Ultra-Count™ 2400 Parts Counter

Operation Manual, Ver 2

Advanced Poly-Packaging, Inc.

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Acknowledgments

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Customers are encouraged to inspect and test machinery and/or systems at APPI's facility prior to purchasing the equipment. Failure to do so constitutes acceptance of equipment performance to purchaser's specification.

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Chapter 1

Introduction

Welcome
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1.1 Welcome

Thank you for selecting the Ultra-Count 2400 Series counter. Designed to accurately sort and count various molded, medical, industrial and food products, the Ultra-Count 2400 will lower your packaging costs with an automatic operation, increased speeds, versatility, reliability, and simplicity.

1.2 Using This Manual

The following manual conventions are frequently used to assist in understanding important information, alerting the operator of potentially dangerous or damaging practices, and the normal functions of the Ultra Count-2400 Series Counter.

Text normal text

Italics Used for emphasis

BOLDFACE Used to identify heading names

***CAUTION*:** Warning messages. To avoid physical harm, damage to equipment or damage to the product. Be sure to read these messages carefully.

1.3 Specifications

General

Machine Dimensions: 54"High X 36"Wide X 42"Deep
Conveyor Motor: Stepper drive
Optical frame: 80mm x 120mm staggered emitter / receiver
Weight: approximately 400 lbs. (varies based upon bowl and drive size)
Air: 80 PSI
Electric: 117V/60Hz

Touch Screen Specifications

16 color Liquid-crystal display (LCD)
Dot number: 320 x 240
Display area: 115.17mm x 86.37mm
Number of touch switches: 20 x 12
Display Element life: 50,000 hours at 25° and 60% relative humidity
Backlight life: 10,000 hours (until surface brightness decreases by 50%)

Touch Screen (back panel)

CN4 Port - Printer connector (not supported in I.O.P. or P.L.C. Program).
TB1 Screws - I.O.P. power terminal block.
CN1 Port - Bar code reader port (not supported in I.O.P. or P.L.C. Program).
CN2 Port - Program port/data communication port between I.O.P. and P.L.C.

Drive Specifications - Performance Data

Part movement approaching 100 feet/minute is obtainable.
Overall Dimensions - 8 3/4 inches high, 161/2 inch square base, 18 inch or 24 inch diameter bowl
Weight - 222 pounds (drive unit less bowl).
Power Required - 3.5 Amps maximum ampere draw @ 120 Volt AC, also available 240 Volt.
Springing - 4 spring banks 90° apart, 15° spring angle.
Rotation - Counterclockwise (or clockwise) - factory assembly

Bowl Mounting - One hole (or four holes on some models), top or bottom mount, bolt circles up to 161/2 inches
Bowl Size - Up to 30 inch stainless steel fabricated or cast aluminum
Operating Mode - 7200 cycles per minute @ 60 Hz, 50 Hz tuning available

1.4 Air & Power Requirements

The UC-2400 is equipped with an external regulator and the air supply should be fed to the UC-2400 with ¼ inch O.D. poly tubing. Make the connection at the rear of the Ultra-Count. Set the air pressure on the UC-2400 between *20 and 40 psi. Note: Air should be dry and oil free*.

The UC-2400 requires 115V/50Hz dedicated power source and will draw 15Amps total per unit.

1.5 Available Options

Although the UC-2400 is extensively equipped with many "built-in" options, there are some options available that may better suit your UC-2400 for your specific needs.

Bowl Configurations - The UC-2400 comes equipped with a flat track (or high-negative bowl as a custom feature). Special tooling including air assist may also be incorporated based upon your product.

Vibratory hopper with leveling arm - Supply hopper triggered by a level switch that is designed to keep the bowl filled to a consistent level which provides for a greater accuracy of parts flow. The leveling switch may be in the form of a leveling arm or

Incline feed conveyor and hopper with leveling arm - Hopper with floor level stand provides for lower filling of hopper. An incline conveyor feeds the bowl and maintains a constant level in the bowl for greater feed accuracy.

FDA coating or rubber coating - FDA coatings are available for food contact. Rubber or polyurethane coatings are also available.

Special tooling - Bowls can be custom tooled to provide for special parts orientating requirements.

1.6 Special Note on Safety

Although many safety features have been included in the mechanical, electronic and pneumatic systems, improper use, improper adjustments or neglect of preventative maintenance may result in serious personal injury. Guards and covers must be in place before operating the unit.

Chapter 2

Getting Started

Unpacking
Machine Setup
Hookups and Connections
Operating Environment
Turning on the Power

2.1 Unpacking & Setup

The UC-2400 is typically shipped completely assembled and on a pallet. However, photo eye or accumulating assemblies may be removed to various level of dissassembly. Cartons securing the electronic module, cables and manual will be also on the pallet. Remove all tape, banding or packing materials that secure the machine.

2.2 Machine Setup

First, position the stand in its operating location. Then, with a lift truck or other lift device, position the drive unit onto the stand locating the feet in their mounting pads or mounting holes. Check the unit to make sure the four rubber feet are securely attached to the base of the unit. It is essential that these feet are in good condition and securely attached to the base. The rubber mounting feet will isolate the slight vibrations of the drive unit from the mounting structure. Mounting screws restrain the drive unit from moving. Secure the feeder bowl to the top plate of the drive unit with the screws provided. Mount or position the electronic module so that the cables reach the connections.

Note: The base drive may not be bolted to the stand; do not attempt to move the parts counter while the base drive is positioned on the stand. Remove the feeder bowl, then the base drive prior to repositioning the stand.

Note: Erratic parts feeding will occur if the bowl mounting screws are not drawn down tightly or if the screws become loose.

