Attachment for Fenner Control Option on Conair Belt Pullers

⚠ **WARNING - Reliance on this Manual Could Result in Severe Bodily Injury or Death!**

This manual is out-of-date and is provided only for its technical information, data and capacities. Portions of this manual detailing procedures or precautions in the operation, inspection, maintenance and repair of the product forming the subject matter of this manual may be inadequate, inaccurate, and/or incomplete and cannot be used, followed, or relied upon. Contact Conair at info@conairgroup.com or 1-800-654-6661 for more current information, warnings, and materials about more recent product manuals containing warnings, information, precautions, and procedures that may be more adequate than those contained in this out-of-date manual.

THE PULLER CONTROL

The M-Trim control is an optional operator interface for the belt puller. Instructions for any optional controls can be found in the Appendix of this User Guide.

Four-Digit Display

When programming the control, the four-digit display shows control settings. During normal operation, it displays either setpoint or actual speed (tach). Both setpoint and actual speed are expressed as either linear speed (ft/min or cm/min) or rpm.

Speed Buttons

Use the Set Speed button to enter and monitor the setpoint speed. Pressing the Tach button displays the actual speed. When you select one of these, the LED in the corner of the button lights. Either Set Speed or Tach is active at all times. **NOTE:** The actual speed shown is the average speed. It is updated once every second.

Numeric Keypad

Use the numeric keypad to access control parameters, adjust program settings and change the setpoint speed.

Data Entry Buttons

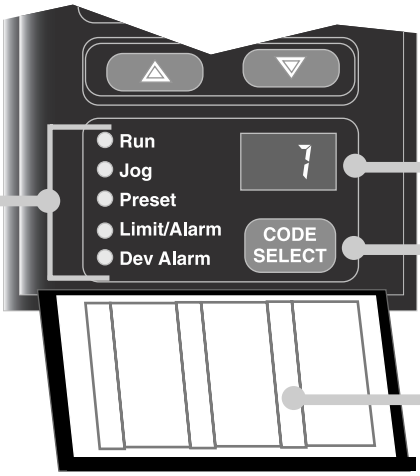
The Clear button deletes the value showing on the digital display that you have just entered. The Enter button to confirms and accepts data values.

Scroll Buttons

Use the Up and Down scroll buttons to adjust the active setpoint displayed on the digital display by one engineering unit. These buttons are always enabled.

Programming Keypad

Flip open the bottom control cover to reveal the programming keypad.



Two-Digit Display

The two-digit display shows the active programming code.

Code Select LEDs

The LED next to the code lights when that code is selected. These are not relevant when the Master Scaling format is used.

Code Select Button

Use this button to enter the desired programming code.

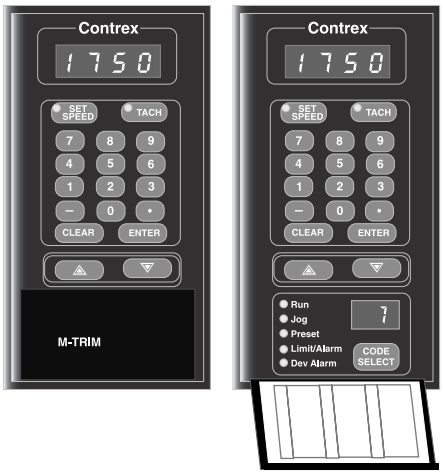
Programming codes

This table lists the major codes for you to choose. See the Control Settings section in the back of this attachment for a complete listing of codes.

VERIFYING PROGRAMMED CONTROL VALUES

The M-Trim control has about 55 programmable control parameters. Some of these parameters are set by Conair as default values and others are set specifically for this puller.

You should verify that these parameter settings match the default parameter codes listed inside the flip-down cover of the control and in the Control Settings section of this manual.



You also should record any changes you make to these settings in the blanks provided in the Control Settings section in the back of this attachment. You will need this information to return to normal operation if the M-Trim control memory is ever corrupted by electrical noise, surges, etc.

