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1 INTRODUCTION

**IMPORTANT**
Before turning the system on for the first time, verify that installation has been completed according to the Installation manual and the main input voltage is 220 VAC, single phase.

The P/A Industries *Ultra Advantage Servo Roll Feed with Servo Pilot Release* is a state of the art AC Servo feed, which simplifies Operator adjustments to feed parameters. These Operator adjustments are entered into the control memory through the keypad. With the use of programmable limit switches, the press signals the feeder when to begin moving the strip, when the feed pitch must be completed, when the press has completed its down stroke, and when to open the rolls for piloting.

The mechanical simplicity, accuracy, and ease of use of the *Ultra Advantage Servo Roll Feed* will help to improve your quality and production for years to come.

2 THEORY OF OPERATION

2.1 MECHANICAL ASSEMBLY

Mechanical assembly consists of:

1) Adjustment/Mounting bracket
2) Feeder
3) Feed Servomotor with Gear Reducer
4) Release Servomotor with Gear Reducer
5) PLS – Programmable Limit Switch

2.2 ELECTRICAL CONTROL ENCLOSURE ASSEMBLY

Electrical control enclosure consists of:

1) Control switches/buttons/relays
2) Power supply, 24 VDC/5 VDC
3) Feed Servo drive – Master drive
4) Release Servo drive – Slave drive
5) Data entry terminal
6) Cabling
7) Jog Pendant
**ALL ULTRA ADVANTAGE SERVO ROLL FEED CONTROLS ARE CONVENIENTLY LOCATED ON THE FRONT SIDE OF THE ELECTRICAL ENCLOSURE**

<table>
<thead>
<tr>
<th>CONTROL/DEVICE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power On/Reset button</td>
<td>Turns controller on, resets the servo drive.</td>
</tr>
<tr>
<td>In Position indicator light, white</td>
<td>Turns on when move is complete and motor is holding position.</td>
</tr>
<tr>
<td>Cycle Start illuminated button, green</td>
<td>Turns controller into “Auto” mode from “Manual” mode, starts cycling.</td>
</tr>
<tr>
<td>Cycle Stop button, red:</td>
<td>Stops cycling and returns the controller into “Manual” mode.</td>
</tr>
<tr>
<td>“JTL / Manual-Auto” mode selector switch:</td>
<td>Turns controller into “Manual” or “JTL” (Jog To Length) mode.</td>
</tr>
<tr>
<td>Emergency Stop mushroom button, red</td>
<td>Shuts controller off</td>
</tr>
<tr>
<td>Operator terminal</td>
<td>Displays controller’s data and enters data into controller.</td>
</tr>
<tr>
<td>“Programming Locked / Unlocked” key-switch</td>
<td>Locks access to programming.</td>
</tr>
<tr>
<td>Forward / Reverse remote jog pendant</td>
<td>Pendant is attached to the enclosure through retractile cable.</td>
</tr>
</tbody>
</table>

### 2.3 SERVOMOTOR/DRIVE

The introduction of servomotor technology to the press roll feed has pushed the limits of accuracy, adjustability, and performance to levels previously unattainable.

The following example is based on the *Ultra Advantage Servo Roll Feed Standard, US* model. The actual numbers for *Heavy Duty* or *metric* models are different.

Each revolution of the servomotor produces 8000 encoder pulses. Every 10.24 revolutions of the servo motor shaft produce 1 revolution of the feed rollers. The circumference of the lower roll is approximately 11.138 inches.

When a new feed pitch is entered into the system, the built in computer calculates the correct number of electronic “pulses” it must receive from the motor mounted encoder in order to rotate the feed rolls the correct distance.
Example: If a feed pitch/length of 11.138 inches is entered into the feeder, this will result in exactly one revolution of the feed rolls. The motor will accelerate and turn 10.24 turns. This will produce \((10.24 \times 8000 = 81,920)\) pulses of the encoder. The feeder will decelerate and stop, when 81,920 pulses are detected. The feeder is now in position. The result is an accurately positioned strip exactly 11.138 inches from its starting point. This entire process happens in milliseconds.

### 2.4 TOOL STORAGE

The tool storage feature allows for storing of parameters that are different from tool to tool. It takes just a few seconds to activate feeding parameters associated with a certain tool number. Maximum 200 tools can be stored. **Tools** are organized by **Tool number**, which is user definable and can contain up to 7 digits. Each tool consists of the following parameters:

- Length;
- Batch Count;
- Speed;
- Dwell;
- Accel;
- Decel;
- Feed Cam “On”;
- Feed Cam “Off”;
- Reset Cam “On”;
- Reset Cam “Off”;
- Pilot Release Cam “On”;
- Pilot Release Cam “Off”;
- Aux1. Cam “On”;
- Aux1. Cam “Off”;
- Aux2. Cam “On”;
- Aux2. Cam “Off”;
- Aux3. Cam “On”;
- Aux3. Cam “Off”;

**NOTE:** Cam settings are available only with PLS version of software.

Consider the tool storage as a part of the servo drive’s NVRAM memory that is dedicated to storing information of all the existing tools. In order to run a tool, it must be activated. Tool activation is an internal drive procedure of making a copy of the tool, and placing it in a different memory location. This copy, not the tool in the tool storage, is used to perform material feeding. “Tool #NNN is active” means only that the feed running parameters are copied from this tool.

A tool in the tool storage area and its copy, are edited independently, with the difference, that only two of the copy’s parameters are accessible – **Length** and **Batch Count**. These are accessible from the Operator screen. In order to edit the rest of the parameters of the tool, the tool in tool storage must be edited, and then, reactivated.

**NOTE:** Deleting an active tool from the tool storage causes deletion of its copy as well.

**NOTE:** An active tool remains active after power recycling.

### 2.5 PLS

The PLS, Programmable Limit Switch consists of an intelligent encoder and the cable that connects the encoder to the servo drive. The encoder is mounted on the press and its shaft is coupled or belted to the crankshaft with a one to one (1:1) ratio. On every power-up, the encoder turns into the intelligent mode (for approximately 10 msec) to read its actual position and store it in the servo drive.

The encoder then turns into the incremental mode, sending the count signals to the servo drive proportionally to the angle of the move (1024 counts per revolution). The servo drive software, having the start point position of the encoder...
shaft, constantly calculates (updates) its current position. The position of the press crankshaft is determined through the offset parameter, which is the position of the encoder shaft when the press is in its 0 degree position (TDC).

Thus, at every point of the stroke, the servo drive knows where the crankshaft is. The servo drive controls sixcams simultaneously, turning them on and off accordingly to the cam settings.

Since the PLS encoder is connected directly to the servo drive, there is no need to wire connections for the Feed Cam and the Reset Cam outputs. These outputs are software type outputs.

The rest of the cam outputs are hardware type and require wiring of output relays to the desired mechanisms, such as a pilot release solenoid, parts blow-off, tool lubricator, etc. The cam settings (On/Off angles) are set through the operator terminal. They are part of the tool settings.

