## Revision History

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### PROPRIETARY NOTE

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INTRODUCTION

The Genetix Belt Feeder controller is designed to be a complete belt feeder control system. It can control almost any conceivable belt weigher or feeder application from the very simple to the very complex. Examples are:

- Belt Scales (also known as Wild Flow Weighers).
- Basic Belt Feeder (simple PID control of feedrate)
- Batching Belt Feeder
- Belt Feeder with Pre-Feeder

In addition, the Genetix Belt Feeder control has the ability to accept input from a variety of optional sensors, such as:

- Belt Tracking Switches
- Material on Belt Switch.
- Discharge Plugging Switch
- Second Encoder
- Infeed Flow Monitor
- Inclinometer

This is not a complete list of all available inputs. If, after reading the appropriate sections of this Manual, you cannot find an input appropriate to your needs consult Merrick Customer Support for other possibilities.

Also, the Genetix controllers support a high degree of connectivity for use with Industrial Networks or other forms of serial communication.

Despite the many modes of operation and the variety of external sensors supported, the Genetix remains very simple to configure and use. For example, those options that are not required are not visible if they are not enabled. In this way the controller and its User Interface is only as complex as your application requires.

The central module for all Genetix controllers is the Genetix Core Module (“GCM”) which contains all the basic feeder control and connections for the standard I/O and peripheral equipment. This is a standalone device and can operate with no User Interface (i.e. as a “blackbox”). Alternatively the GCM may be connected to one of the available Merrick User Interface assemblies (including wireless options), providing the user direct interaction with the feeder.

The following sections in this Manual will instruct you in the proper configuration and use of the Genetix Belt Feeder Controller and the Color User Interface.
SAFETY

The Genetix Belt Feeder Controller is used for the control of process weighing equipment. As such, it is normally responsible for the control of a process and is not intended as a motor control device. To insure personnel safety please read the following instructions and precautions carefully.

In General

Observe all standard precautions that pertain to moving machinery.

Observe all standard precautions that pertain to electrical drives and electrical controls.

Pay particular attentions to special notes and precautions that appear throughout this manual.

Please read and become familiar with this entire manual before attempting service or repair of the Genetix Controller. If you have any questions or problems, please call the Merrick Customer Support Department for assistance.

Electrical Precautions

Before undertaking work on the electrical system, the drives, or the Controller, insure power is disconnected and locked out. Work should never be performed on the Controller with power on the unit.

Verify that all grounds called for on the wiring diagrams are in place and are securely connected. Proper grounding not only helps ensure your personal safety, but is also necessary for the proper operation of the controller.

If it is necessary to work in or near areas of live high voltage, always keep one hand clear of the machine, the cabinet, or any other conductors to avoid the possibility of electrical shock traveling across your chest.

NEVER undertake any electrical work in areas with wet or flooded standing areas.

NEVER impair or disable the function of a fuse or a circuit breaker.

CAUTION: IF PERSONNEL ARE IN DOUBT ABOUT ANY PROCEDURE CONTACT THE MERRICK CUSTOMER SUPPORT DEPARTMENT.

Technical Support

Merrick provides customer technical and spare part support 24 hours a day, seven days a week. Our normal business hours are Monday through Friday 7:30 AM until 4:30 PM Central Time. During normal hours call 1-888 MERRICK (637-7425) and ask for service. The call will be routed to the next available phone support technician.

After normal hours and on holidays and weekends, technical assistance is available by calling 1-888 MERRICK extension 7878. Follow the instructions and be sure to enter the area code and the phone extension where you can be reached. Someone will return your call as soon as possible.

When you call Merrick for Technical Support, please have your machine serial number or a controller serial number. This information will better help us to serve you.
OPERATION

Color User Interface

The Genetix Color User Interface assembly is one of many User Interface options for the Genetix controller. It consists of a 5.7” (145mm) color graphic LCD screen with integral touchpanel. Context appropriate “soft” keys are shown on the different screens that allow the user to make selections, enter parameters, etc.

The Genetix Color User Interface is unique in that it can be connected to several Genetix Control Modules (up to 32 “GCM’s”). With one User Interface it is possible to monitor and/or control up to 32 Merrick feeders.

There are typically two lines of process information shown on the Main Screen (see above), and these may be configured by the user. The text in the upper right corner shows the current feeder control mode (if enabled). The text in the upper left is the “friendly” name of the feeder, which may be set by the user. Any feeder connected to the Color display may be selected for display on the Main Screen.

The user interacts with the controller through a multi-level menu system that is designed such that parameters are easy to find and change. The most commonly accessed features are found at the top of menus, and only those menus that are relevant to the specific feeder application are visible.

Navigation through the menu system is by means of the touchpanel. To enter the menu system, the user presses the “Menu/Esc” key,

To select an item from a displayed menu, the user navigates up or down the list with the Scroll Up/Scroll Down arrow keys until the item desired is highlighted. Most menus also
“autoscroll” if you hold down either the up arrow or down arrow. Once highlighted, the item is selected by pressing the “Enter” key.

Moving up one menu level, or aborting an operation is accomplished by pressing the Menu/Esc key. Ultimately, if you continue to press the Menu/Esc key, you will arrive back at the Main Screen.

The right arrow on the Main Screen allows you to scroll through some additional screens. The first is a graph (i.e. “trend”) screen which the user can configure to continually chart different data. The third screen is a feeder summary screen which shows some summary data for all feeders that the color display is connected to.

**Numeric Entry**

Various numeric parameters are set and/or changed using the common Numeric Data Entry screen. An example is shown below:

To enter or change a value, you simply enter the new value with the numeric keys, using the decimal point key as appropriate. To change the sign of the number, press the +/- key. To clear the number and start over, press the clear key (“C”). To abort the operation press the Menu/Esc key.
Once the desired number is displayed, press the Enter key to accept. Note that there is limit checking on these parameters; the limits being shown in the left portion of the display. If the Min or Max limit is exceeded, the value will be limited appropriately. You will see an error message and the value will change to the Min or Max value as appropriate. You may either accept this value or enter a new value that is within the limits.

**Entering Passwords**

Several areas of the Menu system require entry of a Password, for security. These passwords are 4 digit numbers and have factory default settings. They can be changed by the user and you should do this for extra security (see Main Menu > Advanced Setup > Passwords). In addition the password security can be turned off by setting the respective password to all zeroes (“0000”). Once thus set, that password will no longer be requested.

When you are asked for a password, you must enter the correct code, from left to right, using the Up/Down arrow keys to increment or decrement the digits. Once a digit is set, you use the Right arrow to move to the next digit, at which time the previous digit is obscured by a star (*) (see below). Once all digits are set, press the Enter key to proceed.
**Menu System**

When you first enter the Menu system by pressing the Enter key, you will see the following Main Menu:

```
Feeder Control…
Calibration…
Warnings…
Faults…
Display Settings…
Basic Setup…
Advanced Setup…
Reset Totals…
DNA Key…
Diagnostics…
Drag Chain Control…
```

Note: Not all of the above entries will necessarily appear in the menu, depending on how the controller is configured (see Advanced Set-up > Configuration).

**Feeder Control**

*(Main Menu)*

Note: The items presented in the Feeder Control menu will vary depending on the current control method and source. Also “Feeder Control” only appears in the Main Menu if “Feeder Control” is configured (see Main Menu > Advanced Set-up > Configuration).

The following is a list of all Feeder Control items and their functions:

```
Start [Stop] Feeder…
Setpoint…
Jog Forward
Jog Reverse
```
Start [Stop] Feeder

If Local control has been selected for the control Source (see Main Menu > Advanced Set-up > Feeder Control > Source), this menu item allows you to start and stop the feeder. If the feeder is not running, this item will read “Start Feeder”. If the feeder has already been started, this item will read “Stop Feeder”.

If either “Network” or “Remote” have been selected as the control source, then you will not have local control over starting and stopping, and this menu item will read “Remote Start/Stop”.

If “Manual” has been selected (see Main Menu > Advanced Set-up > Feeder Control > Control) then this will allow you to start and stop the feeder with few restrictions. This mode is normally used only for maintenance or initial set-up of the feeder.

Setpoint

If Local control has been selected for the control Source (see Main Menu > Advanced Set-up > Feeder Control > Source), this menu item allows you to enter and/or change the current Setpoint. Highlighting this item and pressing the Enter key will bring up the Numeric Data Entry screen allowing you to enter the desired setpoint. This value is entered in units of Feedrate if the control method has been selected as “Rate Control”, units of Speed if the control method has been selected as “Speed Control”, or units of percent if in Manual (“Open Loop”) (see Main Menu > Advanced Set-up > Feeder Control > Method). If in Manual control (see above), this value will be entered in percent.

If either “Network” or “Remote” have been selected as the control source, then you will not have local control over Setpoint, and this menu item will display the current Setpoint (as received from the Remote source). You may not select the item to change it.

Jog Forward

This menu item allow you to run the feeder forward briefly, only as long as the Enter key is pressed. You must be in Manual control for this option to be available (see above). Also “Jog OK” must be enabled (see Main Menu > Advanced Set-up > Feeder Control > Settings).

Jog Reverse

This menu item allow you to run the feeder backward briefly, only as long as the Enter key is pressed. You must be in Manual control for this option to be available (see above). Also “Jog OK” must be enabled (see Main Menu > Advanced Set-up > Feeder Control > Settings), and “Belt Reversible”. Note: There is a settable parameter for a delay between running the belt forward and running the belt backward (see Main Menu > Advanced Set-up > Feeder Control > Settings > Numeric Data). This is to prevent damage to the motor or motor contactor.
Calibration

(Main Menu)

Selecting this item from the Main menu will present a screen asking you to enter a Password. The default factory setting for the Calibration password is “1234”. Upon successful entry of the password, you will be presented with the following list of options:

<table>
<thead>
<tr>
<th>Option</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Zero Procedure…</td>
<td></td>
</tr>
<tr>
<td>Weight Procedure…</td>
<td></td>
</tr>
<tr>
<td>Chain Procedure…</td>
<td></td>
</tr>
<tr>
<td>Speed Span…</td>
<td></td>
</tr>
<tr>
<td>Material Test…</td>
<td></td>
</tr>
<tr>
<td>ECal Procedure…</td>
<td></td>
</tr>
<tr>
<td>Weight Factor…</td>
<td></td>
</tr>
<tr>
<td>Chain Factor…</td>
<td></td>
</tr>
<tr>
<td>ECal Factor…</td>
<td></td>
</tr>
<tr>
<td>Numeric Data…</td>
<td></td>
</tr>
</tbody>
</table>
Zero Procedure

(Main Menu > Calibration > Zero Procedure)

This procedure “zeroes” the feeder calibration, accounting for all the dead load represented by the suspension, the belt, etc. Selection of this procedure from the above menu presents a screen that advises you to “Verify belt is empty”, and the current status of the test (0.0%).

Note: The Calibration procedures do not start the belt automatically. Before starting this procedure you must start the belt and see that it is empty. Also the belt should be allowed to run for at least 30 minutes if starting from cold.

From this screen, you simply press the Enter key to start the procedure, or the Menu/Esc key to cancel. Once the procedure is started, the percentage indicator will begin to increment, and the horizontal progress bar at the bottom of the screen will fill from left to right.

Once the procedure is complete (100.0%), a new screen will be displayed with the following data:

- Diff [x] 00.00%
- Curr: [x] 00.00 lb/ft (or kg/m)
- New: [x] 00.00 lb/ft (or kg/m)

Press to Accept test
Press “Menu/Esc” to reject test

Note: The subscript [x] refers to the load cell number, i.e. 1 or 2 (if two load cells are configured)

The percentage difference (“Diff”) is shown on the first line, and represents the difference between the current Zero Load, and the results of this procedure, relative to Design Load.

The current Zero Load (“Curr”) is shown on the next line.

The new Zero Load (“New” is shown on the third line. This value will become the current Zero Load if the results of this procedure are accepted.

To accept the results of this procedure, press the Enter key. If you do not wish to accept the results, and leave the zero value un-changed, press the Menu/Esc key.

Whichever key is pressed at this point, you will be returned to the Zero Procedure start screen so that you may easily run another procedure if desired. It is recommended that you run more than one test to verify that the feeder is repeatable.

Weight Procedure

(Main Menu > Calibration > Weight Procedure)

This is one of the available procedures that “span” the feeder calibration, or set its Scale Factor. Scale Factor is the parameter that relates counts from the Load Cell A/D (analog to digital) converter to belt load units (i.e. lb/ft or kg/m). Scale Factor will vary from feeder to feeder, depending on load cell size, weigh span, etc.
The Weight Procedure requires the placement of certified test weights directly to the scale suspension, usually as provided by Merrick. For assistance with correct use of Test Weights refer to the feeder Instruction Manual and/or the mechanical drawings provided by Merrick.

Note: The Weight Procedure requires that the correct Weigh Span value be entered prior to running the test (see Main Menu > Calibration > Numeric Data > Weigh Span).

Selection of this procedure from the above menu presents a screen that advises you to verify that the correct Calibration weights are applied to the feeder and the current status of the test (0.0%). The value of the Test Weights is shown and should be verified. To change this value see Main Menu > Calibration > Numeric Data > Test Weights.

Note: The Calibration procedures do not start the belt automatically. Before starting this procedure you must start the belt and see that the test Weights are in position. Also the belt should be allowed to run for at least 30 minutes if starting from cold.

From this screen, you simply press the Enter key to start the procedure, or the Menu/Esc key to cancel. Once the procedure is started, the percentage indicator will begin to increment, and the horizontal progress bar at the bottom of the screen will fill from left to right.

Once the procedure is complete (100.0%), a new screen will be displayed with the following data:

Diff [x] 00.00%
Curr: [x] 10000.00
New: [x] 10000.00

Press to Accept test
Press "Menu/Esc" to reject test

Note: The subscript [x] refers to the load cell number, i.e. 1 or 2 (if two load cells are configured)

The percentage difference ("Diff") is shown on the first line, and represents the difference between the current Scale Factor, and the results of this procedure, relative to the current Scale Factor.

The current Scale Factor ("Curr") is shown on the next line.

The new Scale Factor ("New" is shown on the third line. This value will become the current Scale Factor if the results of this procedure are accepted.

To accept the results of this procedure, press the Enter key. If you do not wish to accept the results, and leave the Scale Factor value un-changed, press the Menu/Esc key.

Whichever key is pressed at this point, you will be returned to the Weight Procedure start screen so that you may easily run another procedure if desired. It is recommended that you run more than one test to verify that the feeder is repeatable.
**Chain Procedure**

(Main Menu > Calibration > Chain Procedure)

This is one of the available procedures that “span” the feeder calibration, or set its Scale Factor. Scale Factor is the parameter that relates counts from the Load Cell A/D (analog to digital) converter to belt load units (i.e. lb/ft or kg/m). Scale Factor will vary from feeder to feeder, depending on load cell size, weigh span, etc.

The Weight Procedure requires the placement of a certified test chain onto the feeder belt, usually as provided by Merrick. For assistance with correct use of a Test Chain refer to the feeder Instruction Manual and/or the mechanical drawings provided by Merrick.

Selection of this procedure from the above menu presents a screen that advises you to verify that the correct Test Chain is applied to the feeder and the current status of the test (0.0%). The value of the Test Chain is shown and should be verified. To change this value see Main Menu > Calibration > Numeric Data > Test Weights.

Note: The Calibration procedures do not start the belt automatically. Before starting this procedure you must start the belt and see that the test Weights are in position. Also the belt should be allowed to run for at least 30 minutes if starting from cold.

From this screen, you simply press the Enter key to start the procedure, or the Menu/Esc key to cancel. Once the procedure is started, the percentage indicator will begin to increment, and the horizontal progress bar at the bottom of the screen will fill from left to right.

Once the procedure is complete (100.0%), a new screen will be displayed with the following data:

- Diff [x] 00.00%
- Curr: [x] 10000.00
- New: [x] 10000.00

Press to Accept test
Press “Menu/Esc” to reject test

Note: The subscript [x] refers to the load cell number, i.e. 1 or 2 (if two load cells are configured)

The percentage difference (“Diff”) is shown on the first line, and represents the difference between the current Scale Factor, and the results of this procedure, relative to the current Scale Factor.

The current Scale Factor (“Curr”) is shown on the next line.

The new Scale Factor (“New” is shown on the third line. This value will become the current Scale Factor if the results of this procedure are accepted.

To accept the results of this procedure, press the Enter key. If you do not wish to accept the results, and leave the Scale Factor value un-changed, press the Menu/Esc key.

Whichever key is pressed at this point, you will be returned to the Chain Procedure start screen so that you may easily run another procedure if desired. It is recommended that you run more than one test to verify that the feeder is repeatable.
Speed Span

(Main Menu > Calibration > Speed Span)

The Speed Span procedure is the process by which the controller relates the length of the belt (which you must enter) to the number of tacho pulses representing one belt revolution. It is very important for the accuracy of the speed calculation, for totalization and for the repeatability of Calibration procedures.

Note: Before you perform a Speed Span procedure, you must measure the belt accurately and enter the Belt Length into the Genetix controller (see Calibration > Numeric Data > Belt Length). Also the Speed Span procedure must be performed before all other calibration procedures.

The objective of this test is to allow the controller to count the number of pulses representing one belt revolution. To do this, either a switch on the Feeder Connection Board is used, or this User Interface. For this test, you should place a mark on the belt and select a suitable reference point to establish when the mark passes by. The belt must be running.

When you select the Speed Span procedure from the above menu, you will be presented a screen that shows the number of pulses from Tacho 1 (and Tacho 2, if configured). At the top of the screen you will also see a note showing you how many revolutions of the belt the controller is expecting you to run. Generally, more than one revolution of the belt is used, for accuracy (see Main Menu > Calibration > Numeric Data > Test Revs to set this parameter). The controller will divide total number of pulses counted by the number of revolutions to arrive at the number of pulses per rev ("Pulses/Belt Rev", see Main Menu > Calibration > Numeric Data > Pulses/Belt Rev x).

If your feeder is equipped with a Merrick Feeder Connection Board, with a switch, then you should turn the switch OFF. When you do this, the pulse counters on the display should stop incrementing. Press the Enter key to start counting pulses, and the display(s) should reset to zero.

When your mark on the belt passes your reference point, you should turn the switch to the ON position. Try to be as accurate as possible. While ON, the controller display should be incrementing pulses.

Allow the required number of belt revolutions to take place (see above), and when the mark again passes the reference point, again turn the switch OFF. Pulses should now stop.

At this point, press the Enter key to allow the controller to make the calculation of Pulses/Belt Rev. A new screen will be presented that shows the Current value and the New value. Press the Enter key again to accept the new value or the Menu/Esc key to exit without making any changes.

If your feeder is not equipped with a feeder connection board, or a switch, then use the following procedure to perform a Speed Span:

With the belt running, and the controller incrementing pulses, press the Enter key when your mark on the belt passes the reference point.

Allow the required number of belt revolutions to take place (see above), and when the mark again passes the reference point, press the Enter key to stop counting pulses and calculate Pulses/Belt Rev. A new screen will be presented that shows the
Current value and the New value. Press the Enter key again to accept the new value or the Menu/Esc key to exit without making any changes.

**Material Test**

*(Main Menu > Calibration > Material Test)*

When you select this procedure you will see another screen as follows:

<table>
<thead>
<tr>
<th>GCM Total</th>
<th>↑</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actual Total</td>
<td>↓</td>
</tr>
<tr>
<td>Run Procedure…</td>
<td></td>
</tr>
</tbody>
</table>

The purpose of a Material Test is to run a quantity of material over the scale (or feeder) and weight that quantity on a reference scale for comparison. The reference scale must be in known good condition and have an accuracy better than the desired accuracy of the Genetix. For example, if the Genetix controlled feeder is to have an accuracy of +/- 0.25%, the reference scale should have an accuracy of +/- 0.10%.

Note: Running a proper material test is complicated and can be very expensive, but is arguably the best way to calibrate your scale (or feeder). If you would like assistance organizing a well-run test, please contact the Merrick Customer Support department.

