

CHAPTER 5 - TABLE OF CONTENTS

5.1 OVERVIEW 5-3

5.2 VERIFICATION PROCEDURES 5-4

VP-1 POWER SUPPLY CHECK	5-4
VP-2 BAR CODE READER TEST	5-5
VP-3 LOAD/URGE MODULE TEST	5-6
VP-4 TRANSPORT TEST	5-8
VP-5 WASH SYSTEM TESTS	5-10
VP-6 DISPENSE TESTS	5-12
VP-7 READ SYSTEM TESTS	5-14
VP-8 CONSOLE TEST	5-17
VP-9 SYSTEM TEST	5-18
VP-10 PRINTER TESTS	5-19
VP-11 SENSOR TEST	5-20
VP-12 HOMING TEST	5-22
VP-13 BIT BUS TEST	5-23
VP-14 COMMUNICATIONS TEST	5-24
VP-15 LOAD URGE TO MAIN TRANSPORT DRIVE ALIGNMENT	5-26
VP-16 BAR CODE SWITCH ALIGNMENT	5-28
VP-17 WEB SWITCH - ROLLER BALL STYLE	5-29
VP-18 BAR CODE READER	5-30
VP-19 ALIGN TRANSPORT AUGER	5-31
VP-20 RAIL ALIGNMENT TOP AND SIDE MAIN TRANSPORT ASSY	5-32
VP-21 ENCODER WHEEL POSITION	5-34
VP-22 WASH SWITCH - NEW WIDE ACTUATOR STYLE ..	5-35

VP-23 DISPENSE ACTUATOR TO MAIN TRANSPORT DRIVE	5-36
VP-24 WASH ACTUATOR ASSY TO MAIN TRANSPORT DRIVE	5-37
VP-25 SENSOR BD/DISPENSE BOOM POSITION ALIGNMENT	5-38
VP-26 DISPENSE PUMP/PIPETTOR BOTTLE ALIGNMENT	5-40
VP-27 SENSOR FLAG - WASH ACTUATOR ALIGNMENT ..	5-42
VP-28 EXIT SHROUD (MECHANICAL ALIGNMENT))	5-43
VP-29 EXIT SWITCH - METAL ACTUATOR (MECHANICAL ALIGNMENT)	5-44
VP-30 EXIT SWITCH - PLASTIC ACTUATOR (MECHANICAL ALIGNMENT)	5-45
VP-31 REGULATOR VALVE PRESSURE ADJUSTMENT	5-46
VP-32 AIR PRESSURE LEAK ISOLATION	5-47
VP-33 LOAD URGE RAIL ALIGNMENT (OLD STYLE)	5-48
VP-34 CHECK VOLTAGES ON READ A/D BD	5-49
VP-35 CHECK VOLTAGE AT LAMP	5-50
VP-36 SHELF AND BEZEL ASSY RELAY VOLTAGES	5-51
VP-38 BALL ACTUATOR CLEANING	5-52
VP-39 DECONTAMINATION	5-53
VP-40 LINEARITY TEST	5-54
VP-41 DRIFT TEST	5-55
VP-42 REPEATABILITY TEST	5-56
VP-43 WASH VOLUME VERIFICATION	5-57
VP-44 MEASURE FLASH MEMORY BD VOLTAGES	5-58
VP-46 WASH ACTUATOR ASSY TO MAIN TRANSPORT ..	5-59

VP-47 OPTICS FILTER CLEANING, REPLACEMENT, & ADJUSTMENT	5-60
VP-48 KEYPAD/DISPLAY CLEANING	5-65
VP-49 FLASH MEMORY	5-66
VP-50 CLEAN TRANSPORT AUGER	5-67
VP-51 WASH CYCLE VERIFICATION	5-68
VP-52 CHECK VOLTAGE AT J700, BACK PLANE BD	5-69
VP-54 MEASURE BATTERY VOLTAGE	5-70
VP-55 CLEAN LOAD MODULE URGE BELTS	5-71
VP-56 CALIBRATION	5-72

5.1 OVERVIEW

This chapter contains adjustments, calibrations, checks, tests and additional procedures required to verify instrument operation after repairs are complete. Verification Procedures (VPs) are also used to assist in troubleshooting.



VP-1 POWER SUPPLY CHECK

Time: 5 minutes

Purpose: Verify correct Main Power Supply outputs.

With power ON, lower Left Rear Panel. There are four voltage checks made on Main Power Supply. Locate the terminal strip on the Main Power Supply Bd. (Refer to Figure 5-1 below.)

+12VDC

1. Place positive lead of multimeter on terminal 3.
2. Place negative lead of multimeter on terminal 6 or 7.
3. Reading may range from +11.8VDC to +12.3VDC.
4. The voltage is not adjustable. If the voltage is not within specification, reject the power supply.

-12VDC

1. Place the positive lead of multimeter on the rear lead of R705 on the Cable Panel Interface Bd.
2. Place negative lead of multimeter on pin 3 of J407.
3. Reading may range from -12.3VDC to -11.8VDC.
4. The voltage is not adjustable. If the voltage is not within specification, reject the power supply.

+5VDC

1. Place positive lead of multimeter on terminal 8 or 9.
2. Place negative lead of multimeter on terminal 6 or 7.
3. Reading may range from +5.0VDC to +5.2VDC.
4. To adjust voltage on a Non-CE Mark power supply (1-43150-01), locate R57 potentiometer. To adjust voltage on a CE Mark power supply (1-43150-02), locate V1 potentiometer. Refer to Figure 5-1.
5. To decrease voltage, turn screw on potentiometer clockwise.
6. To increase voltage, turn screw on potentiometer counterclockwise.

+24VDC

1. Place positive lead of multimeter on terminal 4.
2. Place negative lead of multimeter on terminal 5.
3. Reading may range from +23VDC to +27VDC.
4. If the voltage is not within the specified range on 1-43150-01 supply, reject the power supply. For the 1-43150-02 supply adjust V2. If unsuccessful, replace with equivalent part number supply.

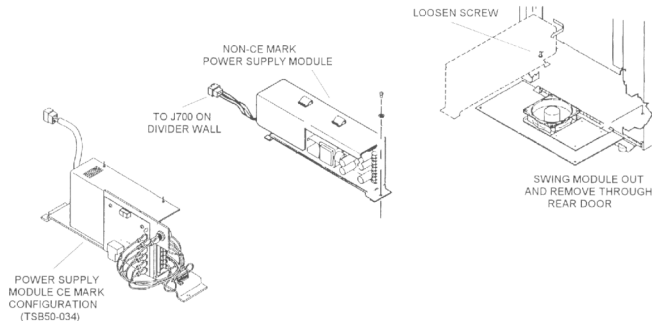


Figure 5-1. Main Power Supply Output Voltage Check

VP-2 BAR CODE READER TEST

Time: 5 minutes

Purpose: Verify operation of Bar Code Reader.

1. At prompt - INSERT TRAY
 - # SPECIAL MODES
 - 4 DIAGNOSTICS
 - 1 BAR CODE
 - 1 INTERNAL BAR CODE OR 2 EXTERNAL BAR CODE
 - READ BAR CODE
2. Verify screen shows:

EXT. BARCODE
PRESENT BARCODE LABEL TO READER
BARCODE DATA: (XXXXXXX)

3. Verify screen shows:

BAR CODE SWITCH OFF
TRAY AT BARCODE

4. Insert tray with bar code label affixed.
5. Verify screen shows:

BAR CODE SWITCH ON

6. Verify screen shows:

BAR CODE DATA (7 DIGIT TRAY NUMBER)
REMOVE TRAY FROM BAR CODE

7. Remove tray.

VP-3 LOAD/URGE MODULE TEST

Time: 5 minutes

Purpose: Verify operation of Load Module Systems.

1. At prompt - INSERT TRAY
 - # SPECIAL MODES
 - 4 DIAGNOSTICS
 - 2 URGE
2. Verify screen shows:

```
TRANSPORT HOME SWITCH    HOME
INSERT TRAY AT BARCODE
<ENTER> TO CONTINUE OR <#> TO EXIT
```

3. Press <ENTER>.
4. Verify screen shows:

```
TRANSPORT HOME SWITCH    HOME
ENTER SOLENOID DOWN
<ENTER> TO CONTINUE OR <#> TO EXIT
```

5. Insert a clean 20-well or 60-well reaction tray into Load/Urge Module.

6. Verify screen shows:

```
BAR CODE SWITCH ON
ENTER SOLENOID DOWN
<ENTER> TO CONTINUE OR <#> TO EXIT
```

7. Press <ENTER>.
8. Verify tray advances to Tray Ready Switch.
9. Verify screen shows:

```
TRAY READY SWITCH        ON
GATE SOLENOID DOWN
<ENTER> TO CONTINUE OR <#> TO EXIT
```

10. Press <ENTER>.
11. Verify Wash Gate Solenoid activates.
12. Verify screen shows:

```
TRANSPORT HOMESWITCH     HOME
ENTER NUMBER OF WEBS TO MOVE <1-9>
SELECT <1-9> OR <#> TO EXIT
```

13. Verify Wash Gate Solenoid deactivates after approximately 3 seconds.

14. Verify screen shows:

WASH STATION SWITCH ON
ENTER NUMBER OF WEBS TO MOVE (1-9)
SELECT (1-9) OR <#> TO EXIT

15. Press <#> to end test.

VP-4 TRANSPORT TEST

Time: 5 minutes

Purpose: Verify operation of augers on Main Transport.

1. Perform **VP-3**.
2. Enter 8 to advance tray. Observe tray advance.
3. Repeat Step 2 until tray exits instrument.
4. Remove tray.
5. Press <#> to end test.

NOTE: This procedure is required to perform Wash System tests, Read A/D tests, and Dispense Well Diagnostics.



VP-5 WASH SYSTEM TESTS

Time: 5 minutes

Purpose: Verify Wash Manifold operation.

1. At prompt - INSERT TRAY
 - # SPECIAL MODES
 - 4 DIAGNOSTICS
 - 2 URGE
2. Insert 20-well reaction tray.
 - ENTER
 - ENTER
 - ENTER
 - MOVE 1 WEB

Wash Head Movement

- # EXIT
 - 4 WASH TEST
1. Verify screen shows:

```

WASH HEAD TEST
1. HEAD MOVEMENT      2. COMPRESSOR
3. SOLENOIDS WITH TRAY
SELECT <1-3> OR <#> TO EXIT
  
```

2. Press <1>.

3. Verify screen shows:

```

WASH HEAD      READY
<ENTER> TO CONTINUE OR <#> TO EXIT
  
```

4. Press <ENTER>. Observe Wash Head move to down position.
5. Verify screen shows:

```

WASH HEAD      DOWN
<ENTER> TO CONTINUE OR <#> TO EXIT
  
```

6. Press <ENTER>. Observe Wash Head move to ready position.
7. Verify screens shows:

```

WASH HEAD      READY
<ENTER> TO CONTINUE OR <#> TO EXIT
  
```

8. Press <ENTER>. Observe Wash Head move to home position.
9. Verify screen shows:

```

WASH HEAD      HOME
<ENTER> TO CONTINUE OR <#> TO EXIT
  
```

10. Press <#> to exit test.

VP-5 WASH SYSTEM TESTS, CONT.**Test Compressor**

1. Verify screen shows:

WASH HEAD TEST
1. HEAD MOVEMENT 2. COMPRESSOR
3. SOLENOIDS WITH TRAY
SELECT (1-3) OR <#> TO EXIT

2. Press <2>.
3. Verify screen shows:

COMPRESSOR OFF
1. TURN ON 2. TURN OFF

4. At prompt:
 - Press <1> to turn ON.
 - Press 2 to turn OFF.
5. Follow screen prompt to turn compressor on and off.
6. Verify compressor is switched on and off.
 - # Exit

CAUTION:

**Insert tray under Wash Manifold using Load/Urge Module
Test before performing Wash Test to prevent flooding
instrument.**

Air/Water Solenoid Test

1. Verify screen shows:

WASH HEAD TEST
1. HEAD MOVEMENT 2. COMPRESSOR
3. SOLENOIDS WITH TRAY
SELECT <1-3> OR <#> TO EXIT

2. Press <3>.
3. Verify screen shows:

WASH SOLENOID TEST
TRAY MUST BE UNDER WASH STATION
<ENTER> TO CONTINUE OR <#> TO EXIT

4. Press:
 - ENTER
 - 1 AIR TEST
 - # EXIT
 - 2 WATER TEST
 - # EXIT
 - # EXIT
 - # EXIT

VP-6 DISPENSE TESTS

Time: 5 minutes

Purpose: Verify dispense head positioning.

