

Operation Manual

ULTRA ADVANTAGE SERVO ROLL FEED

Models SRF-5 / 8 / 12 / 16 / 20 / 24 / 28 / 32 / 36



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RECEIVING INSPECTION

BEFORE REMOVING UNIT FROM ITS PACKAGING, CHECK FOR VISUAL DAMAGE, ESPECIALLY IF CRATE, SKID, OR CARTON HAS BEEN DAMAGED IN TRANSIT. ANY DAMAGE CAUSED IN SHIPMENT SHOULD BE IMMEDIATELY REPORTED TO THE CARRIER. IF UNIT APPEARS IN SATISFACTORY CONDITION, REMOVE ALL PACKING AND WIPE RUST PREVENTIVE FROM ROLLERS WITH MILD SOLVENT.

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* 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 positional 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 with optional pneumatic pilot release, 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

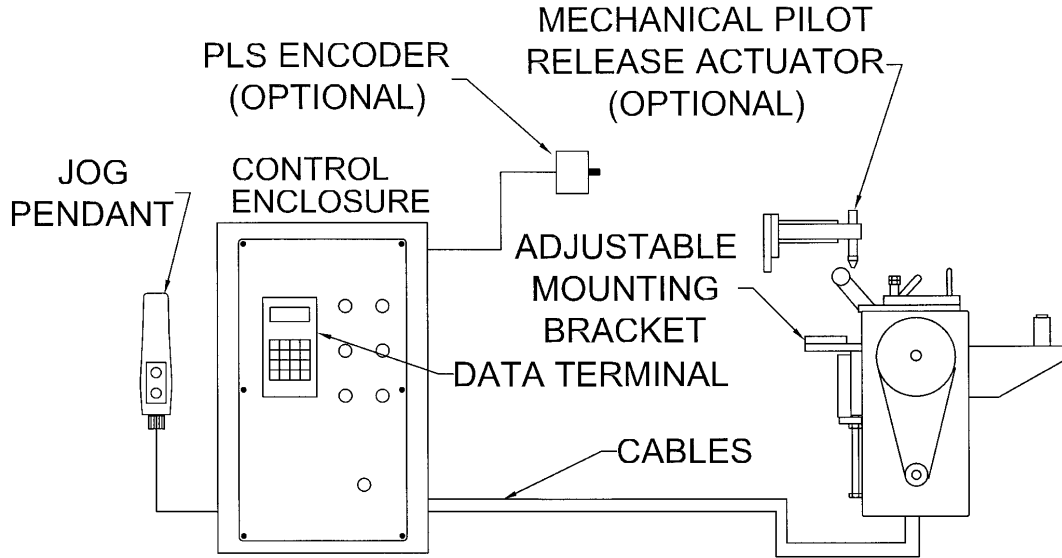
Mechanical assembly consists of:

- 1) Adjustment/Mounting bracket
- 2) Feeder
- 3) Servomotor
- 4) Mechanical pilot release actuator (optional)
- 5) PLS – Programmable Limit Switch (optional)

2.2 ELECTRICAL CONTROL ENCLOSURE ASSEMBLY

Electrical control enclosure consists of:

- 1) Control switches/buttons/relays
- 2) Power supply, 24 VDC/5 VDC
- 3) Servo drive
- 4) Data entry terminal
- 5) Cabling
- 6) Jog Pendant



ALL ULTRA ADVANTAGE SERVO ROLL FEED CONTROLS ARE CONVENIENTLY LOCATED ON THE FRONT SIDE OF THE ELECTRICAL ENCLOSURE

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

2.3 SERVO MOTOR/DRIVE OPERATION

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 OPERATION

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 OPERATION (OPTIONAL)

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 six cams 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: All PLS outputs are active as soon as SRF power is turned on.

