Encoder Calibration Procedures

for the FT-50 and FT-70

Document 40258-0302

Industrial Dynamics Company, Ltd.

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Table of Contents

Determining the Software Version Baseline

Before you begin the calibration procedure determine the software version installed in your inspection unit.

1. Turn the FT-50/70 power on, or press the reset button and the FT-50/70 will begin its start-up sequence.

2. Read the software version code in the displayed status message:

   IDC FT-50/70 MT:011
   VERSION:MGI STAT:0480

   - If the version code is MGI thru MIC, TYW thru TZZ, or SAA thru SZZ use the calibration procedure for baseline eight or newer units. For more information see Calibrating Baseline Eight or Newer Units on page 2.
   - If any other software version appears, use the calibration procedure for baseline seven or older units. For more information see Calibrating Baseline Seven or Older Units on page 18.

Conversion Factors

The following formulas may be helpful when performing the calibration procedures:

Converting inches to millimeters:

25.4 X inches = millimeters

Converting feet per minute to meters per minute:

3.28 x feet = meters

Calculating containers per minute (cpm):

$$\frac{\text{CPH}}{60} = \text{CPM}$$

Calibrating Baseline Eight or Newer Units

The following calibration procedures apply only to FT-50/70 units that have baseline eight or newer of the system software installed. There are three different procedures depending upon your situation:

- Standard Conveyor Calibration Procedure for standard conveyors with a 1.5-inch pitch and you know the number of teeth on the sprocket directly contacting the underside of the main production transport chain. For more information see Standard Calibration Procedure on page 3.
- Unknown Sprocket Size Calibration Procedure for standard conveyors with a 1.5-inch pitch, but you don't know the number of teeth on the sprocket directly contacting the underside of the main production transport chain. For more information see Unknown Sprocket Size Calibration Procedure on page 7.
- Non-Standard Conveyor Calibration Procedure for conveyors that do not have a 1.5-inch pitch, but you do know the number of teeth on the sprocket directly contacting the underside of the main production transport chain and the size of the conveyor segments (chain links). For more information see Non-Standard Conveyor Calibration Procedure on page 12.

LED Definitions

The following LEDs, located on the controller board, are redefined in Baseline Eight. For more information on the LED banks refer to the FT-50/70 Operation Manual.

LED Number	S1, B1	S1, B2	S2, B1	S2, B2
1	Diag Error	Label 1	Remote Clr	Inlabeler 1
2	Reject Pulse	Label 2	Broken Slat or Batch Rej	Inlabeler 2
3	Hi Res Encoder	Label 3	Lw Res Encoder	Inlabeler 3
4	Low Foam	Label 4	X-ray Enable or Optical FL	Inlabeler 4
5	Downcan/Smash	Label 5	X-ray Failure or FSR 2 INPUT	Inlabeler 5
6	Bulged/High Cap	Label 6	Extrn or FSR 1	Cntr Present
7	Missing Cap/Lid	Label 7	Slat Backup or Reject Verify	System Timing
8	Trigger	Label 8	Trigger	Trigger

Standard Calibration Procedure

Use this procedure if you have a standard conveyor with a 1.5-inch chain pitch and you know the number of teeth on the sprocket directly contacting the underside of the main production transport chain.

1. Remove the FT-50/70's cover to access dip switch pack S1. When performing the calibration procedures you are required to change the settings for S1-5 and S1-6.

2. Press Key 5 until System Display appears and then press the Arrow Key to enter the Calibrate Mode. You may be required to enter a password if your system is password protected.

3. Press Key 4 until Rejector Status appears and check to be sure the rejector is activated. If it is turned off, press the Arrow Key to turn it on.

4. Open dip switch S1-5.

5. Press Key 5 until Rejector Type appears and use the Arrow Key to select the type of rejector installed in your system.

6. Press Key 5 until Known Chain Pitch & Teeth appears and set to Present.

7. Press Key 5 until Encoder Resolution appears and enter the encoder resolution. The standard encoder is 500 pulse. The following table lists the encoders and the supported resolution.

Note: The encoder resolution is set at the factory during assembly, however if you upgraded the software you should check the encoder type and set it properly.