2.3 Hookups and Connections

The back of the UC-2400 control module has 8 clearly marked ports:

PORT	CONNECTION
Belt Drive	Military Connector, 10 Pin Femail, Belt Drive
Bowl Drive	Military Connector, 3 Pin Female, Base Drive
Level Input	DB9F, 9 pin female, Leveling Switch
Optical Input	DB9F, 9 pin female, Optical Frame
IOP Serial Port	5 pin female, Touch Screen Operator Panel
Hopper	110 Oulet, Line Out, Vibratory Hopper
Aux In	Military Connector, 7 pin male, Aux. IN Signal (from bagger/conveyor)
Aux out	Military Connector, 6 pin female, Aux. Out Signal (to other counter, bagger, check weigh scale or terminator)

2.4 Operating Environment

When you choose a location for installation, make sure the area is free of excess dust, dirt and moisture. To ensure the highest production possible, consider product flow to the bagger and counter and ensure that finished (packaged) product can easily flow from the system. *Note: For suggested system layouts, please contact an APPI technical sales person for layout drawings.*

2.5 Turning on the Power

The power switch is located on the back of the control module. In the "On" or "Up" position, the switch is illuminated indicating that power is supplied to the unit.

Chapter 3

Operation: Touch Screen

Getting to Know the Touch Screen Panel
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Message Screens

3.1 Getting to Know the Touch Screen

The touch screen is comprised of LEDs, System & Function Buttons and the Screen Operation itself. This section provides the necessary information to navigate the touch screen to change settings.

3.2 Panel LEDs

Power - Green LED is lit when machine is turned on.
Run - Green LED is lit when touch screen is in run mode and program is operating properly.

3.3 System & Function Keys

There are three levels of access to the System Settings: 1) Press **Function Keys** (F1 to F5) directly. 2) Press the **System Key first, then press the Function keys** and 3) Press the **System key, then hold down the F1 and F5 keys** for parameter settings.

3.4 System Settings; Function Keys

Function Keys: function keys are programmed as "hot" keys and may be changed dependent upon the program version. However, F1 key displays a HELP screen. F5 displays a password screen.

3.5 System Settings; System Key for Screen Contrast Settings

System Key first, then press the Function keys: Pressing the System key followed by F2 through F5 allows for screen contract adjustments, as follows:
F2 - Function key 2: Reduces the screen contrast.
F3 - Function key 3: Sets the screen contrast to mid-scale.
F4 - Function key 4: Increases the screen contrast.
F5 - Function key 5: Backlight ON/OFF (locked in ON position).

The contrast control for the Ultra-Count 2400 is accessed through the function keys to the right of the touch screen. To enable the function keys, press the lavender SYSTEM key. Hold down the F2 key or depress it repeatedly to *decrease* the contrast and darken the touch screen display. Hold down the F4 key or depress it repeatedly to *increase* the contrast and brighten the touch screen display. Press the F3 key to set the contrast to the mid-scale position. Press the SYSTEM key again to disable the function keys.
Note: The function keys will only remain active for 5 seconds after the last key is pressed.

3.6 Auto Screen Off / Manual Screen Off

The backlight will automatically turn off after 30 minutes of nonuse of the touch screen for longevity of the screen components. If the backlight is off, simply touch the screen or press the system or function key to illuminate the screen. To turn off the backlight manually, press the System key, followed by the F5 function key. Again, pressing any key or the touch screen will illuminate the screen.

3.7 System Settings; Parameter & Communication Settings

Note: Parameter setting are set at the factory and should not be altered; any changes may cause the touch screen to become inoperative.

System settings can only be accessed by pressing the SYSTEM key and then holding the F1 and F5 function keys simultaneously.

System settings provide access to the COMM parameters, I/O test and Memory Card information.

COMM parameters are set at the factory as follows:
SIG LEVEL: RS232C
CONNECT: 1:1
PC Stat: No: 1
Baud Rate: 19,200

Data: 8
Stop Bit: 1
Parity: ODD

I/O test provides for TOUCH/CONTACT SWITCH tests. Each button can be tested to ensure proper operation of the screen. Press the *right corner* of screen to return to the main menu.

From the main menu, press System / Mode to return to normal operation.

3.8 Touch Screen Program / Color Scheme

The touch screen displays 16 true colors and 16 shaded colors to provide a vivid display. A particular color scheme is used to assist the operator to locate functions:

Blue is the background color used for text information. No "buttons" or functions are blue.

Green is the color used for "buttons" that change settings. Pop-up windows may be displayed or a function is turned on/off for instance.

Red indicates that a function is off or stopped. Pressing a red button may turn a function on for instance.

Yellow is the color used for menu buttons. A menu button displays another screen and allows for movement throughout the entire program.

With an understanding of this basic color scheme, the operator will quickly setup the system or make minor adjustments during operation.

3.9 Touch Screen Program / Operation Settings

The touch screen program is a "user-friendly" menu-driven setup and operation program. Moving through the system is accomplished by touching the area of the screen that describes the desired operation.

3.10 Password Functions / Default Pass Codes

Advanced Poly-Packaging, Inc. (APPI) has included a pass code function in all touch screen equipment to prevent operators from changing settings.

There are two pass code levels described as follows:
1. Level 1: This is the highest level pass code which prevents operators from accessing the Technical Assistance functions of the machine. Additionally, the pass codes are maintained in this area.
2. Level 2: This level pass code, when the pass code function is enabled, prevents the operator from accessing settings screens that affect the operation of the equipment.

Pass codes prevent unauthorized individuals from tampering with settings. When equipment is shipped, APPI uses the following codes which can be changed by the customer at any time:
1. Level 1 pass code: 1001
2. Level 2 pass code: 1002

To enable the pass code function, press the Tech Assist button from the Main Menu. Type in the Level 1 pass code (1001 by default from APPI). Then press the ON toggle button to toggle the pass code function ON. If you change the pass codes, ensure that these codes are written down.