2.6 STRIP ENCODER-OPERATION (OPTIONAL)

The **Strip Encoder** assembly consists of:

- a. 300mm diameter knurled measuring wheel
- b. 10,000 pulses per revolution encoder
- c. Air valve with manual actuator
- d. Air cylinder slide
- e. Magnetic sensor

The encoder measuring wheel is coupled to the encoder and both are mounted on the slide. The slide can be moved up and down by applying air pressure (80-100 PSI) to the air cylinder. The magnetic sensor is used to indicate the up/down position of the measuring wheel.

The encoder output results in 40,000 pulses (counts) per revolution for a final resolution of 3386 counts per inch of linear strip movement.

While the measuring wheel is in its up position, the servo roll feed acts as if there is no strip encoder attached to it, and all of the **SETUP** parameters associated with a strip encoder operation are inactive.

The Strip Encoder may be used to control or to check the position of the material strip.

The P/A Industries® servo roll feed with optional **Strip Encoder** comes standard with the ability to function in one of the two modes.

1. CONTROL MODE

In this mode the position control of the material motion is done through **Strip Encoder** feedback. The velocity control is based on data coming from both, **Strip Encoder** and **Motor Mounted Encoder**.

This mode provides relatively slower speed performance, due to the increase in computation of the velocity control algorithm.

2. CHECK MODE

In this mode the full control of the material motion (**Acceleration, Deceleration, Speed** and positioning) is done through the **Motor Mounted Encoder**. When a move is complete, the **Strip Encoder** positioning control checks if the material is within the **Length Check** tolerance, if it is not, "**Position Error**" is displayed, and **Auto** mode is turned off.

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.

```
P/A Industries
Really Cool Feed
Version 1.00 std
Hit any key to cont.
```

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:

```

Tool#1      Pos:182
      Manual Mode
30          / Cont.Run
      Press a Mode Key
  
```

- Active tool number. In case there is no active tool “**No Tool!**” message is displayed instead
- Current press position in degrees. Available only on PLS model
- 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**.

```

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

OPERATOR screen shows and allows editing the following parameters:

```

Length      1.000
Count      Cont.Run
Length Adjustment <
      Press OPER to exit
  
```

- Length
- Batch count command
- Length micro adjustment

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**”.

```

Edit Tool
Activate Tool <
Create New
Press TOOLS to exit
  
```


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.

```
Edit Tool#1
Arrow keys to scroll
Press TOOLS to exit
```

```
Activate
  Tool#1
Arrow keys to scroll
Press TOOLS to exit
```

```
Create Tool#
Press TOOLS to exit
```

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.

```

Edit Tool#
Arrow keys to scroll
Press TOOLS to exit

```

Or

```

Activate
  Tool#
Arrow keys to scroll
Press TOOLS to exit

```

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.

```

Tool#1
Length          60.000
Count          Cont.Run
Press TOOLS for next

```

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.

```

Tool#1
Speed          72
Dwell          0
TOOLS-next BKSP-Prev

```

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.

```

Tool#1
Accel          400.0
Decel          400.0
TOOLS-next BKSP-Prev

```

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: The following six screens are part of the optional PLS package and displayed only if the corresponding software is loaded.

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.

```

Tool#1          Pos: 354
FeedCam On      260
FeedCam Off     90
TOOLS-next BKSP-Prev
    
```

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
TOOLS-next BKSP-Prev
    
```

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
TOOLS-next BKSP-Prev
    
```

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
TOOLS-next BKSP-Prev
    
```

```

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

```

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

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

Auxiliary 1 (2, 3) Off indicated 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.

```

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

Use **SAVE** to save the tool being edited. Press the “**ENTER**” key.

```

Tool#1      Saved
    
```

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#
Press TOOLS to Abort
    
```

```

Save As #1234567
    
```

```

Tool#1234567 Saved
    
```

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

```

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

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.

```

Tool#
Delete Tool  <
TOOLS-next  BKSP-Prev
    
```

```

Delete Tool#1
  Press 1 to confirm
Another key to abort

```

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

```

Tool#1 Deleted

```

or

```

Aborted!

```

Display will show **STATUS** screen.