CAUTION:

Dispense test should be run without dispense bottles installed. If dispense bottles are used, be sure to insert a tray to prevent contaminating instrument with dispense solution.

1. At prompt: INSERT TRAY
 - # SPECIAL MODES
 - 4 DIAGNOSTICS
 - 2 Urge
2. Insert tray.
 - ENTER
 - ENTER
 - ENTER
 - MOVE 3 WEBS
3. Observe tray moves to wash station.

Bottle Select Test

Press:

- # EXIT
- 5 DISPENSE
- 1 BOTTLE SELECT
- ENTER (Repeat for each bottle station.)
- # EXIT

Pump Arm Test

1. Press:
 - 2 PUMP ARM
2. Verify screen shows:

```
PUMP ARM                HOME
REMOVE BOTTLE UNDER PUMP ARM
<ENTER> TO CONTINUE OR <#> TO EXIT
```

3. Verify LED 302 on Cable Panel Interface Bd is illuminated.
4. Remove reagent bottles.
 - ENTER
5. 5. Verify screen shows:

```
PUMP ARM READY
REMOVE BOTTLE UNDER PUMP ARM
<ENTER> TO CONTINUE OR <#> TO EXIT
```

- ENTER
6. Verify screen shows:

```
PUMP ARM DOWN
REMOVE BOTTLE UNDER PUMP ARM
<ENTER> TO CONTINUE OR <#> TO EXIT
```

7. Verify LED 315 on Cable Panel Interface Bd is illuminated.

8. Press <ENTER>
9. Verify screen shows:

PUMP ARM READY
REMOVE BOTTLE UNDER PUMP ARM
<ENTER> TO CONTINUE OR <#> TO EXIT

10. Press:
 - ENTER
 - # EXIT

Dispense Well Test

1. Press:
 - 3 DISPENSE WELL TEST
2. Verify screen shows:

WELL SELECTED 1
<ENTER> TO CONTINUE OR <#> TO EXIT

- ENTER
3. Verify screen updates well selected numbers.
 - # EXIT
 - # EXIT
 - # EXIT
 4. Observe tray advances to exit switch.
 5. Remove tray.

VP-7 READ SYSTEM TESTS

Time: 5 minutes

Purpose: Verify reader electronics, lamp, and filter wheel operation.

NOTE: Read System must be tested by running a combination of Filter, Analog, and Gain Tests using a Standards Tray. All covers must be closed to prevent admittance of external light.

Dry Test

1. At prompt - **INSERT TRAY:**
 - # SPECIAL MODES
 - 4 DIAGNOSTICS
 - 2 URGE
2. Place Standards Tray at entrance of Load Module.
3. To advance tray to Main Transport and start test by pressing:
 - ENTER
 - ENTER
 - ENTER
 - 8
 - #
 - 6 READER TEST
 - 3 GAIN SELECT
 - 1 X1 GAIN
 - 1 FILTER TEST

4. Blue Filter will appear on display. Press:
 - # EXIT
 - 2 ANALOG DATA TEST
5. Press <ENTER> to toggle through each well. Make note of filter reading at each well. Each Blue Filter reading should be between 1200 to 1800. When reading at each well has been noted, press:
 - # EXIT
 - 1 FILTER TEST
6. Press <ENTER> to cycle to Red Filter. Press:
 - # EXIT
 - 2 ANALOG TEST
7. Press <ENTER> to toggle through each well. Make note of filter reading at each well. Each Red Filter reading should be between 1000 to 2500. When reading at each well has been noted, press:
 - # EXIT

NOTE: If filter count results are not within specification, values can be adjusted by turning VR1 on Read A/D Board.

8. To adjust the gain on the Read A/D Bd, remove the sensor encloser top cover.
9. Adjust VR1 so the display for the lowest of the five sensors is not less than 1200 for blue or 1000 for red.
10. Adjust VR1 so both the red and the blue counts are within specification of 1500 ± 300 for the blue filter and 1000 to 2500 for the red filter.

Gain Test

NOTE: With normal operating conditions, the System switches the gain coming into the A/D Converter from X1 to X16 if the current reading is too low to perform calculations on the CPU Board. The Gain Test portion of Read System Test checks circuitry involved in making this conversion.

- At prompt - INSERT TRAY:
 - # SPECIAL MODES
 - 4 DIAGNOSTICS
 - 6 READER
 - 3 GAIN SELECT
 - 1 GAIN X1
 - # EXIT
 - 2 ANALOG TEST
- Press <ENTER> to cycle through wells and references. Make written note of values of all wells and references. Compare to values in Table 5-1 below.

FILTER POSITION	WELLS 1-5	REF 1	REF 2	REF 3
Home (No Filter)	30-60	0	114-258	35-45
Red	1000-2500	0	114-258	35-45
Blue	1200-1800	0	114-258	35-45

Table 5-1. Gain Test Values

- Calculate value of A as follows:

$$A = (\text{Ref } 2 - \text{Ref } 3)$$

Press:

- # EXIT
- 3 GAIN SELECT
- 2 GAIN X16
- # EXIT
- 2 ANALOG DATA TEST

- Press <ENTER> to cycle through wells and references. Make written note of values of Reference 2 and Reference 3. Compare to values in Table 5-2 below.

FILTER POSITION	WELLS 1-5	REF 1	REF 2	REF 3
All Filters	>32000	38863	33992 - 36296	32783 - 32833

Table 5-2. Global Gain Test Values

- Calculate value of B as follows:

$$B = (\text{Ref } 2 - \text{Ref } 3)$$
- To verify circuitry is working properly:
 - Divide B by A. Results must equal 16.00 ± 0.15 .
 - If result does not equal 16.00 ± 0.15 , perform the following verification procedures:
 - **VP-1**, Main Power Supply
 - **VP-35**, Lamp Power Supply
- Check voltages on Read A/D Board.

8. If power supply checks are within specifications, and Gain test still fails, replace A/D Board (**RR-4.6**).

Filter Test

1. Press:
 - 1 Filter Test
2. Press <ENTER> to cycle through red, blue, and no filters.
3. Verify LEDs 408, 409, 412, and 413 on Cable Panel Interface Board are illuminated as shown in Table 5-3.
4. To exit test:
 - # EXIT
 - # EXIT
 - # EXIT

FILTER POSITION	408	409	412	413
Home (No Filter)	OFF	OFF	OFF	OFF
Red Filter	ON	OFF	OFF	ON
Blue Filter	OFF	OFF	ON	OFF

Table 5-3. Cable Panel Interface Bd LEDs

VP-8 CONSOLE TEST

Time: 2 minutes

Purpose: Verify keypad and display functions.

1. At prompt INSERT TRAY.
 - # SPECIAL MODES
 - 4 DIAGNOSTICS
 - 7 CONSOLE.
2. Verify display goes blank for about five seconds.
3. Verify that display is filled with squares.

NOTE: Lower right corner of filled display will always remain blank. After about five seconds test goes directly to LED test.

4. Verify display automatically cycles through LED test and illuminates LED's on keypad.
5. Press <ENTER> to test individual keys.

NOTE: Display prompts each key. When pressed, key is displayed if functioning correctly.

6. Press # to end test.

VP-9 SYSTEM TEST

Time: 5 minutes

Purpose: Verify system functions.

1. At prompt INSERT TRAY.
 - # SPECIAL MODES
 - 4 DIAGNOSTICS
 - 8 SYSTEM.
2. Pull ring on air canister to remove air pressure.
3. Remove all trays and disconnect air and water as directed.
4. Press <ENTER>.
5. Verify system continuously cycles through all operational functions.
6. Press <#> to end test.
7. Observe number of cycles completed in display.

VP-10 PRINTER TESTS

Time: 3 minutes

Purpose: Verify Printer operation.

1. At prompt - INSERT TRAY.
 - # SPECIAL MODES
 - 4 DIAGNOSTICS
 - 9 MORE
 - 3 LOG
 - 1 LOGON
 - 1 PRINTER.
 - 1 to print several rows of solid squares.
 - 2 to advance printer without printing.
 - 3 to print several rows of alphanumeric characters.
2. To exit test, press <#>.
3. Examine printout for errors.

VP-11 SENSOR TEST

Time: 1 minute

Purpose: Verify sensors operation.

1. Enable logging:
 - # SPECIAL MODES
 - 4 DIAGNOSTICS
 - 9 MORE
 - 3 LOG
 - 1 TURN ON LOG
 - 2 SENSORS
 - #
2. Compare printout with Figure 5-2 and **Figure 5-3**.

```
*****
Welcome to the ABBOTT
PARALLEL PROCESSING CENTER
Date      Version X.XX    Time
Copyright 1992 by ABBOTT LABORATORIES
*****
BAR CODE SWITCH      OFF
TRAY ENTERED SWITCH  OFF
TRAY READY SWITCH    OFF
WASH STATION SWITCH  OFF
WEB SWITCH           OFF
EXIT SWITCH          OFF
TRANSPORT HOME SWITCH OFF
WASH HOME SWITCH     ON
WASH DOWN SWITCH     OFF
WASTE PRESSURE SWITCH OFF
AIR PRESSURE SWITCH  ON
WATER LEVEL SWITCH   ON
WELL HOME SWITCH     ON
```

Figure 5-2. Sensor Test Printout

WELL 0 SWITCH	OFF
WELL 1 SWITCH	OFF
WELL 2 SWITCH	OFF
WELL 3 SWITCH	OFF
WELL 4 SWITCH	OFF
WELL 5 SWITCH	OFF
READ LIMIT 2	OFF
READ HOME 1	OFF
READ HOME 2	OFF
BOTTLE 1 SWITCH	ON
BOTTLE 2 SWITCH	OFF
BOTTLE 3 SWITCH	OFF
BOTTLE 4 SWITCH	OFF
BOTTLE 5 SWITCH	OFF
PUMP ARM HOME SWITCH	ON
PUMP ARM DOWN SWITCH	OFF
READ LIMIT 1	OFF

Figure 5-3. Sensor Test Printout cont.

VP-12 HOMING TEST

Time: 3 minutes

Purpose: Verify stepper motors in Home position.

1. Enable logging:
 - # SPECIAL MODES
 - 4 DIAGNOSTICS
 - 9 MORE
 - 3 LOG
 - 1 TURN ON LOG
 - 4 HOMING
2. Verify screen shows:

```
HOME TEST
REMOVE ALL TRAYS
<ENTER> TO CONTINUE OR <#> TO EXIT
```

LOGGING	ON
HOME TEST	
TRANSPORT	PASSED
PUMP ARM	PASSED
BOTTLE SELECT	PASSED
DISPENSE WELL	PASSED
WASH HEAD	PASSED
READER FILTER	PASSED

Figure 5-4. Homing Test Printout

3. Remove all trays.
4. Press <ENTER>.
5. Verify automatic cycling of all stepper motors that can be homed. Information in **Figure 5-3** will cycle on screen after systems have been homed.
6. To exit test, press <#>.
7. Compare printout results with **Figure 5-6**.
8. If any stepper motors failed, perform appropriate Remove and Replace Procedure and repeat this diagnostic procedure.

VP-13 BIT BUS TEST

Time: 5 minutes

Purpose: Test Circuit Boards.

1. Enable logging:
 - # SPECIAL MODES
 - 4 DIAGNOSTICS
 - 9 MORE
 - 3 LOG
 - 1 TURN ON LOG
 - 5 BIT BUS
2. Verify board name and test result for each circuit board. Test results for each board will be displayed on the screen. Verify relative to **Figure 5-5**.
3. Press <#> to end test.

If any component failed, reseal board or perform appropriate Removal and Replacement Procedure.