To run a Material Test procedure, first reset the Sub-Total totalizer (see Main Menu > Reset Totals > Reset Sub-Total). Then run a quantity of material over the scale that has either been pre-weighed or can be post-weighed on the reference scale.

Go to the Material test screen and the material will be totalized on the first line that says “GCM Total”.

After the material has been weighed on the reference scale, that total should be entered by highlighting the line that reads “Actual Total” and entering the actual total.

Once both values are present, highlight the line that reads “Run Procedure” and press the Enter key. A new screen will be displayed with the following data:

- **Diff [x] 00.00%**
- **Curr: [x] 10000.00**
- **New: [x] 10000.00**

Press to Accept test
Press “Menu/Esc” to reject test

Note: The subscript [x] refers to the load cell number, i.e. 1 or 2 (if two load cells are configured)

The percentage difference (“Diff”) is shown on the first line, and represents the difference between the current Scale Factor, and the results of this procedure, relative to the current Scale Factor.

The current Scale Factor (“Curr”) is shown on the next line.

The new Scale Factor (“New” is shown on the third line. This value will become the current Scale Factor if the results of this procedure are accepted.
To accept the results of this procedure, press the Enter key. If you do not wish to accept the results, and leave the Scale Factor value un-changed, press the Menu/Esc key.

Whichever key is pressed at this point, you will be returned to the Material Test screen so that you may easily run another procedure if desired. It is recommended that you run more than one test to verify that the feeder is repeatable.

Note: It is also possible to use the Material Test procedure to directly affect a change to the Calibration by entering numbers for both parameters that you select. You may enter arbitrary values for both “GCM Total” and “Actual Total” and run the procedure.

The error displayed is calculated as follows:

\[
\text{Error, } \% = \frac{(\text{GCM Total} - \text{Actual Total})}{\text{Actual Total}} \times 100\%
\]

So, if for example you believe the Genetix is reading 1% low, you can correct it directly by selecting appropriate numbers and running the Material Test procedure. In this example a set of numbers can be selected by entering a GCM total that is exactly 1% lower than the Actual total, for example GCM Total = 198, Actual Total = 200. (Note: All numbers must be greater than 100).

After you run the procedure and accept the results the Genetix should now agree with your reference.

**ECal Procedure**

*(Main Menu > Calibration > ECal Procedure)*

This procedure allows you to “span” the feeder calibration without having to use weights, a test chain or any other kind of load. Instead a calibration is performed based on the electrical signal that should be present under a given load. Before performing this procedure this value must be calculated ahead of time and entered in the Genetix controller (see *Main Menu > Calibration > Numeric Data > ECal Value*).

To perform this procedure, select it from the menu by pressing the Enter key.

**Weight Factor**

*(Main Menu > Calibration > Weight Factor)*

This procedure will calculate and store a new gravimetric Weigh Span (see *Main Menu > Calibration > Numeric Data > Weigh Span*) and should only be performed after an accurate Material Test (see *Main Menu > Calibration > Material Test*) or Chain Procedure (see *Main Menu > Calibration > Chain Procedure*). It is performed with Test Weights, exactly like a Weight Procedure.

Once the test is complete, and accepted, a change is made to the Weigh Span; it does not change the calibration (i.e. Scale Factor) of the feeder.

**Chain Factor**

*(Main Menu > Calibration > Chain Factor)*

This procedure will calculate and store a new Test Chain value (see *Main Menu > Calibration > Numeric Data > Test Chain*) and should only be performed after an accurate Material Test (see *Main Menu > Calibration > Material Test*). It is performed with a Test Chain exactly like a Chain Procedure.
Once the test is complete, and accepted, a change is made to the Test Chain value; it does not change the calibration of the feeder. Once the new Test Chain value is stored it is used for all future Chain Procedures.

**ECal Factor**

(Main Menu > Calibration > ECal Factor)

This procedure will calculate and store a new ECal Value (see Main Menu > Calibration > Numeric Data > ECal Value) and should only be performed after an accurate Material Test (see Main Menu > Calibration > Material Test) or Chain Procedure (see Main Menu > Calibration > Chain Procedure). Once the test is complete, and accepted, a change is made to the ECal Value; it does not change the calibration of the feeder.

It is performed exactly like an ECal Procedure. The feeder does not need to be running.

**Numeric Data**

(Main Menu > Calibration > Numeric Data)

In this menu you will find the following parameters that relate to the Calibration procedures. Most of these parameters must be correctly set before any Calibration procedures are performed.

**Belt Length**

(Main Menu > Calibration > Numeric Data)

Before the Calibration procedures can be performed correctly, the feeder belt must be measured accurately and the length entered here. This length should be measured to the nearest 1/8 inch (3mm), and entered in the units of length.

**Pulses/Belt Rev 1**

(Main Menu > Calibration > Numeric Data)

This is the number of pulses emitted by Tacho 1 for one revolution of the feeder belt. It can be estimated depending on the length of the belt, type of tacho, diameter of the pulley, etc. However, it will be accurately determined by the Genetix controller during a Speed Span procedure (see Calibration > Speed Span). You do not have to make an accurate calculation of this parameter and enter it, but you may refer to it here.

**Pulses/Belt Rev 2**

(Main Menu > Calibration > Numeric Data)

Note: This parameter will only appear in this menu if Tacho 2 is enabled (see Advanced Set-up > Configuration)

This is the number of pulses emitted by Tacho 2 for one revolution of the feeder belt. It can be estimated depending on the length of the belt, type of tacho,
diameter of the pulley, etc. However, it will be accurately determined by the Genetix controller during a Speed Span procedure (see Calibration > Speed Span). You do not have to make an accurate calculation of this parameter and enter it, but you may refer to it here.

**Test Revs**
*(Main Menu > Calibration > Numeric Data)*

This is the number of revolutions of the belt that will be counted for any and all of the Calibration procedures. It should normally be at least 2, but may be set higher for feeders with very high belt speed.

**Weigh Span**
*(Main Menu > Calibration > Numeric Data)*

This value represents the “Gravimetric Weigh Span”, which is a factor that relates load on the Load Cell(s) to Belt Load, as follows:

\[
\text{Load Cell load (lb, kg)} = \text{Belt Load (lb/ft, kg/m)} \times \text{Weigh Span (ft, m)}
\]

The units are those of length, but this parameter cannot always be directly measured. On a conveyor with equally spaced idlers it will usually be equivalent to the distance between idlers, however, on some scales there are pivots and ratios involved that complicate the calculation. Normally this parameter is calculated and entered at the factory.

Note: This value will be updated (changed) if a Weight Factor (see Calibration > Weight Factor) procedure is performed, for example after a Material Test (see Calibration > Material Test). In this way, future Weight Procedures (see Calibration > Weight Procedure) that are performed will check or update the controller calibration based on the results of the Material Test.

This value must be correct if a Weight Procedure is to correctly calibrate the controller.

**Test Weight**
*(Main Menu > Calibration > Numeric Data)*

This is usually the total value of the test weights applied to the scale during a Weight Procedure (see Calibration > Weight Procedure). If weights are applied to both sides of the scale or feeder, the sum of all weights should be entered here. The units are those of weight (lb, kg) and the test weights should be stamped with their correct value by the factory.

Note: Removable brackets, pegs, etc. that are used to hang the test weights must be included in the sum. Normally all such pieces will be stamped with their correct weight by the factory.
**Test Chain**  
(Main Menu > Calibration > Numeric Data)  
This is usually the total value of the test chain applied to the scale during a Chain Procedure (see Calibration > Chain Procedure). The units are those of load (lb/ft, kg/m) and the test chain should be stamped with its correct value by the factory.

**ECal LC1 Value**  
(Main Menu > Calibration > Numeric Data)  
This is the calculated output of the weighing mechanism in mV/V (millivolts per volt) at Design Load, for loadcell number 1. This can be difficult to calculate accurately and will usually be done by Merrick. However, in general, it can be calculated as follows

\[
\text{ECal, mV/V} = \frac{L_d \times WS \times SLc}{WLc}
\]

Where

- \(L_d\) = Design Load (i.e. lb/ft or kg/m)  
- \(WS\) = Gravimetric Weigh Span (i.e. ft or m)  
- \(SLc\) = Actual output of loadcell (or loadcells) at rated capacity (mV/V)  
- \(WLc\) = Rated capacity of loadcell (or loadcells) (i.e. lb or kg)

When performing this calculation, it is important to use the actual output of the loadcell (SLc) as certified by the manufacturer, as this can be very different than the nominal output. Also, the determination of Weigh Span can sometimes be tricky (see Main Menu > Calibration > Numeric Data > Weigh Span). Contact the Merrick Customer Support department for assistance if required.

**ECal LC2 Value**  
(Main Menu > Calibration > Numeric Data)  
This is the calculated output of the weighing mechanism in mV/V (millivolts per volt) at Design Load, for loadcell number 2. It is calculated the same as for loadcell number 1, above. This value only appears in the menu, if 2 loadcells are configured (see Main Menu > Advanced Setup > Configuration).

**Zero Tracking**  
(Main Menu > Calibration > Numeric Data > Zero Tracking)  
Note: This item will only appear in this menu if Zero Tracking is enabled (see Advanced Set-up > Configuration).

Zero Tracking (also known as “Auto-Zero”) is a process by which a belt feeder or belt conveyor can be allowed to zero itself, while running, if certain conditions are met. Errors in Zero are the most significant source of poor accuracy and so this can be a very powerful means to improve your performance of your belt scale (or feeder).
Good candidates for Zero Tracking are those feeders or conveyors that occasionally run empty for the period of time necessary to perform a Zero test, and those belt scales that require the utmost accuracy (i.e. certified scales).

Following are the list of parameters involved in Zero Tracking, and how to properly set them.

To enable Zero Tracking, you must first select Zero Tracking from the Configuration menu, and enable it (set it to “Y(es)”). Once enabled, the following settings will be found:

- **Load Limit**
  This value is used to determine whether or not the belt is truly empty. If the measured belt load drops below this value, the “Wait Time” timer starts (see below). If the belt load exceeds this value anytime during the “Wait Time”, then the current Zero Track process is abandoned. Once the belt load drops below this limit again another “Wait Time” period is started. The units for this parameter are those of Load (i.e. lb/ft, kg/m).

  Note: An exception can be made for belts with a bad section (i.e. a mechanical splice) that might normally cause abandonment of a Zero Track process (see “Splice Allowance” below).

- **Wait Time**
  The “Wait Time” value is the delay time that the controller will wait after all conditions have been met before actually beginning a Zero Tracking sequence. For example, the belt must be running empty (see “Load Limit” above) and the “Start Delay” (see below) must have expired before the process of zeroing the belt will begin. Units are seconds.

- **Increment Limit**
  This parameter is the maximum allowed incremental change of the Zero Load, as the result of any one Zero Tracking process. If the calculated correction is above this parameter then no change is made. The units for this parameter are
those of Load (i.e. lb/ft, kg/m). To prevent zeroing a belt when material may actually be present, this value should be set very low.

**Absolute Limit**

This parameter is the maximum allowed total change of the Zero Load. As successive Zero Tracking processes are performed, the sum of all tests is accumulated. If this sum exceeds the “Absolute Limit” then no change is made. The Logical Output “Zero Track Fail” will occur if the change is within the increment limit but outside the absolute limit. Limits are minimum of 0 and maximum of <later> % of the Design Load. To prevent

**Start Delay**

This parameter is the hold off time at power up (coldstart) to keep controller from starting and running Zero Tracking on a cold belt. The units are seconds.

**Splice Allowance**

On some belts there is a section around the splice that causes the measured belt load to “spike” (rapidly increase) then fall back to normal just as quickly. This spike can be high enough to abort the Zero Tracking process, prohibiting it from ever completing. The Splice Allowance parameter allows the controller to ignore a spike in belt load if it occurs for less than the specified amount of belt travel. That section of the belt is not used in the zero calculation

The units of the Splice Allowance are those of length (i.e. ft or m). Setting this parameter to zero defeats this allowance.

**Warnings**

Warnings are logical conditions that may occur of which you wish to be notified. Warnings are informational only and will not affect the process. Any Logical Input or Output can be used to trigger a Warning. To set a Logical I/O point as a Warning, see Main Menu > Advanced Setup > Digital I/O > Warnings/Faults.

If any Warning occurs, you will see a Warning icon on the bottom of the Main Screen, like this:

![Warning Icon]

Selecting “Warnings” from the Main Menu will present a screen that shows a list of all Logical Inputs and Logical Outputs that have had their “Warning” property set. You may also press the Warning icon (shown above) to jump right to this screen. Next to each input or output, you will see one of the following labels,
<table>
<thead>
<tr>
<th>Label</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;blank&gt;</td>
<td>No Warning has occurred (since last reset)</td>
</tr>
<tr>
<td>“Warn-Off”</td>
<td>Warning occurred, but is not now present (may be reset)</td>
</tr>
<tr>
<td>“Warn-ON”</td>
<td>Warning occurred and is still present</td>
</tr>
</tbody>
</table>

If a Logical I/O point shows the label “Warn-Off”, that means that condition did occur but is no longer present. You may scroll to that item, select it and then press the key shown below to reset just the highlighted warning.

![Checkmark]

If a Logical I/O point shows the label “Warn-ON”, then this means the condition is still present and it may not be Reset. The logical condition must no longer be present before a Warning can be reset.

When all Warnings have been reset, the Warning icon will disappear from the main display.

Note: You may reset all Warnings by pressing the button shown below.

![Checkmarks]

Of course, only logical conditions that are currently in the “Warn-Off” state will be reset.

### Faults

Faults are logical conditions that may occur and which will stop the feeder. Any Logical Input or Output can be set to trigger a Fault. To set a Logical I/O point as a Fault, see Main Menu > Advanced Setup > Digital I/O > Warnings/Faults. Note: you should use careful judgement in setting Faults; if they occur, they will cause the feeder to stop.

If any Fault occurs, you will see the Fault icon on the bottom of the Main screen, like this:

![Exclamation]

Selecting “Faults” from the Main menu will present a screen that shows a list of all Logical Inputs and Logical Outputs that have had their “Fault” property set. You may also press the Fault icon (shown above) to jump right to this screen. Next to each input or output, you will see one of the following labels,
<table>
<thead>
<tr>
<th>Label</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;blank&gt;</td>
<td>No Fault has occurred (since last reset)</td>
</tr>
<tr>
<td>“Fault-Off”</td>
<td>Fault occurred, but is not now present (may be reset)</td>
</tr>
<tr>
<td>“Fault-ON”</td>
<td>Fault occurred and is still present</td>
</tr>
</tbody>
</table>

If a Logical I/O point shows the label “Fault-Off”, that means that condition did occur but is no longer present. You may scroll to that item, select it and then press the key shown below to reset.

![Reset button]

If a Logical I/O point shows the label “Fault-ON”, then this means the condition is still present and it may not be Reset. The logical condition must no longer be present before a Fault can be reset.

When all Faults have been reset, the Fault icon will disappear from the main display.

Note: You may reset all Faults by pressing the button shown below.

![Reset button]

Of course, only logical conditions that are currently in the “Fault-Off” state will be reset.

**Display Settings**

These settings determine what is displayed on the main screen, and to a certain extent how it is displayed.

- **Upper**

  *(Main Menu > Display Settings)*

  This item allows you to select what variable is displayed on the upper line of the main screen. You may select from the following list
Lower
(Main Menu > Display Settings)

This item allows you to select what variable is displayed on the lower line of the main screen. You may select from the same list as above.

Note: While at the main screen, it is also possible to scroll the lower display through the available options with the Up/Down arrow keys. This allows you to quickly observe different data. Whichever display option you last scroll to will remain the selection for the lower display until you change it, either by scrolling or through the Display Settings menu as described above.

Damping

These parameters allow you to “damp” (i.e. “smooth) the displayed values, causing the display to be more stable and therefore more readable. The variables that may thus be damped are selectable from the following list:

<table>
<thead>
<tr>
<th>Variable</th>
<th>(Up)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feedrate</td>
<td></td>
</tr>
<tr>
<td>Speed</td>
<td></td>
</tr>
<tr>
<td>Load</td>
<td></td>
</tr>
</tbody>
</table>

The Speed and Load damping parameters are settable from 0 to 100, where 0 is no damping, and 100 is maximum. Note: Damping is not linear, so a setting of 10 is much greater than 1, and should usually be sufficient. Too much damping will cause the display to respond so slowly that process changes may not be visible.

Feedrate damping is settable from 1 to 33, and behaves more linearly.

Damping affects the specific displayed value, and the value presented as an Analog output (if configured), but does not affect the process.
**Graph Setup**

These parameters allow you to configure the graph (one of the screens available as you press the Right arrow key from the Main screen). You may select what variables to plot, the scale for each variable, and the plot update time.

Note: You may select variables from any feeder that is on-line, or from more than one feeder that is on-line. This is independent of the feeder selected for display on the Main screen.

**Basic Setup**

These are the basic parameters for all Belt applications. Selecting this item from the Main menu will present a screen asking you to enter a Password. The default factory setting is “5678”. Upon successful entry of the password, you will be presented with the following list of parameters:

<table>
<thead>
<tr>
<th>Units…</th>
<th>↑</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decimal Points…</td>
<td></td>
</tr>
<tr>
<td>Design Capacities…</td>
<td>↓</td>
</tr>
</tbody>
</table>

These parameters must be set correctly before any other settings. If you later change any of the above, other settings (i.e. Limits) may not behave correctly and also need to be reset.

**Units**

(Main Menu > Basic Set-up)

This parameter refers to the Units in which data are displayed. There are imperial and metric units for the following data: Belt Speed (i.e. ft/min, m/s, m/min); Belt Load (i.e. lb/ft, kg/m); Totals (i.e. TN, kg, t); Lengths (i.e. ft, m); Feedrate (i.e. lb/min, lb/h, TN/h, kg/min, kg/h, t/h). The most common combinations of the above units are presented in groups. You should select the group that best suits your needs.

**Decimal Points**

(Main Menu > Basic Set-up)

These parameters select the number of digits to the right of the decimal point for the following data: Weight/Load; Totals; Length; Feedrate; Speed. The maximum number of decimal places for any of these data is four. They may be set individually and will determine the precision with which the data are displayed or entered. For example if the units of Length have been set to meters (m), and the number of decimal places to 3, then you may enter length data, and it will be displayed, to the nearest millimeter.

When you select Units from the Basic Setup menu, the current setting is highlighted. You may scroll up or down to select a new group, then press Enter.
**Design Capacities**

*(Main Menu > Basic Set-up)*

When you select this item, the following basic feeder design parameters are listed with their current settings:

**Design Load**

*(Main Menu > Basic Set-up > Design Capacities)*

This parameter represents the belt loading that the feeder has been designed for in normal operation. Typically it is set at the maximum load expected. It is set in Load units (i.e. lb/ft, kg/m), and with the number of decimal places specified.

**Design Feedrate**

*(Main Menu > Basic Set-up > Design Capacities)*

This parameter represents the feedrate that the feeder has been designed for in normal operation. Typically this is specified by the buyer. It is set in Rate units (i.e. lb/min, lb/h, TN/h, kg/min, kg/h, t/h), and with the number of decimal places specified.

**Design Speed**

*(Main Menu > Basic Set-up > Design Capacities)*

This parameter represents the speed that the feeder has been designed for in normal operation. Typically it is slightly less than the maximum speed possible. It is set in Speed units (i.e. ft/min, m/s, m/min), and with the number of decimal places specified.

**Advanced Setup**

*(Main Menu > Advanced Setup)*

These are the more advanced settings for all Belt applications. These settings are typically configured at the factory (by Merrick), and so it is possible you may not need to change them.

Selecting this item from the Main menu will present a screen asking you to enter a Password. The default factory setting is “3010”. Upon successful entry of the password, you will be presented with the following list:
Feeder Control…
Limits…
Load Cells…
Tachos…
Process Control…
Analog I/O…
Digital I/O…
Totalizer…
Feeder Peripherals…
Communications…
Date & Time…
Passwords…
GCM Name…
Direct Param Edit…
Configuration…

Note: Some of the above items may not appear, depending on the Configuration settings (see Main Menu > Advanced Setup > Configuration)

Selection of one of the entries from the above list will present further selections in each category as shown below

**Feeder Control**
(Main Menu > Advanced Setup > Feeder Control)

Note: This item will appear in the menu only if Feeder Control is enabled (see Main Menu > Advanced Setup > Configuration > Feeder Control).