> **NOTE:** The Pilot Release Cam output is hardware type output that comes pre-wired.

> **NOTE:** All PLS outputs are active as soon as SRF power is turned on.

### 2.6 SERVO PILOT RELEASE

The **Servo Pilot Release** provides a solution for the piloted tools with the press speed over 200 strokes/minute and when mechanical piloting is not available due to the press design.

The **Servo Pilot Release** consists of a **Servo Motor** with **Gear Reducer** coupled directly to the Feed Roll Release Shaft and it is controlled by the **Slave Servo Drive**.

This **Slave Servo Drive** runs a **Roll Release Motion Program**, controls its fault conditions, sends **Ready** and **Release-at-Home** signals to the **Master Drive** and receives the **Release** signal from the **Master Drive**.

When the **Master Drive** sends the **Release** signal, the **Release Drive** turns the motor to the preprogrammed **Release Angle**, waits until **Release** signal goes off, turns the motor back to its **Home Position** and sends the **Release-at-Home** signal back to the **Master Drive**.

If the Master Drive receives a **Feed** signal before the Release-at-Home, a **Release Sync Fault** occurs. **Auto Mode** is then turned off, and a corresponding message is displayed on the operator terminal.

If during programming, a **Pilot Release** signal window is programmed to overlap the **Feed Signal** window, a corresponding error message will be displayed on attempt to start the feed cycle.

The theory of setting the **Pilot Release** signal window for **Servo Pilot Release** isn’t different from traditional set-ups with pneumatic type releases, but some nuances becomes critical and therefore must be taken into thoughtful consideration.

When the **Release** signal is given, it’s often thought of as the instant when the rolls must be open. In reality, there is a lag, it takes some time (25-30msec) to open the rolls so that the material is actually released. The same occurs when the **Release** signal goes off. Press speeds below 200 strokes/minute provide more than enough time for these events. When the press speed is above 300 strokes/minute this timing becomes more and more critical. Consider the following example.

Let’s say our press is cycling at 300 strokes/minute (5 strokes/second or 1.8^0/ms or 200 ms for one revolution). The **Feed** signal window is 180^0 (from 260^0 to 80^0).

The desired release window is 100^0 (from 125^0 to 225^0).

The time needed for **Servo Pilot Release** to fully open or fully close the rolls is 16 ms (or 30^0 in our example). Thus, for the rolls to be fully open at 125^0 they must start opening at 125^0 – 30^0 = 95^0, therefore, the setting for the **Release** “On” signal must be set for 95^0.

The same with the closing stage, for the rolls to be fully closed at 225^0 they must start closing at 225^0 – 30^0 = 195^0, therefore the setting for the **Release** “Off” signal must be set for 195^0.

In general, whatever a calculated opening/closing angle is, the **Release** signal settings must be shifted/advanced for this angle to achieve a desired **Release** window. Some trial and error to time the release properly to the specific tool is normal.
3 PROGRAMMING THE ULTRA ADVANTAGE SERVO ROLL FEED SYSTEM - OVERVIEW

NOTE: Before attempting any programming, make sure that the “PROGRAMMING LOCKED / UNLOCKED” key switch is in the “Unlocked” position.

NOTE: After power shutdown, WAIT for 10 seconds before powering up the Feed.

Turn on the main power disconnect switch. This applies power to the control power supply. Press the green Power On push-button. The button will illuminate and the OPERATOR terminal display will be visible.

Wait for the IN POSITION light to illuminate.

Press any key to begin.

NOTE: The OPERATOR terminal has three mode keys, they are:
- “OPER”
- “TOOLS”
- “SETUP”

NOTE: The flashing cursor is waiting for the value to be entered.

NOTE: < The pointer prompts to press the “ENTER” key.

NOTE: To confirm any value, press “ENTER”.
3.1 “OPER” KEY

“OPER” key controls appearance of two screens: STATUS screen and OPERATOR screen.

STATUS screen shows:

- Active tool number. In case there is no active tool “No Tool!” message is displayed instead
- Current press position in degrees.
- Current mode of the feed
- Batch count, current and commanded

NOTE: When the feed is turned into Auto mode it displays current press speed (in strokes per minute) instead of current press position.

OPERATOR screen shows and allows editing the following:

Every time the “OPER” key is pressed it toggles between the STATUS screen and the OPERATOR screen.

3.2 “TOOLS” KEY

“TOOLS” key controls appearance of TOOL STORAGE screens. Press the “TOOLS” key to open the first screen. This allows the Operator to chose a Tool Storage operation: “Edit Tool”, “Activate Tool”, or “Create New Tool”.

Position the pointer on desired line, using “↑” and “↓” keys, and press the “ENTER” key.

Enter in the tool number or select it from the tool list using “↑” and “↓” keys and press the “ENTER” key again.
NOTE: Tool number can contain up to seven digits.

If “Activate Tool” operation is chosen, then the desired tool will be activated and message will be displayed for a few seconds:

Tool Activated

Display will show STATUS screen.

Tool#1 Spd:384
Auto Mode
30 / Cont.Run
Press a Mode Key

If “Activate Tool” or “Edit Tool” operation is chosen and the entered tool number doesn’t exist, the following message will be displayed:

Tool doesn’t exist!

The display will show the previous screen.
If “Edit Tool” or “Create New Tool” operation is chosen, then the next three (nine - with PLS option) screens will allow editing of the tool parameters. Position the cursor on desired line, using “↑” and “↓” keys, enter in the desired value, and press the “ENTER” key. Press “TOOLS” to open the next screen or “BKSP” – the previous.

**Length** is a distance in inches (or millimeters) of the “Feed Length”. It is a numeric entry with a range of 0 to the **Maximum Length**.

**Count** is the number of feed indexes that should be performed. It is a numeric entry with a range of 0 to 9999999. Entering “0” will result in a continuous run.

**Speed** is the maximum velocity of the material in in/sec (or mm/sec). It is a numeric entry with a range of 0 to 72 in/sec (1828 mm/sec) for **Standard** model and 0 to 41 in/sec (1041 mm/sec) for **Heavy Duty** models.

**Dwell** controls the “On” duration of the “Permit Press” output while the control is in **Single Stroke** mode. The next feed length will not be started until Dwell time is expired. It is a numeric entry with a range of 0 to 100000 msec.

**Accel** is the rate of acceleration in in/sec² (or mm/sec²). It is a numeric entry with a range of 0-to 1000 in/sec² (25400 mm/sec²). Normally set to 400 in/sec² (10160 mm/sec²).

**Decel** is the rate of deceleration in in/sec² (or mm/sec²). It is a numeric entry with a range of 0-to 1000 in/sec² (25400 mm/sec²). Normally set to 400-in/sec² (10160 mm/sec²). Enter “0” to duplicate **Accel** rate.