BIT BUS TEST	
STEPPER 1 BD	PASSED
STEPPER 2 BD	PASSED
COMMUNICATIONS BD	PASSED
DIGITAL BD	PASSED

Figure 5-5. Bit Bus Test Printout

VP-14 COMMUNICATIONS TEST

Time: 15 minutes

Purpose: Check internal and external communication ports.

Loopback Test

1. At prompt - INSERT TRAY
 - # SPECIAL MODES
 - 4 DIAGNOSTICS
 - 9 MORE
 - 6 COMM
 - 1 LOOPBACK
2. Install loop back connector to channel/port being tested.
3. Enter port number being tested.
4. Press <ENTER>.
5. Verify channel number to test. Pass/Fail is displayed.
6. Repeat Steps 2 through 5 for each channel.
7. To exit test, press <#>.

Echo Test

1. At prompt - **INSERT TRAY**
 - CONNECT PPC TO PIPETTOR
 - # SPECIAL MODES
 - 4 DIAGNOSTICS
 - 9 MORE
 - 6 COMM
 - 2 ECHO

2. Select channel connected to pipettor.
3. Run Loopback Test on connected instrument. Diagnostic messages display on the CRT of connected instrument.
4. To exit test, press <#>.



VP-15 LOAD URGE TO MAIN TRANSPORT DRIVE ALIGNMENT

Time: 25 minutes

Purpose: Verify alignment of Load Urge Module to Main Transport Drive.

Assembling Surface Height Fixture (SHF) - See Figure 5-6.

Zero SHF

1. Zero the Surface Height Fixture (SHF) before starting this procedure.
2. Place assembled SHF on the baseplate.
3. Loosen thumb screw on SHF a sufficient amount to allow dial indicator and bracket assemblies to pivot downward with respect to alignment block pin.
4. Pivot dial indicator and bracket assy until "contact finger" makes contact with surface of baseplate. Contact will cause needle of dial to begin to move.
5. Position "contact finger" so the needle is in the middle of its overall travel. (Dial needle travels equally in both directions, approximately 0.02 inch or 0.508 mm.)
6. With "contact finger" correctly positioned, turn dial so needle points at zero when SHF is on baseplate. Tighten thumbscrew.

Load Urge to Main Transport Alignment

1. Place Surface Height Fixture with block resting on Load Module Assy. Rest dial indicator pointer on one side of Main Transport Assy close to the opening for large idler gear.

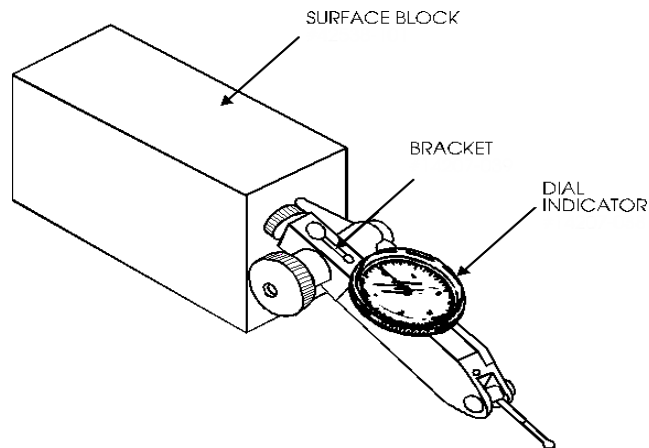
2. Lift SHF, move to other side of assembly, and check near the opening for large idler gear.
 3. Load Urge Module Assy must be 0.015" (± 0.005 ") or (0.381 mm ± 0.127 mm) lower than Main Transport Assy. Both sides of assembly must be within 0.005" with respect to the other.
 4. If Load Urge Module Assy exceeds tolerance limits, follow procedures below to adjust within tolerance.
 5. Loosen two 5/32-inch hex head screws securing Load Urge Module support stanchions (support closest to Main Transport Assy) to base.
 6. Check Load Urge Module support stanchions at entrance. Be sure two 5/32-inch hex head screws securing Load Module Assy to the base are tight.
 7. Place SHF with block resting on Load Module Assy. Rest dial indicator on one side of Main Transport Assy near the opening for large idler gear.
 8. Move SHF to other side of Load Module. Check the height difference on both sides.
- NOTE:** You may see a positive increase (+) on dial indicator of SHF as you move from reference point to junction of Main Transport/Load Urge Module assemblies. This will not affect movement of tray through assemblies.
9. Adjust Load Urge Module Assy by turning two 7/64-inch hex head screws (2 screws for each side of Load Urge Module).
 10. Turn 7/64-inch hex head screw clockwise to raise Load Urge Module. Turn 7/64-inch hex head screws counterclockwise to lower Load Urge Module.



11. Using SHF, recheck height difference between Main Transport and Load Module Assemblies for acceptable tolerance.
12. If Load Urge Module is 0.015-inch (± 0.005 -inch) or 0.381 mm (± 0.127 mm) lower than Main Transport Assy and measurement between 2 points is within 0.005", no further adjustment is required.
13. If greater than 0.005", repeat Steps 5 through 11 until tolerance is acceptable.

NOTE: Use only reference points next to large idler gears and intersecting point of Load Urge Module to set and check for 0.015" (± 0.005 ") height difference.

14. Tighten two 5/32-inch hex head screws securing support to base. Recheck to be sure 0.015" (± 0.005 ") or 0.381 mm ± 0.127 mm tolerance did not change.
15. If tolerance is acceptable, no other adjustment is necessary.
16. If tolerance changed, loosen two 5/32-inch hex head screws and repeat Steps 5 through 11 until correct tolerance is obtained.



**VP-16 BAR CODE SWITCH ALIGNMENT**

Time: 5 minutes

Purpose: Align Bar Code Switch.

1. At prompt select:
 - # SPECIAL MODES
 - 4 DIAGNOSTICS
 - 1 BAR CODE
2. Insert bar code gauge under Bar Code Reader. Check LED #206 on Cable Panel Interface Bd. LED should indicate ON.
3. Verify screen shows:

BARCODE SWITCH ON

4. Remove gauge. LED should turn OFF. Insert gauge under Bar Code Reader several times. Verify that LED #206 indicates ON when switch is active. If OK, you do not need to adjust.

CAUTION:
Do not over-tighten cam screw.

5. If Bar Code Switch LED #206 indicates OFF, hold bar code gauge under switch. Loosen 1/16-inch hex-head set screw on rear of switch housing. Turn cam screw on left side of Bar Code Reader clockwise. Watch LED #206 to indicate ON.
6. Tighten 1/16-inch hex head set screw.
7. Insert bar code gauge under switch several times. Verify LED #206 indicates ON when gauge is under switch.

8. Verify screen shows:

BARCODE SWITCH ON

**VP-17 WEB SWITCH - ROLLER BALL STYLE**

Time: 5 minutes

Purpose: Align Web Switch Assy.

1. At prompt select:
 - # SPECIAL MODES
 - 4 DIAGNOSTICS
 - 2 URGE
2. Place clean 60-well tray in entrance of Load Urge Module. Bar code label not required.
3. Press:
 - ENTER
 - ENTER
4. Tray will move through Load Urge Module and stop against Wash Gate Solenoid.

NOTE: Web Switch Actuator Vertical Alignment is factory set for maximum tray web height. Do not make vertical adjustments to Web Switch Assy.

5. Tray web "C" must be toward the left and NOT touching the white roller ball of web switch. LED #106 on Cable Panel Interface Bd will be OFF.
6. If tray web "C" is touching roller ball of switch, loosen two 3/32-inch hex head screws securing Web Switch Assy to belt slide.
7. Move switch assy so tray web "C" is not touching white roller ball of web switch.

8. Tighten two 3/32-inch hex head screws holding Web Switch Assy to belt slide.
9. Press <ENTER>.
10. Wash Gate Solenoid will lift and allow tray to enter Main Transport Assy.
11. Display shows:

TRANSPORT HOME SWITCH HOME ENTER THE NUMBER OF WEBS TO MOVE (1-9)
--

12. Verify LED #106 on Cable Panel Interface Bd is ON.
13. Viewing white roller ball of web switch from top, tray web "D" must stop so tray web is touching white roller ball.
14. Press <1> on keypad.
15. Tray moves ahead to next web position.
16. LED #106 remains ON and tray web "E" will be touching white roller ball.
17. Press <1>.
18. Tray moves ahead to new web position. Verify LED #106 remains ON. Tray web will be touching white roller ball.
19. If not OK, repeat steps 1 through 18.



VP-18 BAR CODE READER

Time: 3 minutes

Purpose: Verify Bar Code Reader operation.

1. Bar Code Reader Assy cannot be adjusted.
2. Place new bar code labels over frosted section of 2 trays.
3. Place tray on load urge extension and manually push tray until bar code has passed reader. Remove tray.
4. Verify Bar Code Reader decodes labels correctly by comparing bar code label with display readout.
5. Repeat steps 3 and 4 for second tray.
6. If Bar Code Reader does not decode labels correctly, replace Bar Code Reader Assy (**RR-2.8**).

**VP-19 ALIGN TRANSPORT AUGER**

Time: 5 minutes

Purpose: Verify Transport Auger alignment.

1. Power OFF, then ON. Main Transport Assy initializes and augers are in HOME POSITION.
2. Remove 2 front covers.
3. Remove Reader Sensor Enclosure Assy (**RR-4.7**) from mounting posts. Place assembly on top of Cable Panel Interface Bd.

CAUTION:

Use care when inserting Main Transport Set-Up fixture plate to prevent damage to Exit Switch Assy.

4. Remove Exit Shroud.
5. Slide Main Transport Set-Up fixture (MTS) into Main Transport Assy through exit opening.
6. Install jig pins to prevent MTS from moving.
7. Drop auger pitch position blocks into MTS.
8. Auger pitch position blocks slide to bottom, stop, and rest within 1/8-inch of fixture. This indicates correct alignment of augers and no adjustment is needed.

NOTE: It may be necessary to slide MTS plate front to back for alignment blocks to slide to bottom of plate.

9. If either auger is out of position, remove MTS from Main Transport Assy. Repeat Steps 1 through 8.
10. If alignment is still incorrect, replace Main Transport Assy (**RR-4.9**).

VP-20 RAIL ALIGNMENT TOP AND SIDE MAIN TRANSPORT ASSY

Time: 25 minutes

Purpose: Verify alignment of top and side rails of Main Transport Assy.

1. Power instrument OFF, then ON. Main Transport Assy initializes and augers go to HOME position.
2. Remove Reader Sensor Enclosure Assy (**RR-4.7**) from mounting posts. Place assembly on top of Cable Panel Interface Bd.
3. Remove Exit Shroud.
4. Insert Main Transport Set-Up (MTS) Fixture Plate through exit end.

CAUTION:

Use care when inserting Main Transport Set-Up (MTS) Fixture Plate to prevent damage to Exit Switch Assy.

5. There are 2 lengths of MTS plates in the Alignment Tool Kit. Both set-up plates allow you to complete correct alignment on Main Transport Assy.
6. Lift Wash Gate Solenoid plunger to allow MTS fixture into Main Transport Assy.
7. Pin MTS fixture into place using jig pins.

Side Rail Alignment

1. With a 0.002 inch or 0.0508 mm feeler gauge, check gap between MTS fixture and 2 top side rails at pinned end of Main Transport Assy. A 0.002 inch or 0.0508 mm feeler gauge must fit between

MTS fixture and top side rails. A 0.006 inch (0.1524 mm) feeler gauge must NOT fit between MTS fixture and top rails. See Figure 5-7.

2. If using shorter MTS fixture plate, remove jig pins, lift Wash Gate Solenoid, and slide plate toward opposite end of Main Transport Assy until plate is even with leading edge of Wash Gate Solenoid plunger.