Selecting this menu item, you will be presented with the following menu:
Control
This refers to whether feeder control is to be automatic (uses feedback to control), or manual (Belt Speed Demand is manually entered). The two choices for this setting are:

Manual
With this control option selected, you must enter the desired Belt Speed Demand from the keypad. This signal is sent directly to the belt speed control device, and there is no attempt to control it. This mode is generally used for maintenance purposes as it allows you to control the belt speed in a straightforward manner.

Once you set Control for “Manual”, the Feeder Control menu (see Main Menu > Feeder Control) is used to start and stop the feeder and set the speed.

Note: “Manual” is equivalent to setting control source to “Local”, and control method to “Open Loop” (see below).

Auto
With this control option selected various forms of automatic control become available, such as Feedrate control and Speed control. These functions all involve some sort of feedback and therefore control the process variable based on control method (see below).

Source
This refers to the source from which the setpoint (control variable) will be obtained. The choices for this setting are:
**Local**

“Local” refers to control from the User Interface. Once you set the control source to Local, the Feeder Control menu (see Main Menu > Feeder Control) is used to start and stop the feeder and enter the setpoint.

**Remote (Analog)**

“Remote (Analog)” refers to control from an outside source as follows:

Setpoint is determined from an analog signal. Note: An analog input must be mapped to the appropriate control variable (see Main Menu > Advanced Setup > Analog I/O > Inputs > Function).

Feeder Start/Stop is controlled by the Logical input “Run Permission”. Typically this is mapped to a Physical input for remote control (see Main Menu > Advanced Setup > Digital I/O).

**Network (Serial)**

“Network (Serial)” refers to control from an outside source as follows:

Setpoint is determined from a Network source (i.e. PLC). Note: A Network input must be mapped to the appropriate control variable (see Main Menu > Advanced Setup > Analog I/O > Inputs > Network).

Feeder Start/Stop is controlled by the Logical input “Run Permission”. Typically this is mapped to a Network input for remote control, but it could be a Physical input instead (see Main Menu > Advanced Setup > Digital I/O).

**Method**

This refers to the method of control, or what the controlled variable is to be. The choices for this setting are:

- Rate Control
- Speed Control
- Open Loop
Rate Control
If set for “Rate Control”, feedrate is the controlled variable. The controller will attempt to maintain a feedrate setpoint.

Speed Control
If set for “Speed Control”, belt speed is the controlled variable. The controller will attempt to maintain a speed setpoint.

Open Loop
If set for “Open Loop” the setpoint is mapped directly to Belt Speed Demand, with no attempt at control.

Settings
These are settings that enable/disable or control various functions relative to Feeder Control. The settings are:

| Belt Reversible | ↑ |
| AutoStart       |   |
| RP Start/Stop in Local | |
| Jog OK          |   |
| Lock Source     |   |
| Lock Method     |   |
| Clamp Setpoint to Limits | |
| Clamp Spd Demand to Limits | |
| Fast Start      |   |
| Numeric Data…  | ↓ |

Belt Reversible
If belt is reversible, that is it is connected to a control device that can reverse the belt direction through inputs, this should be turned on (set to “Y”). This will enable certain additional Logic inputs that can be used to run the belt in reverse.

AutoStart
If this feature is enabled, the feeder will start anytime the Logical input “Run Permission” is on. If this is mapped to a Physical input and that Physical input is on after a reset, the feeder will start automatically. This is not generally recommended, but available.
RP Start/Stop in Local
If enabled, this feature allows the Logical input “Run Permission” to start and stop the feeder when the Feeder Control source is set to “Local”.

Jog OK
This feature enables “jogging” the belt, which refers to running the belt for brief period, only as long as a button is pressed (see Main Menu > Feeder Control). Also, if “Belt Reversible” is enabled (see above), jogging the belt in reverse is also enabled by this setting.

Lock Source
If this is turned on you will not be able to change the Feeder Control source (see Main Menu > Advanced Setup > Feeder Control > Source). This is to protect the process from inadvertent changes that might cause a setpoint change.

Lock Method
If this is turned on you will not be able to change the Feeder Control method (see Main Menu > Advanced Setup > Feeder Control > Method). This is to protect the process from inadvertent changes that might cause a setpoint change.

Clamp SetP to Limits
If this feature is enabled, the setpoint (i.e. Feedrate or Speed) will be “clamped” to its Limits, which are settable (see Main Menu > Advanced Setup > Limits). This means no value outside of the limits will be accepted, regardless of source, and the resultant value will be set to the appropriate limit. This can be used for example to set the maximum rate that a feeder is allowed to run, or the minimum.

Clamp Spd Dem to Limits
If this feature is enabled, the Belt Speed Demand will be “clamped” to its Limits, which are settable (see Main Menu > Advanced Setup > Limits). This means no value outside of the limits will be accepted, and the resultant value will be set to the appropriate limit.

Fast Start
If this feature is enabled, the belt feeder will attempt to “jump” at start to the correct speed for the current setpoint. For this to happen, the following must be true:

- This feature must be enabled
- The feeder control method must be “Feedrate” (see Main Menu > Advanced Setup > Feeder Control > Method)
- The “Use Head Load” feature must be enabled (see Main Menu > Advanced Setup > Configuration > Use Head Load)
- The current head load must be greater than 1% of Design Load

At start, the Genetix will calculate the desired Belt Speed Demand using the Head Load (belt load), the Setpoint, and the Speed Factor. It will immediately
start at this speed, limited only by the acceleration set by the user (see *Main Menu > Advanced Setup > Process Control > Accel/Decel*). After jumping to this initial speed, closed loop control takes over and regulates the speed appropriately.

**Numeric Data…**

These are various data that affect feeder control.

**Belt Reverse Delay**

This is a time delay, set in seconds, that holds off reversing the belt if it is running. This allows the motor to coast down before re-starting in a different direction.

**Limits**

(*Main Menu > Advanced Setup > Limits*)

Limits provide alarm functionality for selected process parameters. If the actual value moves outside of the limits set here, Logical outputs are set and/or clamping can take place. All Limits have “Delay” settings to prevent nuisance alarms if the process variable only momentarily exceeds its Limit. The process values that may have Limits set are:

```
Feedrate… ✆
Load…
Speed…
Setpoint…
Belt Speed Demand… ✅
```
### Feedrate

The following settings are available for Feedrate limits:

<table>
<thead>
<tr>
<th>Setting</th>
<th>Icon</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Feedrate</td>
<td>↑</td>
</tr>
<tr>
<td>Low Feedrate</td>
<td></td>
</tr>
<tr>
<td>High Feedrate Delay</td>
<td></td>
</tr>
<tr>
<td>Low Feedrate Delay</td>
<td></td>
</tr>
<tr>
<td>High Abs Deviation</td>
<td></td>
</tr>
<tr>
<td>Low Abs Deviation</td>
<td></td>
</tr>
<tr>
<td>High Rel Deviation</td>
<td></td>
</tr>
<tr>
<td>Low Rel Deviation</td>
<td></td>
</tr>
<tr>
<td>High Deviation Delay</td>
<td></td>
</tr>
<tr>
<td>Low Deviation Delay</td>
<td>↓</td>
</tr>
</tbody>
</table>

#### High Feedrate

If the actual feedrate exceeds this limit for duration longer than the High Feedrate Delay value (see below) then the logical output “High Feedrate” is set. Note that this setting is independent of setpoint, and will activate anytime the limit is exceeded, even if the intended rate is higher than the limit. The High Feedrate and Low Feedrate limits are usually used with Belt Weighers or Belt Scales where there is no closed loop control over feedrate. This limit is set in units of feedrate.

#### Low Feedrate

If the actual feedrate drops below this limit for duration longer than the Low Feedrate Delay value (see below) then the logical output “Low Feedrate” is set. This limit is set in units of feedrate.

Note this limit is only active under the following conditions:

- Feeder Control is enabled (see Main Menu > Advanced Setup > Configuration > Feeder Control) and the belt is commanded to run.
- Feeder control is not enabled and the logical input “Belt Running” is on.
- No calibration routine is running.

#### High Feedrate Delay

This value provides a delay for the High Feedrate limit, in order to prevent nuisance alarms. The feedrate must remain above the limit value for duration
as long as this delay value for the logical output to be set. This delay value is set in seconds.

Low Feedrate Delay
This value provides a delay for the Low Feedrate limit, in order to prevent nuisance alarms. The feedrate must remain below the limit value for duration as long as this delay value for the logical output to be set. This delay value is set in seconds.

Note: The following feedrate limits will appear in the menu only if Feeder Control is enabled (see Main Menu > Advanced Setup > Configuration > Feeder Control).

High Abs Deviation
If the actual feedrate exceeds the setpoint by this amount for duration longer than the High Deviation Delay value (see below) then the logical output “High Feedrate” is set. This limit is set in units of feedrate.

Low Abs Deviation
If the actual feedrate drops below the setpoint by this amount for duration longer than the Low Deviation Delay value (see below) then the logical output “Low Feedrate” is set. This limit is set in units of feedrate.

High Rel Deviation
If the actual feedrate exceeds the setpoint by this percentage for duration longer than the High Deviation Delay value (see below) then the logical output “High Feedrate” is set. This limit is set in units of percent.

Low Rel Deviation
If the actual feedrate drops below the setpoint by this percentage for duration longer than the Low Deviation Delay value (see below) then the logical output “Low Feedrate” is set. This limit is set in units of percent.

High Deviation Delay
This value provides a delay for the High Deviation limits, in order to prevent nuisance alarms. The feedrate must remain above the limit value for duration as long as this delay value for the logical output to be set. This delay value is set in seconds.

Low Deviation Delay
This value provides a delay for the Low Deviation limits, in order to prevent nuisance alarms. The feedrate must remain below the limit value for duration as long as this delay value for the logical output to be set. This delay value is set in seconds.
Load

The following settings are available for Load limits:

<table>
<thead>
<tr>
<th>Setting</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Belt Load</td>
<td>↑</td>
</tr>
<tr>
<td>Low Belt Load</td>
<td></td>
</tr>
<tr>
<td>High Belt Load Delay</td>
<td></td>
</tr>
<tr>
<td>Low Belt Load Delay</td>
<td>↓</td>
</tr>
</tbody>
</table>

**High Belt Load**

If the actual belt load exceeds this limit for duration longer than the High Belt Load Delay value (see below) then the logical output “High Belt Load” is set. This limit is set in units of belt load.

**Low Belt Load**

If the actual belt load drops below this limit for duration longer than the Low Belt Load Delay value (see below) then the logical output “Low Belt Load” is set. This limit is set in units of belt load.

Note this limit is only active under the following conditions:

- Feeder Control is enabled (see Main Menu > Advanced Setup > Configuration > Feeder Control) and the belt is commanded to run.
- Feeder control is not enabled and the logical input “Belt Running” is on.
- No calibration routine is running.

**High Belt Load Delay**

This value provides a delay for the High Belt Load limit, in order to prevent nuisance alarms. The belt load must remain above the limit value for duration as long as this delay value for the logical output to be set. This delay value is set in seconds.

**Low Belt Load Delay**

This value provides a delay for the Low Belt Load limit, in order to prevent nuisance alarms. The belt load must remain below the limit value for duration as long as this delay value for the logical output to be set. This delay value is set in seconds.
### Speed

The following settings are available for Speed limits:

<table>
<thead>
<tr>
<th>Setting</th>
<th>Setting Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Belt Speed</td>
<td>↑</td>
</tr>
<tr>
<td>Low Belt Speed</td>
<td></td>
</tr>
<tr>
<td>High Belt Speed Delay</td>
<td></td>
</tr>
<tr>
<td>Low Belt Speed Delay</td>
<td>↓</td>
</tr>
</tbody>
</table>

**High Belt Speed**

If the actual belt speed exceeds this limit for duration longer than the High Belt Speed Delay value (see below) then the logical output “High Belt Speed” is set. This limit is set in units of belt speed.

**Low Belt Speed**

If the actual belt speed drops below this limit for duration longer than the Low Belt Speed Delay value (see below) then the logical output “Low Belt Speed” is set. This limit is set in units of belt speed.

Note this limit is only active under the following conditions:

- Feeder Control is enabled (see *Main Menu > Advanced Setup > Configuration > Feeder Control*) and the belt is commanded to run.
- Feeder control is not enabled and the logical input “Belt Running” is on.

**High Belt Speed Delay**

This value provides a delay for the High Belt Speed limit, in order to prevent nuisance alarms. The belt speed must remain above the limit value for duration as long as this delay value for the logical output to be set. This delay value is set in seconds.

**Low Belt Speed Delay**

This value provides a delay for the Low Belt Speed limit, in order to prevent nuisance alarms. The belt speed must remain below the limit value for duration as long as this delay value for the logical output to be set. This delay value is set in seconds.

### Setpoint

The following settings are available for Setpoint limits:

Note: The following setpoint limits will appear in the menu only if Feeder Control is enabled (see *Main Menu > Advanced Setup > Configuration > Feeder Control*).
Max Rate Setpoint
This is the maximum allowed setpoint, and the logical output “High Setpoint” will be set if it is exceeded for longer than the duration set by the limit “Max Rate SP Delay” (see below). This limit is set in units of feedrate.

Note also that if setpoint clamping is enabled (see Main Menu > Advanced Setup > Feeder Control > Settings), the setpoint used by the controller will be clamped to this limit value even if it exceeded. However, in this case the logical output “High Setpoint” will still be set.

Min Rate Setpoint
This is the minimum allowed setpoint, and the logical output “Low Setpoint” will be set if the setpoint drops below this limit for longer than the duration set by the limit “Min Rate SP Delay” (see below). This limit is set in units of feedrate.

Note also that if setpoint clamping is enabled (see Main Menu > Advanced Setup > Feeder Control > Settings), the setpoint used by the controller will be clamped to this limit value even if it drops below. However, in this case the logical output “Low Setpoint” will still be set.

Note this limit is only active under the following conditions:

- Feeder Control is enabled (see Main Menu > Advanced Setup > Configuration > Feeder Control) and the belt is commanded to run.
- Feeder control is not enabled and the logical input “Belt Running” is on.
- No calibration routine is running.

Note that the Max and Min Rate Setpoint limits are active only if the Feeder Control Method is set to “Rate Control” (see Main Menu > Advanced Setup > Feeder Control > Method)
**Max Rate SP Delay**

This value provides a delay for the High Rate Setpoint limit, in order to prevent nuisance alarms. The feedrate setpoint must remain above the limit value for duration as long as this delay value for the logical output to be set. This delay value is set in seconds.

**Min Rate SP Delay**

This value provides a delay for the Low Rate Setpoint limit, in order to prevent nuisance alarms. The feedrate setpoint must remain below the limit value for duration as long as this delay value for the logical output to be set. This delay value is set in seconds.

**Max Speed Setpoint**

This is the maximum allowed speed setpoint, and the logical output “High Setpoint” will be set if it is exceeded for longer than the duration set by the limit “Max Speed SP Delay” (see below). This limit is set in units of speed.

Note also that if setpoint clamping is enabled (see Main Menu > Advanced Setup > Feeder Control > Settings), the setpoint used by the controller will be clamped to this limit value even if it exceeded. However, in this case the logical output “High Setpoint” will still be set.

**Min Speed Setpoint**

This is the minimum allowed setpoint, and the logical output “Low Setpoint” will be set if the setpoint drops below this limit for longer than the duration set by the limit “Min SpeedSP Delay” (see below). This limit is set in units of speed.

Note also that if setpoint clamping is enabled (see Main Menu > Advanced Setup > Feeder Control > Settings), the setpoint used by the controller will be clamped to this limit value even if it drops below. However, in this case the logical output “Low Setpoint” will still be set.

Note this limit is only active under the following conditions:

- Feeder Control is enabled (see Main Menu > Advanced Setup > Configuration > Feeder Control) and the belt is commanded to run.
- Feeder control is not enabled and the logical input “Belt Running” is on.
- No calibration routine is running.

Note that the Max and Min Speed Setpoint limits are active only if the Feeder Control Method is set to “Speed Control” (see Main Menu > Advanced Setup > Feeder Control > Method)

**Max Speed SP Delay**

This value provides a delay for the High Speed Setpoint limit, in order to prevent nuisance alarms. The Speed setpoint must remain above the limit value for duration as long as this delay value for the logical output to be set. This delay value is set in seconds.

**Min Speed SP Delay**

This value provides a delay for the Low Speed Setpoint limit, in order to prevent nuisance alarms. The Speed setpoint must remain below the limit value for
duration as long as this delay value for the logical output to be set. This delay value is set in seconds.

**Belt Speed Demand**

The following settings are available for Belt Speed Demand limits:

*Note: The following setpoint limits will appear in the menu only if Feeder Control is enabled (see *Main Menu > Advanced Setup > Configuration > Feeder Control*).*

<table>
<thead>
<tr>
<th>Max Belt Spd Demand</th>
<th>↑</th>
</tr>
</thead>
<tbody>
<tr>
<td>Min Belt Spd Demand</td>
<td></td>
</tr>
<tr>
<td>Max Spd Demand Delay</td>
<td></td>
</tr>
<tr>
<td>Min Spd Demand Delay</td>
<td>↓</td>
</tr>
</tbody>
</table>

**Max Belt Spd Demand**

If the actual belt speed demand (i.e. controlled variable, or “CV”) exceeds this limit for duration longer than the Max Spd Demand Delay value (see below) then the logical output “High PID CV” is set. This limit is set in units of percent.

Note also that if speed demand clamping is enabled (see *Main Menu > Advanced Setup > Feeder Control > Settings*), the speed demand used by the controller will be clamped to this limit value even if the PID calculation yields a larger value. However, in this case the logical output “High PID CV” will still be set.

**Min Belt Spd Demand**

If the actual belt speed demand drops below this limit for duration longer than the Min Belt Speed Delay value (see below) then the logical output “Low PID CV” is set. This limit is set in units of percent.

Note this limit is only active under the following conditions:

- Feeder Control is enabled (see *Main Menu > Advanced Setup > Configuration > Feeder Control*) and the belt is commanded to run.
- Feeder control is not enabled and the logical input “Belt Running” is on.

Note also that if speed demand clamping is enabled (see *Main Menu > Advanced Setup > Feeder Control > Settings*), the speed demand used by the controller will be clamped to this limit value even if the PID calculation yields a smaller value. However, in this case the logical output “Low PID CV” will still be set.

**Max Spd Demand Delay**

This value provides a delay for the Max Speed Demand limit, in order to prevent nuisance alarms. The belt speed demand must remain above the limit
value for duration as long as this delay value for the logical output to be set. This delay value is set in seconds.

**Min Spd Demand Delay**

This value provides a delay for the Min Belt Speed Demand limit, in order to prevent nuisance alarms. The belt speed demand must remain below the limit value for duration as long as this delay value for the logical output to be set. This delay value is set in seconds.

### Load Cells

(*Main Menu > Advanced Setup > Load Cells*)

Selecting this menu item, you will be presented with the following menu:

| Function… | ↑ |
| Settings… |   |
| Numeric Data… | ↓ |

#### Function

The following menu lists all the available functions for the load cell functionality.

Note: Some functions require two load cells and so will only appear if two load cells have been configured (see *Main Menu > Advanced Setup > Configuration > Load Cell n*)

| First Only | ↑ |
| Second Only |   |
| Both |   |
| Auto Bypass |   |
| Inferred Load |   |
| Analog Input |   |
| From Network | ↓ |
**First Only**

Only one load cell, or group of load cells in parallel, is connected and they are connected to Load Cell Channel 1 on the GCM. This is the most basic level of functionality with no special features.

**Second Only**

Same as “First Only” above, except load cells are connected to Channel 2 on the GCM.

**Both**

This requires load cells be connected to both GCM load cell channels. The load will be determined by averaging the inputs from both channels.