---

**NOTE:** Each of the following six PLS screens (Feed Cam, Reset Cam, Pilot Release, Auxiliary 1,2,3) has a press current position shown at the top right corner.
FeedCam On indicates the position of the press when the feed cam switch turns on and the feed starts feeding the material.

FeedCam Off indicates the position of the press where the feeding must be completed. Otherwise, the servo drive will generate Synch Fault Signal, display the corresponding message in the screen, and stop feeding.

| Tool#1 | Pos:354 |
| ResetCam On | 180 |
| ResetCam Off | 200 |

ResetCam On indicates the position of the press when the reset cam switch turns on.

ResetCam Off indicates the position of the press when the reset cam switch turns off.

| Tool#1 | Pos:354 |
| PilotRel On | 125 |
| PilotRel Off | 240 |

Pilot Release On indicates the position of the press when the pilot release cam switch turns on to open the rolls.

Pilot Release Off indicates the position of the press when the pilot release cam switch turns off to close the rolls.

| Tool#1 | Pos:354 |
| Aux1 On | 0 |
| Aux1 Off | 120 |

| Tool#1 | Pos:354 |
| Aux2 On | 120 |
| Aux2 Off | 240 |

| Tool#1 | Pos:354 |
| Aux3 On | 240 |
| Aux3 Off | 0 |

Auxiliary 1 (2, 3) On indicates the position of the press when the auxiliary cam switch turns on.

Auxiliary 1 (2, 3) Off indicates the position of the press when the auxiliary cam switch turns off.

Tool information can be saved on the next screen.

NOTE: Up to 200 tools can be saved.
Use **SAVE** to save the tool being edited. Press the “ENTER” key.

![Tool#1 Saved](image)

Use **SAVE AS** to create a new tool using the one being edited. Press the “ENTER” key, enter desired tool number, and press the “ENTER” key again.

![Save As Tool#](image)

Press TOOLS to Abort

![Save As #1234567](image)

![Tool#1234567 Saved](image)

The display will show the **STATUS** screen.

![Tool#1 Spd:384 Auto Mode 30 / Cont.Run Press a Mode Key](image)

If saving is skipped, then the next screen allows deleting the tool being edited. Press “TOOLS” to open it. Press the “ENTER” key, the warning message will be displayed, press “1” key to confirm deleting or any key to abort.

![Delete Tool TOOLS-next BKSP-Prev](image)

![Delete Tool#1 Press 1 to confirm Another key to abort](image)

The corresponding message on the next screen confirms the chosen command execution.
Or

Display will show STATUS screen.

NOTE: To exit tool editing at any time, press the “OPER” key. Changes will not be saved.

3.3 “SETUP” KEY

“SETUP” key controls the appearance of setup screens. Seven screens contain parameters of the feed that are not changed often or never are changed. Press “SETUP” key three times to open the first screen. Position the cursor on the desired line, using “↑” and “↓” keys, enter in desired value and press the “ENTER” key. Press “SETUP” key to open the next screen or “BKSP” – the previous.

Jog Speed %  5
JogAccel    10.0
JogDecel    10.0
Press SETUP for next

Jog speed is the maximum jogging speed. It is a numeric entry with a range of 0 to 99 percent of the Speed parameter. Normally set between 1-5%.

JogAccel is the rate of jogging acceleration. It is a numeric entry with a range of 0-to 300-in/sec². Normally set 10 in/sec².

JogDecel is the rate of jogging deceleration. It is a numeric entry with a range of 0-to 300-in/sec². Normally set 10-in/sec².

InPosition  0.0200
Priority (1/0) FBP
AdjustmentStep 0.001
SETUP-Next BKSP-Prev
**InPosition** is a tolerance window around the final position. This is used to verify the feed index accuracy is within acceptable limits before continuing onto the next function. It is a numeric entry with a range of 0 to 100 inch. Normally set 0.02 inch.

**Priority** is a parameter that selects whether the feeder indexes before the press starts “FBP” or the press starts before the feeder indexes “PBF”. Entering a “0” selects “PBF” mode and a “1” selects “FBP” mode.

**AdjustmentStep** is an increment of the **Length adjustment**. It is a numeric entry with a range of 0 to 1 inch. Normally set 0.001 inch.

**Scale** is the encoder scaling parameter used to define the number of encoder counts/inch (or mm). It is a numeric entry. **Standard** model value is 7355 cnts/inch (289.56 cnts/mm). **Heavy Duty** model value is 12871 cnts/inch (506.73 cnts/mm).

**Direction** controls the direction of positive motor rotation. Entering “0” selects CW and a “1” selects CCW.

**Debounce** is the amount of time each input should stay HI or LOW, in order to be recognized. It is a numeric entry, with a range of 0 to 999 **msec**. It is normally set to 1.

**Kp** is proportional gain of the position loop of the Master Drive. This is a tuning parameter, in order to change its value consult P/A Industries Service Department.

**Pgain** is proportional gain of the velocity loop of the Master Drive. This is a tuning parameter, in order to change its value consult P/A Industries Service Department.

**Igain** is integral gain of the velocity loop of the Master Drive. This is a tuning parameter, in order to change its value consult P/A Industries Service Department.

**FF** is an acceleration feedforward gain of the velocity loop of the Master Drive. This is a tuning parameter, in order to change its value consult P/A Service Department.

**Kff** is a feedforward gain of the position loop of the Master Drive. This is a tuning parameter, in order to change its value consult P/A Service Department.

**Current Limit** is a maximum positive and negative current the Master drive may output to the Feed motor. This is a tuning parameter, in order to change its value consult P/A Service Department.
**Back Length** is used for Cut-to-Length application to protect the material against bending up by the blade. If any value is assigned for this parameter, the feed will move material back for the distance that equals **Back Length** when **Reset Cam** input is turned “On” by the blade bottom position sensor. The **Back Length** is compensated on the next move, so it has no affect on the **Length** parameter. It is a numeric entry, with a range of 0 to 1 inch.

**Kerf** is a cutting tool width and used for Cut-to-Length application to compensate for a loss of the **Length** caused by width of the tool. It is a numeric entry, with a range of 0 to 10 inches.

**Max length** is a **Length** limit and protects against accidental entering extra digits, for example: 100 inch instead of 10 inch. It is a numeric entry, with a range of 0 to 999999. (This value is factory set to 20.000.)

**PLS Counts/Rev** is an amount of pulses the PLS encoder produces per revolution. This is a tuning parameter. In order to change its value, consult P/A Industries Service Department.

**Press Offset** is a difference between PLS and Press absolute positions in degrees. It is a numeric value, with a range of 0 to 360. See **4.10 HOW TO SYNCHRONIZE PRESS AND PLS** on page 25.

**Release Kp** is proportional gain of the position loop of the Release Drive. This is a tuning parameter, in order to change its value consult P/A Industries Service Department.