Once the pass code function is enabled, the operator will have a programmed amount of time (time-out time) to make changes. Once this time has elapsed, the Operation Screen will automatically be displayed. This time can be changed by accessing the Pass Code setup screen. By default, the time is set to 5 minutes.

If you misplace or forget the pass codes, contact APPI Service Dept for assistance. APPI will prove a "factory code" so that the current pass codes can be displayed. Once you receive the factory code, press F5 function key, located to the right of the touch screen, to enter the factory code and display your preset codes.

Note: Refer to Technical Assistance section of this chapter for further information on how to access this function.

3.11 Introduction Screen

When the Ultra-Count 2400 is turned on, an Introduction screen is "flashed" on the I.O.P. momentarily. See Fig 3-1.

3.12 Main Menu

The Main Menu screen is provided to navigate quickly through the entire program, linking to other screens on the program. See Figure 3-2.

The menu command buttons are the yellow buttons located in the center side of the Main Menu screen. Pressing one of the menu command buttons will change which screen is currently being displayed by the I.O.P. To access another screen, simply press the corresponding menu command button. Menu buttons appear through the touch screen program to assist in navigating throughout the program, normally located on the right side of the screen.

3.13 Operation Screen

The Operation Screen where the operator will monitor the operation of the counter, begin operation and stop the system from running. See Figure 3-3.

Top line toggle switches appear on most screens throughout the program. These toggle switches include RUN/STOP button, MANL/AUTO button, AUX ON/OFF button and Hopper ON/OFF button

RUN/STOP Button: The RUN / STOP mode button changes the current state of the counter's operation. To start the counter, press the RUN button. To stop the counter, press the STOP button..

MANL/AUTO: Operation button to switch from manual operation or automatic. In the automatic mode, the counter will cycle in a continous mode (if AUX is OFF) or in a closed loop communication mode (if AUX is ON). To run with a bagger or conveyor, the switch must be in the AUTO position.

AUX ON/OFF: To setup communication with the bagger, conveyor or other equipment (including the CW scale), the AUX toggle button must be in the ON position. If you wish to operation the unit stand-a-lone, then the AUX button must be in the OFF position. For setup, place the AUX button in the OFF position.

HOPPER ON/OFF: If equipped with a hopper or hopper/conveyor system, the toggle button must be in the ON position. However, even in the ON position, the hopper will not turn on only if the bowl is in fast operation mode and the leveling switch is ON.

MANUAL CYCLE button: Press this button to manually cycle the counter. If the final count has been reached, the unit should cycle. Before running the parts counter in a "system", the counter should be cycled several times as a stand alone unit to test for parts flow and count accuracy. The manual cycle button can be pressed any time during the count sequence and when the counter reaches the final count, the counter will automatically cycle and the counting process will begin again.

No further settings or buttons can be accesses from this screen. If the passcode function is enabled, this screen will automatically displayed after the passcode timeout period has expired.

3.14 Settings Screen

The Settings Screen contains all the timer settings, count settings and speed settings used to control the operation of the parts counter. By pressing a button on this screen, a numeric keypad window will be displayed to change the setting value. Enter the value and press Enter to accept the value. If entered incorrectly, press Clear, then reenter the value. See Fig. 3-4, 3-5, 3-6, 3-7.

Belt Fast / Slow: The belt speed button displays the current belt speed. To change the belt speed, press the BELT FAST or BELT SLOW button and change the value using the numeric key pad. The minimum and maximum values for each parameter are indicated in white to the right of the numeric pad. Use the numeric pad to input a new value of the belt speed and press the Enter key. The belt speed will change only after the next cycle operation begins. The fast and slow belt speed operations will function in the Trailing Edge Eye Mode, but only the fast belt speed with operate in the Leading Edge Eye Mode.
Note: Values below the minimum value or above the maximum value will not be accepted when the enter key is pressed. Press the clear key and enter a new value that is acceptable.
Note: Over counts may occur if parts continue to travel through the optical frame after the belt stops. If parts on the belt continue to move after the belt stops, slowing down the belt may be required.

Bowl Fast/Slow: The bowl fast and slow button displays the current fast bowl speed. The bowl speed changes immediately after pressing Enter on the numeric key pad, if the value has been changed. Two speeds are provided in order to increase production and accuracy. The fast speed is used to get close to the final count quickly and the slow feed for accuray.

Note: Over counts may occur if the bowl is feeding parts onto the belt too closely that cause the optical frame to count two parts as only one. Slow the fast and/or slow bowl speeds down to avoid over counts.

Overcount setting: An overcount setting is provided to stop the system if an overcount condition exists. To enable this feature, set the overcount to 1 or higher. To disable this feature, set the overcount setting to zero. If set to one, the cycle operation will stop and a message will appear on the screen indicating an overcount condition (an overcount of one or higher). To continue operation, touch anywhere on the screen.

Final Count setting: Set the final count value to the desired count. Once the final count is reached, the cycle operation will stop awaiting a signal to drop the parts.

Slow Count setting: Set the slow count to a value that causes the bowl (and/or belt) to slow down with the count approaches the final count. For small value counts (such as 1 up to 5), the slow count value may be set to the final count value since the bwol will be running more slowly for smaller counts. To determine the slow count setting, first set the value to 80% of the final count and adjust after testing.

Note: The defference between the final count and slow count settings must be greater than the number of parts on the V-track belt, at any one time.

Batch Time setting: The batch time is the amount of the time the accumulator door remains open, before it closes. This allows the batch quantity of parts to fully escape the accumulator before it closes.

Cont. Cycle setting: The continous cycle timer provides a delay time if running in a stand-a-lone mode and Auto mode. The operator can keep pace with the counter and if needed, increase the continuous cycle counter to slow down the operation..

