CD1</th>
<th></th>
<th>1</th>
<th></th>
<th>COBAS MIRA analyzer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Com 1 or Com 2</td>
<td>RxD 2</td>
<td></td>
<td>2 TxD</td>
<td></td>
<td>Interface Connector</td>
</tr>
<tr>
<td>Sub D 9 Female</td>
<td>TxD 3</td>
<td></td>
<td>3 RxD</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>DTR 4</td>
<td></td>
<td>4 RTS</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>DSR 6</td>
<td></td>
<td>5 CTS</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>GND 5</td>
<td></td>
<td>7 GND</td>
<td></td>
<td></td>
</tr>
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<td>RTS 7</td>
<td></td>
<td>8 CD</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>CTS 8</td>
<td></td>
<td>6</td>
<td></td>
<td>Sub D 25 Female</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>20 DTR</td>
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<td></td>
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</tbody>
</table>