**Release Pgain** is proportional gain of the velocity loop of the Release Drive. This is a tuning parameter, in order to change its value consult P/A Industries Service Department.

**Release Igain** is integral gain of the velocity loop of the Release Drive. This is a tuning parameter, in order to change its value consult P/A Industries Service Department.

**Release FF** is an acceleration feedforward gain of the velocity loop of the Release Drive. This is a tuning parameter, in order to change its value consult P/A Service Department.

**Release Kff** is a feedforward gain of the position loop of the Release Drive. This is a tuning parameter, in order to change its value consult P/A Service Department.

**Release Current** is a maximum positive and negative current the Slave (Release) drive may output to the Release motor. This is a tuning parameter, in order to change its value consult P/A Service Department.
Release Angle is an angle of the feed release shaft rotation. It is proportional to the roll lifting distance. The rolls are open with no material at about 10°, but some trial and error effort is normal to find the minimum lifting distance (minimum opening angle) for the certain application. It is a numeric entry with a range of 0 to 45 degrees.

Release Speed is a speed of the feed release shaft rotation. It is a numeric entry with a range of 0 to 9999 degree/sec. Normally set 9999 degree/sec.

Release Accel is an acceleration/deceleration rate of the feed release shaft rotation. It is a numeric entry with a range of 0 to 400000 degree/sec². Normally set 400000 degree/sec².

<table>
<thead>
<tr>
<th>Rel Scale</th>
<th>11650.8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rel HomeOffset</td>
<td>3.0</td>
</tr>
<tr>
<td>Rel InPosition</td>
<td>0.50</td>
</tr>
</tbody>
</table>

Rel Scale is the release encoder scaling parameter used to define the number of encoder counts/degree. It is a numeric entry with a value of 11650.8 counts/degree.

Rel HomeOffset is a difference in degrees between release encoder zero position and the feed release shaft position when the rolls are fully closed. It is a numeric value, with a range of 0 to 45.

Rel InPosition is a tolerance window in degrees around the position of the fully open rolls. This is used to verify the release accuracy is within acceptable limits before continuing onto the next function. It is a numeric entry with a range of 0 to 5 degrees. Normally set 0.5 inch.

NOTE: To exit setup editing at any time, press the “OPER” key. Changes will be saved.

4 HOW TO …

4.1 HOW TO CREATE A NEW TOOL

NOTE: Make sure that the PROGRAMMING “LOCKED / UNLOCKED” key switch is in “Unlocked” position and OPERATOR screen is displayed. If the current screen is not OPERATOR one then press the “OPER” key to bring it up.

Press the “TOOLS” key.

Position the pointer next to Create new tool command and press the “ENTER” key.

Enter new tool number and press the “ENTER” key again.
Position cursor next to desired parameter, enter appropriate value, and press the “ENTER” key.

**Tool Created**

Press “TOOLS” key to open next screen. Position cursor next to desired parameter, enter appropriate value, and press the “ENTER” key.

**Tool#1**
- **Length**: 1.000
- **Count**: Cont. Run

Press “TOOLS” key to open next screen. Position cursor next to desired parameter, enter appropriate value, and press the “ENTER” key.

**Tool#1**
- **Speed**: 72
- **Dwell**: 0

Press “TOOLS” key to open next screen. Position cursor next to desired parameter, enter the appropriate value, and press the “ENTER” key. Enter “0” for Decel to use Accel value or an actual desired value.

**Tool#1**
- **Accel**: 400.0
- **Decel**: 400.0

Press “TOOLS” to open the next screen. Position cursor next to desired parameter, enter new value, and then press “ENTER” key.

**Tool#1**
- **Pos**: 354
- **FeedCam On**: 260
- **FeedCam Off**: 90

Press “TOOLS” to open the next screen. Position cursor next to desired parameter, enter new value, and press “ENTER” key.

**Tool#1**
- **Pos**: 354
- **ResetCam On**: 180
- **ResetCam Off**: 200

Press “TOOLS” to open the next screen. Position cursor next to desired parameter, enter new value, and press “ENTER” key.

**Tool#1**
- **Pos**: 354
- **PilotRel On**: 125
- **PilotRel Off**: 225
Press "TOOLS" to open the next screen. Position cursor next to desired parameter; enter new value, and press "ENTER" key.

![Tool#1 parameters](image1)

Press "TOOLS" to open the next screen. Position cursor next to desired parameter, enter new value, and press "ENTER" key.

![Tool#1 parameters](image2)

Press "TOOLS" to open the next screen. Position cursor next to desired parameter, enter new value, and press "ENTER" key.

![Tool#1 parameters](image3)

Press "TOOLS" key to open next screen. To save changes, choose the SAVE command and press the "ENTER" key.

![Save Tool](image4)

### 4.2 HOW TO EDIT AN EXISTING TOOL

**NOTE:** Make sure that the PROGRAMMING “LOCKED / UNLOCKED” key switch is in “Unlocked” position and OPERATOR screen is displayed. If the current screen is not OPERATOR one then press the “OPER” key to bring it up.

Press “TOOLS” key, position the pointer next to EDIT TOOL command and press the “ENTER” key.
Enter desired tool number or select it from the tool list using “↑” and “↓” keys and press the “ENTER” key again.

<table>
<thead>
<tr>
<th>Edit Tool#</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arrow keys to scroll</td>
</tr>
<tr>
<td>Press TOOLS to exit</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Edit Tool#1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arrow keys to scroll</td>
</tr>
<tr>
<td>Press TOOLS to exit</td>
</tr>
</tbody>
</table>

Position cursor next to desired parameter, enter the new value, and press the “ENTER” key.

<table>
<thead>
<tr>
<th>Tool#1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length</td>
</tr>
<tr>
<td>Count</td>
</tr>
<tr>
<td>Press TOOLS for next</td>
</tr>
</tbody>
</table>

Press “TOOLS” key to open next screen. Position cursor next to desired parameter, enter new value, and press the “ENTER” key.

<table>
<thead>
<tr>
<th>Tool#1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speed</td>
</tr>
<tr>
<td>Dwell</td>
</tr>
<tr>
<td>TOOLS-next BKSP-Prev</td>
</tr>
</tbody>
</table>

Press “TOOLS” key to open next screen. Position cursor next to desired parameter, enter new value, and press the “ENTER” key.

<table>
<thead>
<tr>
<th>Tool#1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accel</td>
</tr>
<tr>
<td>Decel</td>
</tr>
<tr>
<td>TOOLS-next BKSP-Prev</td>
</tr>
</tbody>
</table>

Press “TOOLS” to open the next screen. Position cursor next to desired parameter, enter new value, and then press “ENTER” key.

<table>
<thead>
<tr>
<th>Tool#1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pos: 354</td>
</tr>
<tr>
<td>FeedCam On</td>
</tr>
<tr>
<td>FeedCam Off</td>
</tr>
<tr>
<td>TOOLS-next BKSP-Prev</td>
</tr>
</tbody>
</table>

Press “TOOLS” to open the next screen. Position cursor next to desired parameter, enter new value, and press “ENTER” key.