**Auto Bypass**

This requires load cells to be connected to both GCM load cell channels. The load will be determined by averaging the inputs from both channels, but in addition, the two channels will be monitored individually and if a difference greater than the allowable is observed, the Load Cell Function can be observed to switch to “Bypassed”. This assumes that the difference is being caused by a failure in the weighing system and the load cannot reliably be measured by the load cells. “Bypassed” is a form of Inferred Load feeding (see below).

While in Inferred Load mode, the load is not being measured but rather is set to a value that has been established by the Genetix controller based on history, or can be set by the user. Once the problem is corrected, the controller can be switched back to gravimetric mode by setting the Load Cell Function back to “Auto Bypass”.

Switching to “Bypassed” also turns the Logical output “Load Imbalance” on. Typically this is set as a Warning to advise the user that a load balance has occurred and that the feeder is using Inferred Load for control.

**Inferred Load**

The user may force the controller to Inferred Load mode if no load cells are available. The belt load will be fixed and as set by the Inferred Load value (see Main Menu > Advanced Setup > Load Cells > Numeric Data).

Note: If a Material on Belt switch is enabled (see Main Menu > Advanced Setup > Configuration > Material on Belt Sw), then the Inferred Load value will be controlled by this switch. When the switch is on, the load used will be as set by the Inferred Load parameter, if the switch is off (no Material on Belt), then the load value will be set to zero.

This feature is most often used for a volumetric belt feeder that does not feed by weight.
Analog Input
Load information is generated by an analog input. Note that the load value must be calibrated using an analog input calibration procedure. Negative load values on the analog input are not allowed and are replaced with zero.

This setting is most commonly used when there is a weight transmitter available with a high level (i.e. 4-30mA) analog output representing belt load.

From Network
Load information is written to the GCM by means of communications. Note that the load value must be written as a floating point number in engineering units.

This setting can be used when there are no load cells but there is a signal available from the Network that represents belt load.

Settings
Inf Load AutoUpdate
This setting must be enabled to automatically update the Inferred Load value while the feeder is running. If normal operation with load cells is maintained for one belt revolution, within all limits and without any load related warnings or faults, then the Inferred Load will be updated with the average load for that revolution.

Numeric Data
The following menu lists numeric settings that affect load cell functionality.

Note: Some settings require two load cells and so will only appear if two load cells have been configured (see Main Menu > Advanced Setup > Configuration > Load Cell n)

<table>
<thead>
<tr>
<th>Setting</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Inferred Load</td>
<td>↑</td>
</tr>
<tr>
<td>LC to Headpulley</td>
<td></td>
</tr>
<tr>
<td>Difference Time</td>
<td></td>
</tr>
<tr>
<td>Max Difference</td>
<td></td>
</tr>
<tr>
<td>Scale Factor 1</td>
<td></td>
</tr>
<tr>
<td>Zero Load 1</td>
<td></td>
</tr>
<tr>
<td>Scale Factor 2</td>
<td></td>
</tr>
<tr>
<td>Zero Load 2</td>
<td>↓</td>
</tr>
</tbody>
</table>
Inferred Load

This is the value that will be used for belt load, if in Inferred Load mode. This can be a result of either the user selecting “Inferred Load” as the load cell function (see Main Menu > Advanced Setup > Load Cells > Function), or as a result of a load imbalance if “Auto Bypass has been selected as the load cell function.

This value can be automatically updated if enabled (see Main Menu > Advanced Setup > Load Cells > Settings), or can be manually adjusted by the user.

LC to Headpulley

This is the distance from the load cell to the headpulley, measured along the belt, in units of length. To improve batching and/or short term accuracy, a translational algorithm is used to calculate the load at the headpulley rather than at the load cell. This feature must be enabled (see Main Menu > Advanced Setup > Configuration > Use Head Load) for this algorithm to be employed.

Note if this distance is set to zero, that will effectively disable this feature.

Max Difference

This is the maximum allowed difference, in percent of Design Load, that if exceeded for longer then the time set by “Difference Time” (see below) will cause the logical output, “Load Imbalance” to be set. Also, if the load cell function is set to “Auto Bypass”, a shift to “Bypassed” (Inferred Load) will occur.

Difference Time

This is the maximum allowed time, in seconds, that the load cells can be out of balance (based on Max Difference above) before the logical output, “Load Imbalance” is set.

Scale Factor 1

This is the calibration factor associated with load cell 1. This value is basically is basically the number of A/D counts associated with one unit of belt load, and is typically the result of a calibration procedure. It is not normally entered by the user, but may be done if it is known.

Zero Load 1

This is the zero load (i.e. when belt is empty) associated with load cell 1. This value is the average empty belt load as observed by the first load cell, and is typically the result of a zero procedure. It is not normally entered by the user, but may be done if it is known. This value is in units of belt load.

Note: If the feeder is re-calibrated then this value may change.

Scale Factor 2

Same as Scale Factor 1 (see above), but for load cell 2.

Zero Load 2

Same as Zero Load 1 (see above), but for load cell2.
Tachos

(Main Menu > Advanced Setup > Tachos)

Selecting this menu item, you will be presented with the following menu:

<table>
<thead>
<tr>
<th>Function…</th>
<th>↑</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tacho 1</td>
<td></td>
</tr>
<tr>
<td>Tacho 2</td>
<td></td>
</tr>
<tr>
<td>Numeric Data…</td>
<td>↓</td>
</tr>
</tbody>
</table>

Note: Not all menu items will appear, depending on how many Tachos are configured (see Main Menu > Advanced Setup > Configuration).

**Function**

This setting describes the functionality of the tacho or tachos, if more than one is configured. The available options are:

<table>
<thead>
<tr>
<th>First Only</th>
<th>↑</th>
</tr>
</thead>
<tbody>
<tr>
<td>Second Only</td>
<td></td>
</tr>
<tr>
<td>First (Pri) Second (Slip)</td>
<td></td>
</tr>
<tr>
<td>Second (Pri) First (Slip)</td>
<td></td>
</tr>
<tr>
<td>First (Pri) Second (ZSpd)</td>
<td></td>
</tr>
<tr>
<td>Second (Pri) First (ZSpd)</td>
<td></td>
</tr>
<tr>
<td>Analog Input</td>
<td></td>
</tr>
<tr>
<td>From Network</td>
<td></td>
</tr>
<tr>
<td>Simulator</td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>↓</td>
</tr>
</tbody>
</table>

**First Only**

This is the setting to use if you have only one tacho connected and it is connected to the Tacho 1 port on the GCM. This is the tacho that will be used for all functions within the controller. Note: This tacho may be a 2-channel (i.e. quadrature), but it is still considered one tacho.

Note: The Configuration settings should be set to enable only Tacho 1 (see Main Menu > Advanced Setup > Configuration > Tacho 1).
Second Only
This is the setting to use if you have only one tacho connected and it is connected to the Tacho 2 port on the GCM. This is the tacho that will be used for all functions within the controller. Note: This tacho may be a 2-channel (i.e. quadrature), but it is still considered one tacho.

Note: The Configuration settings should be set to enable only Tacho 2 (see Main Menu > Advanced Setup > Configuration > Tacho 2).

First (Pri) Second (Slip)
This setting requires that tachos be connected to both tacho ports on the GCM. They may each be any of the allowable types (see Main Menu > Advanced Setup > Tachos > Tacho n).

With this setting, the First tacho (connected to port 1) will be used for all process control functions and the Second (connected to port 2) will be used to detect belt slippage. This is done by monitoring the ratio of the signals from the two tachos. Nominally it should be constant regardless of belt speed. However, if the belt slips on the driving pulley (i.e. the head pulley), the ratio will change and this can be detected and used to set alarms. If the ratio exceeds a settable amount then the Logical output “Belt Slippage” will turn on (see Main Menu > Advanced Setup > Tachos > Numeric Data > Max Allowed Ratio Diff).

This setting is most commonly used when there is a tacho connected to port 1 that is mounted to a tail pulley or some other idling pulley and another tacho connected to port 2 that is mounted on the driving motor.

Second (Pri) First (Slip)
This setting is the same as the one above except the roles of the two tachos are reversed.

First (Pri) Second (ZSpd)
This setting requires that tachos be connected to both tacho ports on the GCM. They may each be any of the allowable types (see Main Menu > Advanced Setup > Tachos > Tacho n).

With this setting, the First tacho (connected to port 1) will be used for all process control functions and the Second (connected to port 2) will be used to detect “Zero Speed”. The primary tacho will be used to calculate belt travel and all other process functions. Pulses from the second tacho will be counted and if a certain amount of belt travel occurs before a pulse from the second tacho is received, then belt speed will be assumed to be slipping.

This setting is most commonly used when there is a tacho connected to port 1 that is mounted to the driving motor. This tacho is not directly measuring belt speed and therefore may not detect true zero speed. For example in this setup if the belt was to break, the motor could keep turning and without an additional sensor, a loss of belt speed would not be detected. However, if a second encoder, or some kind of sensor can be arranged to sense belt motion (i.e. a
proximity switch and target) then this can be connected to the second tacho port and used to detect belt slippage or breakage.

Note: In conjunction with this setting, the parameter corresponding to how much belt travel to allow without a pulse from the second tacho must be set (see Main Menu > Advanced Setup > Tachos > Numeric Data > Zero Spd Distance).

**Second (Pri) First (ZSpd)**

This setting is the same as the one above except the roles of the two tachos are reversed.

**Analog Input**

Speed information is generated by an analog input. Note that the speed value must be calibrated using an analog input calibration procedure. Negative speed values on the analog input are not allowed and are replaced with zero.

This setting is most commonly used when there is no real tacho available, but there is an analog signal available that represents belt speed. This might be from an output on the drive or a tach-generator on the motor.

**From Network**

Speed information is written to the GCM by means of communications. Note that the speed value must be written as a floating point number in engineering units. Negative speed values are not allowed and are replaced with zero.

This setting is most commonly used when there is no real tacho available, but there is a signal available from the Network that represents belt speed.

**Simulator**

Speed information is derived from the feedrate PID controller’s Belt Speed Demand signal. This makes it possible to run PID control of a feeder with no tachos, usually for testing or diagnostic purposes. A parameter called “Speed Factor” is used to adjust for the relation between Belt Speed Demand and belt speed (see Main Menu > Advanced Setup > Tachos > Numeric Data > Speed Factor).

Calculation:

\[ \text{Belt Spd} = \frac{(\text{Belt Spd Demand} \times \text{Design Speed})}{\text{Speed Factor}} \]

**None**

If no tachos are connected and the belt speed can be assumed to be constant this setting can be used. There is a Logical Input available called “Belt is Running” that can be used to turn belt speed on and off. Typically this would be mapped to a Physical input and connected to a motor starter that drives the belt.
Whenever this input is on, the belt speed will be set to a constant speed which is determined by a user parameter called “Inferred Speed” (see Main Menu > Advanced Setup > Tachos > Numeric Data > Inferred Speed).

Tacho 1
Each tacho that is enabled (see Main Menu > Advanced Setup > Configuration > Tacho n) must be configured as to its type and direction detect ability. When you select this tacho from the menu, you will two settings as follows:

```
Type… ↑
Direction.. ↓
```

**Type**
The type of tacho connected to this port must be set here. This is basically the electrical characteristic of the specific tacho used. The options are:

```
Quad, Opt/TTL ↑
F-25/Mag, Ch-A
Quad, Opt/Line Drv
Frequency ↓
```

**Quad, Opt/TTL**
This setting is used with 2-channel encoders that have their outputs arranged in a quadrature arrangement (one channel leads the other by 90°). These types of encoders can be used to detect direction of belt travel as well as distance, and travel in the reverse direction will not be counted. In this scenario only forward travel will be measured, which can be useful if there is significant vibration or encoder noise that might otherwise be interpreted as belt travel.

The outputs of this encoder must be nominal "TTL" levels (i.e. 0-5 VDC).
This is the most common type of encoder used on Merrick belt feeders.

**F-25/Mag, Ch-A**
The setting is used with the Merrick F-25 or DSP-825 type 2-wire current loop encoders, and certain other encoders of this style.

These encoders are single channel and therefore do not have the ability to detect direction. Also, they may be connected to either tacho port on the GCM, but they must be connected to channel A.
Note: This setting turns on a bias current and therefore should not be used if an optical encoder is connected. Damage to the encoder may result.

**Quad, Opt/Line Drv**
This setting functions the same as “Quad, Opt/TTL” (see above), but is used with optical encoders that have “Line Driver” outputs. These types of encoders are sometimes used if there is a great distance between encoder and GCM.

**Frequency**
This is a generic setting for use with encoders that have a basic sinusoidal output; that is an output swings both negative and positive at a frequency that is proportional to speed.

**Direction**
Tachos that are able to detect direction (i.e. quadrature encoders) must have this parameter set correctly so that this feature functions correctly. The available options are:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Left Hand</td>
<td>↑</td>
</tr>
<tr>
<td>Right Hand</td>
<td></td>
</tr>
<tr>
<td>No Direction</td>
<td>↓</td>
</tr>
</tbody>
</table>

**Left Hand**
This typically refers to an encoder that is mounted on the left side of the belt (facing direction of travel). However, more technically, it means that channel B of the encoder is leading channel A.

**Right Hand**
This typically refers to an encoder that is mounted on the right side of the belt (facing direction of travel). However, more technically, it means that channel A of the encoder is leading channel B.

**No Direction**
Direction of tacho rotation is not detectable. The GCM will only look at channel A of the tacho port for pulses.
Tacho 2

All the same settings as for tacho 1 are available for tacho 2. Note: These settings are only available if Tacho 2 is enabled (see Main Menu > Advanced Setup > Configuration > Tacho 2).

Numeric Data

These are numeric settings that affect the operation of the tachos or the speed detection algorithms of the GCM.

Note: Not all settings will appear in this list unless two tachos are configured (see Main Menu > Advanced Setup > Configuration > Tacho 1,2).

The available settings are:

<table>
<thead>
<tr>
<th>Setting</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zero Timeout</td>
<td>This value determines how long to wait for a pulse from the primary tacho. If no pulses are received within this time limit, the Logical output “No Belt Motion” is turned on, providing the means for an alarm. Note: This function is always enabled, regardless of feeder control mode. In other words anytime pulses stop, for any reason, this Logical output will turn on.</td>
</tr>
<tr>
<td>Inferred Speed</td>
<td>This is the speed that will be inferred whenever the tacho function is set to “None” (see Main Menu &gt; Advanced Setup &gt; Tachos &gt; Function), and the “Belt is Running” Logical input is on. The units are those of speed (i.e. ft/min or m/min, etc.).</td>
</tr>
</tbody>
</table>
Speed Factor
“Speed Factor” is used to calculate and set speed when the tacho function is set to “Simulator” (see Main Menu > Advanced Setup > Tachos > Function > Simulator).

Normally this parameter is automatically updated when a valid speed is available from tachos. However, when in simulator mode, you may set this parameter directly and it will then not be updated (changed).

Max Allowed Ratio Diff
This is the maximum allowable absolute value for the difference between nominal tacho ratio and actual tacho ratio. The nominal ratio between of the tachos is determined by the two BLT parameters “Pulses per Belt Rev 1” and “Pulses per Belt Rev 2”, which are set during a Speed Span calibration. (see Main Menu > Calibration > Speed Span and Main Menu > Calibration > Numeric Data). If the difference exceeds this set amount, the Logical output “Belt Slippage” is turned on. The units of this parameter are percent (%).

Zero Spd Distance
This parameter corresponds to how much belt travel to allow without a pulse from the “Zero Speed” tacho (see Main Menu > Advanced Setup > Tachos > Function). If a pulse from the tacho set as the “Zero Speed” tacho is not received by the time the belt has moved this distance, then the Logical output “Belt Slippage” is turned on. The units of this parameter are length (i.e. ft or m).

Process Control
(Main Menu > Advanced Setup > Process Control)
Note: This entire menu will not appear unless Feeder Control is enabled (see Main Menu > Advanced Setup > Configuration).

Selecting this menu item, you will be presented with the following menu:

<table>
<thead>
<tr>
<th>PID…</th>
<th>↑</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accel/Decel</td>
<td></td>
</tr>
<tr>
<td>Filters…</td>
<td>↓</td>
</tr>
</tbody>
</table>

PID
Selection of this menu item shows you the list of parameters that are the settings for conventional PID (Proportional plus Integral plus Derivative) control and their current value. PID is the control action that enables the Genetix to maintain the desired setpoint, by constantly striving to minimize the deviation between the
setpoint and the process variable (i.e. Feedrate or Belt Speed). The PID algorithm
uses the deviation to calculate a new Belt Speed Demand to bring the feeder to
the setpoint.

A complete description of how PID control action works is beyond the scope of this
Manual, but a brief description of each term is provided below.

<table>
<thead>
<tr>
<th>Proportional Gain</th>
<th>↑</th>
</tr>
</thead>
<tbody>
<tr>
<td>Integral</td>
<td></td>
</tr>
<tr>
<td>Derivative</td>
<td>↓</td>
</tr>
</tbody>
</table>

**Proportional Gain**

The Proportional Gain (or sensitivity) is the closed loop gain, expressed in
percent (%). This setting affects all three PID components (Proportional,
Integral and Derivative). The higher the value of Proportional Gain, the harder
the controller will react to a deviation from setpoint.

Note: Proportional control by itself can result in stable control, but the feeder will
likely always be offset from the setpoint. Too much Gain and the control action
will oscillate. Too little Gain and the control action may be very slow to respond.

**Integral**

The PID Integral component uses the accumulated (integrated) deviation over
time to adjust the Belt Speed Demand signal. The Integral parameter,
expressed in units of s\(^{-1}\) (i.e. 1/s) determines how fast the accumulation takes
place. The Integral function will, over time, make the deviation go to zero,
assuming everything else is in steady state. Essentially this means that the
longer time passes with the feeder not at setpoint, the larger the sum of the
deviation becomes over time, and the more control action that is applied to the
Belt Speed Demand signal.

The Integral function may be disabled by setting this parameter to zero, but this
is not recommended as it will usually result in very poor control, or a feeder that
never comes to setpoint.

**Derivative**

The PID Derivative component uses the rate of change (the trend) of the
deviation to adjust the Belt Speed Demand signal. The Derivative parameter,
expressed in seconds determines the sensitivity to trend changes. The
Derivative function will react earliest to deviations.

The Derivative function can be disabled by setting this parameter to zero, but
this is not recommended as it will usually result in poor control. However, only a
little Derivative action is typically required, so this setting is normally fairly low.

Note: The effects of all three of the above terms are combined to produce the
total change to the Belt Speed Demand signal. Thus, they all interact to some
degree. Settings for all three parameters will vary from feeder to feeder and will
also depend on the nature of your process.
Accel/Decel

Selection of this menu item shows you the settings that allow you to control how rapidly the Belt Speed Demand signal is allowed to change, and therefore provide a certain amount of dynamic output protection. These parameters are set in percent/second (%/s). For example, a setting of 100 allows the Belt Speed Demand signal to change from 0 to maximum in 1 second.

<table>
<thead>
<tr>
<th>Max Accel</th>
<th>↑</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max Decel</td>
<td>↓</td>
</tr>
</tbody>
</table>

Note: Setting these parameters too low can defeat the settings of the PID control and result in very slow response. Normally the factory settings should produce reasonable results.

Also note that many drives (especially Variable Frequency Drives or Inverters) have their own settings for Acceleration and Deceleration and these should always be verified as part of the feeder setup process. Again, if the drive Accel/Decel parameters are set too low, this can defeat the settings of the PID control.

Filters

Filters are a means of averaging certain process data to improve the smoothness of the control or to compensate for “noisy” data. The averaging is performed by means of a sliding average, and the extent of the averaging can be set by the number of “slots”. The following process parameters have filtering available. They are described along with their effects on the control system.

<table>
<thead>
<tr>
<th>Speed</th>
<th>↑</th>
</tr>
</thead>
<tbody>
<tr>
<td>Load</td>
<td></td>
</tr>
<tr>
<td>Setpoint</td>
<td></td>
</tr>
<tr>
<td>PID Feedrate</td>
<td>↓</td>
</tr>
</tbody>
</table>

Speed

In some cases the speed signal generated by the feeder tacho(s) is unusable to calculate feedrate as-is because of mechanically generated noise, for example an out-of-round pulley. In these cases, a sliding average algorithm calculates an average speed with less noise. This parameter is settable between 1 and 33 slots, with 1 representing no averaging. The result of the averaging is used in feedrate calculations.