```

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

```

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           7355.00
Direction (1/0)  CW
Debounce (mS)   1
SETUP-Next     BKSP-Prev
```

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             200
Pgain         1200
Igain         1
SETUP-Next     BKSP-Prev
```

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

```
FF             1.0
Kff           0.0
Current Limit  30
SETUP-Next     BKSP-Prev
```

FF is an acceleration feed-forward gain of the velocity loop. This is a tuning parameter, in order to change its value consult P/A Service Department.

Kff is a feed-forward gain of the position loop. 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 drive may output to the motor. This is a tuning parameter, in order to change its value consult P/A Service Department.

```

Back Length      0.000
Kerf              0.000
MaxLength        60.000
SETUP-Next BKSP-Prev

```

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.)

NOTE: The following screen is part of the optional PLS package and displayed only if the corresponding software is loaded.

```

PLS Counts/Rev  1024
Press Offset     321
SETUP-Exit BKSP-Prev

```

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 [HOW TO SYNCHRONIZE PRESS AND PLS](#) section of this manual for further details.

```

Length Mode Control
Length Check     0.01
Strip Scale     3386.30
SETUP-Next BKSP-Prev

```

Length Mode is a parameter that selects whether the feeder works in the **Control** or **Check** mode. Entering a "0" selects **Control** mode and "1" selects **Check** mode.

Length Check is a parameter that defines the **Check** mode tolerance. It is a numeric entry with a range of 0.00 to 5.00 inch.

Strip Scale is the Strip Encoder scaling parameter used to define the number of encoder counts/inch. It is a numeric entry with a factory value 3386.17.

```

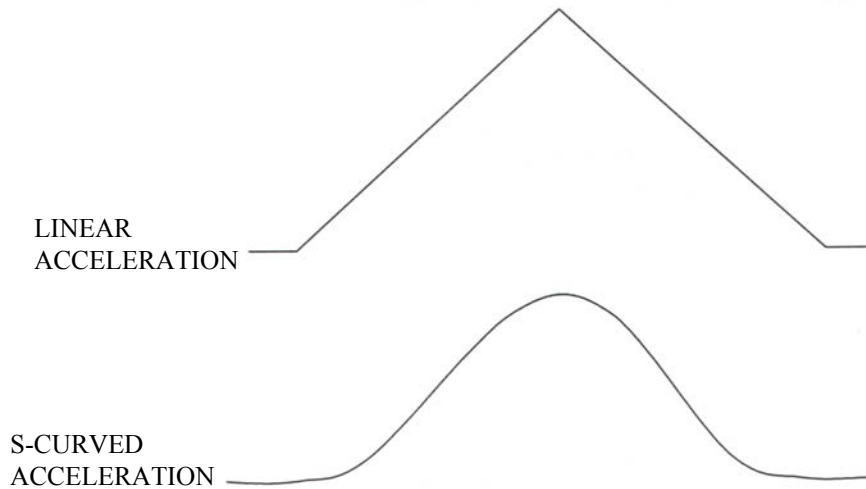
Profile          Linear
Bandwidth        300
Kp Multiplier    1.3
SETUP-Next BKSP-Prev

```

Profile: is a parameter that defines whether the feed motion profile is **Linear** or **S-Curve**. In other words, the motion profile is triangle or trapezoidal with linear acceleration / deceleration, or acceleration / deceleration is S-shaped. (Refer to the picture below) The **S-Curve** becomes handy on applications with possible-material slippage between the rolls of the feed. Entering a "0" selects **Linear** mode and "1" selects **S-Curve** mode.

Bandwidth is a tuning parameter, before changing its value consult the P/A Industries Service Department

Kp Multiplier is a parameter that defines a proportional gain of the position loop of the Strip Encoder and based on the value of the motor encoder's **Kp** proportional gain. This is a tuning parameter, before changing its value, consult the P/A Industries Service Department.



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.