<table>
<thead>
<tr>
<th>Tool#1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pos: 354</td>
</tr>
<tr>
<td>ResetCam On</td>
</tr>
<tr>
<td>ResetCam Off</td>
</tr>
<tr>
<td>TOOLS-next BKSP-Prev</td>
</tr>
</tbody>
</table>
Press “TOOLS” to open the next screen. Position cursor next to desired parameter, enter new value, and press “ENTER” key.

```
Tool#1 | Pos: 354
PilotRel On | 125
PilotRel Off | 240
TOOLS-next BKSP-Prev
```

Press “TOOLS” to open the next screen. Position cursor next to desired parameter; enter new value, and press “ENTER” key.

```
Tool#1 | Pos: 354
Aux1 On | 0
Aux1 Off | 120
TOOLS-next BKSP-Prev
```

Press “TOOLS” to open the next screen. Position cursor next to desired parameter, enter new value, and press “ENTER” key.

```
Tool#1 | Pos: 354
Aux2 On | 120
Aux2 Off | 240
TOOLS-next BKSP-Prev
```

Press “TOOLS” to open the next screen. Position cursor next to desired parameter, enter new value, and press “ENTER” key.

```
Tool#1 | Pos: 354
Aux3 On | 240
Aux3 Off | 0
TOOLS-next BKSP-Prev
```

Press “TOOLS” key to open next screen. To save changes choose SAVE command and press the “ENTER” key.

```
Tool# | Save <
Save as
TOOLS-next BKSP-Prev
```

```
Tool#1 | Saved
```

### 4.3 HOW TO CREATE A NEW TOOL USING AN EXISTING ONE

**NOTE:** Make sure that the PROGRAMMING “LOCKED / UNLOCKED” key switch is in “Unlocked” position and OPERATOR screen is displayed. If the current screen is not OPERATOR one then press the “OPER” key to bring it up.
Press “TOOLS” key, position the pointer next to EDIT TOOL command and press the “ENTER” key.

Enter desired tool number or select it from the tool list using “↑” and “↓” keys and press the “ENTER” key again.

Position cursor next to desired parameter, enter new value, and press the “ENTER” key.

Press “TOOLS” key to open next screen. Position cursor next to desired parameter, enter new value, and press the “ENTER” key.

Press “TOOLS” key to open the next screen. Position cursor next to desired parameter, enter new value, and then press “ENTER” key.

Press “TOOLS” to open the next screen. Position cursor next to desired parameter, enter new value, and press “ENTER” key.
Press “TOOLS” to open the next screen. Position cursor next to desired parameter, enter new value, and press “ENTER” key.

Press “TOOLS” to open the next screen. Position cursor next to desired parameter; enter new value, and press “ENTER” key.

Press “TOOLS” to open the next screen. Position cursor next to desired parameter, enter new value, and press “ENTER” key.

Press “TOOLS” to open the next screen. Position cursor next to desired parameter, enter new value, and press “ENTER” key.

Press “TOOLS” key to open next screen. To save changes as a new tool, choose the SAVE AS command and press the “ENTER” key.

Enter the new tool number and press the “ENTER” key again.

Press TOOLS to Abort
4.3 HOW TO DELETE A TOOL

NOTE: Make sure that the PROGRAMMING “LOCKED / UNLOCKED” key switch is in “Unlocked” position and OPERATOR screen is displayed. If the current screen is not OPERATOR one then press the “OPER” key to bring it up.

Press “TOOLS” key, position the pointer next to EDIT TOOL command and press the “ENTER” key.

Enter desired tool number or select it from the tool list using “↑” and “↓” keys and press the “ENTER” key again.

Press the “TOOLS” key four (ten – with PLS option) times scrolling through the editing screens.
Press “ENTER” key.

Delete Tool

Press 1 to confirm
Another key to abort

Press “1” key.
4.4 HOW TO ACTIVATE A TOOL

NOTE: Make sure that the PROGRAMMING “LOCKED / UNLOCKED” key switch is in “Unlocked” position and OPERATOR screen is displayed. If the current screen is not OPERATOR one then press the “OPER” key to bring it up.

Press “TOOLS” key, position the pointer next to Activate tool command and press the “ENTER” key.

Enter desired tool number or select it from the tool list using “↑” and “↓” keys and press the “ENTER” key again.

4.5 HOW TO EDIT “SETUP” PARAMETERS

NOTE: Make sure that the PROGRAMMING “LOCKED / UNLOCKED” key switch is in “Unlocked” position and OPERATOR screen is displayed. If the current screen is not OPERATOR one then press the “OPER” key to bring it up.

Press “SETUP” key three times, position cursor next to desired parameter, enter in new value, and press the “ENTER” key.

Press “OPER” key if editing is done or press “SETUP” key to open next screen.
4.7 HOW TO EDIT LENGTH FROM OPERATOR SCREEN
Locate the OPERATOR screen, position cursor next to the Length, enter new value, and press the “ENTER” key.

<table>
<thead>
<tr>
<th>Length</th>
<th>1.000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Count</td>
<td>Cont. Run</td>
</tr>
<tr>
<td>Length Adjustment</td>
<td>&lt;</td>
</tr>
<tr>
<td>Press OPER to exit</td>
<td></td>
</tr>
</tbody>
</table>

4.8 HOW TO EDIT COUNT FROM OPERATOR SCREEN
Locate the OPERATOR screen, position cursor next to the Count, enter new value, and press the “ENTER” key. Enter “0” for continuous run.

<table>
<thead>
<tr>
<th>Length</th>
<th>1.000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Count</td>
<td>Cont. Run</td>
</tr>
<tr>
<td>Length Adjustment</td>
<td>&lt;</td>
</tr>
<tr>
<td>Press OPER to exit</td>
<td></td>
</tr>
</tbody>
</table>

4.9 HOW TO MICRO ADJUST LENGTH USING LENGTH ADJUSTMENT
Locate the OPERATOR screen, position pointer next to the Length Adjustment and press the “ENTER” key.

<table>
<thead>
<tr>
<th>Length</th>
<th>1.000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Count</td>
<td>Cont. Run</td>
</tr>
<tr>
<td>Length Adjustment</td>
<td>&lt;</td>
</tr>
<tr>
<td>Press OPER to exit</td>
<td></td>
</tr>
</tbody>
</table>

Adjust Length using “↑” and “↓” keys and then press “OPER” to exit adjusting.

4.10 HOW TO SYNCHRONIZE PRESS AND PLS
Open SetUp screens, find Press offset parameter, and verify its value is set to “0” and if it is not, set it so. Recycle the power.