Note: The Speed signal can be further “damped” for display purposes only (see Main Menu > Display Settings > Damping > Speed).
Load

In some cases the load signal generated by the feeder mechanics is unusable to calculate feedrate as-is because of mechanically generated noise, for example excessive ambient vibration. In these cases, a sliding average algorithm calculates an average load with less noise. This parameter is settable between 1 and 33 slots, with 1 representing no averaging. The result of the averaging is used in feedrate calculations.

Note: The Speed signal can be further “damped” for display purposes only (see Main Menu > Display Settings > Damping > Load).

Setpoint

In some cases the setpoint signal as received from the remote system is unusable because it is too noisy. Therefore it also possible to average the setpoint before it goes to the PID control algorithm. This is also a sliding average, settable between 1 and 33 slots.

PID Feedrate

If, after Load averaging and Speed averaging, the calculated feedrate is still too noisy, it can cause erratic control action as the PID algorithm tries to compensate. Therefore it also possible to average the feedrate before it goes to the PID control algorithm. This is also a sliding average, settable between 1 and 33 slots.

Note: It is very rarely necessary to set this parameter higher than 1 if Load averaging and Speed averaging are used properly. Also, this is not the same as the “actual” feedrate which can be damped for display purposes only (see Main Menu > Display Settings > Damping > Feedrate).

Analog I/O

(Main Menu > Advanced Setup > Analog I/O)

This menu allows you to map the physical Analog Inputs and Analog Outputs to specific logical functions, and to set certain properties for those IO. Physical inputs are those that exist on the installed hardware. Physical inputs accept analog information (such as current or voltage) from external sources, and physical outputs present similar information. The exact number of physical Analog IO points and their form depends on the installed hardware and the Configuration settings (see Main Menu > Advanced Setup > Configuration). Selecting this menu item, you will be presented with the following menu:
Inputs

(Main Menu > Advanced Setup > Analog I/O > Inputs)

Selecting Inputs from the Analog I/O menu will present you with the following menu:

<table>
<thead>
<tr>
<th>Analog In 1...</th>
<th>↑</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analog In 2...</td>
<td></td>
</tr>
<tr>
<td>Analog In 3...</td>
<td>↓</td>
</tr>
</tbody>
</table>

Analog In 1

Selection of one of the Analog Inputs above will allow the following settings to be configured:

<table>
<thead>
<tr>
<th>Function...</th>
<th>↑</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calibration...</td>
<td></td>
</tr>
<tr>
<td>Numeric Data...</td>
<td>↓</td>
</tr>
</tbody>
</table>

Function

This setting allows you to what process value will be received by this physical input. The options are:

<table>
<thead>
<tr>
<th>Feedrate SP</th>
<th>↑</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speed SP</td>
<td></td>
</tr>
<tr>
<td>Oloop SP</td>
<td></td>
</tr>
<tr>
<td>Load</td>
<td></td>
</tr>
<tr>
<td>Speed</td>
<td></td>
</tr>
<tr>
<td>Inclination</td>
<td></td>
</tr>
<tr>
<td>Available</td>
<td>↓</td>
</tr>
</tbody>
</table>
**Feedrate SP**
If you select this parameter, the analog input received will be mapped to a value representing the desired feedrate (i.e. the Feedrate setpoint). This will be used to control the feeder if the Feeder Control Method is “Rate Control” (see **Main Menu > Advanced Setup > Feeder Control > Method**), and the Feeder Control Source is “Remote Analog” (see **Main Menu > Advanced Setup > Feeder Control > Source**). The data will be scaled according to the Calibration of this analog input and the parameters under Numeric Data (see below).

**Speed SP**
If you select this parameter, the analog input received will be mapped to a value representing the desired belt speed (i.e. the Speed setpoint). This will be used to control the feeder if the Feeder Control Method is “Speed Control” (see **Main Menu > Advanced Setup > Feeder Control > Method**), and the Feeder Control Source is “Remote Analog” (see **Main Menu > Advanced Setup > Feeder Control > Source**). The data will be scaled according to the Calibration of this analog input and the parameters under Numeric Data (see below).

**Oloop SP**
If you select this parameter, the analog input received will be mapped directly to the Belt Speed Demand output, bypassing all closed loop control. This will be used to control the feeder if the Feeder Control Method is “Open Loop” (see **Main Menu > Advanced Setup > Feeder Control > Method**), and the Feeder Control Source is “Remote Analog” (see **Main Menu > Advanced Setup > Feeder Control > Source**). The data will be scaled according to the Calibration of this analog input and the parameters under Numeric Data (see below).

**Load**
If you select this parameter, the analog input received will be mapped to a value representing the actual belt load. This might be useful if the belt load is being measured by a sensor that transmits an analog output. The data will be scaled according to the Calibration of this analog input and the parameters under Numeric Data (see below).

**Speed**
If you select this parameter, the analog input received will be mapped to a value representing the actual belt speed. This might be useful if the belt speed is being measured by a sensor that transmits an analog output. The data will be scaled according to the Calibration of this analog input and the parameters under Numeric Data (see below).

**Inclination**
If you select this parameter, the analog input received will be mapped to a value representing the angle of the feeder or conveyor. This value then is used to correct the measured load according to the angle. This might be useful if the scale or feeder is mounted in such a way that the angle relative to earth is changeable, allowing automatic correction. The data will be scaled
according to the Calibration of this analog input and the parameters under Numeric Data (see below).

Note: For automatic angle correction to take place, the “Inclinometer” option must be enabled (see Main Menu > Advanced Setup > Configuration).

**Available**

Selecting this parameter allows you to read the analog input via a network or serial connection. It is not used by the GCM application. The value will appear in a register in floating point format, which will be scaled according to the Calibration of this analog input and the parameters under Numeric Data (see below).

Note, the name of the register used is `GLO.AnalnHijack`, the number of which will be dependent on the GCM firmware version. Contact Merrick Customer Support for assistance if necessary.

**Calibration**

This menu allows you to calibrate the physical analog input for the signal to which it is connected. The options are:

<table>
<thead>
<tr>
<th>Snap Low Current</th>
<th>↑</th>
</tr>
</thead>
<tbody>
<tr>
<td>Snap High Current</td>
<td>↓</td>
</tr>
</tbody>
</table>

**Snap Low Current**

This allows you to set the GCM for the lowest value that the analog signal will present. You should be connected to the analog signal and have it sending its lowest value. If you select this menu item you will go to a screen that shows the live value of the analog signal. Pressing the Enter key at this point will accept this value as the input to scale to the low end. You must press the Enter key again to confirm.

**Snap High Current**

This allows you to set the GCM for the highest value that the analog signal will present. You should be connected to the analog signal and have it sending its highest value. If you select this menu item you will go to a screen that shows the live value of the analog signal. Pressing the Enter key at this point will accept this value as the input to scale to the high end. You must press the Enter key again to confirm.

**Numeric Data**

This menu contains numeric parameters that allow you to scale the analog input to the process value it represents. The parameters are:
Selecting any of the above parameters brings up the Numeric Data Entry screen that allows you to assign or edit the numeric value.

**High mA**
This is the value that represents the maximum analog signal that will be received. If an analog input calibration has been performed then this value will have been assigned automatically by that process. Alternatively it may be entered directly here.

**Full Scale**
This is the maximum process value that will be assigned to the maximum analog input value. The Full Scale value is entered in engineering units representing the process value. For example if the analog input function is set to Feedrate Setpoint, then this value would be set in units of rate (i.e. lb/min, kg/min).

**Low mA**
This is the value that represents the minimum analog signal that will be received. If an analog input calibration has been performed then this value will have been assigned automatically by that process. Alternatively it may be entered directly here.

**Zero**
This is the minimum process value that will be assigned to the minimum analog input value. The Zero value is entered in engineering units representing the process value. For example if the analog input function is set to Feedrate Setpoint, then this value would be set in units of rate (i.e. lb/min, kg/min).

**Analog In 2**
For this analog input to be present in the menu, a second Expansion Analog Card must be enabled (see Main Menu > Advanced Setup > Configuration > Expansion Analog Card 1).

If present this analog input can be configured exactly as Analog Input 1, above.

**Analog In 3**
For this analog input to be present in the menu, a third Expansion Analog Card must be enabled (see Main Menu > Advanced Setup > Configuration > Expansion Analog Card 2).

If present this analog input can be configured exactly as Analog Input 1, above.
### Outputs

(Main Menu > Advanced Setup > Analog I/O > Outputs)

Selecting Outputs from the Analog I/O menu will present you with the following menu:

<table>
<thead>
<tr>
<th>Analog Out 1…</th>
<th>↑</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analog Out 2…</td>
<td></td>
</tr>
<tr>
<td>Analog Out 3…</td>
<td></td>
</tr>
<tr>
<td>Analog Out 4…</td>
<td></td>
</tr>
<tr>
<td>Analog Out 5…</td>
<td></td>
</tr>
<tr>
<td>Analog Out 6…</td>
<td>↓</td>
</tr>
</tbody>
</table>

**Analog Out 1**

Selection of one of the Analog Outputs above will allow the following settings to be configured:

<table>
<thead>
<tr>
<th>Function…</th>
<th>↑</th>
</tr>
</thead>
<tbody>
<tr>
<td>Numeric Data…</td>
<td>↓</td>
</tr>
</tbody>
</table>

**Function**

This setting allows you to what process value will be transmitted by this physical analog output. The options are:

<table>
<thead>
<tr>
<th>Belt Spd Demand</th>
<th>↑</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feedrate</td>
<td></td>
</tr>
<tr>
<td>Belt Load</td>
<td></td>
</tr>
<tr>
<td>Belt Speed</td>
<td></td>
</tr>
<tr>
<td>Setpoint</td>
<td></td>
</tr>
<tr>
<td>Available</td>
<td></td>
</tr>
<tr>
<td>Always Zero</td>
<td>↓</td>
</tr>
</tbody>
</table>
**Belt Spd Demand**
This output is used to set the desired speed of the belt, via the motor speed control (i.e. VFD or SCR drive).

**Feedrate**
This output transmits the actual feedrate, i.e. to an analog rate meter or chart recorder.

**Belt Load**
This output transmits the actual belt load.

**Belt Speed**
This output transmits the actual belt speed. This can be used, for example, to control the rate of a pre-feed device such that it is always proportional to the belt speed.

**Setpoint**
This output transmits the actual setpoint. Note that this setpoint may be received from several sources (i.e. Local, Network, Remote Analog, etc.).

**Available**
Selecting this parameter allows you to write a value to the analog output via a network or serial connection, which will then be sent out the physical analog output. It is not used by the GCM application. The value is written to a register in floating point format, which will be scaled according to the parameters under Numeric Data (see below).

Note, the name of the register used is `GLO.AnaOutHijack`, the number of which will be dependent on the GCM firmware version. Contact Merrick Customer Support for assistance if necessary.

**Always Zero**
This setting effectively “turns off” the physical output, so that no power is used.

**Numeric Data**
This menu contains numeric parameters that allow you to scale the analog output to the process value it represents. The parameters are:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
</tr>
</thead>
<tbody>
<tr>
<td>High mA</td>
<td>↑</td>
</tr>
<tr>
<td>Full Scale</td>
<td></td>
</tr>
<tr>
<td>Low mA</td>
<td>↓</td>
</tr>
<tr>
<td>Zero</td>
<td></td>
</tr>
</tbody>
</table>

Selecting any of the above parameters brings up the Numeric Data Entry screen that allows you to assign or edit the numeric value.
High mA
This is the value that represents the maximum analog signal that will be sent. It is entered in mA (milliamperes). Note the range is nominally 4-20mA, but it is possible to enter numbers outside this range if the connected device cannot be calibrated.

Full Scale
This is the maximum process value that will be assigned to the maximum analog output value. The Full Scale value is entered in engineering units representing the process value. For example if the analog output function is set to Feedrate, then this value would be set in units of rate (i.e. lb/min, kg/min).

Low mA
This is the value that represents the minimum analog signal that will be sent. It is entered in mA (milliamperes). Note the range is nominally 4-20mA, but it is possible to enter numbers outside this range if the connected device cannot be calibrated.

Zero
This is the minimum process value that will be assigned to the minimum analog output value. The Zero value is entered in engineering units representing the process value. For example if the analog output function is set to Feedrate, then this value would be set in units of rate (i.e. lb/min, kg/min).
Digital I/O

(Main Menu > Advanced Setup > Digital I/O)

This menu allows you to map the physical Digital Inputs and Digital Outputs to specific logical functions, and to set certain properties for those IO. Physical inputs are those that exist on the installed hardware. Physical inputs accept digital information (such as contact closures) from external sources, and physical outputs present similar information. The exact number of physical IO points and their form depends on the installed hardware and the Configuration settings (see Main Menu > Advanced Setup > Configuration).

Logical inputs are events that occur within the Genetix controller that typically cause some action to take place. An example of a Logical input for a belt feeder would be “Run Permission”, which is required to make the feeder run. For this permission to come from an outside source, this Logical input must be mapped to a Physical input, and then that physical input connected to the external source.

Logical outputs are events that happen within the Genetix controller that are usually the result of some action or process. An example of a Logical output for a belt feeder would be “Running”, which indicates that the belt is actually moving. For an outside source to be informed of this event, this Logical output must be mapped to a Physical output, and then the Physical output connected to the outside source.

Note: Mapping of Digital I/O and settings will normally take place at the Merrick factory based on your specific requirements and wiring details. Changes should be made carefully, as there is generally external equipment involved that may start, stop, open, close, etc. unexpectedly. No changes should be made unless all equipment is secure and no personnel are at risk.

If you have any doubts about this process, contact the Merrick Customer Service department for assistance.

When you select “Digital I/O” you will be presented with another menu as follows:

```
Inputs...  ↑
Outputs...
Warnings/Faults...
Forces...
Inverted IO...
```

**Inputs**

This menu item allows you to map the Logical Inputs to the available physical inputs. One Physical input may be mapped to multiple Logical inputs, allowing one external physical event to trigger many internal logical events.

Selecting “Inputs” will present you with a list of all the current Logical Inputs, along with the Physical input they are currently mapped to, if any.
Selecting a Logical input from the list, by pressing the Enter key, brings up the list of available Physical inputs to which they may be mapped. Again, note that the list of Physical inputs will depend on installed hardware and Configuration settings.

Note there are “special” Physical inputs that are used that don’t actually represent hardware. In some cases it is desired to turn a logical function permanently on or permanently off. Two special physical inputs are available for this, “Always On”, and “Always Off”.

The list of all possible Logical inputs varies by application and so is not presented here. Also, the Configuration settings will cause specific Logical inputs to appear or disappear from this menu. Consult the Appendices to this Manual, or contact the Merrick Customer Service department for assistance.

Outputs

This menu allows you to map the Physical outputs to the Logical outputs. One Logical Output may be mapped to multiple Physical outputs, allowing one internal event to be sent to multiple external processes.

Selecting “Outputs” will present you with a list of all the current Physical outputs, along with the Logical output they are currently mapped to, if any. Again, note that the list of Physical outputs will depend on installed hardware and Configuration settings.

Selecting a Physical output from the list, by pressing the Enter key, brings up the list of available Logical outputs to which they may be mapped.

Note there are “special” Logical outputs available. In some cases it is desired to turn a Physical output permanently on or permanently off. Two special Logical outputs are available for this, “Always On”, and “Always Off”.

The list of all Logical outputs varies by application and so is not presented here. Also, the Configuration settings will cause specific Logical outputs to appear or disappear from this menu. Consult the Appendices to this Manual, or contact the Merrick Customer Service department for assistance.

Warnings/Faults

This menu item allows you to set a specific property for any Logical input or Logical output.

Setting an input or output to “Warning” causes an annunciation (display) whenever that logical event occurs. Warnings are displayed (see Main Menu > Warnings), but cause no further action.

Setting an input or output to “Fault” causes the feeder to “trip” (stop) and an annunciation. The feeder cannot resume until the fault condition is cleared (see Main Menu > Warnings).

Selecting “Warnings/Faults” shows the following menu
Logical Inputs…

Logical Outputs…

Select one of the above items to show the desired list. Select a Logical I/O point from the list by pressing the Enter key, and you will see the following options:

None
Warning
Fault

By selecting one of the above items, you may set the Logical I/O property as described above.

**Forces**

Physical I/O points may be forced to be On or to be Off. An I/O point thus set will be permanently set to that state overriding all other conditions. For example, if a Logical output is mapped to a Physical output and the Physical output is forced to be On, the physical state of the output will be on ("energized"), but the Logical output is unaffected and may be On or Off depending on the process or other conditions.

However, if a Physical input is mapped to a Logical input and the Physical input is forced On, then the resulting Logical input will also be turned On. Likewise if a Physical input is forced Off, then it will be off and all Logical inputs mapped to it will be off, regardless of the physical state of the Physical input.

Any Physical I/O point that is forced On or Off will remain so until reset with this menu.

If you select “Forces” you will be presented with the following menu:

Physical Inputs…
Physical Outputs…

Select one of the above items to show the respective list. Select a Physical I/O point from the list by pressing the Enter key, and you will see the following options:
By selecting one of the above items, you may set the Physical I/O property as described above.

Note: Obviously the ability to force Physical I/O On or Off is a powerful tool, but risky. Changes should be made carefully, as there is generally external equipment involved that may start, stop, open, close, etc. unexpectedly. No changes should be made unless all equipment is secure and no personnel are at risk.

If you have any doubts about this process, contact the Merrick Customer Service department for assistance.

**Inverted I/O**

Physical I/O points may also be inverted. This simply reverses the logical function of any particular input or output. For example if a Physical output is mapped to a Logical output and the Physical output is inverted, then when the Logical output is On, the Physical output will be Off, and vice versa.

If you select “Inverted I/O” you will be presented with the following menu:

```
Physical Inputs... ↑
Physical Outputs... ↓
```

Select one of the above items to show the respective list. Select a Physical I/O point from the list by pressing the Enter key, and you will see the following options:

```
None ↑
Invert ↓
```

By selecting one of the above items, you may set the Physical I/O property as described above.

**Totalizer**

*(Main Menu > Advanced Setup > Totalizer)*

Selecting this menu item, you will be presented with the following menu:
Totalizer Cutoff
This setting allows you to specify a value for Belt Load below which totalization will not occur. Totalization is normally bi-directional, meaning that material can be subtracted from the totalizer if belt load is negative. If you wish to prevent this from happening, you may set this value at some reasonable value and any belt load lower than the setting (including negative values) will not be totalized.

The units of this setting are those of Belt Load (i.e. lb/ft or kg/m). The lower limit is -10% of Design Load and the upper limit is 50% of Design Load (see Main Menu > Basic Setup > Design Capacities > Design Load).

Weight per EMT Pulse
This is the value for one pulse of the EMT (external mechanical totalizer) output. The units are those of Weight (i.e. lb or kg). The lower limit is 0.01 and the upper limit is 100,000.

Pulse Length
This is the “on” time in seconds for each pulse that is sent to the EMT (external mechanical totalizer) output. This is settable to allow longer pulses for mechanical totalizers versus electronic. The “off” time will never be less than the “on” time, but may be longer depending on the actual rate of pulses.

Also note that output pulses are buffered so that none are lost. If the Pulse Length and/or the rate of pulses are high enough, it is possible that the external totalizer will not be able to keep up with the internal totalizers. However, it will “catch up” and no pulses should be lost. The rate of pulses will depend on the setting for “Weight per EMT Pulse” (see above) and the actual feedrate.

The minimum setting for this parameter is 0.01 seconds and the maximum is 5.0 seconds.

Feeder Peripherals
(Main Menu > Advanced Setup > Feeder Peripherals)
Note: This menu item will only appear if at least one of the following feeder peripherals is enabled (see Main Menu > Advanced Setup > Configuration).

Selection of this menu item will present you with a list of peripheral devices that have been configured, and allow you to set certain parameters that control their functionality.