Open / Closed Accumulator: In closed accumulator mode, the final count will be reached with the accumulator doors closed. In open accumulator mode, the final count will be reached with the doors open and the doors will close as soon as the final count has been reached.

Leading / Trailing Edge eye setting: Two eye modes of operation are provided to obtain accurate counts. Leading edge: This mode works well with parts that when one part passes through the eye, the part is counted with a value of more than one. This occurs when the part is small than the gap between the eyes

in the optical frame. This also can occur when the optical eyes pass through the part itself and only the more dense parts of the eye are detected. In the leading edge mode, the count is initiated when the part first passes through the eye. Then, the remainder of the part is ignored for a programmed amount of time (just enough time to allow the part to pass completely through the eye). See Leading Edge Eye Setting Screen for further information on how to setup the eye.

Trailing Edge eye setting: This mode works well for parts that are larger and where there is scrap mixed in with the good parts. The scrap size is set so the counter will ignore any parts under a certain length. The scrap size can be set to any value less than the smallest part length observed while running the counter on Test screen mode.

Note: If the part length measurement is .1, the scrap value must be set to 0.

Note: Over counts may occur if the scrap value is set too close to the part length. Reduce the scrap size if parts are passing through the optical frame but are not being counted.

3.15 Leading Edge Test Screen

The leading edge test screen is provided to assist in making settings for the eye when the eye is set to the Leading Edge. If changed from Leading to Trailing Edge or vise versa, changes may be required in the Eye Settings screen. See Fig. 3-8.

First, setup the bowl counter so that the parts are flowing around the bowl with good parts separation. With the counter in RUN mode and MANL , press the MANUAL CYCLE button. Then press the RESET button. Press the MANUAL CYCLE button several times until you are satisfied the MAX value does not increase. This value represents the longest amount of time that one component is in the eye. Press the MAX SIZE button and set the value to a figure that is greater than the MAX value. Now, continue pressing the MANUAL CYCLE button viewing the final count value and actually counting the parts, to ensure that the counter is counting accurately. If the counts are not accurate, increase the MAX SIZE value if you are experiencing Undercounts. Decrease the value if you are experiencing Overcounts.

Note: Leading Edge mode causes the counter to run the belt speed in fast speed only. Scrap may also be counted in this mode.

Note: Leading edge settings will only function properly if the optical frame pots are set according to section 4.12. Otherwise, results from the test screen will vary.

3.16 Trailing Edge Test Screen

The trailing edge test screen is provided to assist in making correct settings when the eye is set to Trailing Edge. If changed from Leading to Trailing Edge or vise versa, changes may be required in the Eye Settings screen. See Fig. 3-9.

First, setup the bowl counter so that the parts are flowing around the bowl with good parts separation. Ensure that only good parts pass through the eye (NO SCRAP). With the counter in RUN mode and MANL , press the MANUAL CYCLE button. Then press the RESET button. Press the MANUAL CYCLE button several times until you are satisfied the MIN value does not decrease. This value represents the amount of time that the smallest part (or narrowest profile of part) passes through the eye. If the value is .1 or less, then set the MIN value to 0.

Note: With a MIN (scrap) value of 0 or .1, the counter will not be able to detect scrap.

Now, continue pressing the MANUAL CYCLE button viewing the final count value and actually counting the parts, to ensure that the counter is counting accurately.

Double Part: If longer parts overlap, a double part setting may be required to allow the two parts to count as two (even though the parts pass through and break the eye beam continually). The setting for the double part length should be at least 1.5 times the value of the MAX value. Test this feature by placing the two parts on the V-track, slightly overlapping then press RUN. Test to see if the two parts are counted as two.

Note: Trailing edge settings will only function properly if the optical frame pots are set according to section 4.12. Otherwise, results from the test screen will vary.

3.17 Counters Screen

The UC-2400 is equipped with a startup counter that allows for system startup (numerous counters), batch counter which counts the machine cycles, a parts counter that counts the individual parts and a maintenance counter which cannot be reset. See Fig. 3-10.

Startup Counter: When in a system comprised of numerous parts counters feeding a compartment or bucket conveyor, the parts counter can be setup to begin operations when a preset number of "empty" compartments or buckets go by each counter "station". A station number can be set one time so that when the Startup button is pressed, the counter will begin operation only after that preset number of input signals is received. When the Startup button is ON, the Aux communication is suspended until the Startup Count has been reached. Then normal auxiliary communications resume. Additionally, when the startup switch is first switched ON, the current startup and current batch values are reset to their respective set values. During startup, the counter "waits" a predetermined number of cycles before it starts running. After the predetermined number of cycles, the startup switch automatically turns OFF and the counter operates normally. When the Startup Counter function is turned ON, all remaining counts and functions are reset.

Batch Count button: The batch count display shows the remaining number of batches for the current job. The batch count is a user-defined variable that can be changed on the Counter screen. Pressing on the batch count display will access the Counter Screen.

Part Total display / Reset button: The parts total shows the number of parts that have run through the eye since the counter was reset. Press the reset button to zero this value.

Maintenance Couner: Displays the total cycle operations on the counter.

3.18 Job Save Screen

The UC-2400 is equipped with memory storage to save the settings for 96 different parts. A part number can be assigned to each part for easy reference. See Figures 3-11, 3-12 and 3-13.

Job Save Function: When all settings have been made and have been tested, press the Job Save button, located on the Main Menu. A listing of jobs will be shown, as follows:
No.: Each column of the part save/recall screen is numbered which describes a memory address/order.
PN: Enter a Part number (up to six numbers) for your reference.
To save a job to a memory address that has had no settings saved, press the field located to the right of the number (NO.). Type in a part number that you will reference at a later date.
Note: You can also save the settings over a previously saved job, but this will cause the previous settings to be lost.