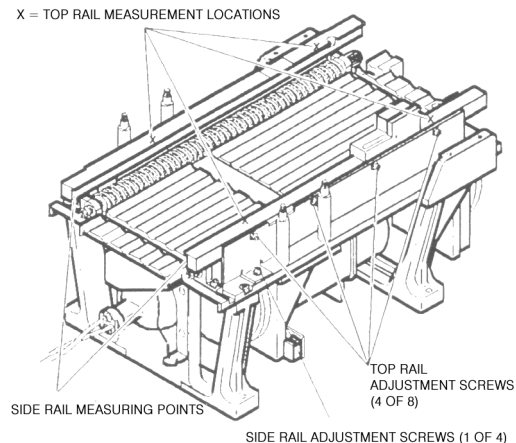


Figure 5-7. Rail Alignment

3. If using longer MTS plate, lift jig pins and slide MTS plate toward Exit Switch. Stop when the leading edge of MTS plate is even with leading edge of Wash Gate Solenoid plungers.
4. There is a beveled edge on side rails to ease the transition into Main Transport Assy. Do not check side rail clearance on beveled surface.
5. With a 0.002-inch (0.0508 mm) feeler gauge, check gap between MTS fixture and side rails. At same position, a 0.006 inch (0.1524 mm) feeler gauge will NOT fit between MTS plate and side rails. If side rail clearance is within tolerance, go to Step 10. If side rail clearance needs alignment, go to Step 6.
6. Start with front rail of Main Transport Assy and loosen two 9/64-inch hex-head screws securing side rail to Main Transport Assy to allow rail to move.
7. Hold rail against MTS fixture and tighten two hex-head screws.

NOTE: Adjust side rail clearances by inserting a 0.014 inch (0.3556 mm) feeler gauge between side rail and Main Transport Assy. Press firmly against side rail and tighten both 9/64-inch hex-head screws. Remove feeler gauge and check if 0.002 feeler gauge fits into gap. If not, loosen 2 screws and use the next larger feeler gauge. Then check with 0.006 inch (0.4524 mm) feeler gauge. If 0.006 inch (0.4524 mm) feeler gauge fits, repeat step 6 using a 0.012 inch (0.3048 mm) feeler gauge. Repeat this process until correct clearance is obtained. Feeler gauge must slide completely into the gap, especially at the gap by the Load Module where a slight obstruction may prevent full

insertion of feeler gauge.

8. Next align rear rail of Main Transport Assy. Loosen two 9/64-inch hex-head screws to allow rail to move. Push top of rail against MTS fixture and tighten two 9/64-inch hex-head screws.
9. Repeat procedure in previous note until correct side rail alignment is obtained.

Top Rail Alignment

1. Using a 0.005 inch or 0.127 mm feeler gauge, check clearance between MTS fixture and 2 top rails. A 0.005 inch or 0.127 mm feeler gauge will NOT fit between MTS fixture and top rail. A 0.002 inch or 0.0508 mm feeler gauge will fit between MTS fixture and top rails, but may NOT pass entire length of top rail.
2. If clearance is within tolerance, reinstall Reader Sensor Enclosure Assy (**RR-4.7**).
3. Remove Dispense Actuator Assy to enable access to four 9/64-inch hex-head screws securing top rail.
4. Loosen screws holding top rail. Move rail against MTS fixture. Maintain even pressure as you tighten hardware.

NOTE: Adjusting top rail clearance is a trial and error procedure. Try inserting different thickness feeler gauges between Top Rail and MTS Fixture gap and tightening adjustment screws. Alignment may vary in other locations. If this happens, try adjusting alignment at one adjusting screw and then next adjusting screw.

5. When proper alignment is obtained, perform Dispense Actuator Assy Alignment Verification Procedure (**VP-23**).



VP-21 ENCODER WHEEL POSITION

Time: 5 minutes

Purpose: Verify alignment of encoder wheel.

1. Be sure power to Main Transport Drive Motor is available.
2. Move plastic drive gear clockwise, then counterclockwise while watching LED 104 on Cable Panel Interface Board. LED should turn ON with equal travel of Encoder Wheel in both directions through the Home Sensor.
3. If travel through HOME sensor is not equal distance, loosen the encoder wheel printed circuit board.
4. Move printed circuit board left or right to center sensor with Encoder Wheel.
5. Tighten hardware.
6. Repeat Steps 1 through 3.

**VP-22 WASH SWITCH - NEW WIDE ACTUATOR STYLE**

Time: 15 Minutes

Purpose: To align new style Wash Switch

1. Turn power OFF.
2. Turn power on to ensure augers are in HOME position.
3. Remove reader enclosure (**RR-4.7**).
4. Remove Exit Shroud. Use care when installing MTS fixture to prevent damaging Exit Switch Assy.
5. Insert Main Transport Set-Up (MTS) fixture into Transport Assy through exit until Wash Switch Actuator is in cut-out. Insert jig pins to lock MTS into position.

CAUTION:

Do not bend or deform switch actuator arm while performing alignment.

12. If switch does not operate correctly, loosen two hex-head screws and move switch until LED #103 lights. Repeat Steps 6 through 11 until switch is properly aligned.

NOTE: Check Wash Switch Actuator clearance in Step 7 each time the switch is moved.

6. Loosen 2 screws securing wash switch.
7. Use feeler gauge and adjust for 0.030-inch (0.762 mm) clearance between side rail and side of switch actuator.
8. Adjust wash switch until LED #103 on Cable Panel Interface Bd is OFF.
9. Tighten 2 screws securing wash switch.
10. Remove jig pins and pull MTS fixture 1/16-inch toward exit.
11. Verify LED #103 is ON.

5 VERIFICATION PROCEDURES VP-23 DISPENSE ACTUATOR TO MAIN TRANSPORT DRIVE

5-36

VP-23 DISPENSE ACTUATOR TO MAIN TRANSPORT DRIVE

Time: 15 minutes

Purpose: To align Dispense Actuator to Main Transport Assy

CAUTION:

Be sure to bleed air pressure from wash system before disconnecting any tubing. Bleed air pressure by slowly lifting ring of pressure check valve on stainless steel canister.

1. Bleed air pressure from Wash System by lifting ring on the stainless steel canister.
2. Remove Wash Manifold from Wash Actuator Assy.

CAUTION:

Use extreme care when disconnecting tubing to prevent damage to Wash Manifold.

3. Remove screw and washer holding Dispense Boom Post to Dispense Tip Holder.
4. Remove Reader Sensor Enclosure Assy from Main Transport Assy (**RR-4.7**). Place enclosure on Cable Panel Interface Bd.
5. Remove Exit Shroud.
6. Insert Main Transport Set-Up (MTS) fixture through exit opening.
7. Install wash/dispense alignment block on top of MTS fixture with notched side toward Wash Actuator Assy. Slide fixture into place and insert jig pins.

8. Position the 5-tip dispense holder to middle of wash/dispense alignment block.
9. Verify dispense station is parallel and fits snugly against wash/dispense alignment block. If correct, no further alignment is required. If alignment is not correct, go to Step 10.
10. To align Dispense Boom Actuator Assy, loosen two 9/64-inch hex-head screws securing Dispense Actuator to Main Transport.
11. Perform Steps 8 through 9. Tighten screws.
12. Position 5-tip dispense holder to HOME position above waste cup.
13. Perform Wash Actuator Assy-to-Main Transport Drive (**VP-24**).

VP-24 WASH ACTUATOR ASSY TO MAIN TRANSPORT DRIVE

Time: 15 minutes

Purpose: Verify alignment of Wash Actuator Assy to Main Transport Drive using straight pins.

**CAUTION:**

Be sure to bleed air pressure from wash system before disconnecting any tubing. Bleed air pressure by slowly lifting ring of pressure check valve on stainless steel canister.

1. Bleed air pressure from Wash System by lifting ring on stainless steel canister.
2. Remove Wash Manifold from Wash Actuator Assy.

CAUTION:

Use extreme care during the next step to prevent breaking Wash Manifold!

3. Remove hardware securing Reader Sensor Enclosure Assy above Main Transport Assy (**RR-4.7**). Set assembly on Cable Panel Interface Bd.

CAUTION:

Use care when inserting Main Transport set-up fixture plate to prevent damage to Exit Switch Assy.

4. Remove Exit Shroud and slide MTS plate into Main Transport Assy through exit opening.
5. Install wash/dispense alignment block on top of MTS fixture. Notched side should be toward Wash Actuator Assy.
6. Slide MTS fixture into place and insert new jig pins to prevent MTS fixture from moving. New jig pins are 0.020-inch (0.508 mm) smaller to correct for wash spraying problems.
7. With new jig pins installed, move MTS plate toward Exit Switch.
8. Turn wash motor by hand until drive screw is at upper travel position.
9. Align wash head carriage so it is parallel and tight against wash/dispense alignment block. If alignment is needed, go to step 11.
10. Loosen four 9/64-inch hex-head screws securing Wash Actuator Assy to Main Transport Assy.
11. Reposition Wash Actuator Assy against alignment block.
12. Tighten four 9/64-inch hex-head screws and check alignment with Steps 8 through 10.
13. If aligned, remove jig pins, wash/dispense block and MTS fixture from Main Transport Assy.

5 VERIFICATION PROCEDURES VP-25 SENSOR BD/DISPENSE BOOM POSITION ALIGNMENT

5-38



VP-25 SENSOR BD/DISPENSE BOOM POSITION ALIGNMENT

Time: 15 minutes

Purpose: Verify correct alignment of dispense boom.

1. Obtain "bull's-eye" and pointer (alignment tools) from tool kit.
2. Power INSTRUMENT OFF, then ON. This will reinitialize and HOME all assemblies.
3. Remove Dispense Boom Post (see **RR-4.4**) from 5-tip holder.
4. Verify screen shows:

INSERT TRAY

5. At Insert Tray prompt select:
 - # SPECIAL MODES
 - 4 DIAGNOSTICS
 - 2 URGE
6. Place clean 60-well tray at entrance to Load Module. No bar code is required.
7. Press <ENTER> 3 times. Tray will move through Load Module and enter Main Transport Assy.
8. Verify screen shows:

TRANSPORT HOME SWITCH HOME
ENTER THE NUMBER OF WEBS TO MOVE (1-9)

9. Press: <3>
10. Row moves under 5-tip holder.

11. Press: <#>.
12. This returns you to Diagnostics. At prompt select:
 - DISPENSE
13. Place pointer in center of 5-tip holder.
14. At prompt select:
 - DISPENSE WELL TEST
15. Dispense head moves over position #1 and display shows:

POSITION #1

16. Place "bull's-eye" in row "A", position #3.
17. Press <ENTER> until pointer is above "bull's-eye". Note position.
18. Press <ENTER> twice to move pointer to position #5.
19. Move "bull's-eye" to position #1.
20. Move pointer over position #1 by pressing <ENTER> four times. Recheck position of pointer over "bull's-eye".
21. Remove "bull's-eye" from tray.
22. At prompt select: <#>.
23. This returns you to Diagnostics screen.
24. At prompt select:
 - TRANSPORT
25. Move 60-well tray so row "M" is under 5-tip dispense holder.
26. Exit Transport test by pressing <#>.

27. At prompt select:

■ DISPENSE

28. Dispense head moves over position #1 and display shows:

POSITION #1

29. Place "bull's-eye" in row "M", position #3.

30. Press <ENTER> until pointer is above "bull's-eye". Note position.

31. Press <ENTER> twice to move pointer to position #5.

32. Move "bull's-eye" to position #1, Row "M".

33. Move pointer over position #1 by pressing <ENTER> four times.
Recheck position of pointer over bull's-eye.

34. If pointer is centered over "bull's-eye", no alignment is required.

35. Remove "bull's-eye" from tray and pointer from 5-tip holder.

36. At prompt select: <#>

37. This is the exit for Dispense Well Test.

38. At prompt select: <#>.

39. This command returns to the Diagnostics screen.

40. If alignment is needed perform Steps 42 through 44.

41. Next alignment optimizes centering of 5-tip holder (front-to-rear) alignment as it moves across all five (5) well positions in a tray row.

42. Remove cover above Dispense Boom PCB.

43. Loosen two screws securing Dispense Boom PCB to assembly.

44. Use 3/32-inch hex-head screw on end of PCB assy to move PCB sensors and align dispense tip. Turning screw clockwise moves pointer towards front of instrument. Turning screw counterclockwise moves pointer toward back of PPC.