Only those devices that have been enabled will appear in this menu.
### Pre-feeder *(not available yet)*

Note, there are many pre-feeder arrangements that can be accommodated with the standard Genetix. If you have a pre-feeder application and require assistance, contact the Merrick Customer Support department.

### Drive Feedback

Note: To enable this item, see **Main Menu > Advanced Setup > Configuration > Drive Feedback**

Many feeder drives (i.e. VFD, PWM, SCR) have extra digital outputs that can help diagnose drive related problems. By enabling the Genetix “Drive Feedback” feature, additional GCM inputs and outputs are turned on that can be used to improve overall feeder diagnostics by including drive diagnostics. See below for the menu of settings and parameters and descriptions of the I/O functionality.

<table>
<thead>
<tr>
<th>Settings…</th>
<th>↑</th>
</tr>
</thead>
<tbody>
<tr>
<td>Numeric Data…</td>
<td>↓</td>
</tr>
</tbody>
</table>

### Settings

The following settings are available for Drive Feedback:

<table>
<thead>
<tr>
<th>Overld Connected</th>
<th>↑</th>
</tr>
</thead>
<tbody>
<tr>
<td>AtSpd Connected</td>
<td>↓</td>
</tr>
</tbody>
</table>

### Overld Connected

This is a switch (Y/N) that tells the Genetix that the drive has an overload output and that is connected to a GCM input, which has been mapped to the Logical input “Belt Drv Overld.”
AtSpd Connected

This is a switch (Y/N) that tells the Genetix that the drive has an “At Speed” output and that is connected to a GCM input, which has been mapped to the Logical input “Belt Drive AtSp”.

Numeric Data

The following parameters are available for Drive Feedback:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overld On Delay</td>
<td>↑</td>
</tr>
<tr>
<td>Not at Spd On Delay</td>
<td>↓</td>
</tr>
</tbody>
</table>

**Overld On Delay**

A time delay, in seconds, between the time the “Belt Drv Overld” input comes on and the output “Belt Drive Ovld” comes on. This timer and the output are active even if the drive is not enabled (commanded to run).

**Not at Spd On Delay**

The elapsed time, in seconds, allowed for the drive to come up to speed, once enabled (commanded to run). The “Belt Drive AtSp” must come on within this set time to prevent the output “Belt Drive NAS” from turning on.

Material on Belt Sw

Note: To enable this item, see Main Menu > Advanced Setup > Configuration > Material on Belt Sw

A material on belt switch (MOB) is intended to provide an electromechanical indication of the presence of material on the belt. Typical designs are: limit switch, tilt switch, or capacitance probe.

Selection of this item will present the following menu, whose settings will determine the functionality of this switch.

<table>
<thead>
<tr>
<th>Setting</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Settings…</td>
<td>↑</td>
</tr>
<tr>
<td>Numeric Data…</td>
<td>↓</td>
</tr>
</tbody>
</table>

**Settings**

The following settings are available for the Material on Belt Switch:

<table>
<thead>
<tr>
<th>Setting</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blocking</td>
<td>↑</td>
</tr>
<tr>
<td>Jog while Blocking</td>
<td>↓</td>
</tr>
</tbody>
</table>
Blocking
This is a switch (Y/N) that indicates whether or not it is okay to run the belt forward in Manual mode, while the MOB is indicating that there is material on the belt. If “Blocking” is enabled (“Y”), then this is not allowed. This is a requirement of the NFPA for some coal feeders.

Jog OK while Blocking
This is a switch (Y/N) that indicates whether or not it is okay to jog the belt forward while “Blocking” is enabled (see above). If this setting is turned on (“Y”), and blocking is also enabled, then it will still be possible to jog the belt forward (see Main Menu > Feeder Control) while the MOB is indicating that there is material on the belt.

Numeric Data
The following numeric parameters can be set for the Material on Belt Switch:

<table>
<thead>
<tr>
<th>MOB Off Delay</th>
</tr>
</thead>
<tbody>
<tr>
<td>↑</td>
</tr>
<tr>
<td>↓</td>
</tr>
</tbody>
</table>

MOB Off Delay
This parameter sets the time, in seconds, that the controller will ignore a loss of material on the belt, before taking any action. This can be used to prevent temporary loss of material from unnecessarily causing alarm (nuisance trips).

Discharge Monitor
Note: To enable this item, see Main Menu > Advanced Setup > Configuration > Discharge
A discharge pluggage switch is typically mounted below the head pulley of the feeder and is intended to provide an indication of flow stoppage at the discharge. Typical designs are: limit switch, paddle switch, or capacitance probe.

Selection of this item will present the following menu, whose settings will determine the functionality of this switch:

<table>
<thead>
<tr>
<th>Settings…</th>
</tr>
</thead>
<tbody>
<tr>
<td>Numeric Data…</td>
</tr>
</tbody>
</table>

Settings
The following settings are available for the Material on Belt Switch:
Blocking

This is a switch (Y/N) that indicates whether or not it is okay to start the belt in Auto, while the discharge pluggage switch is indicating that there is material in the discharge cavity. If “Blocking” is enabled (“Y”), and this switch is on, the “Ready” condition will not be true and the feeder cannot be started.

Numeric Data

The following numeric parameters can be set for the Discharge Monitor:

<table>
<thead>
<tr>
<th>Disch On Delay</th>
</tr>
</thead>
<tbody>
<tr>
<td>↑</td>
</tr>
<tr>
<td>↓</td>
</tr>
</tbody>
</table>

Disch On Delay

This parameter sets the time, in seconds, that the controller will ignore a discharge pluggage condition, before taking any action. This can be used to prevent temporary pluggages from unnecessarily causing alarms (nuisance trips).

Drag Chain

“Drag Chain” can refer to any cleanout conveyor designed to clean out the feeder body underneath the belt, moving any material that may have fallen off the belt into the discharge area. Enabling this feature allows the GCM to control the cleanout conveyor according to the following settings and parameters.

Note: To enable this item, see Main Menu > Advanced Setup > Configuration > Drag Chain.

<table>
<thead>
<tr>
<th>Settings…</th>
</tr>
</thead>
<tbody>
<tr>
<td>↑</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Numeric Data…</th>
</tr>
</thead>
<tbody>
<tr>
<td>↓</td>
</tr>
</tbody>
</table>

Settings

The following settings are available for the Drag Chain:
<table>
<thead>
<tr>
<th>Feature</th>
<th>Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Linked with Auto Run</td>
<td>↑</td>
</tr>
<tr>
<td>Timed (No = Cont)</td>
<td></td>
</tr>
<tr>
<td>Reversible</td>
<td></td>
</tr>
<tr>
<td>Has Zero Spd Sw</td>
<td>↓</td>
</tr>
</tbody>
</table>

**Linked with Auto Run**

This is a switch (Y/N) that links the running of the cleanout conveyor with the running of the belt. If this is set for “Y”, the drag chain will only run if the belt is running, and will not run if the belt is not running. Note: If the drag chain is set for “Timed” operation (see below), the drag chain will cycle while the belt is running, even though the belt is running continuously.

If this option is set for “N”, the drag chain will only run when started from the User Interface (see Main Menu > Drag Chain Control), and will only stop when stopped from the User Interface.

**Timed**

This is a switch (Y/N) that indicates if the cleanout conveyor should cycle on and off, or run continuously. A setting of “Y” indicates timed operation, and a setting of “N” indicates continuous. See “Numeric Data” below for the timer settings.

**Reversible**

This is a switch (Y/N) that indicates if the cleanout conveyor can run backwards. If this is enabled, then it will be possible to run the drag chain in reverse from the User Interface.

**Has Zero Spd Sw**

If a proximity (or other type) switch has been installed to monitor the motion of the drag chain, this feature can be turned on to provide a Zero Speed function. Enabling this feature adds an additional Logical Input called “Drag Chain ZSS” and an additional Logical Output called “Drag Chain Jam”.

**Numeric Data**

The following numeric parameters can be set for the Drag Chain:

---

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On Time
This is the time, in seconds, that the drag chain will run if set for “Timed” operation (see Main Menu > Advanced Setup > Feeder Peripherals > Drag Chain > Settings).

Off Time
This is the time, in seconds, that the drag chain will be off if set for “Timed” operation (see Main Menu > Advanced Setup > Feeder Peripherals > Drag Chain > Settings).

Reverse Delay
This is the time, in seconds, that the controller will wait after the drag chain has run forward, before allowing the user to run it in reverse (from the User Interface).

ZSS Off Delay
This parameter sets the time, in seconds, that the controller will wait after the proximity (or other) switch is triggered. If the switch is not triggered again within this wait period, the drag chain will be assumed to have jammed and the appropriate output will be set.

Note: This parameter will not be visible unless the setting “Has Zero Spd Sw” is enabled (see Main Menu > Advanced Setup > Feeder Peripherals > Drag Chain > Settings).

Infeed Flow Monitor
Infeed Flow Monitor refers to a device installed above the feeder, generally in a downspout, that monitors the flow of material and indicates when flow has stopped. Generally if the feeder is running and flow above the feeder stops, this is an indication of a blockage, and in certain situations this can be very dangerous as it may eliminate the seal between the feeder and the silo above, if the downspout is allowed to completely empty.
Loss of flow will be determined by two methods; a fixed turn-off time delay, and a delay based on the amount of material that passes through the feeder after the initial loss of flow is indicated. The intent is to provide a warning soon after a loss of flow, and then a Fault (i.e. trip the feeder) before the pipe is completely empty and a loss of seal occurs. Each method qualifies a specific Logical output and can therefore be acted on independently.

Note: To enable this item, see Main Menu > Advanced Setup > Configuration > Infeed Flow Monitor.

- **Numeric Data…**

<table>
<thead>
<tr>
<th>Numeric Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>↑</td>
</tr>
<tr>
<td>↓</td>
</tr>
</tbody>
</table>

The following parameters control the functionality of the Infeed Flow Monitor:

<table>
<thead>
<tr>
<th>Loss of Flow Delay</th>
<th>↑</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loss of Flow Weight</td>
<td>↓</td>
</tr>
</tbody>
</table>

**Loss of Flow Delay**

This is the amount of time, in seconds, that the controller will wait, after an initial indication of loss of flow, before turning on the “No Flow” logical output.

**Loss of Flow Weight**

This is the amount of material, in units of weight (i.e. lb or kg), that must pass through the feeder after an initial indication of loss of flow, before the controller turns on the “Empty Pipe” logical output.

Note: It is common for the “No Flow” output to be set as a “Warning” (annunciate only), and for the “Empty Pipe” output to be set as a “Fault” (shuts down, or trips, the feeder).
Communications

(Main Menu > Advanced Setup > Communications)

Selecting this menu item, you will be presented with a list of all the available serial communications ports. Each is individually configurable for any of the available communications protocols. The minimum list of available ports will like this:

<table>
<thead>
<tr>
<th>Port</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>GCM Port 0 (USB)…</td>
<td>↑</td>
</tr>
<tr>
<td>GCM Port 1</td>
<td></td>
</tr>
<tr>
<td>GCM Port 2</td>
<td>↓</td>
</tr>
</tbody>
</table>

When you select any of the available ports you will be presented with another menu like this:

<table>
<thead>
<tr>
<th>Setting</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Protocol…</td>
<td>↑</td>
</tr>
<tr>
<td>Baudrate…</td>
<td></td>
</tr>
<tr>
<td>Parity…</td>
<td></td>
</tr>
<tr>
<td>Data bits…</td>
<td></td>
</tr>
<tr>
<td>Stop Bits…</td>
<td></td>
</tr>
<tr>
<td>Exp Comm Bd Routing…</td>
<td></td>
</tr>
<tr>
<td>Numeric Data…</td>
<td>↓</td>
</tr>
</tbody>
</table>

Protocol

There are several different serial protocols available for different kinds of communications tasks. Each is listed below with a brief description of its intended use. Note, not all protocols are available on all ports.

Note: A complete discussion of these protocols details of how to use them for communications with the Genetix controllers is beyond the scope of this Manual. If you require assistance, contact the Merrick Customer Support department or see www.merrick-inc.com/mct
UI Protocol

This is a special protocol developed by Merrick for communications between a User Interface and the GCM board. If you have a Merrick User Interface connected to a serial port, then that port must be set to “UI Protocol”. This is a binary protocol.

Note: If you change this setting via the User Interface, then you may lose communication and not be able to change it back. Make sure you know which port (if any) is connected to the User Interface and don’t inadvertently change its settings.

ScaleNet

This is a protocol developed by Merrick for the exchange of information between a computer and the Genetix controller. It is a “Master/Slave” protocol wherein the master requests information or an action and the slave responds. Typically the master is a computer (PC), and the slave is the Genetix controller. It is also possible to use this protocol in a “multi-drop” configuration (i.e. RS-422/RS-485) that allows one master to talk to several slaves (i.e multiple Genetix controllers). Through ScaleNet, you may have access to all parameter data in the Genetix controllers. ScaleNet is an ASCII protocol.

The ScaleNet protocol, although proprietary to Merrick, is published and can be used to develop your own communications interface through programming. The details of this protocol and programming examples are beyond the scope of this manual, but if you require assistance contact the Merrick Customer Support department.

Note: WinMerik® is a program developed by Merrick that runs on a PC and uses the ScaleNet protocol to get parameter data for either logging or archival purposes. If you intend to use WinMerik you must set the appropriate port’s
protocol to “ScaleNet”. For more information on the WinMerik application, contact the Merrick Customer Support department.

**DF1**

DF1 is an Allen-Bradley protocol primarily used to communicate with Allen Bradley devices such as PLC’s and DeviceNet interfaces (DNI’s).

**Modbus RTU**

Genetix controllers support the Modbus RTU communications protocols. They will act as slaves, supporting the Modbus functions 3 (Read Holding Registers) and 16 (Preset Multiple Registers). Function 8, sub function 0 (Return Query Data) is also supported. The master is assumed to maintain a cyclic conversation with the controller, which exposes the Merrick Common Interface Table (CIT), making it possible to monitor and supervise the Genetix controller completely.

This protocol is commonly used to interface Genetix controllers with a variety of industrial networks, often with the use of protocol converters. Modbus RTU is a binary protocol.

**Modbus ASCII**

Genetix controllers also support the Modbus protocols as above, in its ASCII form.

**Modbus TCP**

This protocol is again the Modbus protocol, supported in the Genetix as above, encapsulated in TCP/IP format and transported over Ethernet networks. Use of this protocol requires an optional Ethernet converter.

**Monitor**

Monitor is a special protocol developed by Merrick primarily for test and diagnostic purposes. With it, any PC equipped with terminal emulation software can connect to a Genetix controller and receive a tremendous amount of data for diagnostic purposes.

**None**

Selecting “None” for a communications protocol effectively shuts off that port, disabling all communications functions.

**Baudrate**

This is the communications data rate in bits per second. Master and slave devices must have the same setting for communications to take place. Baudrate must be selected from one of the following settings: 2400, 4800, 9600, 19200, 38400, 57600, 115200, and 230400.
Parity
Parity provides basic error detection for serial communications. Master and slave devices must have the same setting for communications to take place. Parity must be selected from one of the following settings: None, Odd, Even.

Data bits
This is the number of data bits used to represent one byte of data. Master and slave devices must have the same setting for communications to take place. Data bits must be selected from one of the following settings: 7, 8.

Stop Bits
This is the number of stop bits used at the end of the data. Master and slave devices must have the same setting for communications to take place. Stop bits must be selected from one of the following settings: 1, 2.

Numeric Data
These are various numeric parameters that support or modify serial communications. Not all the parameters in this list will appear depending on the protocol selected.
The Unit Address is a number that uniquely identifies the controller. It is typically embedded in communications telegrams so that each GCM knows who is to respond to which telegram. The lowest address is always one (1), and the highest depends on the protocol selected. The default address is 1, but this may change if there are multiple controllers connected to one network or serial communications bus (i.e. RS-485).

If multiple Genetix GCM’s are connected to one Genetix Color User Interface, each connected GCM must have a sequential Unit Address, starting at one (1).

If multiple Genetix GCM’s are connected to one network protocol converter, each GCM must have a unique Unit Address, but they need not necessarily start at one (1), although this is typically the case.

The Unit Address is port and protocol specific. For example, it is possible to have a Unit Address on port 1 that is different from the Unit Address on port 2, along with different protocols.
Selecting this parameter from the Numeric Data menu will bring up the Numeric Data Entry screen that will allow you to enter the desired Unit Address. This should be done after selecting the correct protocol (see above).

Start Code

Some protocols use Start Codes and End Codes to identify the beginning and end of a telegram. The Start Code parameter will only appear in the Numeric Data list if “ScaleNet” has been selected as the protocol. The default value for this is 10, and this should probably not be changed. Certain Merrick applications (i.e. WinMerik®) expect this parameter to be set to 10.

Selecting this parameter from the Numeric Data menu will bring up the Numeric Data Entry screen that will allow you to enter the desired Start Code. This should be done after selecting the correct protocol (see above).

End Code

Some protocols use Start Codes and End Codes to identify the beginning and end of a telegram. The End Code parameter will only appear in the Numeric Data list if “ScaleNet” has been selected as the protocol. The default value for this is 13, and this should probably not be changed. Certain Merrick applications (i.e. WinMerik®) expect this parameter to be set to 13.

Selecting this parameter from the Numeric Data menu will bring up the Numeric Data Entry screen that will allow you to enter the desired Start Code. This should be done after selecting the correct protocol (see above).

Communication Timeout

This is the maximum amount of time that the GCM will wait for a valid incoming telegram (message). If a valid telegram is not received within this time period, a communications timeout error will occur, and an appropriate logical output will be set (i.e. “Port x Timeout”). This value is set in seconds. A value of zero (0) will effectively disable this parameter and a timeout error will never occur.

This parameter is valid and will appear in the Numeric Data menu only if one of the following protocols is selected:

- UI Protocol
- ScaleNet
- DF1
- Modbus RTU
- Modbus ASCII
- Modbus TCP
Selecting this parameter from the Numeric Data menu will bring up the Numeric Data Entry screen that will allow you to enter the desired Timeout period. This should be done after selecting the correct protocol (see above).

**Comm Data Mapping**

There are two Common Interface Tables (CIT’s) available for communications use, “Small” and “Large”. They represent a data structure containing some fixed elements and some that you can configure. The small data map (CIT) is exactly the same as previous Merrick controllers (i.e. MC³) to maintain compatibility. The large data map exposes some additional data and can be used in more complex systems. For a complete description of the CIT, please see our website at [www.merrick-inc.com/mct](http://www.merrick-inc.com/mct)

This parameter is valid and will appear in the Numeric Data menu only if one of the following protocols is selected:

- ScaleNet
- DF1
- Modbus RTU
- Modbus ASCII
- Modbus TCP

Selecting this parameter from the Numeric Data menu will bring up a screen that will allow you to select either the small (default) or large data map. This should be done after selecting the correct protocol (see above).

**Write Protection**

This parameter allows you to protect certain data in the data map from being overwritten. The write protection property should be set when a register is tagged for monitoring only. When writing to words that are write protected, the corresponding Tag n W value changes accordingly, but the corresponding MC³ register (Tag n R Value) is unaffected. This is useful for testing data transfers to the GCM before they are implemented, or when you need to change a variable only at certain instances. Individual data may be write-protected or not. Typical values for this parameter are:
<table>
<thead>
<tr>
<th>Value</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>4095 (0xFFF)</td>
<td>All values write protected</td>
</tr>
<tr>
<td>3071 (0xBFF)</td>
<td>All values except Primary Setpoint write protected.</td>
</tr>
<tr>
<td>0000 (0x000)</td>
<td>No values write protected</td>
</tr>
</tbody>
</table>

This parameter is valid and will appear in the Numeric Data menu only if one of the following protocols is selected:

- ScaleNet
- DF1
- Modbus RTU
- Modbus ASCII
- Modbus TCP

Selecting this parameter from the Numeric Data menu will bring up the Numeric Data Entry screen that will allow you to enter the desired Write Protection value. This should be done after selecting the correct protocol (see above).

Note that this parameter can also be changed via communications, using the data map. This can be useful if only certain data needs to be written and/or only at certain times.