The current value of each parameter is stored in memory and recovered on startup. While the control can be reset to factory-default settings, any information specific to your puller will be lost unless you maintain a copy of the values you have set.

1 **Turn on the puller** by turning the main disconnect to the ON position. The microprocessor performs a self-diagnostic test (about 2 seconds) then enters the default STOP state:

Speed Command output = zero
(Parameters and setpoints are recovered from memory)

2 **Open the controller's flip-down cover** to view the programming keypad.

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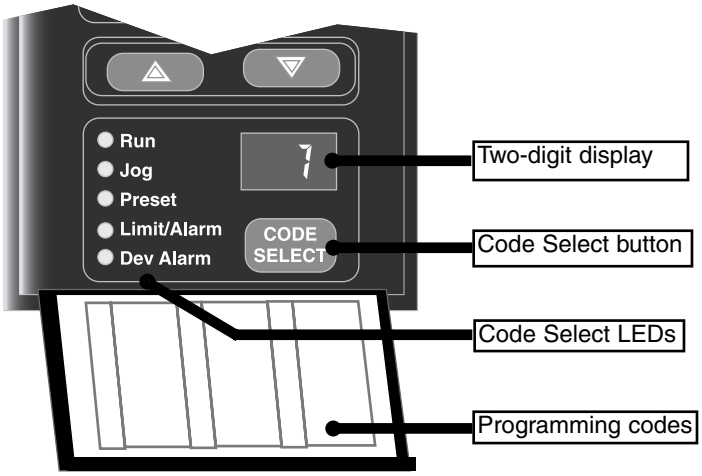
VERIFYING PROGRAMMED CONTROL VALUES
CONTINUED



3 **Press the Code Select button** (the LED lights) and enter the two-digit parameter code. Refer to the Control Settings section in the back of this attachment for a complete list of parameter codes, descriptions, and settings.

4 **Press the Enter button.**
The two-digit program code displays in the lower LED window. The current value for that code displays in the upper LED window. The LED light on the Code Select button goes out when you press the Enter button.

5 **Repeat steps 3 and 4** to compare the value in the upper display to the value listed in the Control Settings section of this manual.

6 **Continue to press the Enter button** to view all the parameter codes. If any values differ from what is listed in the Control Settings section of this manual, contact Conair Service immediately.

VIEWING ACTUAL PULLER SPEED

To view the actual speed of the puller during operation, press the Tach button on the control.

- The LED in the corner of the Tach button lights.
- The Display changes to the actual speed of the puller, and is updated every 1 to 2 seconds.

CHANGING THE SPEED SETPOINT

1 Press the Set Speed button on the control.

- The LED in the corner of the Set Speed button lights.
- The numeric keypad is enabled.

2 Enter the desired setpoint in ft/min or rpm.
If necessary, press the Clear to delete any errors.

3 Press the Enter button to accept the new setpoint.
The new setpoint displays.

FINE-TUNING THE SETPOINT

Use the Up or Down arrow to adjust the setpoint. The setpoint adjusts by one engineering unit each time an arrow is pressed.

- If the Tach button is active, the actual speed gradually changes to the new value.
- If the Set Speed button is active, the setpoint changes immediately.

NOTE: These keys are always enabled to change the active setpoint. Because they provide only slow scroll speeds, use them for fine tuning.

RESTORING DEFAULT MEMORY SETTINGS

WARNING
This procedure restores the M-Trim control to the factory default settings. Any user-entered parameters or programming will be erased.

To restore default memory settings:

1. **Turn OFF power to the puller.**
2. **While simultaneously pressing** the Clear and the 7 on the numeric keypad, turn the power ON.

   ◆ The factory default settings are restored. The M-Trim control performs the power up routine.

RESTORING USER-SPECIFIC MEMORY SETTINGS

Set any user-specific memory settings after you have restored the default memory settings. Using the Control Settings found on the tables in Appendix D-1, restore your control to it's normal operating state:

1. **Open the flap** at the bottom of the M-Trim control.
2. **Press the Control Select button.**
3. **Enter the desired two-digit code number** (from the control settings section located in the back of this attachment.)
4. **Press the Enter button.**

   ◆ The two-digit code displays in the lower digital display.