Job Recall Function: To run a part that has been previously been run and settings saved, press the field that has your part number displayed. Then press the View button to display the settings. From this screen, you can run / load the job by pressing the LOAD button.

3.19 Statistics Screen

The Statistics screen is a graphical representation of the counter's operating performance. See Figure 3-14.

There are four performance gauges on the Ultra-Count's Statistics screen. The belt speed and bowl speed gauges show the instantaneous belt and bowl speeds; while, the batches per minute and the parts per minute gauges show the number of batches and the number of parts the counter processed during the *previous minute*.

3.20 Auxiliary Screen

The UC-2400 is equipped to operate within a system for fully automatic parts counting. From the Auxiliary Screen, the type of communications can be setup that match the equipment you are running the counter with. See Fig. 3-15.

Option 1 or 2: This option is set at the factory to match the bagger, conveyor or CW scale that the counter is connected to.

Continuous Cycle timer: This is the same timer that was described in the settings counter, but the button is also on this screen. Again, this timer causes a delay between cycles if the counter is running in a stand-a-lone mode or during setup.

Aux Time delay: This delay timer causes the output of the counter to be delayed to allow for the parts to settle, once they have been dropped from the accumulating funnel of the counter. Increase this delay timer if the bagger is cycling before the parts are in the bag, for instance.

3.21 Technical Assistance Screen

The Technical Assistance screen provides for operator information, factory settings adjustments and functions testing and troubleshooting. The screen is protected from access with a Level 1 password. The password is set by defualt (from the factory) to 1001. This code can and should be changed when the system is put into operation. See Figure 3-16.

The Technical Assistance screen displays the current touch screen (TS) program version and programmable logic controller (PLC) versions. This information should be told to an APPI service technician when requesting technical assistance. Contact information is also provided to receive technical service via phone or mail.

3.22 Pass Code Setup Screen

The passcode function, as described in the beginning of this chapter is provided to safeguard the settings from changes from anauthorized persons. Level 1 passcode is always ON which protects only the settings that can accessed from the Technical Assistance Screen. However, Level 2 passcode, if enabled, safeguards the remainder of the equipment settings. See Figures 3-17, 3-18, 3-19.

3.23 PLC I/O Status Screen

The UC-2400 Inputs and Outputs are illustrated on the I/O Status Screens. These screens assist in the troubleshooting of the equipment and assist APPI service technicians to assist operators or maintenance personnel. See Figures 3-20 through 3-24. During the cycle operation of the UC-2400, the input and output conditions are illustrated with LEDs. To determine what each LED indicates, press the row of LEDs; a short description is provided.

3.24 Message Screens

Message screens appear to inform the operator of normal operating conditions and errors in the operation of unit. See Figures 3-25 through 3-27 for some examples of message screens.

Chapter 4

Machine Adjustment Settings

Bowl Discharge Position
Skivers
Drop Gate
Level Switch
Bowl Drive
Erratic Bowl Feeding
Dead Spots
Coil Gap Adjustment
Optical Frame Pot Settings
Height Adjustment

4.1 Bowl Discharge Position

Position the bowl so that it feeds onto the center of the belt drive and as close to the belt as possible.

Loosen the bowl by loosening the bolts that hold the base drive to the bottom ring of the bowl and turn the bowl to the desired position.

A clamp collar holds the V-track belt in position. Loosen the clamp collar to turn, raise or lower the V-track assembly.

Note: It may be necessary to adjust the feet on the bowl drive to accomplish proper bowl position. On some models, the V-track conveyor assembly can be positioned without moving the bowl for proper feeding of parts from the bowl to the conveyor.

4.2 Skivers

Adjust skivers so that parts flow in a consistant, steady, inline pace. Skivers are designed to orient the part to assist with parts separation.

Use the skivers to brush off components stacked on top of other components.

Use skivers to decrease the volume of parts on a track by pushing the product off the track an back into the bowl.

4.3 Drop Gate

The drop gate should be opened just far enough to allow a single part to pass over without dropping off. A second drop gate is provided to decrease the volume of parts to the final drop gate. Loosen the drop gate slide screws and push the gate in or out.

4.4 Level Switch

Vibratory bowls should be consistently fed with parts for best operation. Bowls that are full run slower than empty bowls and inconsistent levels may cuase incorrect counts. To maintain a consistent level of parts in the bowl, hoppers or conveyor should be used to feed the bowl. A leveling switch is used to detect the level of parts in the bowl and causes hoppers or conveyor to turn on and feed parts into the bowl.

Note: Hoppers only feed when the bowl is in a fast feed mode.

Several types of level switches may be supplied, dependent upon the bowl size and types of parts. If parts are not heavy enough to cause a leveling arm to move, then other types of sensors must be used which include ultrasonic sensors or photo optic sensors.

Leveling Arm / Switch Adjustment:
With a leveling arm, the switch should turnON when the “paddle” portion of the arm is approximately 1/2” from the floor of the bowl and should remain ON from 0” to 1/2”. Adjust the arm by either resetting the position of the arm on the shaft or by turning an adjustment screw located on the side of the switch.

Some switches also have an LED that when ON, indicates that the switch is ON. The LED should come ON when the paddle is approximately 1/2” above the surface of the bowl. Turn the adjustment screw counterclockwise to raise the paddle before the LED comes on. In other words, turn the screw counterclockwise to allow more parts to feed in the bowl before the hopper turns off.

If by turning the screw, the LED does not turn ON at a different paddle position, then the leveling arm must be repositioned. Loosen the screw that holds the shaft of the leveling arm in position and turn the shaft coming out of the sensor block until the LED remains ON when the paddle is touch the bowl up to 1/2” above the bowl. Retighten the screw.