```

Edit Tool
Activate Tool
Create New <
Press TOOLS to Exit

```

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


```

Create Tool#
Press TOOLS to Exit

```

```

Create #1

```

```

Tool Created

```

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

```

Tool#1
Length          1.000
Count          Cont.Run
Press TOOLS for next

```

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
TOOLS-next BKSP-Prev

```

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
TOOLS-next BKSP-Prev

```

NOTE: The following six screens are part of the optional PLS package and displayed only if the corresponding software is loaded.

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
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
ResetCam On 180
ResetCam Off 200
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
PilotRel On 125
PilotRel Off 225
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 the SAVE command and press the “ENTER” key.

```

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

```

Tool#1      Saved

```

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.

```

Edit Tool      <
Activate Tool
Create New
Press TOOLS to Exit

```

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

```

Edit Tool#
Arrow keys to scroll
Press TOOLS to exit

```

```

Edit Tool#1
Arrow keys to scroll
Press TOOLS to exit

```

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

```

Tool#1
Length      20.000
Count      Cont.Run
Press TOOLS for next

```

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

```

Tool#1
Speed      72
Dwell      150
TOOLS-next BKSP-Prev

```

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

```

Tool#1
Accel          400.0
Decel          400.0
TOOLS-next BKSP-Prev
    
```

NOTE: The following six screens are part of the optional PLS package and displayed only if the corresponding software is loaded.

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
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
ResetCam On     180
ResetCam Off    200
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
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.

```

Edit Tool      <
Activate Tool
Create New
Press TOOLS to Exit

```

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

```

Edit Tool#
Arrow keys to scroll
Press TOOLS to exit

```

```

Edit Tool#1
Arrow keys to scroll
Press TOOLS to exit

```

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

```

Tool#1
Length      20.000
Count      Cont.Run
Press TOOLS for next

```

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

```

Tool#1
Speed          72
Dwell          150
TOOLS-next  BKSP-Prev

```

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

```

Tool#1
Accel          400.0
Decel          400.0
TOOLS-next  BKSP-Prev

```

NOTE: The following six screens are part of the optional PLS package and displayed only if the corresponding software is loaded.

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
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
ResetCam On     180
ResetCam Off    200
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
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 as a new tool, choose the SAVE AS command and press the “ENTER” key.

```

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

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

```

Save as Tool#
Press TOOLS to Abort
    
```

```

Save as #5
    
```

```

Tool#5 Saved
    
```

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.

```

Edit Tool      <
Activate Tool
Create New
Press TOOLS to Exit
  
```

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

```

Edit Tool#
Arrow keys to scroll
Press TOOLS to exit
  
```

```

Edit Tool#1
Arrow keys to scroll
Press TOOLS to exit
  
```

```

Tool#1
Length      20.000
Count      Cont.Run
Press TOOLS for next
  
```

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

```

Tool#1
Speed      72
Dwell     150
TOOLS-next BKSP-Prev
  
```

```

Tool#1
Accel     400.0
Decel     400.0
TOOLS-next BKSP-Prev
  
```

```

Tool#1      Pos:354
FeedCam On  260
FeedCam Off 90
TOOLS-next BKSP-Prev
  
```

```

Tool#1      Pos:354
ResetCam On 180
ResetCam Off 200
TOOLS-next BKSP-Prev
  
```



```

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

```

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

```

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

```

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

```

Tool#1
Save
Save as <
TOOLS-next BKSP-Prev
    
```

```

Tool#1
Delete Tool <
TOOLS-next BKSP-Prev
    
```

Press “ENTER” key.

```

Delete Tool#1
Press 1 to confirm
Another key to abort
    
```

Press “1” key.

```

Tool#1          Deleted
    
```

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.

```

Edit Tool
Activate Tool <
Create New
Press TOOLS to exit

```

```

Activate Tool#
Arrow keys to scroll
Press TOOLS to exit

```

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

```

Activate #1234567
Arrow keys to scroll
Press TOOLS to exit

```

```

Tool Activated

```

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.