   ◆ The current parameter value displays in the upper digital display.

   ◆ The numeric keypad is enabled.

If necessary, use the numeric keypad to enter a new value.

CAUTION
Press the Enter button within 10 seconds to accept the new number. Otherwise the parameter reverts to the previous value.

ADVANCED PROCEDURE: PID TUNING

PID (Proportional, Integral, Differential) tuning is the process of setting the M-TRIM control algorithm parameters (codes 65-69) to achieve optimum performance. While each puller is tuned before shipment to optimize performance over the entire speed range, customers may wish to tune the puller for their specific operating conditions.

Code	Description	Procedure
65	**Gain**-small numbers increase the contribution of the Proportional component. Zero eliminates the Gain contribution.	1. Set Reset (66) and Rate (67) to zero. 2. Set Trim Authority (68) to 100. 3. Reduce the Gain setting until the system becomes unstable. 4. Increase Gain slightly to re-stabilize the system.
66	**Reset**-small numbers increase the contribution of the Integral component. Zero eliminates the Reset contribution.	Decrease the value of Reset until overshoot is observed. Overshoot occurs when the feedback goes over the desired setpoint before settling to the desired value.
67	**Rate**-small numbers increase the contribution of the Derivative component. Zero eliminates the Rate contribution.	1. Decrease the value of Rate until the system becomes unstable. 2. Increase Rate slightly to re-stabilize the system.
68	**Trim authority**-determines how much of the output is influenced by Gain, Reset and Rate, and how much is determined by feedforward.	Start with Trim Authority set at 100. If stable operation cannot be achieved, reduce this parameter and repeat the tuning procedure.
69	**Rate threshold**-sets the amount of differential error required before the Rate term influences the control output.	If unstable operation occurs only at very low feedback frequencies, slightly increase the this parameter.

PRODUCT QUALITY PROBLEMS

Look in this section when the extrudate shows annular rings in the cross-sectional cut of the product.

Symptom	Possible cause	Solution
◆ **Wall thickness fluctuation on the extrudate.**	**There are variations in the speed of the puller.**	**Check:** ❑ The PID Tuning. ❑ If motor brushes are worn.
◆ **Diameter fluctuation on the extrudate.**	**There are variations in the speed of the puller.**	**Check:** ❑ The PID Tuning. See the section entitled, ***ADVANCED PROCEDURE: PID TUNING*** in this attachment. . ❑ If motor brushes are worn.

OPERATION PROBLEMS

Look in this section when the control or motor is not working properly.

Symptom	Possible cause	Solution
◆ **Controller stopped during power-up PROM test. '❐.❐.❐.❐' displays in the digital display.**	**RAM failed.**	Contact Conair service.
◆ **Controller stopped during power-up RAM test. A number displays in the digital display.**	**PROM checksum comparison failed.**	Contact Conair service.
◆ **Motor does not stop.**		Check programming code 53. See ***M-TRIM USER MANUAL, DIAGNOSTICS***.
◆ **Motor does not run.**		Check programming code 53. See ***M-TRIM USER MANUAL, DIAGNOSTICS***.

Look in this section when the control or motor is not working properly.

OPERATION PROBLEMS

Symptom	Possible cause	Solution
◆ **Motor runs at wrong speed.**		Check programming code 53. See ***M-TRIM USER MANUAL, DIAGNOSTICS***.
◆ **Motor at correct (set) speed, but not fast enough for the extrusion line.**	**Maximum rpm incorrectly set.**	Check programming code 11. See ***M-TRIM USER MANUAL, DIAGNOSTICS***.
◆ **Motor at correct (set) speed, but not slow enough of the extrusion line.**	**Minimum rpm is set incorrectly.**	Check programming code 10. See the ***M-TRIM USER MANUAL, DIAGNOSTICS***.
◆ **Motor seems unstable.**		Check PID tuning. See the section entitled, ***ADVANCED PROCEDURE: PID TUNING*** in this attachment.
◆ **Tach reads incorrectly.**		See item 8, ***M-TRIM USER MANUAL, DIAGNOSTICS***.
◆ **Display shows ---1, ---2, or ---3.**	**Electrical noise is reaching controller.**	Check control parameters against desired values. If values have changed, restore the original settings. See ***RESTORING MEMORY SETTINGS*** in this section.