45. At prompt select: DISPENSE.

46. At prompt select 3 DISPENSE WELL TEST.

47. Repeat Steps 15 through 34.

48. If alignments made, return to Diagnostics by pressing <#>.

**VP-26 DISPENSE PUMP/PIPETTOR BOTTLE ALIGNMENT**

Time: 15 minutes

Purpose: Verify alignment of Dispense Pump and pipettor bottle.

1. Power PPC OFF, then ON. This reinitializes PPC and all assemblies go to HOME.
2. Verify screen shows:

INSERT TRAY

3. At prompt select:
 - # SPECIAL MODES
 - 4 DIAGNOSTICS
 - 5 DISPENSE
 - 1 BOTTLE SELECT
4. Press <ENTER> until dispense pump plunger is over position #1.
5. Insert empty pipettor bottle in position #1.
6. Press <#> to return to Dispense.
7. At prompt select:
 - 2 PUMP ARM
8. Press <ENTER> to cycle pump. Each time you press <ENTER> the screen updates to show position of Dispense Pump.
9. Alignment is correct when plunger strikes in labeled area of Tri-Continent bottle button.
10. Press <ENTER> until plunger is at top of travel.
11. Remove pipettor bottle from position #1.

12. Insert pipettor bottle in position #5.
13. Press <#> to return to dispense.
14. At prompt select:
 - 1 BOTTLE SELECT
15. Press <ENTER> until dispense pump plunger is over position 5.
16. Repeat Steps 6 through 11.
17. Remove pipettor bottle from position 5.
18. Insert pipettor bottle in position 3.
19. Press <#> to return to dispense.
20. At prompt select:
 - 1 BOTTLE SELECT
21. Press <ENTER> until dispense pump plunger is over position 3.
22. Repeat Steps 6 through 11.
23. If alignment is correct, take no further action.
24. If alignment is not correct, go to step 25.
25. If more than one bottle holder is out of alignment, dispense plunger can be adjusted to move left or right. Go to Step 28.
26. If only one bottle holder is out of alignment, individual dispense holder can be adjusted. Go to Step 29.
27. Be sure metal dispense-pump cover is not resting on bottle holders to prevent damage to retaining pins.
28. If more than one bottle holder is out of alignment:
 - a. Remove left front cover.
 - b. Remove 2 Phillips-head screws securing metal shield on top of dispense bottle holders.

- a. Remove 2 screws securing left front cover to main unit.
 - b. Tap unit gently on right side and slide cover from right to left and remove from main unit.
 - c. Loosen 5/64-inch hex-head set screws on rear side of dispense pump plunger.
 - d. Center plunger over pipettor bottle.
 - e. Tighten set screws.
 - f. Repeat Steps 3 through 22 to verify correct alignment.
29. If only one bottle is out of adjustment:
- a. Loosen 2 Phillips-head screws on rear and move holder right to left until centered over pipettor.
 - b. Tighten 2 Phillips-head screws.
 - c. Repeat Steps 3 through 22 to verify alignment.



VP-27 SENSOR FLAG - WASH ACTUATOR ALIGNMENT

Time: 20 minutes

Purpose: Verify alignment of Sensor Flag to Wash Actuator.

NOTE: For correct adjustment of wash actuator sensor flag the Wash Manifold must be attached to the Wash Actuator Assy with new gaskets in the Wash Manifold.
(See **ISA 50-069**.)

1. Power PPC OFF and then ON.
2. PPC will initialize and all assemblies will HOME.
3. Verify LED #102 on Cable Panel Interface Bd is ON.
4. At prompt, select:
 - # SPECIAL MODES
 - 4 DIAGNOSTICS
 - 2 URGE
5. Place a clean 60-well tray in entrance of Load Urge Module. A bar code is not needed on the tray.
6. Press ENTER 3 times. Tray moves through Load Urge Module and enters Main Transport Assy.
7. Screen displays:

TRANSPORT HOME SWITCH HOME
ENTER THE NUMBER OF WEBS TO MOVE (1-9)

8. Press <1> to move "A" row under Wash Manifold.
9. Press <#> to return to Diagnostics.
10. At prompt, select:

- 4 WASH
- 1 HEAD MOVEMENT

11. Press <ENTER> to move head to Wash Head Ready position.
12. Press <ENTER> to move wash head to down position.
13. Verify LED #107 on Cable Panel Interface Bd is ON.
14. Press <ENTER> twice to return wash head to home position.
15. Press <ENTER> twice to drive head down.
16. Insert the setting end (0.02-inch) of the Gap Setting Tool between wash actuator carriage and drive screw/nut assembly.
17. Verify there is a slight resistance to tool insertion. The first step (0.015-inch) on the checking end of the Gap Setting Tool should enter the gap. Tool insertion then should be blocked at the second (0.035-inch) step. The second step does not enter the gap.
18. Verify LED #107 on Cable Panel Interface Bd is ON.
19. If clearance is within specifications, no adjustment is required
20. If clearance is not within specifications:
 - a. Loosen Phillips-head locking screw on side of flag 1/2 turn counterclockwise.
 - b. Turn top spring-loaded screw counterclockwise to move flag up and clockwise to move flag down.
 - c. Tighten locking screw.
21. Repeat Steps 11 through 15 several times to be sure flag travels between sensors without binding.
22. Repeat Steps 11 through 19 to verify correct clearance range 0.015-inch (0.3 mm) to 0.035-inch (0.9 mm).

**VP-28 EXIT SHROUD (MECHANICAL ALIGNMENT)**

Time: 5 minutes

Purpose: To verify exit shroud alignment.

1. Check to ensure Exit Shroud is flush with instrument sides and does not interfere with Exit Switch function.
2. To align shroud, loosen two (2) 9/64-inch hex head clamp screws.
3. Reposition shroud to clear switch, then tighten screws.

VP-29 EXIT SWITCH - METAL ACTUATOR (MECHANICAL ALIGNMENT)

Time: 10 minutes

Purpose: To align Exit Switch - metal actuator.

NOTE: If LED 105 is ON when 60-well tray leaves main transport,
Exit Switch is properly aligned.

1. Remove Exit Shroud.
2. Loosen Exit Switch screws.
3. Position switch upward, then tighten screws.

NOTE: Ensure that LED 105 is NOT on with only Exit Shroud
installed and no tray is present.

4. Re-install Exit Shroud.



**VP-30 EXIT SWITCH - PLASTIC ACTUATOR
(MECHANICAL ALIGNMENT)**

Time: 10 minutes

Purpose: To align Exit Switch - plastic actuator assy.

1. Perform **VP-28** prior to making any adjustments to Exit Switch.
2. Insert Exit Switch alignment block sideways into Exit Shroud.
3. Align block flush with left side wall with the deepest cutout in the block over Exit Switch.
4. Verify LED #105 on Cable Panel Interface Bd is OFF when switch actuator arm is in contact with alignment block.
5. If LED #105 is ON, or Exit Switch is not in contact with deep cutout of alignment block, alignment is required.
6. Remove Exit Shroud.
7. Ensure screw on right side of switch is in slot at bottom of mounting bracket.
8. Loosen 3/32-inch hex-head screws on left side of switch.
9. Adjust switch upward or downward as needed. Tighten screw.
10. Reinstall Exit Shroud using **VP-28**.
11. Insert Exit Switch alignment block sideways into Exit Shroud.
12. Align block flush with left side wall with deepest cutout in the block over Exit Switch.
13. Verify LED #105 on Cable Panel Interface Bd is OFF when switch actuator arm is in contact with alignment block.
14. With LED 105 OFF, press down on left and right corners of Exit Shroud.
15. Verify LED 105 remains OFF.
16. Insert alignment block sideways in Exit Shroud flush against right side wall.
17. Verify LED 105 is ON when actuator arm is contacting shallow cutout of alignment block. If not, repeat Steps 7 through 10 to obtain correct alignment.

VP-31 REGULATOR VALVE PRESSURE ADJUSTMENT

Time: 10 Minutes

Purpose: To verify correct air pressure to Wash Manifold

NOTE: Bleed air pressure from water canister by lifting ring on top of canister.

1. Install pressure gauge in air line at compressor outlet or wash station connection.
2. At prompt - INSERT TRAY
 - # SPECIAL MODES
 - 4 DIAGNOSTICS
 - 4 WASH
 - 2 COMPRESSOR
 - 1 TURN ON
3. Verify pressure stabilizes at 25 ± 1 psi.
4. To adjust pressure, remove cover from compressor cart.
5. Loosen adjustment-screw locking nut.
6. Turn screw clockwise to increase pressure (counterclockwise to reduce pressure).
7. Tighten lock nut and replace cover.
8. Wait for pressure to stabilize, then bleed pressure from canister.
9. Verify pressure returns to 25 ± 1 psi and is stable.
10. Repeat steps 6 through 11 as necessary.
11. Press <2> to turn compressor off.
12. Press <#> to end test.

13. When operating pressure is reached, unplug AC power cord from left side of PPC. Observe pressure gauge. Pressure should not drop more than 1/2 psi per minute. If pressure drops at this or greater rate, perform Leak Isolation Test (**VP-32**).

NOTE: There may be an immediate, small pressure drop when AC power cord is unplugged from PPC. This is a normal occurrence.

VP-32 AIR PRESSURE LEAK ISOLATION

Time: 5 minutes

Purpose: To determine source of air leak.

1. Clamp air line between pressure gauge and PPC with hemostat or other clamp.
2. If pressure drop stops, PPC has an internal air leak.
3. If pressure drop continues, go to Step 4.
4. Clamp air line at Compressor Cart air output.
5. If pressure drop stops, leak is in Compressor Cart.
6. If pressure drop continues, go to Step 7.
7. Clamp air line going from compressor output "T-fitting" and Water Canister air input.
8. If pressure drops stops, leak is in water container.
9. Leak could also be occurring at air input quick disconnect to Water Canister.

**VP-33 LOAD URGE RAIL ALIGNMENT (OLD STYLE)**

Time: 25 minutes

Purpose: To align old style load module transport rails.

NOTE: Assemble Urge-Transport Alignment fixture.

1. Insert alignment fixture at tray entrance until it stops.
2. Verify alignment fixture movement is snug but not restrictive.
3. Pull alignment fixture out until end is flush with tray entrance.
4. Use 0.002 inch or 0.0508mm feeler gauge to measure between alignment fixture and upper corners of side rails.
5. Verify clearance is less than 0.002 inch or 0.0508mm and gauge does not slip between alignment fixture and rails.
6. If clearance is greater than 0.002 inch or 0.0508mm, perform Rail Alignment.

Rail Alignment

1. Remove Bar Code Reader from rear rail.
2. Loosen four (4) screws holding rear rail. Do not remove screws.

NOTE: Screw number 4 is located at right side and is recessed in load module. This screw is a 9/64-inch hex-head screw. All other screws are Phillips-head screws.

3. Hold both rails snug against alignment fixture and tighten, in following order, screw #1, #4, #2, and #3.
4. Repeat steps 2 and 3 for front rail.
5. Leave fixture inserted and reinstall Bar Code Reader.
6. Push alignment fixture into Load Module until it stops.

7. Use a 0.025-inch or 0.635mm feeler gauge to measure clearance between Load Module and cover panel.
8. Loosen four (4) screws securing Load Module to base plate and move module for correct clearance. Tighten screws and remove fixture.
9. Perform (VP-4) Transport Test.



VP-34 CHECK VOLTAGES ON READ A/D BD

Time: 10 minutes

Purpose: To verify voltages received or generated on Read A/D Bd

1. Remove Read A/D cover.
2. Turn power ON.
3. There are 3 voltage measurements to take on Read A/D Bd.

+5VDC

1. Locate +5VDC test point and ground test point on Read A/D Bd. (See Figure 5-8.)
2. Place positive lead of multimeter on "+5VDC" test point.
3. Place negative lead of multimeter on "Ground" test point.
4. Reading may be in range of 5.00 to 5.20VDC.
5. Voltage is not adjustable. If reading is not within specification, replace Read A/D Bd.