<table>
<thead>
<tr>
<th>PLS Counts/Rev</th>
<th>1024</th>
</tr>
</thead>
<tbody>
<tr>
<td>Press Offset</td>
<td>0</td>
</tr>
<tr>
<td>SETUP-Exit</td>
<td>BKSP-Prev</td>
</tr>
</tbody>
</table>

Jog the press to its “0” degree (TDC) position, open status screen and read PLS position.

<table>
<thead>
<tr>
<th>Tool#</th>
<th>Pos:324</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual Mode</td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>/Cont. Run</td>
</tr>
<tr>
<td>Press a Mode Key</td>
<td></td>
</tr>
</tbody>
</table>
Go back to Press offset parameter and change it to match PLS reading.

<table>
<thead>
<tr>
<th>PLS Counts/Rev</th>
<th>1024</th>
</tr>
</thead>
<tbody>
<tr>
<td>Press Offset</td>
<td>324</td>
</tr>
<tr>
<td>SETUP-Exit</td>
<td>BKSP-Prev</td>
</tr>
</tbody>
</table>

Recycle the power. Read PLS position from the status screen, it should be the same as the press’, “0” degrees.

At this point the press and PLS are synchronized and you can start setting cam On/Off parameters.

4.11 HOW TO SET CAM “ON” AND “OFF” PARAMETER

Open the screen that displays desired cam settings, jog the press to position where cam should turn on, read the exact value of the press current position and enter this value for Cam On parameter.

<table>
<thead>
<tr>
<th>Tool#</th>
<th>Pos: 0</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Manual Mode</td>
</tr>
<tr>
<td>30</td>
<td>/Cont.Run</td>
</tr>
<tr>
<td></td>
<td>Press a Mode Key</td>
</tr>
</tbody>
</table>

Follow the same procedure to set Cam Off parameter.

5 OPERATING THE ULTRA ADVANTAGE SERVO FEED

5.1 PROGRAMMING

There is no need to program anything if the “Tool Storage” is properly set up. It is only a matter of activating the needed tool, although the OPERATOR screen allows the Operator to edit two basic parameters.

OPERATOR screen is the only one that is Operator editable. This screen displays Length, Count, and Length Adjustment. Length and Count can be changed only when cycling is stopped, although Length can be adjusted by using the LENGTH ADJUSTMENT command even while the feed is running.

When Length and Count are edited or adjusted from OPERATOR screen, they override the stored tool Length and Count and will be active until current tool is reactivated or another tool is activated.

Activate tool is the only command that is Operator accessible and can be executed only when the feed is not cycling.

5.2 PRIORITY MODE

The Ultra Advantage Servo Roll Feed has two modes of automatic cycle starting. The choice can be made between “Press – Before – Feed” (“PBF”) and “Feed – Before – Press” (“FBP”) operating mode.

When “PBF” mode is selected and the Cycle Start button is pressed on the control panel, the feeder causes the “Auto” and “Permit Press” relays to turn on thus enabling the start of continuous cycling on the press.

When “FBP” is selected and Cycle Start button is pressed on the feed control, the material/strip will be fed forward before the press is started. The Operator may verify that the strip is in position before starting the press.
The Ultra Advantage Servo Roll Feed will now follow the press until it is stopped by the Operator, counter, emergency stop, or feed error.

5.3 “JTL” (JOG TO LENGTH) MODE
“JTL” mode is used primarily during the threading of the strip through the die. This mode allows the Jog – To – “Feed Length” operations to be performed. While in the “JTL” mode, the strip may be moved using the remote Jog Pendant.

If the “Jog Forward” is stopped before the “Feed Length” is reached, then either the “Jog Forward” or the “Jog Reverse” Operator buttons will work. The “Jog Reverse” will not allow the strip to go backwards beyond the initial “Feed Length” starting point.

The “Jog Forward” Operator button will function until the end of the “Feed Length” is reached. During “JTL” mode, the bottom line on the display will show “Waiting for Jog”. When the “Feed Length” is reached, the jog buttons become inactive and the message on display will show “Waiting for Press”. The jog buttons will not become active again until after the press has made a cycle.

5.4 “AUTO / MANUAL” MODE
“Auto” Mode is used for production running of the Ultra Advantage Servo Roll Feed. When “Manual” mode is selected via the 2-position selector switch, the control can be put in “Auto” mode by pressing Cycle Start button.

During “Manual” mode, the feeder can be jogged infinitely in either direction. After the Cycle Start button is pressed, the jog buttons are inactive, and the feeding of the strip follows the cam signals from the press.

During “Auto” mode, the control keeps check on synchronization of the feeder and the press. If the feeder does not complete the index within the feed cam window, the message “SYNC FAULT” displays.

The Ultra Advantage Servo Roll Feed has 2 modes of automatic cycling. The feeder can operate with Single Stroke or Continuous modes. The mode is selected through an input to the feed controller. The Press single stroke/continuous mode switch should be interfaced to that input for proper operation. During single stroke mode operation, the “Permit Press” relay is activated upon the completion of each feed index.

The “Permit Press” relay remains activated until the reset cam signal turns on, or for the duration of the Dwell, if the Dwell parameter is programmed. The “Permit Press” relay may be used to signal the press when to initiate the single stroke cycle. The automatic cycling of the press and feeder will continue until the batch is completed, or the cycle is stopped by the Operator, or an error occurs.

During “Continuous Press” mode, the “Permit Press” relay turns on at the beginning of the indexing.

The “Permit Press” relay remains activated until the automatic cycling is stopped by either “Cycle Stop” button, “Batch Complete” internal command, “Sync Fault” or any other drive related error. Under “Cycle Stop” or “Batch Complete” stopping, the output will turn off at the beginning of the Feed Cam Signal. This should allow the press to stop near the top of the stroke. Under “Sync Fault” or other drive fault conditions, the “Permit Press” relay will turn off immediately upon detection of the error.