Leveling Switch / Ultrasonic or Photo Optic:
With a proximity sensor, proper parts level may be achieved by moving the sensor closer or further away from the bottom of the bowl. Some sensors have a "training" button which allows for electronic adjustment of sensor to set the level of parts in the bowl. Refer to the manual for these types of switches for further information.

Note: Over filling the bowl will prevent the parts from moving smoothly or may cause the parts to stop flowing.

A GREEN LED is located on a box to the rear of the hopper (or on the conveyor if a hopper conveyor system is supplied). The LED indicates that the hopper should be feeding. The hopper will only feed if the bowl is in fast feed mode. If the leveling switch turns ON and the bowl is in fast mode, the hopper will start to vibrate. The hopper will vibrate for at least 5 seconds even if the switch turned on for only a moment.

To increase the vibration level of the hopper, turn the potentiometer clockwise. To decrease the vibration level of the hopper, turn the potentiometer counterclockwise.

4.5 Bowl Drive

The drive has several adjustment points to allow for high production parts flow. However, do not advance the drive setting (Fast or Slow speed) to a higher feed rate than necessary as excessive vibration may decrease the useful output of the feeder. Do not mount external tracks or extensions to the feeder bowl without the manufacturer's approval; such additions may create dead spots in the feeder bowl or may harm the power unit or decrease the feed rate. Additionally, maintain a gap between the feeder bowl discharge and the "V" track so the bowl is not vibrating against components of the "V" track or housing components.

4.6 Erratic Feeding of the Bowl

When erratic feeding is observed, first check to see that the feeder bowl is securely mounted on the drive unit. All mounting screws must be tight. Check the bowl track to be sure there are no physical obstructions causing interruptions in the feed such as parts stuck under wipers or parts wedged together and jammed between tracks. Check also to see if coatings on the parts, such as mold release compound, oil, dirt or some other foreign matter, may have made the track slippery or sticky, thus preventing the parts from properly driving up the track. A broken spring in any of the spring banks will cause the feed rate to diminish or stop. A broken spring screw will have the same effect. Removal and assembly of each spring bank, *one at a time*, will permit examination of springs - a cracked spring will make a dead sound when struck against a hard surface. A broken screw will be self-evident. All drive units are tuned before shipping. Tuning is accomplished by adding springs to the unit until a resonance is established between the driving coils and the mass being driven. A broken spring, or a broken or loose spring screw, destroys this resonance and the feeding ability diminishes or stops.

4.7 Dead Spots in the Bowl

Dead spots may occur in either the fabricated or cast bowls and are usually the result of an unequal distribution of mass in the bowl construction caused by tooling. They may also occur when one section of the bowl is not securely fastened to the drive unit, when a weld has broken, or when part of the bowl track has loosened. This may be determined by removing the bowl from the drive unit and rotating it 90° from its original position. If the dead spot remains at the same point in the bowl, it can be assumed that the problem is in the bowl. Dead spots, caused by an unequal mass distribution in the bowl, are generally corrected by adding weight to a selected spot or spots on the outer periphery of the bowl, usually 180° from the dead spot.

4.8 Adjustment of the Coil Gap

The XL Series drive units are equipped with two adjustable coils mounted on the base casting and two fixed armatures mounted on the top plate. The air gap between each armature and coil is adjusted at the factory and under normal operation should not require any further adjustment. Should a continuous metallic rapping sound develop during feeder operation or when the power control knob is turned to maximum, it will indicate that the armature is striking the coil and damage to the feeder unit will occur if not corrected. To adjust the coil for a larger air gap, first back off the two 1/2" socket head cap screws whose centers form a vertical line in the four screw pattern, approximately 1/8 of a turn. Then tighten the two 1/2" socket head cap screws whose centers form a horizontal line in the four screw pattern, approximately 1/8 of a turn. This will draw the coil back away from the armature about an additional .009" and should eliminate the metallic rapping sound. Care should be taken to loosen both vertical screws the same amount and tighten the two horizontal screws the same amount so that the surface of the coil remains parallel to the surface of the armature. Normal air gaps run from .025" to .040". Some units could have as little as .015" gap or as much as .075" gap. To adjust the coil for less air gap, back off the two horizontal screws and tighten the two vertical screws, the same amount each. Make sure all four screws are tight after making the adjustment.

4.9 Spring "Tuning"

The XL Series drive units employ four spring banks for tuning the drive unit. These spring banks usually contain the same number and thickness of springs; however, sometimes due to bowl construction or bowl tooling, it is necessary to vary the number and thickness of the springs in each bank. When springs of different thickness are used in a spring bank, the thickest spring should always be placed so that it is next to the base and top plate castings and the thinner springs toward the screw heads. A smaller diameter and lighter weight bowl will require less or thinner springs than a larger diameter and heavier bowl.

The XL Series drive units are powered by alternating (unrectified) 60 cycle current which energizes the coil at a rate of 120 pulses per second. These pulses cause the coils to magnetize and draw the armature toward them, thereby flexing the springs. The combined spring force must be sufficient to return the armatures to their original or neutral position at the same rate of 120 reactions per second. When this happens, the unit is properly tuned for 60 cycle current. If the power source is 50 cycle, such as used in some European countries, the drive unit must be retuned by reducing the number or thickness of springs. If the power source is other than 110/120 Volt, then different coils must be used (240 volt AC coils are available from stock).

4.10 Belt Tracking

The V-track belt is constructed of two small conveyors at 90 degrees to each other. Each belt has a drive roller and a tracking roller. The tracking roller is located at the discharge end of the belt where all adjustment points are located.

To adjust the belt tracking, first remove the accumulator/eye assembly. Bolts holding the accumulator to the V-track assembly are located beneath the belt, to the rear of the accumulating funnel.