+12VDC

1. Locate +12VDC test point and ground test point on Read A/D Bd. (See Figure 5-8.)
2. Place positive lead of multimeter on +12VDC test point.
3. Place negative lead of multimeter on Ground test point.
4. Reading may range from +11.8VDC to 12.3VDC.
5. Voltage may be adjusted at Main Power Supply. Refer to **VP-1** for adjustment procedures.

-12V

1. Locate -12VDC test point and ground test point on Read A/D Bd.
2. Place positive lead of multimeter on -12VDC test point.
3. Place negative lead of multimeter on Ground test point.
4. Reading may range from -12.3VDC to -11.8VDC.

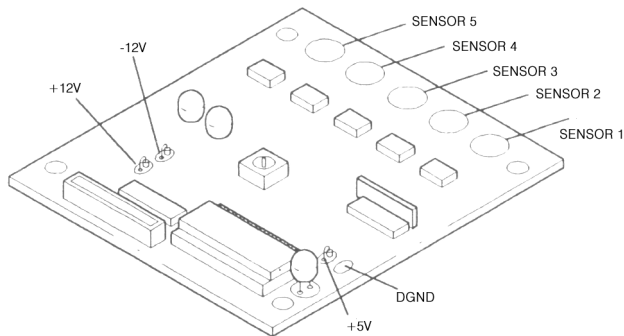


Figure 5-8. Read A/D Board Voltage Test Points

**VP-35 CHECK VOLTAGE AT LAMP**

Time: 5 Minutes

Purpose: Verify lamp voltage.

1. Remove lamp (**RR-5.13**).
2. Turn power ON.
3. At lamp socket, place positive probe of multimeter in elliptical shaped hole and negative probe in smaller round hole.
4. Voltage may range between +11.9VDC and +12.1VDC.
5. To adjust voltages, locate potentiometer R9 of Lamp Power Supply on Shelf and Bezel Assy.
 - a. To decrease voltage, turn screw on potentiometer counterclockwise.
 - b. To increase voltage, turn screw on potentiometer clockwise.

NOTE: Voltage specifications and adjustment procedures are the same for the 1-42485-01 (Non-CE Mark) and the 1-42485-02 (CE Mark) Shelf and Bezel Assemblies. Reference Chapter **1.4 CE MARK CERTIFICATION** in Section 1, General Data.

**VP-36 SHELF AND BEZEL ASSY RELAY VOLTAGES**

Time: 5 minutes

Purpose: To verify correct input and output voltages at relay on Shelf and Bezel Assy.

Input Voltage

1. With power ON, remove compressor power cord. Refer to Figure 5-9 for measurement test points.
2. Place positive lead and negative leads of multimeter in the output connector to the compressor cart.
3. Check for 110VAC. Reading can vary $\pm 10\%$.
4. If reading is not within specifications, replace relay (**RR-6.2**).

Output Voltage

1. With power ON, remove left rear panel and locate relay on Shelf and Bezel Assy.
2. Place multimeter leads on output terminals of relay.
3. Check for 110VAC. Reading can vary $\pm 10\%$.
4. Place multimeter leads on input terminals.
5. Check for 5V. Reading may range from 5.00 to 5.20 volts.
6. If reading is not within specifications, replace relay (**RR-6.2**).

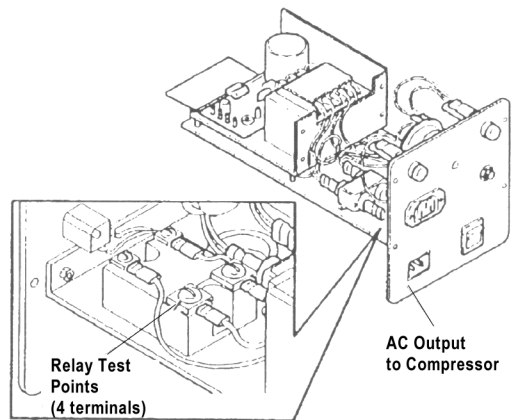


Figure 5-9. Shelf & Bezel Assembly Input & Output Voltages

**VP-38 BALL ACTUATOR CLEANING**

Time: 15 minutes

Purpose: Clean ball actuator at tray ready and tray entered switch.

1. Turn power OFF.
2. Remove power cord from left side of PPC.
3. Locate tray entered and tray ready switches on Load Module Assy.
4. Remove tray entered (**RR-2.7**) and tray ready (**RR-2.6**) switches.
5. Push ball actuator to outside and remove ball.
6. Clean ball by wiping with a wet paper towel.
7. Wipe ball actuator with dry paper towel until ball is dry.
8. Wipe Load Urge Module Ball Actuator hole with a wet paper towel and then wipe with dry paper towel until ball actuator hole is dry.
9. Replace tray entered (**RR-2.7**) and tray ready (**RR-2.6**) switches.
10. Place ball actuator in Load Module Assy.
11. Place spacer into position and align screw holes.
12. Insert screws with washer into Micro-switch.
13. Place Microswitch over spacer and tighten 2 screws securing switch to Load Module Assy.
14. Verify tray entered and tray ready switches depress easily by sliding finger across ball actuators.
15. Pass ten trays through PPC using Transport test (**VP-4**).
16. Verify no tray binding occurs.

**VP-39 DECONTAMINATION**

Time: 20 minutes

Purpose: To avoid possibility of contact with blood products.

1. Use following precautions during any service call:
 - a. Assume all components may be contaminated.
 - b. Cover any abrasions and cuts.
 - c. Wear rubber gloves and safety glasses.
 - d. Do not eat, drink, or smoke in immediate area.
 - e. Do not touch mouth, eyes, or face after contact with the instrument.
 - f. Decontamination solution must be freshly prepared for each use and must be used within 2 hours of preparation.
 - g. Never pipette by mouth.
 - h. If possible, get a lab coat to avoid clothing contact with bleach solution.
 - i. Laboratory personnel must provide specific disposal or handling procedures.
 - j. After handling biohazards, wash hands with soap and water.
 2. Prepare a 1% sodium hypochlorite solution. Mix one (1) part of household bleach to four (4) parts water
- NOTE:** Do not increase concentration of chlorine solution in attempt to reduce decontamination time.
3. For radioactive contamination use glutaraldehyde.
 4. Prepare enough solution to decontaminate exterior surface of PPC and any assemblies to be serviced.
 5. A rinse solution of water or detergent must be used to remove chlorine solution after decontamination.
 6. Decontamination procedure:
 - a. Wipe down with a detergent solution and allow to dry for ten (10) minutes.
 - b. Wipe down exterior surfaces with the chlorine solution.
 - c. Allow to remain on surfaces for 30 minutes.
 - d. Wipe dry with disposable towels.
 - e. Rinse all surfaces thoroughly with rinse solution and wipe dry with disposable towels.
 7. Place towels in plastic bag and dispose as instructed by laboratory personnel.

VP-40 LINEARITY TEST

Time: 5 minutes

Purpose: To determine if there is a difference between the measured absorbance value of Standards Tray and the predicted absorbance value calculated by the instrument.

NOTE: User verification causes system to reset. Data on trays in process will be lost.

1. Enter New Standards Tray Concentration Values
 - # SPECIAL MODES
 - 5 VERIFICATION
 - 1 READER VERIFICATION
 - 1 LINEARITY TEST
 - YES

NOTE: If using a new Standards Tray, select NO and then enter the correct concentration values.

2. Standards Tray serial number must be used as Standards Tray ID.
3. Enter concentration values for Standards Tray. Press <ENTER> and then <YES> after each value entered.

NOTE: Return Standards Tray to its sealed storage case upon completion of test.

4. Examine printout results to verify Passed/Failed status for each reader column.
5. To exit test, press <#>.

Linearity Test Specifications

The percent difference for STD 0, 1, and 2 must be less than or equal to 2% or 0.005A, whichever is the greater. The percent difference for STD #3 must be less than or equal to 3.5%, full scale.

VP-41 DRIFT TEST

Time: 60 minutes

Purpose: To verify spectrophotometer takes consistent readings over time.

1. At prompt: INSERT TRAY
 - # SPECIAL MODES
 - 5 VERIFICATION
 - 1 READER VERIFICATION
 - 2 DRIFT TEST
2. Insert Standards Tray.
3. Verify start and end times for test.

NOTE: Return Standards Tray to its sealed storage case upon completion of test.

4. Examine printout results to verify PASSED/FAILED status for each column.
5. Press <#> to end test.

Drift Test Specification

The difference for each group should be less than or equal to 0.005.

VP-42 REPEATABILITY TEST

Time: 16 minutes

Purpose: To verify reader performs consistently.

1. At prompt: INSERT TRAY
 - # SPECIAL MODES
 - 5 VERIFICATION
 - 1 READER VERIFICATION
 - 3 REPEATABILITY TEST
2. Insert and remove Standards Tray 20 times.
3. Examine printout results to verify PASSED/FAILED status for each column.

NOTE: Return Standards Tray to its sealed storage case upon completion of test.

Repeatability Test Specification

The standard deviation of each well reading must be less than or equal to 0.0025 or the percent coefficient of variation must be less than or equal to 0.5%.

VP-43 WASH VOLUME VERIFICATION

Time: 5 minutes

Purpose: To verify wash volume is adequate.

1. At prompt: INSERT TRAY
 - # SPECIAL MODES
 - 5 VERIFICATION
 - 2 WASH VERIFICATION
2. Insert special wash volume verification tray.
3. At prompt, enter any series of five numbers for a tray number.
4. Remove special wash volume verification tray upon completion of test.
5. Verify water level in all wells is between 2 lines marked on wash tray.

NOTE: Water level for wells 1 and 5 may be higher than wells 2, 3, or 4.

6. Press <#> to end test.

VP-44 MEASURE FLASH MEMORY BD VOLTAGES

Time: 5 minutes

Purpose: To verify correct voltages at Flash Memory Board.

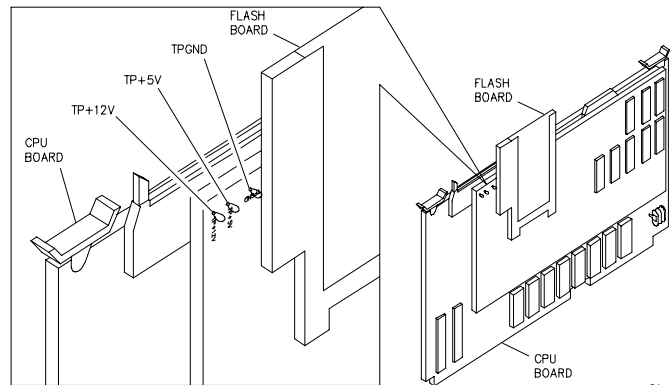
1. With power ON, raise Top Right Cover of PPC.
2. Remove metal cover over CPU and Flash Memory Boards.
3. Locate +12V, +5V, and ground test points on Flash Memory Board.
(See Figure 5-10.)

+12V

1. Place positive lead of multimeter on +12V test point.
2. Place negative lead of multimeter on ground test point.
3. Voltage may read from range of 12.3V to 12.6V.
4. Voltage can be adjusted at Main Power Supply. Refer to **VP-1** for adjustment procedure.

+5V

1. Place positive lead of multimeter on +5V test point.
2. Place negative lead of multimeter on ground test point.
3. Voltage may read from range of 5.0 to 5.2V.
4. Voltage may be adjusted at Main Power Supply. Refer to **VP-1** for adjustment procedure.



S1-17

Figure 5-10. Flash Memory Board Voltage Measurement

VP-46 WASH ACTUATOR ASSY TO MAIN TRANSPORT

Time: 15 minutes

Purpose: Verify alignment of Wash Actuator Assy to Main Transport Drive (Old Main Transport)

**CAUTION:**

Be sure to bleed pressure from wash system by slowly lifting ring for pressure check valve located on stainless steel canister. Allow air to escape before disconnecting any tubing.

1. Remove Wash Manifold from Wash Actuator Assy.

CAUTION:

Use extreme care during next step to prevent breaking Wash Manifold.

2. Disconnect waste, water and air tubing from manifold.
3. Remove hardware securing Reader Sensor Enclosure Assy above Main Transport Assy. (**RR-4.7**). Set assy on Cable Panel Interface Bd.