```

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

```

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.

```

Length 1.000
Count Cont.Run
Length Adjustment
Press OPER to exit

```

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.

```

Length          1.000
Count          Cont.Run
Length Adjustment <
Press OPER to exit

```

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.

```

Length          1.000
Count          Cont.Run
Length Adjustment <
Press OPER to exit

```

```

Length          1.000
Use Arrow Keys to
Adjust Length
Press OPER to exit

```

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

4.10 HOW TO SYNCHRONIZE PRESS AND PLS

Open Set-Up screens, find **Press offset** parameter, and verify its value is set to “**0**” and if it is not, set it so. Recycle the power.

```

PLS Counts/Rev 1024
Press Offset    0
SETUP-Exit BKSP-Prev

```

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

```

Tool#          Pos:324
Manual Mode
30             /Cont.Run
Press a Mode Key

```

Go back to Press offset parameter and change it to match PLS reading.

```

PLS Counts/Rev 1024
Press Offset    324
SETUP-Exit BKSP-Prev

```

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

```

Tool#          Pos: 0
Manual Mode
30             /Cont.Run
Press a Mode Key

```

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”/“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.

```

Tool#1          Pos: 354
FeedCam On      260
FeedCam Off     90
TOOLS-next BKSP-Prev

```

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 *UltraAdvantage 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.

5.5 STRIP ENCODER OPERATION

The control is designed such that if there is no **Strip Encoder** attached to the Servo Drive or the measuring wheel is lifted, the Servo Drive and the whole feed acts as regular feed, operation of which is described in this Manual.

The *measuring wheel* must be lowered and the **Length Mode** must be set up before **Cycle Start** button is pressed.

Refer to **STRIP ENCODER-OPERATION** section of this manual for **Length Mode** description.

There are four additional **SETUP** parameters that take care of proper **Strip Encoder** operation. They are as follows:

Length Mode is a parameter that selects whether the feeder works in the **Control** or **Check** mode. Entering a “**0**” selects **Control** mode and “**1**” selects **Check** mode.

Length Check is a parameter that defines the **Check** mode tolerance. It is a numeric entry with a range of **0.00 to 5.00** inch.

Strip Scale is the **Strip Encoder** scaling parameter used to define the number of encoder counts/inch. It is a numeric entry with a factory value **3386.17**.

Kp Multiplier is a parameter that defines a proportional gain of the position loop of the Strip Encoder and based on the value of the motor encoder's **Kp** proportional gain. This is a tuning parameter, before changing its value, consult the P/A Industries Service Department.

```
Length Mode Control
Length Check      0.01
Strip Scale      3386.30
SETUP-Next BKSP-Prev
```