NOTE: The following speed performance charts represent theoretical calculations based on parameter values most commonly used. Higher performance for specific applications can be reached by custom tuning the control.
<table>
<thead>
<tr>
<th>Velocity (in/sec)</th>
<th>72.00</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feed Window (degrees)</td>
<td>90</td>
</tr>
<tr>
<td>Feed (in)</td>
<td>Feed Time (sec)</td>
</tr>
<tr>
<td>0.25</td>
<td>0.070</td>
</tr>
<tr>
<td>0.50</td>
<td>0.091</td>
</tr>
<tr>
<td>0.75</td>
<td>0.107</td>
</tr>
<tr>
<td>1.00</td>
<td>0.120</td>
</tr>
<tr>
<td>2.00</td>
<td>0.161</td>
</tr>
<tr>
<td>3.00</td>
<td>0.193</td>
</tr>
<tr>
<td>4.00</td>
<td>0.220</td>
</tr>
<tr>
<td>5.00</td>
<td>0.244</td>
</tr>
<tr>
<td>6.00</td>
<td>0.265</td>
</tr>
<tr>
<td>7.00</td>
<td>0.285</td>
</tr>
<tr>
<td>8.00</td>
<td>0.303</td>
</tr>
<tr>
<td>9.00</td>
<td>0.320</td>
</tr>
<tr>
<td>10.00</td>
<td>0.336</td>
</tr>
<tr>
<td>12.00</td>
<td>0.366</td>
</tr>
<tr>
<td>14.00</td>
<td>0.394</td>
</tr>
<tr>
<td>16.00</td>
<td>0.422</td>
</tr>
<tr>
<td>18.00</td>
<td>0.450</td>
</tr>
<tr>
<td>20.00</td>
<td>0.478</td>
</tr>
<tr>
<td>22.00</td>
<td>0.506</td>
</tr>
<tr>
<td>24.00</td>
<td>0.533</td>
</tr>
<tr>
<td>26.00</td>
<td>0.561</td>
</tr>
<tr>
<td>28.00</td>
<td>0.589</td>
</tr>
<tr>
<td>30.00</td>
<td>0.617</td>
</tr>
<tr>
<td>35.00</td>
<td>0.686</td>
</tr>
<tr>
<td>40.00</td>
<td>0.756</td>
</tr>
<tr>
<td>45.00</td>
<td>0.825</td>
</tr>
<tr>
<td>50.00</td>
<td>0.894</td>
</tr>
<tr>
<td>55.00</td>
<td>0.964</td>
</tr>
<tr>
<td>60.00</td>
<td>1.033</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Velocity (in/sec)</th>
<th>41.00</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feed Window (degrees)</td>
<td>90</td>
</tr>
<tr>
<td>Feed (in)</td>
<td>Feed Time (sec)</td>
</tr>
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<td>0.25</td>
<td>0.070</td>
</tr>
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<td>0.50</td>
<td>0.091</td>
</tr>
<tr>
<td>0.75</td>
<td>0.107</td>
</tr>
<tr>
<td>1.00</td>
<td>0.120</td>
</tr>
<tr>
<td>2.00</td>
<td>0.161</td>
</tr>
<tr>
<td>3.00</td>
<td>0.193</td>
</tr>
<tr>
<td>4.00</td>
<td>0.220</td>
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<td>5.00</td>
<td>0.244</td>
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</tr>
<tr>
<td>7.00</td>
<td>0.285</td>
</tr>
<tr>
<td>8.00</td>
<td>0.303</td>
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<tr>
<td>9.00</td>
<td>0.320</td>
</tr>
<tr>
<td>10.00</td>
<td>0.336</td>
</tr>
<tr>
<td>12.00</td>
<td>0.366</td>
</tr>
<tr>
<td>14.00</td>
<td>0.394</td>
</tr>
<tr>
<td>16.00</td>
<td>0.422</td>
</tr>
<tr>
<td>18.00</td>
<td>0.450</td>
</tr>
<tr>
<td>20.00</td>
<td>0.478</td>
</tr>
<tr>
<td>22.00</td>
<td>0.506</td>
</tr>
<tr>
<td>24.00</td>
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</tr>
<tr>
<td>26.00</td>
<td>0.561</td>
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<tr>
<td>28.00</td>
<td>0.589</td>
</tr>
<tr>
<td>30.00</td>
<td>0.617</td>
</tr>
<tr>
<td>35.00</td>
<td>0.686</td>
</tr>
<tr>
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<td>0.756</td>
</tr>
<tr>
<td>45.00</td>
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</tr>
<tr>
<td>50.00</td>
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<tr>
<td>55.00</td>
<td>0.964</td>
</tr>
<tr>
<td>60.00</td>
<td>1.033</td>
</tr>
</tbody>
</table>
## 5.5 TROUBLESHOOTING GUIDE

The chart that follows contains the most frequently encountered issues.

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Cause or Remedy</th>
</tr>
</thead>
</table>
| No power indication when **Power On** button is pressed | 1. Check the main power supply for proper voltage.  
2. Check the supply circuit breakers.  
3. Verify that the main disconnect switch is on.  
4. Verify that the E-Stop is not engaged (E-Stop Loop closed.)  
5. Check the bulb in **Power On** push button. |
| No display on power up | 1. Check the cabling connection between display and the servo drive.  
2. Check 5 VDC power supply. |
| Feed will not jog | 1. Check if the Feed is in “JTL” mode. Waiting for press?  
2. Check if **IN POSITION** indicator is off. Check parameters. Check drive for Error Codes.  
3. Check the **FAULT** in display i.e. DRIVE FAULT # ABC. Check for Error descriptions. See Section 5.2 of the “Ultra 5000 Intelligent Positioning Drives” Installation manual. |
| **Power On** indicator is lit. Feed will not operate. | 1. Check that the **IN POSITION** indicator is lit. If not, check parameters.  
2. Check that the Error message is in the Display. If so, check error description in Section 7.2  
3. Move selector switch to “**Manual**”, press the **Power On** button, release the **Power On** button, and then try to jog feeder. |
| Feed will not accept new “**Feed Length**” or other parameters | 1. Make sure that the feed is not in “**Auto**” Mode.  
2. Reset the Feed. |
| Inaccurate feeding | 1. Adjust the rolls for the correct material thickness; the tip of the roll release lever must have a small amount of play/wobble – approx. 1/16”.  
2. Adjust the spring pressure (Do not bottom springs. Catastrophic damage can occur.)  
3. Confirm if the rolls are slipping on the strip. Remove oil from the feed rolls, reduce acceleration, check the tool for binding/slugs, etc.  
4. Adjust the upstream equipment if the upstream equipment not providing adequate/consistent free loop.  
5. Check the roll release for the proper settings |
| Feed runs backwards | 1. Verify that the direction parameter has been set properly (CW or CCW).  
2. Reset the Feed. |
| Drive Fault | This is a generic display prompt indicating a fault on the Servo Drive.  
1. Look at the diagnostic display on the Servo Drive. The cause of the fault can be determined by reading the Error Code.  
2. Refer to Sections 7.2. This fault condition can be caused by any one of the errors in the lists.  
3. Check the Error Code first, then reset the Servo Drive by turning the power off, waiting 10 seconds, and then powering the Servo Drive back on.  
4. Verify that the fault will not reset. Call the factory for assistance. |

If the problem you are having does not appear in the above chart, or does appear in the chart, and you have questions about it, call the P/A Service Department for assistance. Please have your Model Number and Serial Number ready. However, it is advisable to check the basics before calling to be sure the problem is not something simple that may have been overlooked.
## 5.6 ERROR CODES