For additional assistance contact the Merrick Customer Support department or see our website [www.merrick-inc.com/mct](http://www.merrick-inc.com/mct)

**Byte (Word) Order**

The Word Order Bit, when set, reverses the order of the two words that contains value information. To correctly transfer floating-point values to and from some PLC’s these bits may have to be set. Typical values are 4095 (0xFFF) for Siemens S5 & S7, Allen-Bradley PLC-5 and SLC PLC's, and 0 for the Modicon and Allen-Bradley ControlLogix family of PLC's.

This parameter is valid and will appear in the Numeric Data menu only if one of the following protocols is selected:

- ScaleNet
- DF1
- Modbus RTU
- Modbus ASCII
• Modbus TCP
Selecting this parameter from the Numeric Data menu will bring up the Numeric Data Entry screen that will allow you to enter the desired Word Order value. This should be done after selecting the correct protocol (see above). Valid values are 0 to 4095 (0xFFF).

Note that this parameter can also be changed via communications, using the data map. For additional assistance contact the Merrick Customer Support department or see our website [www.merrick-inc.com/mct](http://www.merrick-inc.com/mct)

Integer/Frac FP
The Integer/Fraction bits are used when the device using the data (i.e. the PLC) does not support floating-point numbers. With the corresponding Word Order bit cleared, the first word will carry the Integer part, and the second the fractional part, multiplied with 10000. (4 implied decimal places). Note that for a negative value, both the integer and fractional parts are negative.

This parameter is valid and will appear in the Numeric Data menu only if one of the following protocols is selected:
• ScaleNet
• DF1
• Modbus RTU
• Modbus ASCII
• Modbus TCP

Selecting this parameter from the Numeric Data menu will bring up the Numeric Data Entry screen that will allow you to enter the desired Integer/Frac FP value. This should be done after selecting the correct protocol (see above). Valid values are 0 to 4095 (0xFFF).

Note that this parameter can also be changed via communications, using the data map.
For additional assistance contact the Merrick Customer Support department or see our website [www.merrick-inc.com/mct](http://www.merrick-inc.com/mct)

Register Tag 1
This is a register location (i.e. register number) in the GCM to be tagged for reading and/or writing. Registers are memory locations containing various data; almost any parameter in the GCM can be accessed by tagging it. Up to 5 registers can be accessed in this manner, through the small data map (CIT). The large data map exposes more data but in a different manner.

This parameter is valid and will appear in the Numeric Data menu only if one of the following protocols is selected:
• ScaleNet
• DF1
- Modbus RTU
- Modbus ASCII
- Modbus TCP

Selecting this parameter from the Numeric Data menu will bring up the Numeric Data Entry screen that will allow you to enter the desired register number to be tagged. This should be done after selecting the correct protocol (see above).

Note: In order to select the register number corresponding to the data you want to access, you will need a register list for your GCM application. Contact the Merrick Customer Support department for assistance.

**Register Tag 2**
See Register Tag 1, above.

**Register Tag 3**
See Register Tag 1, above.

**Register Tag 4**
See Register Tag 1, above.

**Register Tag 5**
See Register Tag 1, above.

**Use LRC**
If DF-1 is the selected protocol, you have the option of using either LRC (Longitudinal Redundancy Check) or CRC (Cyclic Redundancy Check) error checking. CRC is the most common, and is the default. Some older PLC’s can only accommodate LRC, however.

If you are using an Allen-Bradley DNI (DeviceNet Interface), this parameter should be set to CRC.

Selecting this parameter from the Numeric Data menu will bring up a screen that will allow you to select either CRC or LRC error checking. This should be done after selecting the correct protocol (see above).
Date & Time

(Main Menu > Advanced Setup > Date & Time)

Selecting this menu item, you will be presented with the following menu:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Hour</td>
<td>↑</td>
</tr>
<tr>
<td>Minute</td>
<td></td>
</tr>
<tr>
<td>Day</td>
<td></td>
</tr>
<tr>
<td>Month</td>
<td></td>
</tr>
<tr>
<td>Year</td>
<td>↓</td>
</tr>
</tbody>
</table>

Selection of any of the above items brings up the Numeric Data Entry screen allowing the user to set that particular parameter. All parameters are limited appropriately. These data are normally set at the factory, according to the local time zone.

Passwords

(Main Menu > Advanced Setup > Passwords)

Selecting this menu item, you will be presented with the following menu:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Calibration</td>
<td>↑</td>
</tr>
<tr>
<td>Basic Setup</td>
<td></td>
</tr>
<tr>
<td>Advanced Setup</td>
<td></td>
</tr>
<tr>
<td>Direct Param Edit</td>
<td>↓</td>
</tr>
</tbody>
</table>

Selection of any of the first three above items brings up the Numeric Data Entry screen allowing the user to change that particular password. All passwords are 4 digit numbers, settable from “0000” to “9999”. Setting all four digits of any password to zero defeats that password (disables security) for those menus requiring that password.

Note: If you select the “Direct Param Edit” password from the above list, you will be asked to enter this password before being allowed to change it.

GCM Name

Each Genetix GCM is allowed to have a unique “friendly” name. This name will be displayed in the top left corner of the User Interface, and may also be used in certain communications modes (i.e. Bluetooth) to identify the feeder you wish to talk to.

The maximum number of characters for this name is 15 and may consist of any alphabetic (upper or lower case) or numeric character, plus some special characters. You may use this name to identify the feeder any way you wish, but the name should be unique at your plant.
To edit the GCM name, select this menu item from the “Advanced Setup” menu to be presented with a screen that looks like this:

![GCM Name Edit Screen]

The current name is displayed with the cursor position highlighted. You simply scroll to the correct character with the left/right arrow keys, and then increment/decrement that character with the up/down arrow keys. The value shown (i.e. “Val[66]”) is the decimal ASCII code. The characters in the name are limited to ASCII 32 (space) to 122 (“z”). Note, if you are using Bluetooth, do not embed a space within the name, as this is not allowed by the Bluetooth protocol. All other characters are allowed. If you wish to change an existing name and remove characters from the end, you may erase them by entering a space.

The following may help you enter a name:

- Special characters range from ASCII 32 to 47, 58 to 64, and 91 to 96
- Numbers range from ASCII 48 to 57
- Uppercase characters range from ASCII 65 to 90
- Lowercase characters range from ASCII 97 to 122

Note that if you have an Extended Communications Card configured (see Main menu > Advanced Setup > Configuration > Expansion Comm Bd ) and are using Bluetooth, the GCM name you enter here becomes the Bluetooth “friendly name”. When power is cycled on the GCM, the current name is written to the Expansion Comm Board (“XDC”). When a Bluetooth scan is performed this is the name that will appear to the scanning device. It is not possible to edit the Bluetooth name directly; you must edit the GCM name, then cycle power.
Direct Param Edit

(Main Menu > Advanced Setup > Direct Param Edit)

Note: This menu item allows you direct editing ability for all the parameters in the Genetix controller with very few constraints. It is for the advanced user or Service Technician only.

Selecting this menu item, you will be presented with a screen asking you for a password. Upon successful entry of the password, you will be presented with a screen like this,

You may enter the register number you wish to change (upper left corner), by incrementing or decrementing using the up/down arrow keys and pressing the Enter key. Once the register number is entered (18 as shown above), the cursor will move to the current value, allowing you to edit it. Press the screen in the area of the value and it will bring up the Numeric Data Entry screen, allowing you to edit the value. In order to do this properly, you will probably need a list of registers, which can be provided by Merrick if necessary.

Note: Directly entering register values is very risky, as it is possible to enter a value that will render your Genetix controller inoperative. Again, it is for the advanced user or Service Technician only.
Configuration

(Main Menu > Advanced Setup > Configuration)

This section allows you to configure the Genetix controller for your specific application. By enabling or disabling certain features, you can tailor the control to your feeder and application. Also as you enable or disable features, the User Interface menu system is re-configured automatically making certain items visible or invisible. All features are enabled by setting to yes (“Y”) or disabled by setting to no (“N”).

Selecting this menu item, you will be presented with the following menu:

<table>
<thead>
<tr>
<th>Feature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feeder Control</td>
</tr>
<tr>
<td>Load Cell 1</td>
</tr>
<tr>
<td>Load Cell 2</td>
</tr>
<tr>
<td>Tacho 1</td>
</tr>
<tr>
<td>Tacho 2</td>
</tr>
<tr>
<td>Zero Tracking</td>
</tr>
<tr>
<td>Belt Tracking Sws</td>
</tr>
<tr>
<td>Material on Belt Sw</td>
</tr>
<tr>
<td>Discharge Monitor</td>
</tr>
<tr>
<td>Drag Chain</td>
</tr>
<tr>
<td>Belt Index</td>
</tr>
<tr>
<td>DNA Key</td>
</tr>
<tr>
<td>Expansion IO Bd 1</td>
</tr>
<tr>
<td>Expansion IO Bd 2</td>
</tr>
<tr>
<td>Network IO</td>
</tr>
<tr>
<td>Programmable IO</td>
</tr>
<tr>
<td>Expansion Analog Card 1</td>
</tr>
<tr>
<td>Expansion Analog Card 2</td>
</tr>
<tr>
<td>Expansion Comm Bd</td>
</tr>
<tr>
<td>Use Head Load</td>
</tr>
<tr>
<td>Disable Outs in Cal</td>
</tr>
<tr>
<td>--------------------</td>
</tr>
<tr>
<td>Infeed Flow Monitor</td>
</tr>
<tr>
<td>Drive Feedback</td>
</tr>
<tr>
<td>Inclinometer</td>
</tr>
<tr>
<td>Number of GCMs</td>
</tr>
</tbody>
</table>

Each item above also shows its current setting (“Y/N”)

**Feeder Control**

If this feature is not enabled (is set for “N”), the Genetix cannot function as a feeder, but only as a weigher. An example of an application with this feature disabled is a Belt Conveyor Scale (“Belt Scale”), or a wild flow weigher. In this type of application, the Genetix has no control of the feedrate or speed, but can simply measure what goes across the scale.

To function as a feeder, either to control Feedrate or Speed, you must turn this feature on.

**Load Cell 1**

Turn this feature on if you have one or more load cells connected to GCM Load Cell Channel 1. This is the lower of the two load cell connectors on the GCM board. Note: It is possible to have more than one load cell connected in parallel to a single load cell channel, but load cells connected like this cannot be resolved independently. All load cells connected to a single channel are treated as one.

**Load Cell 2**

Turn this feature on if you have one or more load cells connected to GCM Load Cell Channel 2. These load cells will be resolved independently of those connected to GCM Load Cell Channel 1. This is most frequently used when the scale or feeder has a load cell (or load cells) on both sides of the belt. Using both channels, the two sides can be resolved independently and load cell problems can sometimes be identified.

Also, if only one set of load cells is being used, but need to be connected to GCM Load Cell Channel 2, then this feature must be turned on. In this case Load Cell 1 (see above) would likely be turned off.

Those features that rely on two load cells will only appear in the menus if both Load Cell 1 and Load Cell 2 are enabled.

**Tacho 1**

Turn this feature on if you have a tacho (tachometer, encoder, etc.) connected to Tac1 on the GCM board.
**Tacho 2**

Turn this feature on if you have a tacho (tachometer, encoder, etc.) connected to Tac2 on the GCM board. This is frequently used in conjunction with the tacho connected to Tac1 to detect belt slippage.

Also, if only one tacho is being used, but it must be connected to Tac 2, then this feature must be turned on. In this case Tacho 1 (see above) would likely be turned off.

Those features that rely on two tachos (i.e. detection of belt slippage) will only appear in the menus if both Tacho 1 and Tacho 2 are enabled.

**Zero Tracking**

Zero Tracking (also known as “Auto-Zero”) is a process by which a belt feeder or belt conveyor can be allowed to zero itself, while running, if certain conditions are met. Errors in Zero are the most significant source of poor accuracy and so this can be a very powerful means to improve your performance of your belt scale (or feeder).

Good candidates for Zero Tracking are those feeders or conveyors that occasionally run empty for the period of time necessary to perform a Zero test, and those belt scales that require the utmost accuracy (i.e. certified scales).

To use Zero Tracking, you must enable this feature (set to “Y”). Once enabled, the menu for the Zero tracking parameters will appear in the Calibration menu (see **Main Menu > Calibration > Numeric Data > Zero Tracking**)

**Belt Tracking Sws**

Some belt feeders are equipped with Belt Tracking switches (also called “run-off switches”) that can advise the operator when the belt mis-tracks. If desired these switches can be connected directly to Genetix digital inputs and certain operations can be made to automatically take place when a mis-track occurs. For example, a Warning can be displayed if the belt mis-tracks a certain amount (called “Belt Offset”), or a Fault can occur (feeder will stop), if the belt mis-tracks a greater amount (called “Belt Error”).

To take advantage of this functionality, this feature must be enabled.

**Material on Belt Sw**

Some feeders are equipped with a Material on Belt switch that can advise the operator when there is (or is not) material on the belt. Various types of switches are used such as paddle, tilt, capacitance, etc. If desired these switches can be connected directly to a Genetix digital input and certain operations can be made to automatically take place when a loss of material occurs.

To take advantage of this functionality, this feature must be enabled.
**Discharge Monitor**

Some feeders are equipped with a Discharge Pluggage switch that can advise the operator when material has backed up at the discharge, possibly due to a pluggage downstream from the feeder. Various types of switches are used such as paddle, capacitance, etc. If desired these switches can be connected directly to a Genetix digital input and certain operations can be made to automatically take place when a discharge pluggage occurs.

To take advantage of this functionality, this feature must be enabled.

**Drag Chain**

Some feeders are equipped with a Drag Chain conveyor (also called “Cleanout Conveyor”) which sweeps the bottom of the interior of the feeder, removing any material that has fallen off the belt. There are several settings available that control when the Drag Chain runs, how long it runs, etc.

To take advantage of this functionality, this feature must be enabled.

**Belt Index**

Some feeders are equipped with a Belt Index which is a switch of some type that provides an input once per belt revolution. This can be used to detect slippage, or for the Zero Memory feature.

To take advantage of this functionality, this feature must be enabled.

**DNA Key**

Some Genetix controllers are provided with a DNA Key interface that allows certain data to be transferred to a removable memory device (called a “DNA Key”). For example, you may save all the parameters from a particular controller. These then might be later transferred back to the controller, in case of inadvertent re-programming, or to another controller. The “DNA Key” becomes visible in the Main Menu when this feature is enabled.

To take advantage of DNA Key functionality, this feature must be enabled.

**Expansion IO Bd 1**

Expansion IO boards provide the Genetix controller with additional digital inputs and outputs. To inform the Genetix that these additional IO points exist, and are therefore accessible to the controller, this feature must be enabled.

**Expansion IO Bd 2**

See Expansion IO Bd 1 (above)
Network IO

Network I/O are “virtual” physical inputs and outputs that are accessible from an outside source (i.e. Network) connected to a serial port on the GCM. Network inputs are settable from the Network, and network outputs are readable from the Network.

A Network input may have multiple Logical inputs mapped to it and takes on all other aspects of Genetix Physical inputs. For example they may be forced and/or inverted (see Main Menu > Advanced Setup > Digital I/O > Forces, Inverted I/O).

Multiple Network outputs may be mapped to a Genetix Logical output, and likewise take on all other aspects of Genetix Physical outputs. For example they may be forced and/or inverted (see Main Menu > Advanced Setup > Digital I/O > Forces, Inverted I/O).

The use of Network I/O is fairly sophisticated and generally done with the assistance of Merrick. The PLC programming required to interface with Genetix Network I/O is beyond the scope of this Manual. If you require assistance, please contact the Merrick Customer Support department.

To enable Network I/O you must set this Configuration parameter to “Y”. Otherwise Network I/O will not appear in the list of Physical I/O.

Programmable IO

Programmable I/O points are Logical I/O points that can take on the characteristics of both inputs and outputs. They have no inherent logical functionality, but are generally used to “connect” inputs to outputs. For example one Physical input may be mapped to multiple Programmable I/O points, each of which may in turn be mapped to multiple Physical outputs. In this example, if the Physical input turns on, all the Physical outputs so mapped would also turn on.

Because Programmable I/O points are Logical I/O, they can also be set for Warning or Fault ((see Main Menu > Advanced Setup > Digital I/O > Warnings/Faults).

The use of Programmable I/O is fairly sophisticated and generally done with the assistance of Merrick. Many things are possible, beyond the simple example shown above; however a complete discussion is beyond the scope of this Manual. If you require assistance, please contact the Merrick Customer Support department.

To enable Programmable I/O you must set this Configuration parameter to “Y”. Otherwise Programmable I/O will not appear in the list of Logical I/O.

Expansion Analog Card 1

Some Genetix controllers are provided with an auxiliary analog card that can either be plugged into the expansion header on the GCM as a daughtercard, or panel mounted and connected to the GCM via a cable. Each such card card provides for 2 additional analog outputs, one additional analog input, and 4 additional digital inputs (dry contact). There can be a maximum of two Expansion Analog cards.
If you have such a card, this feature must be turned on to enable it. Once enabled, the additional I/O will appear in the menus.

**Expansion Analog Card 2**

If you have a second Expansion Analog card, this feature must be turned on to enable it (see above).

**Expansion Comm Bd**

Some Genetix controllers are provided with an auxiliary communications card (also called a “daughter card”) that is plugged into the expansion header on the GCM. This provides for certain special serial communications features, such as Bluetooth.

If you have such a card, this feature must be turned on to enable it.

**Use Head Load**

This is a feature that allows the translation of the belt load from the suspension (where it is actually measured) to the head pulley (where it is actually discharged). In some applications, such as Stopped Belt Batching, this can have a very important affect on accuracy.

Note: you must enter the distance from the suspension to the head pulley (see Main Menu > Advanced Setup > Load Cells > Numeric Data > LC to Head Pulley) for the Genetix to know how to make this translation. This menu item will appear if this feature is enabled.

To take advantage of Head Load translation, this feature must be enabled.

**Disable Outs in Cal**

This option disables the external totalizer and the analog feedrate outputs while a Calibration procedure is running. This prevents other process equipment from being affected by the data that would otherwise be presented at these outputs.

To enable this feature (disable the outputs), turn this feature on.

**Infeed Flow Monitor**

Some feeder are equipped with a device that monitors the flow in the pipe or chute at the inlet to the feeder. Often this is an Acoustic Flow Monitor that actually listens for this flow and sets an output when it stops, for example if the material in the silo forms a bridge or an arch. By connecting this output directly to a Genetix digital input certain operations can be made to automatically take place when a loss of flow occurs. This can be very important, for example on a pressurized coal feeder that must maintain a column of material in the infeed to form a seal. Loss of this seal can allow hot gases into the silo and cause a fire.

To take advantage of this functionality, this feature must be enabled.
Drive Feedback

In a typical belt feeder application the Genetix controller is connected to the variable speed drive which allows it to control the belt speed. The minimum number of signals that must be used for this connection is an analog signal that tells the drive how fast to go (called “Belt Speed Demand”) and a digital signal that tells the drive to start (called “Belt Forward”). Also, in the case where the belt is allowed to run backward, another digital output is available called “Belt Reverse”.

If it is desired to provide greater integration between the Genetix controller and the Drive, the “Drive Feedback” feature may be enabled and additional inputs and outputs will become available.

Inclinometer

An inclinometer is a device capable of sending an analog signal representing the angle (or “inclination”) of the conveyor or feeder relative to horizontal. Connected to an analog input on a GCM, this will allow the Genetix controller to correctly measure the belt load regardless of angle. This might be useful, for example if the scale or feeder is installed such that this angle changes during operation.

To use this feature, it must be enabled, and the analog input must be mapped to the “Inclination” logical analog input (see Main Menu > Advanced Setup > Analog I/O > Inputs > Function). Also, like all analog inputs it must be calibrated so that the angle is correctly represented by the analog signal.

Number of GCM’s

The Genetix Color User Interface is capable of monitoring several feeders at one time with a single display. All feeders connected are continuously scanned and updated. This parameter tells the color display how many GCM’s are connected and how many therefore to scan.