CAUTION:

Use care when inserting Main Transport Set-Up (MTS) fixture plate to prevent damage to Exit Switch Assy.

4. Remove Exit Shroud.

5. Slide MTS fixture plate into Main Transport Assy through exit opening.
6. Install wash/dispense alignment block on top of MTS fixture. The side with a notch faces toward Wash Actuator Assy.
7. Slide MTS fixture into place and insert "T Handle" jig pins to prevent MTS fixture from moving.
8. Manually turn wash motor until drive screw is at upper travel position.
9. Align wash head carriage so it is parallel and tight against alignment block. If alignment is not needed, go to Step 13. If alignment is needed, go to Step 10.
10. Loosen four (4) cap head screws securing Wash Actuator Assy to Main Transport Assy.
11. Reposition Wash Actuator Assy against alignment block.
12. Tighten screws and check alignment with Steps 8 and 9.
13. If alignment correct, remove "T Handle" jig pins, wash/dispense alignment block and MTS fixture plate from Main Transport Assy.



VP-47 OPTICS FILTER CLEANING, REPLACEMENT, & ADJUSTMENT

Time: 25 minutes

Purpose: Clean or replace optics filters, clean main fiber optics bundle and glass enclosure on main drive platform, and make filter count adjustments.

NOTE: The following have been included in the COMMANDER PPC Service Kit.

Filter Holders (2)	C/N 1-42449-01	
Neutral Density Filters	P/N 14842-045	0.1 @ 600nm
	P/N 14842-037	0.2 @ 600nm
	P/N 14842-038	0.3 @ 600nm
Red Filter	C/N 1-36117-01	
Blue Filter	C/N 1-36117-02	

NOTE: The following items are recommended for use during the cleaning procedure, however, they have not been included in the PPC Service Kit. These items are not available through Abbott Parts.

- *Optical Lens Cleaning Solution. Standard over-the-counter brands. DO NOT USE SALINE OR ALCOHOL.*
- *Optical Lens Paper/Tissue, P/N 0103953. International locations and U.S. FSEs may order this part through the Hematology Division. DO NOT USE CHEM OR INDUSTRIAL TYPE WIPES.*
- *Cotton Tip Applicators.*

Cleaning Procedure

1. Turn the Power Switch off and unplug the Power Cable on the left side of the instrument.
2. Lift the Left Side Cover.
3. Remove the two screws securing the metal cover on the top of the Dispense Bottle Holders.
4. Remove the two screws securing the Lower Left Front Cover to the Main Unit. Slide the cover to the left.
5. Disconnect the cable connections at J1 and J2 to the Backlight PCB Assembly.
6. Remove the Lower Left Front Cover away from the PPC unit.
7. Identify the Blue and Red Filters. (See **Figure 5-11**, Optics Filter Wheel Assembly, End View.)
8. Locate and remove the filters from the Filter Wheel as per the following instructions:
 - a. Rotate the Filter Wheel by hand to the HOME position. HOME is located at the 11:00 O'Clock or 330 degree position on the wheel. This position has no filter but does have a heat sink.
 - b. Move the wheel to the Blue Filter position by rotating the Filter Wheel counterclockwise to the first filter following the HOME position.
 - c. The Red Filter is located similarly at filter position four, or the fourth filter following the HOME position.

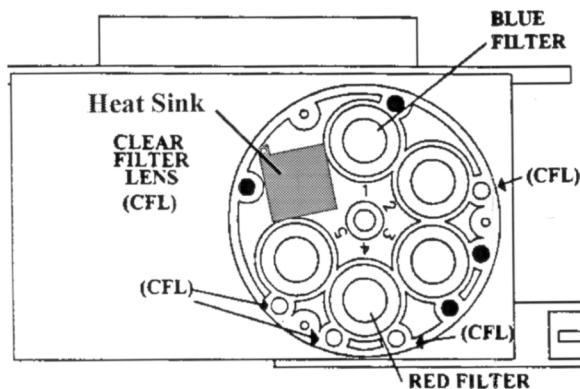


Figure 5-11. Optics Filter Wheel Assy., End View

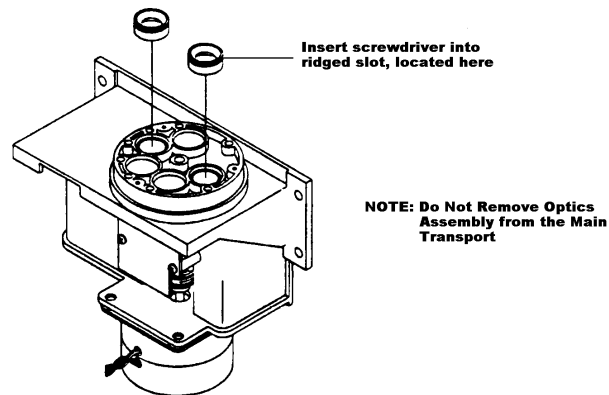


Figure 5-12. Optics Filter Wheel Assembly

9. Gently insert the tip of a small, flat-bladed screwdriver into the ridged slot on the Red or Blue Filter Holder. Gently pry the Filter Holder away from the Filter Wheel Assembly. (See Figure 5-12, Optics Filter Wheel Assembly.) When the Filter Holder is separated from the Filter Wheel, the Red or Blue Filter will be held loosely within the Filter Holder.
10. Gently remove the filters from the Filter Holders and place them on a lint-free tissue. Frequently, a Neutral Density Filter (thin, clear plastic) will accompany the Red Filter. It will be nested between the Red Filter and the Fiber Optic Bundle. If a Neutral Density (ND) Filter is included within the Red Filter Holder. Remove and discard the ND Filter.

11. To clean the filters, deposit several drops of the chosen optical lens cleaning solution onto a lint free lens cleaning tissue. Hold the filter between the forefinger and thumb, along the outer rim of the filter. Gently wipe away any grime and dust from the flat surfaces of the filter.

NOTE: DO NOT TOUCH THE OPTICAL SURFACES OF THE FILTER WITH YOUR FINGERS.

12. Wipe away dust and grime from the four, in-place clear filter lenses (CFL) also. (See **Figure 5-11**.)
13. Next, clean the Fiber Optics Bundle fibers.
 - a. Locate Position 1 or the Blue Filter position in the wheel.
 - b. With the Filter Holder and the Blue Filter removed, rotate the wheel by hand until the Fiber Optic Bundle is visible. It is located behind the HOME position on the Filter Wheel or the 11:00 O'clock position.
 - c. Moisten the tip of a cotton tipped swab with DI water. Squeeze out excess water so the tip is damp but not dripping water.
 - d. Gently rub the moistened applicator tip across the surface of the Fiber Optic Bundle until all visible dirt and grime is removed.
14. Discard the old, black Filter Holders. Obtain two new Filter Holders from the PPC Service Kit.
15. Inspect the Red and/or Blue Filters removed from the wheel earlier for physical damage. Replace the filters if damage is evident.

NOTE: The Red Filter will appear orange and the Blue Filter green.

16. Place the Red and Blue Filters into the new filter holders. When installing the filters, ensure the mirrored surface of the filter is facing upward. If both surfaces of the filter are mirrored, the side with the colored band on the outer edge of the lens will face the lamp housing.
17. Obtain filter counts for the Red and Blue Filters by performing the Dry Test (**VP-7**). Blue Filter counts should be in the range of 1500 \pm 300 and the Red Filter counts between 1000 to 2500 counts.
18. If the readings are not within these ranges, calibrate and then make adjustments to the readings by performing the following procedure.
 - a. Remove the Sensor Enclosure Top Cover to the Read A/D PCB Potentiometer (VR1) and adjust the potentiometer with a screwdriver until the Blue Filter counts are within the specified range.
 - b. if the Blue Filter counts are within an acceptable range but the Red Filter counts are at or above the upper limit, then the addition of a Neutral Density Filter with the Red Filter is required. Use either the 0.1, 0.2, or 0.3 Neutral Density Filter, as required, to bring the Red Filter counts closer to the mean of the range, 1700 to 2000 counts.
 - c. Place the Neutral Density Filter between the Red Filter and the Fiber Optic Bundle. See **Figure 5-13**.
 - d. If the counts are still out of range, replace the optical source lamp and repeat steps 17 and 18 until acceptable count ranges are obtained.

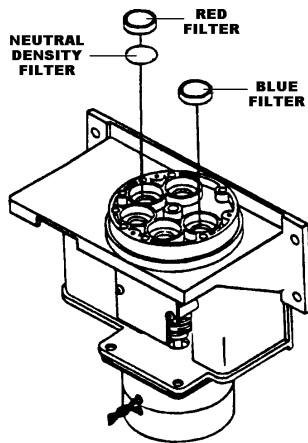


Figure 5-13. Neutral Density Filter Placement

19. Replace the filters if any of the following conditions occur.
 - a. If the filters are delaminated. (Heat damage, inconsistencies in the mirrored surface of the filter.)
 - b. If after performing the cleaning procedure and The Read A/D adjustment, the Blue Filter counts are not within the 1500 ± 300 count range and the Red Filter within the 1000 to 2500 count range.

Filter Removal and Replacement Procedure

1. Turn the power switch off and unplug the power cable on the left side of the instrument.
2. Lift the Left Side Cover.
3. Remove the two screws securing the metal cover on the top of the Dispense Bottle Holders.
4. Remove the two screws securing the Lower Left Front Cover to the Main Unit. Slide the cover to the left.
5. Disconnect the cable connections at J1 and J2 to the Backlight PCB Assembly.
6. Remove the Lower Left Front Cover away from the PPC unit.
7. Identify the Blue and Red Filters. (See **Figure 5-11**, Optics Filter Wheel Assembly, End View.)
8. Locate and remove the filters from the Filter Wheel as per the following instructions:
 - a. Rotate the Filter Wheel by hand to the HOME position. HOME is located at the 11:00 O'Clock or 330 degree position on the wheel. This position has a heat sink instead of a filter.

- b. Move the wheel to the Blue Filter position by rotating the Filter Wheel counterclockwise to the first filter following the HOME position.
 - c. The Red Filter is located similarly at filter position four, or the fourth filter following the HOME position.
 9. Gently insert the tip of a small, flat-bladed screwdriver into the ridged slot on the Red or Blue Filter Holder. Gently pry the Filter Holder away from the Filter Wheel Assembly. (See **Figure 5-12**, Optics Filter Wheel Assembly.) When the Filter Holder is separated from the Filter Wheel, the Red or Blue Filter will be held loosely within the Filter Holder.
 10. Remove the Red, Blue, and Neutral Density (if present) Filters from the Filter Holders and discard them. Also discard the two, black Filter Holders unless these were just replaced as part of the Optics Cleaning Procedure.
 11. Replace the filters with new Red and Blue Filters found in the PPC Service Kit. Place the Red and Blue Filters into the Filter Holders. When installing the filters, ensure the mirrored surface of the filter is facing upward. If both surfaces of the filter are mirrored, the side with the colored band on the outer edge of the lens will face the lamp housing.
- NOTE:** The Red Filter will appear orange and the Blue Filter green.
12. Obtain filter counts for the Red and Blue Filters by performing the Dry Test (**VP-7**). Blue Filter counts should be in the range of 1500 \pm 300 counts and the Red Filter counts between 1000 to 2500 counts.
 13. If the readings are not within these ranges, make adjustments to the readings by performing the following procedure.
 - a. Remove the Sensor Enclosure Top Cover to the Read A/D PCB Potentiometer (VR1) and adjusting the potentiometer with a screwdriver until the Blue Filter counts are within the specified range.
 - b. if the Blue Filter counts are within an acceptable range but the Red Filter counts are at or above the upper limit, then the addition of a Neutral Density Filter with the Red Filter is required. Use the either the 0.1, 0.2, or 0.3 Neutral Density Filter, as required, to bring the Red Filter counts closer to the mean of the range, 1700 to 2000.
 - c. Place the Neutral Density Filter between the Red Filter and the Fiber Optic Bundle. See **Figure 5-13**.
 - d. After adjustments are made to the filters and the potentiometer, repeat the Dry test (**VP-7**) test as in step (a) above.