With the accumulator removed, the adjustment screw and slot can be seen to adjust the position / alignment of the rollers.

Adjust the roller up or down to correct the belt alignment. When properly adjusted there should be a very small (1/16") between the belts as they are running.

4.11 Accumulator Funnel Adjustment

The accumulator funnel mounts to the V-track conveyor assembly. The optical frame slides into the accumulator funnel. The optical frame must be positioned at the end of the V-track so that parts discharging from the belt completely pass through the photo array. If parts only partially pass through the eye (beneath the eye), miscounts can occur. Larger / longer parts may require the optical frame to be positioned further away from the end of the conveyor to avoid parts blocking the photo array when hanging from a stopped belt.

To adjust the accumulator funnel, loosen the bolts positioned beneath and to the rear of the accumulator.

4.12 Optical Frame Pot Settings

The optical frame (four sided frame) has four potentiometers which control the functionality of the outputs to the PLC. Factory settings provide for a static output (output is ON while the detection area is blocked or parts are present). Additionally, the sensitivity is set to the highest possible setting.

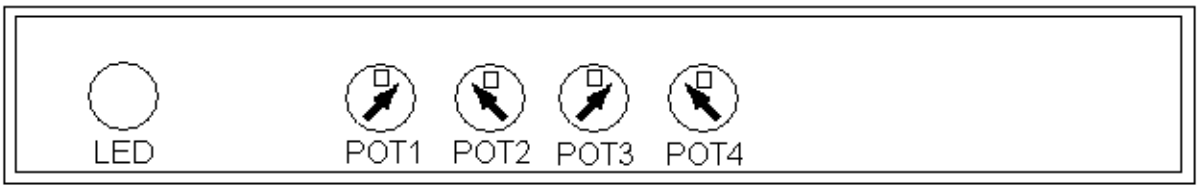
Factory settings are described while holding the frame so that you are looking at the pots with the cable extending out from the eye, to the LEFT of the pots.

You will see that there are four pots with covers over the two center pots. Remove these covers to change settings.

POT 1 (left most pot): OUTPUT DURATION, set at the factory to the most CCW position - this pot is used only when the optical frame is set to Dynamic functionality. Since the optical frame is set at the factory to Static (not Dynamic), you only need to adjust this pot if you have changed POT 2 to the Dynamic Position. Again, POT 2 is set at the factory to the most CCW position. If you do reset POT 2 to Dynamic, use a small flat head screw driver and turn the pot clockwise to increase the output duration.
POT 2 (second from the left): STATIC/DYNAMIC, set at the factory to STATIC which is the most CW position. Static functionality means that when the eye is blocked, the output is ON. To test the eye, you can place your finger in the eye field and you will notice that the LED at the base of the cable is ON continually while the eye is blocked. To change to the DYNAMIC functionality, turn the pot using a small flathead screwdriver to the most CCW position. Dynamic functionality means that the output to the PLC will be a fixed time, regardless of the lenght of the part. If you change to the DYNAMIC functionality, you may need to change the output duration (POT1) to achieve the correct counting function. Be careful not to set the duration too long or two parts may be passing through the optical frame while only one output is given to the PLC.

POT3 (third from the left): DARK/LIGHT mode, set at factory to DARK which is the most CCW position. Do not reset this POT or the output to the PLC will not be in the proper sequence.

POT4 (right most pot): SENSITIVITY adjustment, set at the factory to the most sensitive position which is the most CW position. The eye is set to the most sensitive setting so that even the smallest parts can be detected in the field. To cause the detection to be less sensitive (to not see scrap, for instance), turn the pot CCW until the scrap is not detected (may not work properly for parts that are too large).



Note: Illustration of factory settings/pots.

4.13 Height Adjustment

The UC-2400, when sold individually, mounts to a single column telescoping stand. The height can be adjusted, but due to the weight of the unit, a lift truck or other similar device must be used.

Position the forks of the lift truck beneath the mouting plate of the bowl. Slightly lift the forks and tilt back the forks so that the weight is off the stand and so that if the unit slides, it will slide toward the lift truck.

Loosen the screws from the side with two others holding the unit in position. Raise or lower the unit with the lift truck and tighten the screws.

Warning: Extreme safety must be used due to the weight of the unit to avoid severe injury. Only trained and licensed lift truck operators should perform these tasks.

Chapter 5

Maintenance/Trouble-shooting

Troubleshooting Checklist
Preventative Maintenance

Trouble Shooting Checklist (Ultra-Count 2400)