Note: Each connected GCM must have a unique Unit Address set for the port that is connected to the color display (see Main Menu > Advanced Setup > Communications > Port n > Numeric Data > Unit Address). In addition the first feeder must have its Unit Address set to 1, and they must be sequence with the last feeder’s Unit Address being equal to the Number of GCM’s.

The protocol for the GCM port connected to the color display must be set to “UIServer”.

The maximum number of GCM’s that may be connected to one color display is 32.
Reset Totals
Selecting this item from the Main Menu will bring up the following selections:

<table>
<thead>
<tr>
<th>Selecting this item from the Main Menu will bring up the following selections:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reset Sub-Total…</td>
</tr>
<tr>
<td>Reset Grand-Total…</td>
</tr>
</tbody>
</table>

If you select “Reset Sub-Total” from the above screen you will see a screen that shows the respective current totalizer value and asks you to confirm the reset. Press the Enter key to reset the totalizer or press the Menu/Esc key to cancel without resetting.

If you select “Reset Grand-Total from the above menu, you will be asked for a password to allow the reset. This is the same password as used for Calibration (default = “1234”). Upon successful entry of the password you will see a screen that shows the respective current totalizer value and asks you to confirm the reset. Press the Enter key to reset the totalizer or press the Menu/Esc key to cancel without resetting.

DNA Key
Selecting this item from the Main Menu will bring up the following selections:

<table>
<thead>
<tr>
<th>Selecting this item from the Main Menu will bring up the following selections:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Save to Key…</td>
</tr>
<tr>
<td>Restore from Key…</td>
</tr>
</tbody>
</table>

In addition, at the bottom of the display there will be various Help messages. For example if no DNA Key is inserted into the receptacle, the message will read, “Waiting for DNA Key Insertion”

Upon insertion of a properly formatted key, the message will read, “DNA Key Inserted”, and then, “Reading Master Page”, and then “Ready”

If a key is inserted that has not been properly formatted, the message will read, “Error, can’t read!”

Note: All DNA Keys must be formatted before they can be used. This is normally done at the Merrick factory.

Once the “Ready” message is received, you may proceed to one of the options above.
Save to Key

If you select this option from the above menu, you will see a screen warning you that all data (if any) will be overwritten on the inserted DNA Key. Press the Enter key to confirm and continue, or the Menu/Esc key to abort, leaving the existing data on the DNA Key intact.

If you confirm, all of the parameters, settings, and data in the internal memory of the Genetix GCM will be saved to the key. If successful, the Help message will read,

“Writing Data”, and then,

“Successful Save”

Restore from Key

If you select this option from the above menu, you will see a screen warning you that all data in the Genetix GCM will be overwritten by the data on the present DNA Key.

Note: Once the data is written to the GCM from the DNA Key, the GCM will automatically be reset, making the new settings effective. This will cause the feeder to stop (if it was running), and may cause other process related issues. It is strongly recommended that the Restore operation only be done while the process is stopped and peripheral devices secured.

Press the Enter key to confirm and continue, or the Menu/Esc key to abort, leaving the data in the Genetix GCM intact.

If you confirm, all of the data on the present DNA Key will be written to the Genetix GCM will be overwritten, re-configuring it. If successful, the Help message will read,

“Reading data”, and then,

“Successful Restore”

Diagnostics
(Main Menu > Diagnostics)

Selection of “Diagnostics” from the Main menu presents a list of items the use can select to see specific data for diagnostics or informational purposes. The following sections are available,

| Load Cells… | ↑ |
| Tachos… | |
| Analog Inputs… | |
| Analog Outputs… | |
| Digital Inputs… | |
| Digital Outputs… | |
Each of the above menu items displays additional screens with data relative to that particular item. Many items have multiple screens, and for those you will see “← →” in the lower right of the display. You may scroll through the available screens with the left and right arrow keys.

Drag Chain Control

(Main Menu > Drag Chain Control)

Note: The items presented in the Drag Chain Control menu will vary depending on current configuration. Also “Drag Chain Control” only appears in the Main Menu if “Drag Chain” is enabled (see Main Menu > Advanced Set-up > Configuration).

The following is a list of all Feeder Control items and their functions:

Start [Stop] Drag Chain…
Jog Forward
Jog Reverse

Start [Stop] Drag Chain

If the drag chain is not linked to Feeder Running (see Main Menu > Advanced Set-up > Feeder Peripherals > Drag Chain > Settings), or if feeder is in Manual mode, this menu item allows you to start and stop the drag chain. If the drag chain is not running, this item will read “Start Drag Chain”. If the drag chain has already been started, this item will read “Stop Drag Chain”.

Note: If the drag chain has been configured to run in “timed” mode, the drag chain will actually run in accordance with the timer settings, once started (see Main Menu > Advanced Set-up > Feeder Peripherals > Drag Chain > Numeric Data).

Jog Forward

If the feeder is in Manual mode, this command will appear and will run the drag chain forward as long as you hold the Enter key down.

Jog Reverse
If the feeder is in Manual mode and the drag chain has been configured as reversible, this command will appear and will run the drag chain in reverse as long as you hold the Enter key down.

Note: If Drag Chain is linked to Auto Run, no start/stop options will be shown (see Main Menu > Advanced Setup > Feeder Peripherals > Drag Chain > Settings).
Appendix A
Logical Inputs

This is a list of all Logical inputs that are available in the Genetix controller.
Note: Not all inputs will be visible, depending on the Configuration settings (see Main Menu > Advanced Setup > Configuration).

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Belt is Running</td>
<td>Belt is running input.</td>
</tr>
<tr>
<td>Total Enabled</td>
<td>Enable grand total update</td>
</tr>
<tr>
<td>Subtot Enabled</td>
<td>Enable sub total or volumetric total update</td>
</tr>
<tr>
<td>EMT Enabled</td>
<td>Enable EMT total update</td>
</tr>
<tr>
<td>Reset Faults</td>
<td>Reset Faults</td>
</tr>
<tr>
<td>Reset Warnings</td>
<td>Reset warnings</td>
</tr>
<tr>
<td>Reset Subtotal</td>
<td>Clear the active subtotal. If in &quot;Bypassed&quot;, will clear the Volumetric Sub-total.</td>
</tr>
<tr>
<td>Spd Pulse Block</td>
<td>Hold input for speed span test</td>
</tr>
<tr>
<td>Permit Calibr</td>
<td>Calibration procedures permitted</td>
</tr>
<tr>
<td>Diverter Valve</td>
<td>Diverter valve limit switch. ON when valve is open</td>
</tr>
<tr>
<td>Register Access</td>
<td>Extended register access permitted</td>
</tr>
<tr>
<td>Zero Tracking</td>
<td>Enable zero tracking</td>
</tr>
<tr>
<td>External Fault</td>
<td>External switch that can be used for indication of fault, and trip (stop) feeder.</td>
</tr>
<tr>
<td>Goto Volumetric</td>
<td>Go into volumetric (inferred load) mode.</td>
</tr>
</tbody>
</table>

Feeder related inputs. Present when “Feeder Control” is enabled (see Main Menu > Advanced Setup > Configuration > Feeder Control).

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Run Permission</td>
<td>Controller auto run permission</td>
</tr>
<tr>
<td>Netw. Run Perm</td>
<td>Controller network run permission</td>
</tr>
<tr>
<td>Min Setpoint</td>
<td>Revert to Minimum setpoint (feeder control method is Rate or Speed)</td>
</tr>
<tr>
<td>Feeder Block</td>
<td>Unconditional feeder block. Feeder will not run in any mode</td>
</tr>
<tr>
<td>Local Lockout</td>
<td>Block from going out of Auto</td>
</tr>
<tr>
<td>Force Network</td>
<td>Force Serial Setpoint at good comm’s</td>
</tr>
<tr>
<td>Belt Drv Fail</td>
<td>Belt Drive Fault or Not Ready output from speed control</td>
</tr>
</tbody>
</table>

Belt Index related. Present when “Belt Index” is enabled (see Main Menu > Advanced Setup > Configuration > Belt Index).

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Belt Index Sw</td>
<td>Belt Index Prox Switch</td>
</tr>
</tbody>
</table>

Drag Chain related. Present when “Drag Chain” is enabled (see Main Menu > Advanced Setup > Configuration > Drag Chain).

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drag Chain ZSS</td>
<td>Drag chain zero speed switch</td>
</tr>
<tr>
<td>Chn Mot Overld</td>
<td>Chain Motor overload</td>
</tr>
<tr>
<td>Discharge Pluggage Switch related. Present when “Discharge Monitor” is enabled (see Main Menu &gt; Advanced Setup &gt; Configuration &gt; Discharge Monitor).</td>
<td></td>
</tr>
<tr>
<td>---------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Disch Monitor</td>
<td>Discharge Pluggage detected</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Material On Belt Switch related. Present when “Material on Belt Sw” is enabled (see Main Menu &gt; Advanced Setup &gt; Configuration &gt; Material on Belt Sw).</th>
</tr>
</thead>
<tbody>
<tr>
<td>Material On Blt</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Flow monitor related. Present when “Infeed Flow Monitor” is enabled (see Main Menu &gt; Advanced Setup &gt; Configuration &gt; Infeed Flow Monitor).</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low Infeed Flow</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Drive Check related. Present when “Drive Feedback” is enabled (see Main Menu &gt; Advanced Setup &gt; Configuration &gt; Drive Feedback).</th>
</tr>
</thead>
<tbody>
<tr>
<td>Belt Drive AtSp</td>
</tr>
<tr>
<td>Belt Drv Overld</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Belt Tracking switches related. Present when “Belt Tracking Sws” is enabled (see Main Menu &gt; Advanced Setup &gt; Configuration &gt; Belt Tracking Sws).</th>
</tr>
</thead>
<tbody>
<tr>
<td>Belt Offs Left</td>
</tr>
<tr>
<td>Belt Offs Right</td>
</tr>
<tr>
<td>Belt Err Left</td>
</tr>
<tr>
<td>Belt Err Right</td>
</tr>
</tbody>
</table>
Appendix B
Logical Outputs

This is a list of all Logical outputs that are available in the Genetix controller. Note: Its possible some outputs will not be visible, depending on the Configuration settings (see Main Menu > Advanced Setup > Configuration).

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Warning</td>
<td>Warning</td>
</tr>
<tr>
<td>Fault</td>
<td>Fault</td>
</tr>
<tr>
<td>Running</td>
<td>Feeder belt is running</td>
</tr>
<tr>
<td>Feeding</td>
<td>There is a feedrate</td>
</tr>
<tr>
<td>Ready</td>
<td>Feeder is running or startable</td>
</tr>
<tr>
<td>LoadCell 1 Ovl</td>
<td>Load Cell A/D channel 1 overload</td>
</tr>
<tr>
<td>LoadCell 1 Undl</td>
<td>Load Cell A/D channel 1 underload</td>
</tr>
<tr>
<td>LoadCell 2 Ovl</td>
<td>Load Cell A/D channel 2 overload</td>
</tr>
<tr>
<td>LoadCell 2 Undl</td>
<td>Load Cell A/D channel 2 underload</td>
</tr>
<tr>
<td>LC Ch1 Failure</td>
<td>Load cell A/D channel 1 failure</td>
</tr>
<tr>
<td>LC Ch2 Failure</td>
<td>Load cell A/D channel 2 failure</td>
</tr>
<tr>
<td>High Belt Load</td>
<td>High Belt Load limit</td>
</tr>
<tr>
<td>Low Belt Load</td>
<td>Low Belt Load limit</td>
</tr>
<tr>
<td>High Belt Speed</td>
<td>High Belt Speed limit</td>
</tr>
<tr>
<td>Low Belt Speed</td>
<td>Low Belt Speed limit</td>
</tr>
<tr>
<td>High Feedrate</td>
<td>High Feedrate limit</td>
</tr>
<tr>
<td>Low Feedrate</td>
<td>Low Feedrate limit</td>
</tr>
<tr>
<td>Load Imbalance</td>
<td>Load Cell A/D channels imbalance</td>
</tr>
<tr>
<td>Zero Track Fail</td>
<td>Zero Tracking has stepped out of range</td>
</tr>
<tr>
<td>Belt Slippage</td>
<td>The tacho ratio Tac2/Tac1 is outside of its limits</td>
</tr>
<tr>
<td>Inferred Load</td>
<td>Inferred load used</td>
</tr>
<tr>
<td>Inferred Speed</td>
<td>Inferred speed used</td>
</tr>
<tr>
<td>No Belt Motion</td>
<td>No belt motion was detected. Note, this output always active.</td>
</tr>
<tr>
<td>Cal in Progress</td>
<td>A Calibration procedure is active</td>
</tr>
<tr>
<td>HeartBeat</td>
<td>Application integrity toggle output</td>
</tr>
<tr>
<td>Parameter Fail</td>
<td>Parameter load at start-up failed or save after change failed</td>
</tr>
<tr>
<td>Port 0 Timeout</td>
<td>Communications time out, port 0 (USB)</td>
</tr>
<tr>
<td>Port 1 Timeout</td>
<td>Communications time out, port 1 (UART0)</td>
</tr>
<tr>
<td>Port 2 Timeout</td>
<td>Communications time out, port 0 (UART1)</td>
</tr>
</tbody>
</table>

Expansion Board related. Present when one or more expansion I/O boards are enabled (see Main Menu > Advanced Setup > Configuration).

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>XIO 1 Failure</td>
<td>Expansion board 1 is enabled and is failing</td>
</tr>
<tr>
<td>XIO 2 Failure</td>
<td>Expansion board 2 is enabled and is failing</td>
</tr>
<tr>
<td>XADC Failure</td>
<td>Analog I/O expansion board is enabled and is failing. (Can be either of two Expansion Analog Cards)</td>
</tr>
<tr>
<td>XDC Failure</td>
<td>Communication board is enabled and is failing</td>
</tr>
</tbody>
</table>

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### Feeder related outputs. Present when “Feeder Control” is enabled (see Main Menu > Advanced Setup > Configuration > Feeder Control).

<table>
<thead>
<tr>
<th>Description</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Deviation</td>
<td>Feedrate is higher than max deviation limit</td>
</tr>
<tr>
<td>Low Deviation</td>
<td>Feedrate is lower than max deviation limit</td>
</tr>
<tr>
<td>High Setpoint</td>
<td>High Setpoint limit</td>
</tr>
<tr>
<td>Low Setpoint</td>
<td>Low Setpoint limit</td>
</tr>
<tr>
<td>High PID CV</td>
<td>PID controller output at high limit</td>
</tr>
<tr>
<td>Low PID CV</td>
<td>PID controller output at low limit</td>
</tr>
<tr>
<td>Good Feedrate</td>
<td>Good feedrate maintained</td>
</tr>
<tr>
<td>Belt Motor</td>
<td>Belt to go any direction</td>
</tr>
<tr>
<td>Belt Forward</td>
<td>Belt to go forward direction</td>
</tr>
<tr>
<td>Belt Reverse</td>
<td>Belt to go reverse direction</td>
</tr>
<tr>
<td>Auto State</td>
<td>Feeder state is auto</td>
</tr>
<tr>
<td>Manual State</td>
<td>Feeder state is manual</td>
</tr>
<tr>
<td>Rem Ana Setptn</td>
<td>Remote Setpoint</td>
</tr>
<tr>
<td>In Control</td>
<td>Ready/run perm/no cal proc</td>
</tr>
<tr>
<td>Belt Drive Fail</td>
<td>Drive fault or not ready when required</td>
</tr>
</tbody>
</table>

### Belt Index related. Present when “Belt Index” is enabled (see Main Menu > Advanced Setup > Configuration > Belt Index).

<table>
<thead>
<tr>
<th>Description</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Missed Belt Idx</td>
<td>Belt Position index not present when expected</td>
</tr>
</tbody>
</table>

### Drag Chain related. Present when “Drag Chain” is enabled (see Main Menu > Advanced Setup > Configuration > Drag Chain).

<table>
<thead>
<tr>
<th>Description</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chain Motor</td>
<td>Drag Chain to go any direction</td>
</tr>
<tr>
<td>Chain Forward</td>
<td>Drag Chain to go forward direction</td>
</tr>
<tr>
<td>Chain Reverse</td>
<td>Drag Chain to go reverse direction</td>
</tr>
<tr>
<td>Drag Chain Jam</td>
<td>Drag Chain zero speed switch time expired</td>
</tr>
</tbody>
</table>

### Discharge Pluggage Switch related. Present when “Discharge Monitor” is enabled (see Main Menu > Advanced Setup > Configuration > Discharge Monitor).

<table>
<thead>
<tr>
<th>Description</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disch Plugged</td>
<td>On when a discharge plugged condition has existed longer then the delay setting (see Main Menu &gt; Advanced Setup &gt; Feeder Peripherals &gt; Discharge Monitor &gt; Numeric Data ). Feeder must be in Auto and must be running.</td>
</tr>
</tbody>
</table>

### Material on Belt Switch related. Present when “Material on Belt SW” is enabled (see Main Menu > Advanced Setup > Configuration > Material on Belt SW).

<table>
<thead>
<tr>
<th>Description</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Material</td>
<td>On when a no material on belt condition has existed longer then the delay setting (see Main Menu &gt; Advanced Setup &gt; Feeder Peripherals &gt; Material on Belt SW &gt; Numeric Data ). Feeder must be in Auto and must be running.</td>
</tr>
</tbody>
</table>

### Infeed Flow Monitor related. Present when “Infeed Flow Monitor” is enabled (see Main Menu > Advanced Setup > Configuration > Infeed Flow Monitor).

<table>
<thead>
<tr>
<th>Description</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Flow</td>
<td>On when a loss of flow condition has existed longer then the delay setting (see Main Menu &gt; Advanced Setup &gt; Feeder Peripherals &gt; Infeed Flow Monitor &gt; Numeric Data ). Feeder must be in Auto and must be running.</td>
</tr>
<tr>
<td>Empty Pipe</td>
<td>On when a calculated loss of material is greater than the allowable loss (see Main Menu &gt; Advanced Setup &gt; Feeder</td>
</tr>
</tbody>
</table>
Peripherals > Infeed Flow Monitor > Numeric Data). Feeder must be in Auto and must be running. When a loss of flow is detected (logical input “Low Infeed Flow” turns on, an internal totalizer is started. If this totalizer exceeds the set amount, the logical output “Empty Pipe” is set.

<table>
<thead>
<tr>
<th>Drive Check related. Present when “Drive Feedback” is enabled (see Main Menu &gt; Advanced Setup &gt; Configuration &gt; Drive Feedback).</th>
</tr>
</thead>
<tbody>
<tr>
<td>Belt Drive Ovld</td>
</tr>
<tr>
<td>Belt Drive NAS</td>
</tr>
</tbody>
</table>
Consult your Merrick wiring diagram for additional connection information, or contact the Merrick Customer Support department for assistance.
Appendix D
GCM Specifications

**Environmental**
Maximum ambient temperature: 50°C (122°F)
Minimum ambient temperature: -10°C (14°F)

**Power**
Supply voltage: 24 VDC +/- 1V
Power consumption: 8W nominal, 12W maximum
Power dissipation: 5W nominal, 10W maximum

**Loadcell Inputs (2)**
Excitation voltage: 5 VDC
Excitation current: 300mA (max)

**Tachos (2)**
Supply voltage: 5 VDC
Supply current: 400mA, maximum (total)

**Analog Inputs**
Input impedance (Current input): 200 ohms
Input impedance (Voltage input): 100Kohms

**Analog Outputs (2)**
4-20mA, 1000 ohm maximum

**Digital Inputs (4)**
Note: Standard GCM digital inputs require external voltage sourcing, jumper selectable for 24VDC, 120 VAC, or 240 VAC.

Input impedance at 24 VDC: 7.5 KΩ
Input impedance at 120 VAC: 64 KΩ
Input impedance at 240 VAC: 120 KΩ

**Digital Outputs (4)**
Note: Standard GCM digital outputs are relays with form "C" contacts (1 NO, 1 NC).

Contact ratings: 5A, 250 VAC; 5A, 30 VDC

**EMT (external mechanical totalizer)**
Contact ratings: 120mA, 240 VAC; 120mA, 24 VDC