<table>
<thead>
<tr>
<th>Error Code</th>
<th>Problem or Symptom</th>
<th>Possible Cause(s)</th>
<th>Action/Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>04</td>
<td>Motor Over Temperature</td>
<td>Motor thermostat trips due to: High motor ambient temperature, and/or Excessive RMS torque. Bad encoder cable or connection.</td>
<td>Operate within (not above) the continuous torque rating for the ambient temperature (40°C maximum). Lower the ambient temperature to increase motor cooling. Check the encoder cable connections. Check the encoder cable for continuity.</td>
</tr>
<tr>
<td>05</td>
<td>IPM Fault</td>
<td>Motor cables shorted. Motor winding shorted internally. Ultra5000 Servo drive temperature too high.</td>
<td>Verify continuity of motor power cable and connector. Check for short on U,V,W and Gnd windings of the motor. Check for clogged vents or defective fan. Ensure cooling is not restricted by insufficient space around the unit. Verify ambient temperature is not too high (above 60°C). Operate within the continuous power rating. Replace Ultra5000.</td>
</tr>
<tr>
<td>09</td>
<td>Bus Under Voltage</td>
<td>Low AC line/AC power input. 100 VAC minimum for safe Ultra5000 operation.</td>
<td>Verify voltage level of the incoming AC power. Check AC power source for glitches or line drop (below 90V AC). Install an uninterruptible power supply (UPS) of the proper size on your AC input.</td>
</tr>
<tr>
<td>10</td>
<td>Bus Over Voltage</td>
<td>Excessive regeneration of power. When the motor is driven by an external mechanical power source, it may regenerate too much peak energy through the Ultra5000's power supply. The system faults to save itself from an overload. Excessive AC input voltage. Output short circuit. Motor cabling wires shorted together. Internal motor winding short circuit.</td>
<td>Lower the deceleration rate. Verify input is below 264V AC. Check for shorts.</td>
</tr>
<tr>
<td>11</td>
<td>Illegal Hall State</td>
<td>Incorrect phasing. Bad connections.</td>
<td>Check cables and connections.</td>
</tr>
<tr>
<td>20</td>
<td>Motor Encoder State Error</td>
<td>The motor encoder encountered an illegal transition.</td>
<td>Replace the motor. Check the Pilot Release settings. Route the cables away from potential noise sources. Check the system grounds. Replace motor.</td>
</tr>
<tr>
<td>Error Code</td>
<td>Problem or Symptom</td>
<td>Possible Cause(s)</td>
<td>Action/Solution</td>
</tr>
<tr>
<td>------------</td>
<td>-------------------------------</td>
<td>-----------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------</td>
</tr>
<tr>
<td>21</td>
<td>Auxiliary Encoder state Error</td>
<td>The auxiliary encoder encountered an illegal transition.</td>
<td>Use shielded cables with twisted pair wires.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Route the encoder cable away from potential noise sources.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Bad encoder - replace motor.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Check the ground connections.</td>
</tr>
<tr>
<td>22</td>
<td>Motor Thermal Protection Fault</td>
<td>The internal filter protecting the motor from overheating has tripped.</td>
<td>Reduce acceleration rates.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Reduce duty cycle (&quot;On/Off&quot;) of feed indexes.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Increase time permitted for motion.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(Check cabling.)</td>
</tr>
<tr>
<td>23</td>
<td>IPM Thermal Protection Fault</td>
<td>The internal filter protecting the IPM at slow speed has tripped.</td>
<td>Reduce acceleration rates.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Reduce duty cycle (&quot;On/Off&quot;) of feed indexes.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Increase time permitted for motion.</td>
</tr>
</tbody>
</table>

The servo drive module has built in diagnostics. The current status of the drive is always shown on the 7-segment **LED STATUS** display, located on the front of the drive. The normal state of the **LED** is to actively cycle its edge segments and an illuminated decimal point that indicates +5 volts. If an error occurs, the **LED** displays flashing letter **E** followed by a two-digit error code, one digit at a time.

Errors can also be viewed on a Personal Computer screen using **Ultraware** software package available upon request.
WARNING

This equipment offers various means of operating or controlling machines. The operator must not be in or near the point-of-operation of the machine, or the operating parts of any equipment installed on the machine, or bodily injury could result. The EMPLOYER must post adequate warning signs onto the machine with proper warnings for his machine and the specific application to which the machine and equipment are being applied.

Occupational Safety and Health Act (OSHA) Sections 1910.211, 1910.212, and 1910.217 contain installation information on the distance between danger points and point-of-operation guards and devices. No specific references have been made to which paragraph of OSHA 1910.211, 1910.212, 1910.217 or any other applicable sections because the paragraphs may change with each edition of the publication of OSHA provisions.

All equipment manufactured by us is designed to meet the construction standards of OSHA in effect at the time of sale, but the EMPLOYER installs the equipment so the EMPLOYER is responsible for installation, use, application, training, and maintenance, as well as adequate signs on the machine onto which this equipment will be installed.

Remember, OSHA says that the EMPLOYER must use operating methods designed to control or eliminate hazards to operating personnel.

It shall be the responsibility of the EMPLOYER to establish and follow a program of periodic and regular inspections of his machine to insure that all their parts, auxiliary equipment, and safeguards are in a safe operating condition and adjustment. Each machine should be inspected and tested no less than weekly to determine the condition of the machine. Necessary maintenance or repair of both shall be performed and completed before the machine is operated. The EMPLOYER shall maintain records of these inspections and the maintenance work performed.

Our Company is not responsible to notify the user of this equipment of future changes in State or Federal laws, or construction standards.

SAFETY PROGRAM

Accident free operation will result from a well developed, management sponsored and enforced safety program. Of vital importance to any successful program is the proper selection of guards and devices. However, there is no safety device that will bring “automatic” safety to your operation.

Of equal importance to this proper selection of the guard and the device is the training of your personnel. Each person must be trained as to the operation of the guard or safety device, highlighting why they have been provided on the equipment. Rules for safe operating should be written and enforced at all times. A final major concern of an effective safety program is regularly scheduled inspection and maintenance of all of the equipment.

To ensure continued safety at all times, top management, line supervision, safety engineers and all employees must assume their proper share of the responsibility in the program. Only as a group, one that knows your own operation and its problems, can you carry out an effective safety program.

To assist you in the development of and continued use of safety programs, many safety minded groups have made guidelines available to you. However, you must know when and how to apply these guidelines. The manufacturer provides information to assist you in properly adjusting and maintaining your equipment. There is no short cut to proper safety; therefore, it is recommended that you comply with their recommendations at all times.

WARRANTY

We warrant our new parts against defects under normal use and service for a period of 12 months after date of shipment. Our obligation under this warranty is limited to replacing or repairing (at our option) the defective part without charge, F.O.B. our plant in Bloomfield, Connecticut. The defective part must be forwarded to our plant, freight prepaid, for our inspection prior to replacement or repair. EXCEPT AS EXPRESSLY PROVIDED HEREIN, THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING A WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. Furthermore, the seller does not warrant or represent that the equipment complies with the provisions of any law, particularly including the Occupational Safety and Health Act of 1970, and regulations promulgated thereunder. In no event shall we be liable for special, indirect incidental or consequential damages, however rising.