```
Profile          Linear
Bandwidth        300
Kp Multiplier    1.3
SETUP-Next BKSP-Prev
```

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.

Figure 6 SPEED PERFORMANCE CHART

Velocity (in/sec)	72.00	Feed Window (degrees)		
Accel (in/sec ²)	400.00	Strokes per minute		
Feed(in)	Feed Time(sec)	90	180	270
0.25	0.070	214	429	643
0.50	0.091	165	331	496
0.75	0.107	141	281	422
1.00	0.120	125	250	375
2.00	0.161	93	186	279
3.00	0.193	78	155	233
4.00	0.220	68	136	205
5.00	0.244	62	123	185
6.00	0.265	57	113	170
7.00	0.285	53	105	158
8.00	0.303	50	99	149
9.00	0.320	47	94	141
10.00	0.336	45	89	134
12.00	0.366	41	82	123
14.00	0.394	38	76	114
16.00	0.422	36	71	107
18.00	0.450	33	67	100
20.00	0.478	31	63	94
22.00	0.506	30	59	89
24.00	0.533	28	56	84
26.00	0.561	27	53	80
28.00	0.589	25	51	76
30.00	0.617	24	49	73
35.00	0.686	22	44	66
40.00	0.756	20	40	60
45.00	0.825	18	36	55
50.00	0.894	17	34	50
55.00	0.964	16	31	47
60.00	1.033	15	29	44

Velocity (in/sec)	41.00	Feed Window (degrees)		
Accel (in/sec ²)	400.00	Strokes per minute		
Feed(in)	Feed Time(sec)	90	180	270
0.25	0.070	214	429	643
0.50	0.091	165	331	496
0.75	0.107	141	281	422
1.00	0.120	125	250	375
2.00	0.161	93	186	279
3.00	0.193	78	155	233
4.00	0.220	68	136	205
5.00	0.244	61	123	184
6.00	0.269	56	112	167
7.00	0.293	51	102	153
8.00	0.318	47	94	142
9.00	0.342	44	88	132
10.00	0.366	41	82	123
12.00	0.415	36	72	108
14.00	0.464	32	65	97
16.00	0.513	29	59	88
18.00	0.562	27	53	80
20.00	0.610	25	49	74
22.00	0.659	23	46	68
24.00	0.708	21	42	64
26.00	0.757	20	40	59
28.00	0.805	19	37	56
30.00	0.854	18	35	53
35.00	0.976	15	31	46
40.00	1.098	14	27	41
45.00	1.220	12	25	37
50.00	1.342	11	22	34
55.00	1.464	10	20	31
60.00	1.586	9	19	28

5.6 TROUBLESHOOTING GUIDE

The chart that follows contains the most frequently encountered issues.

Symptom	Cause or Remedy
No power indication when Power On button is pressed	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 1. Check the cabling connection between display and the servo drive. 2. Check 5 VDC power supply.
Feed will not jog	<ol style="list-style-type: none"> 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.	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 1. Make sure that the feed is not in “Auto” Mode. 2. Reset the Feed.
Inaccurate feeding	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 1. Verify that the direction parameter has been set properly (CW or CCW).
Drive Fault	<p>This is a generic display prompt indicating a fault on the Servo Drive.</p> <ol style="list-style-type: none"> 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.

5.7 ERROR CODES

Error Code	Problem or Symptom	Possible Cause(s)	Action/Solution
04	Motor Over Temperature	Motor thermostat trips due to: High motor ambient temperature, and/or Excessive RMS torque. Bad encoder cable or connection.	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.
05	IPM Fault	Motor cables shorted. Motor winding shorted internally. Ultra5000 Servo drive temperature too high.	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.
		Operation above continuous power rating. Ultra5000 has a bad IPM, output short circuit, or over current.	Verify ambient temperature is not too high (above 60°C). Operate within the continuous power rating. Replace Ultra5000.
09	Bus Under Voltage	Low AC line/AC power input. 100 VAC minimum for safe Ultra5000 operation.	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.
10	Bus Over Voltage	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.	Lower the deceleration rate. Verify input is below 264V AC. Check for shorts. Check for shorts. Check for shorts.
11	Illegal Hall State	Incorrect phasing. Bad connections.	Check cables and connections.
20	Motor Encoder State Error	The motor encoder encountered an illegal transition.	Replace the motor. Check the Pilot Release settings. Route the cables away from potential noise sources. Check the system grounds.
		Bad encoder.	Replace motor.

Error Code	Problem or Symptom	Possible Cause(s)	Action/Solution
21	Auxiliary Encoder state Error	The auxiliary encoder encountered an illegal transition.	Use shielded cables with twisted pair wires. Route the encoder cable away from potential noise sources. Bad encoder - replace motor. Check the ground connections.
22	Motor Thermal Protection Fault	The internal filter protecting the motor from overheating has tripped.	Reduce acceleration rates. Reduce duty cycle (“ On/Off ”) of feed indexes. Increase time permitted for motion. (Check cabling.)
23	IPM Thermal Protection Fault	The internal filter protecting the IPM at slow speed has tripped.	Reduce acceleration rates. Reduce duty cycle (“ On/Off ”) of feed indexes. Increase time permitted for motion.

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.



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