VP-48 KEYPAD/DISPLAY CLEANING

Time: 5 minutes

Purpose: To clean Keypad/Display Assy (New version keypad)

NOTE: This procedure is NOT for older versions Keypad/Display Assemblies with a backlight display. If an older backlight display is encountered, replace it with the new version Keypad/Display Assy.

1. Remove Keypad/Display Assy (**RR-1.10**)
2. Turn power OFF.
3. Remove power cord from left side of PPC.
4. Raise top left cover.
5. Lower keypad cover.
6. Remove four nuts securing LCD display to Keypad/Display Assy.
7. Lift LCD display up off Keypad/Plate Assy.
8. Wipe display with soft lint free towel.
9. Place LCD display back on Keypad/Plate Assy and fasten with nuts removed in Step 6.
10. Replace Keypad/Display Assy.
11. Perform Console Test (**VP-8**) to verify all segments of display are visible and functioning properly.

VP-49 FLASH MEMORY

Time: 10 minutes

Purpose: To verify correct installation and operation of Flash Memory Card. Refer to **TSB 50-037** for software download procedure.

1. Turn power ON.
2. Verify correct time and date shown on screen.
3. If time and date incorrect:
 - a. Enter Configuration Mode in Special Modes Menu
 - b. Set correct time and date
4. Edit assays to match those previously printed before Flash Memory Card was removed. (Reference **RR-1.1**).
5. Set up parameters to match those printed before Flash Memory Card was removed. (Reference **RR-1.1**).
6. Verify port characteristics recorded before Flash Memory Bd was removed.
7. Verify bar code characteristics recorded before Flash Memory Bd was removed.
8. Perform **VP-40**, Linearity Test to verify proper tray concentration values. Retain a copy of printout for Laboratory Supervisor.
9. Verify display angle is set so display reads clearly. If display needs adjustment, go to Special Modes Menu, Configure Option.

NOTE: Ability to set display angle may not be available on all units.

10. Reassign appropriate Test Number to each PPC Assay protocol using data obtained before Flash Memory Card was removed.

NOTE: Before Test Numbers can be entered, a password must be used. Assigned password must be stored in safe place for future reference.

11. After entering Test Numbers and exiting from Test Number assignment mode, PPC will print assignments made. Give printout to Laboratory Supervisor to use in verification of Test Number assignments.
12. If laboratory uses Quality Control (QC) database, reassign desired assays to QC Directory using printout obtained before Flash Memory Card was removed.
13. Verify communications between PPC and ALL connected instruments.
14. Pipette saline or DI water from tubes on each POS ID connected to the FPC™. Use reaction trays with Bar Code Labels during pipetting process.
15. Insert pipetted tray into PPC.
16. PPC must recognize tray as starting a new FPC or POS ID batch or communications not established properly.
17. If the System starts a "new STAND-ALONE Batch", there is a communications problem between FPC or POS ID and the PPC. Refer to Error Code section of manual for troubleshooting process.

NOTE: Verify IDM is contacted prior to leaving to insure communication from PPC to DATA MANAGEMENT SYSTEM communication port over modem, and reset DMS™ port if necessary. IDM contact number is: 1-800-443-9791.

**VP-50 CLEAN TRANSPORT AUGER**

Time: 10 minutes

Purpose: To remove debris, dirt, and tray dust from transport augers.

1. Obtain auger cleaning 60-well tray.

NOTE: Tray is modified with 2 bottle brushes and four squared units of foam attached to underside of tray.

2. Moisten four small sponges on cleaning 60-well tray with small amount of DI water.
3. Squeeze sponges to remove excess water.
4. Perform Manual Wash:
5. At prompt: INSERT TRAY
 - WASH
6. At prompt: WASH
 - 1
 - ENTER
7. At prompt: WASH ALL WELLS
 - NO
8. At prompt: WELL TO START
 - A
 - 1
 - ENTER

9. At prompt: LAST WELL
 - A
 - 5
 - PRESS ENTER
10. At Insert Tray 1 of 1 for manual operation prompt, insert Cleaning Tray.
11. At Prompt INSERT TRAY I.D.#:
 - 1 (five times)
12. At Ready Prompt
 - YES
13. After removing tray from PPC, wipe residual dust from exit area tracks.
14. Run a Read Verification before returning PPC to service.
15. Cleaning tray must be cleaned by rinsing brush and sponges with isopropyl alcohol.
16. Rinse sponges with clean water and blot excess water from sponges.
17. Store tray in location where brushes and sponges will not dry in a deformed position.

VP-51 WASH CYCLE VERIFICATION

Time: 10 minutes

Purpose: To verify entire wash cycle is consistently occurring and all wells are being washed and dried.

1. Wash three 60-well trays of beads in rapid succession.
2. Visually check that during rinse portion of cycle:
3. Water is pumped through tubing.
4. All 5-bead wells are washed simultaneously and evenly.
5. No water spray escapes around manifold seals.
6. Waste water exits bead trays through manifold and flows into waste container with no leaks.
7. During drying portion of cycle verify:
 - a. Compressed air flows through tubing and manifold without obstructions.
 - b. All bead wells are air blown uniformly and dry simultaneously.
 - c. Virtually no water on washed beads.

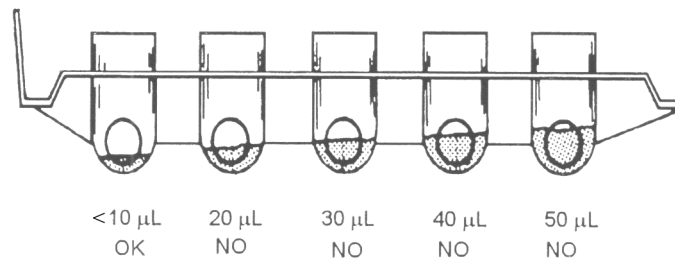


Figure 5-14. Wash Cycle Verification



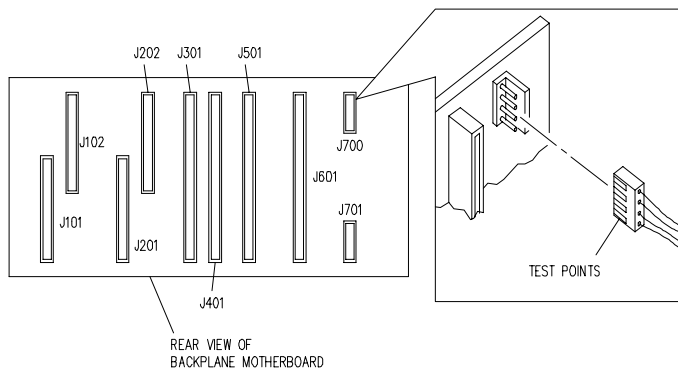
VP-52 CHECK VOLTAGE AT J700, BACK PLANE BD

Time: 5 minutes

Purpose: To verify voltages at J700, Back Plane Bd.

1. Lower Upper Left Rear Cover.
2. Locate J700 on Back Plane Bd. See Figure 5-15 below.

NOTE: There are 3 voltage measurements that can be done at J700.



S1-3

Figure 5-15. Back Plane Voltage Check At J700

3. J700 has four pins. With negative lead of multimeter on pin 4, measure following voltages:
 - a. +5VDC with positive lead of multimeter on pin 3 voltage should be in range of 5.0 to 5.2VDC.
 - b. +12VDC with positive lead of multimeter on pin 2 voltage should be in range of +11.8 to +12.3VDC.
 - c. -12VDC with positive lead of multimeter on pin 1 voltage should be in range of -12.3 to -11.8VDC.
4. If voltages are not within specified ranges, refer to **VP-1** for procedures to adjust either 12V or 5V outputs.

VP-54 MEASURE BATTERY VOLTAGE

Time: 20 minutes

Purpose: To measure battery voltage which is used to determine if battery needs replacement.

1. Turn power OFF.
2. Remove power cord from left side of PPC.
3. Raise Top Right Cover.
4. Remove shield over top of CPU Board.
5. Wait 15 minutes before measuring voltage.
 - a. Set voltmeter to DC mode.
 - b. Place positive lead at pin 16 of U-1.
 - c. Place negative lead at top leg of C-4.
 - d. Make note of voltage.
6. A measurement of 3.75V or more indicates no further action is required.
7. A measurement of less than 3.75V requires battery replacement. Perform **RR-1.2** and required verification procedures for this replacement procedure.
8. If CPU Board is out of the PPC, measurements can be taken at following locations:
 - a. Positive lead at TP9, located near battery.
 - b. Negative lead at C66+, also located near battery.

**VP-55 CLEAN LOAD MODULE URGE BELTS**

Time: 20 Minutes

Purpose: Minimize possible slipping of urge belts on reaction trays.

1. Lift the top right cover and pull the Keypad/Display Assy forward. Remove the (2) two thumbscrews securing the card cage to the mounting posts. Lift the assembly to gain access to the Load Module.
2. Dampen a soft, lint-free cloth with methanol.
3. Lift the urge belts at a point half-way between the pulleys using a small screwdriver. Place the dampened cloth under the urge belts.
4. While holding the urge belts, reach under the Bar Code Reader Block and actuate the Bar Code Switch. This will cause the Load Module urge belts to turn. Keep the methanol dampened cloth in contact with the urge belts until the belts stop moving.

NOTE: This procedure may be repeated weekly or as needed.

5. Remove the methanol dampened cloth from beneath the urge belts.
6. Perform a reverse actions of the process in step 1 to reassemble.
7. Run a "stand-alone" wash with 60-well trays to check operation.

VP-56 CALIBRATION

Time: 15 Minutes

Purpose: Set transport, wash, dispense, and read functions to specification.

Calibration includes transporting, washing, dispensing, and reading the first (6) six rows in a 60-well tray. The calibration tray consists of one 60-well tray with rows A, B, C, D, E, and F filled with reagent blanking beads. Rows G, H, K, L, and M remain empty. The calibration process involves tray transport, washing the blanking beads with wash type (0), and dispensing 300µl of Optical Reference Solution (LN-1B07-01) from bottle location 3 into each well. Each well is read with both the Red (600nm) and Blue (460nm) Filters and an Optical Density (OD) is calculated. An invalid reading will produce an "OD" reading of "ERROR" and a well status of "REJECT" signifying a reader saturation situation (i.e., OD >2.2) or the Dark Read was greater than the Light Read.

1. From the INSERT TRAY screen, press the <CALIBRATE> key on the keyboard. The light on the CALIBRATE key will light and the following screen will display:

INSERT CALIBRATION TRAY...

2. Place a tray bar code label on a clean, dry 60-well reaction tray.
3. Fill all the wells in rows A, B, C, D, E, and F with blanking beads.

4. Attach a bottle of Optical Reference Solution (LN-1807-01) to a 300µl Tri-Continent dispenser and place in bottle position #3.
5. Insert the 60-well reaction tray.
6. After the tray bar code is read, the following confirmation screen is displayed:

CALIBRATE
ALL BATCHES WILL BE DELETED
CONTINUE? (YES/NO)

7. Press <YES> to delete all existing batches stored in RAM memory and perform the calibration. The tray is locked into the transport and subsequently processed. The first three lines of the following screen are displayed while the tray is gated into the urge. After the tray is gated and locked into the urge, the "READY? (YES/NO)" line is added to the display.

CALIBRATE
TRAY XXXXXXXX 1 OF 1
WASH/DISP 300µL OPTICAL REF SOLN STA.#3
READY? (YES/NO)

8. Press <YES> to continue with calibration. Pressing <NO> will abort the calibration.

9. After processing of the 60-well tray is complete, a printout of the calibration data is produced. An example of this printout is shown below.

Calibration PASSED
Date: 08/31/95 Time: 16:32:55

	Col 5	Col 4	Col 3	Col 2	Col 1
Mean:	0.000	-0.013	-0.004	-0.010	-0.006
Std:	0.002	0.002	0.001	0.002	0.002

10. If the calibration test fails, refer to **VP-7**, Read Systems Test, and **VP-47**, Optics Filter Cleaning, Replacement, & Adjustment.