CONTROL SETTINGS

This table shows the settings for each control parameter set at the factory. The parameters are set either to the default setting, or to a setting specific to your requirements (Customer column). If you change any value, record it in this column. Keep these values up-to-date so you can easily restore your puller to normal operation if the memory is corrupted.

Code	Parameter	Range	Default	Customer
Setpoint Control				
01	Primary Setpoint 1	0000-9999		
02	Primary Setpoint 2	0000-9999		
03	Secondary Setpoint 1	0000-9999		
04	Secondary Setpoint 2	0000-9999		
05	Jog Setpoint	0000-9999		
06	Output Setpoint	0000-9999		
Alarms and Limits				
10	Minimum Limit	0000-9999		
11	Maximum Limit	0000-9999		
12	Low Alarm	0000-9999		
13	High Alarm	0000-9999		
14	Error Alarm 1, ramped	0000-9999		
15	Error Alarm 2, scaled	0000-9999		
Acceleration and Deceleration				
16	Acceleration time	000.0-600.0		
17	Deceleration time	000.0-600.0		
Phase Control				
18	Lag Pulse Limit	0-9999		
19	Lead Pulse Limit	0-9999		
Scaling				
20	Engineering units (primary setpoint)	000.0-9999		
21	Engineering units (secondary setpoint)	000.0-9999		
22	Engineering units (primary display)	000.0-9999		
23	Engineering units (secondary display)	000.0-9999		
Phase Control				
29	Recovery multiplier	0-100		
Scaling				
30	PPR (external reference input)	1-9999		
31	PPR (feedback input)	1-9999	60	
32	PPR (auxiliary input)	1-9999		
33	Max RPM (external refer. input: primary mode)	1-9999		
34	Max RPM (feedback: primary mode)	1-9999	1750	
35	Max RPM (auxiliary input: primary mode)	1-9999		

If the controller's memory is corrupted by electrical noise or static, you may need to reset the control parameters.

Continued on next page.

CONTROL SETTINGS

CONTINUED

Code	Parameter	Range	Default	Customer
36	Max RPM (external refer. input: secondary mode)	1-9999		
37	Max RPM (feedback: secondary mode)	1-9999		
38	Max RPM (auxiliary input: secondary mode)	1-9999		
Scaling Format Selection and Control				
60	Output format	1-2		
61	Primary scaling mode	0-3	01	
62	Secondary scaling mode	0-3		
63	Primary display mode	1-2	01	
64	Secondary display mode	1-2		
Tuning				
65	Gain	0-9999		
66	Reset (integral)	0-9999		
67	Rate (derivative)	0-9999		
68	Trim authority	0-100		
69	Rate threshold	0-100		
Serial Communications				
70	Device addresses	1-32		
71	Baud rate	1-6		
72	Character format	1-3		
73	Control mask	0-255		
Alarms and Limits				
74	Zero speed logic	0-1		
Scaling Format Selection and Control				
75	Primary mode positive offset	0-9999		
76	Primary mode negative offset	0-9999		
77	Secondary mode positive offset	0-9999		
78	Secondary mode negative offset	0-9999		
Setpoint Control				
79	Setpoint mask	0-2		
Analog Input/Output				
80	Analog output function select	0-99		
81	Analog output range	0-9999		
82	Analog output zero	0-2048		
83	Analog output span	2048-4095		
84	Analog input function select	0-7		
85	Analog input zero	0-2048		
86	Analog input span	2048-4095		