PROBLEM	POSSIBLE CAUSE	CORRECTIVE ACTION
Touch screen does not display	1. Power off 2. Main fuse blown 3. Breaker tripped 4. I.O.P. cables loose/damaged 5. Contrast out of adjustment	1. Check main/individual power switch Plug in power cord 2. Replace fuse #1 on the module 3. Check breaker in main power box. 4. Check cables behind I.O.P. cover 5. Adjust screen contrast
No main power LED	1. Power off 2. Main fuse blown 3. Breaker tripped 4. I.O.P. cables loose/damaged 5. LED burned out	1. Check main/individual power switch Plug in power cord 2. Replace fuse #1 on the module 3. Check breaker in main power box 4. Check cables behind I.O.P. cover 5. Replacement not possible
No run LED	1. I.O.P. in program mode 2. LED burned out	1. Press "System" key then "F1" key 2. Replacement not possible
Accumulating funnel not functioning correctly or not at all	1. No/low air pressure 2. Leaking hoses or air cylinders 3. Accumulator in "open" mode 4. "Batch toggle switch" is "off" 5. *Belt drive* cable loose/damaged	1. Check main and individual regulators Check for kinked air hoses 2. Check all air hoses and cylinders 3. Check mode on "Operation Screen" 4. Check switch on "Operation Screen" 5. Check *belt drive* cable
Part sensor (eye) not functioning	1. Part dust in eye 2. Eye cables loose/damaged	1. Wipe inside of eye 2. Check eye cables
Bowl not driving well or not at all	1. Bowl overfilled 2. "Bowl Fast" and/or "Bowl Slow" values set too low 3. Bowl drive cable loose/damaged	1. Empty bowl 2. Check values on "Settings Screen" 3. Check bowl drive cable
Hopper does not run	1. "Hopper toggle switch" is "off" 2. Counter running in "Bowl Slow" mode 3. Part level in bowl to high 4. Hopper cable loose/damaged 5. Level sensor cable loose/damaged 6. Hopper fuse blown	1. Check switch on "Operation Screen" 2. Check the "Slow indicator" on "Operation Screen"- adjust "Slow Count" on "Settings Screen" 3. Move parts so level arm can touch the bottom of the bowl 4. Check hopper cable 5. Check level sensor cable 6. Replace fuse #2 on the module
Bowl overfills	1. Gate on hopper raised too high 2. Ramp on front of hopper sloped down too far 3. Hopper running after bowl is full 4. Level sensor cable damaged	1. Lower gate 2. Raise ramp 3. Adjust part level sensor 4. Check level sensor cable
Belt does not move	1. Part(s) jamming belt 2. "Belt Speed" set too low 3. Belt drive cable loose/damaged	1. Check belt housing for loose parts 2. Check "Belt Speed" value on "Settings Screen" 3. Check belt drive cable

Trouble-shooting: Base / bowl drive unit.

Should your bowl stop completely (i.e., no vibration or humming sound at all), the reason will be an *electrical* failure. Carefully check the following to be certain that:
1. The power cord is plugged into a live outlet. For troubleshooting purposes, unplug the power during remaining electrical checks.
2. The fuse on the controller is good.
3. The auxiliary contacts inside the controller are properly shorted or jumpered together.
4. The input and output power connections inside the controller are good and sound.
5. The coil wires are properly connected to the controller output wires.
6. The coils themselves show continuity with the controller disconnected. If there is still no output, then the controller should be returned to the factory. If the failure is not our responsibility, APPI will advise you of repair costs.

If your bowl feeder does not stop feeding completely, or starts feeding slowly or erratically (i.e., fast then slow), and you can hear the unit humming, then the problem is *mechanical.*
Carefully check the following to be certain that:
1. Parts are not jammed under track wipers or wedged between tracks.
2. The feeder bowl mounting screws are tight.
3. The rubber mounting feet are not cut and are securely tightened to the feeder base.
4. The rubber mounting feet are not tight in the foot locators (if used).
5. The armatures and coils have an air gap between them.
6. There is no loose tooling in the feeder bowl.
7. Parts are not slipping or sticking on the track due to oily air contamination, mold release compound from parts, etc.
8. There are no broken welds, especially track welds, on the fabricated bowls; a broken track weld could cause a dead spot, erratic feeding or a metallic rattle"
9. Other equipment is not restricting the bowl from vibrating freely.
10. There are no cracked or broken springs in any of the spring banks.
11. There are no broken spring mounting screws. If, after checking all of the above, the feeder still does not feed properly, then get a 13/16" box wrench and check both the upper and the lower spring mounting screws for tightness. If the screws seem excessively tight, try loosening each set of four screws about 1/8 turn each. (The amplitude control knob should be set at the maximum feed position while doing this.)
If the screws are loose, the feed rate will slow down to a point where feeding will stop entirely. Progressively tighten the four upper spring screws, and then tighten the four lower screws.
As you tighten the screws, the feed rate should immediately pick up. You will know by the sound of the feeder when you have attained the proper torque on the screws. Attempt to tighten all screws to the same torque.

Trouble Shooting Checklist (Conveyor Feed Problems)

PROBLEM	POSSIBLE CAUSE	CORRECTIVE ACTION
Conveyor feeds more than once	1. Conveyor is in "continuous" mode instead of "auto" 2. Conveyor's part sensors are dirty or out of alignment 3. Cleat sensor under the conveyor is dirty, has been moved or needs adjusted 4. Cable connecting the counters, conveyor, bagger loose/damaged 5. Cleat sensor cable damaged 6. Part sensor cables loose/damaged	1. Change mode on the conveyor control panel 2. Wipe the part sensors/check that the eyes are in line 3. Wipe sensor, tilt sensor bracket, turn sensitivity adjustment 4. Check the cables connecting the counters, conveyor, and bagger 5. Check cleat sensor cable 6. Check conveyor's part sensor cables
Conveyor does not feed	1. Conveyor is unplugged 2. Conveyor switch on back of panel is off 3. Main power switch is off 4. Cable connecting the counters, conveyor, bagger loose/damaged 5. Conveyor motor breaker tripped 6. Damaged conveyor motor relay 7. Conveyor not in "run" mode 8. Bagger not ready 9. A counter has auxiliary "on" and is not in "run" mode 10. Parts jam at an individual counter 11. Counter eye problem	1. Plug in conveyor 2. Switch conveyor on 3. Throw main power switch 4. Check the cables connecting the counters, conveyor, and bagger 5. Check main power box for tripped breaker 6. Check main power box for bad relay 7. Change mode on the conveyor control panel 8. Confirm bagger is in auto mode, is not paused, has a properly threaded supply of bags, has a supply of heat transfer film, etc. 9. Check all counters. Auxiliary should be "on" if counter is being run. 10. Check all counters for "Part Flow Interruption Screen" 11. Check for a counter that cannot "see" parts - wipe the inside of the eye

Chapter 6

Replacement Parts

Components Lists with Drawings