Description	Resolution
Standard	500
Dual Track	1000
Ultra High Resolution	5000

8. Close Dip Switch S1-5.

9. Measure the distance in millimeters from the trigger sensor beam to the centerline of the rejector. If you are using a slat rejector measure from the beam to the upstream edge of the slat assembly. Accurate measurement is extremely important for proper calibration.

10. Press Key 4 until Inspect Trig To C/l Rej appears and use the Arrow Key to enter the measurement in millimeters.

11. Measure the diameter of the production container (in millimeters) at the point where the container intersects the trigger beam. This is the containers bottle width at the trigger point.

12. Press Key 5 until Bottle Width At Trig appears and enter (in millimeters) the production container's width at the trigger point.

13. Measure the diameter of the container (in millimeters) at its widest point. This is the containers maximum diameter.

14. Press Key 5 until Maximum Bottle Diameter appears and enter (in millimeters) the production container's maximum diameter.

15. Press Key 5 until Maximum Line Speed appears and enter the line speed (in cpm) for the container in use. The program assumes 12 mm container spacing in order to perform preliminary calculations.

16. Press Key 5 until Conveyor Drive Sprocket appears and enter the number of teeth on the conveyor chain sprocket, or the number of teeth on the chain sprocket at the drive shaft where the encoder is directly coupled.

17. Start the conveyor and run it at the maximum required production speed. If this is not possible because the filler is not running, run it at the highest speed available.

Note: If you cannot perform steps 17 and 18 while running the conveyor at maximum speed, you must repeat steps 17 and 18 later, when maximum speed is available.

18. Press Key 5 until Chain Velocity appears. Note this value because you need to enter it in the Maximum Conveyor Speed function (step 18).

19. Press Key 5 until Maximum Conveyor Speed appears and enter the Chain Velocity value from the previous step. The optimum encoder value for the current line speed is now calculated including the Calibrate Encoder Value, Encoder Prescaler Value, and Gamma/X-ray Sample Cutoff Limit.

20. To verify the calibration press Key 4 until Reject Next appears and then press the Arrow Key to enter the number of containers you want to reject consecutively. Choose a number such as 6 or higher to provide enough attempts to make adjustments. When the number reaches zero, you must repeat this step to reactivate the rejector.

21. With the conveyor running very slowly so the reaction delay does not effect the result, place a production container upstream of the FT-50/70 so that it passes through the FT-50/70 without slipping. If the container appears to be centered on the upstream third of the rejector pad at the point of contact, proceed to step 22 on page 1-5.

Note: The slat rejectors have a variation factor of ± 0.5 inch. If you are using a slat rejector, average the accuracy over several rejects using a single slat.

22. If the container is not rejected properly, make changes to the measured distance or number of sprocket teeth as follows:

    - Verify the Inspect Trigger to C/L Rejector distance is measured and entered correctly (see step 9 on page 1-4 and step 10 on page 1-4).
    - Verify the number of conveyor drive sprocket teeth is entered correctly (see step 16 on page 1-4).

    The container position at reject can be in error by 0.5 inch for every 12 inches of distance from the inspection trigger to the rejector centerline (or slat assembly). For example:

    - If the Inspection Trigger to Centerline Rejector distance is 24 inches and the container is 1 inch upstream of the rejector when it fires, then the number of drive sprocket teeth should be reduced by one.
    - If the container is 1 inch down stream when the rejector fires, the number of teeth should be increased by one.

23. Run the conveyor at the same speed as in step 17 on page 1-4 and place a bottle on the conveyor far enough upstream so that it does not slip on the conveyor as it passes through the FT-50/70.

If the reject is late, check to be sure the encoder coupling is not slipping. Try a rejection with a thin layer of grease on the pad. If the resulting mark in the grease starts in the upstream third of the pad face and is centered, then performance is acceptable. If there are still significant early/late problems, and you are certain that you have a standard conveyor chain, contact the Industrial Dynamics Customer Service.

24. If you performed the step 23 at production speed, then proceed to step 28 on page 1-6. If you did not perform step 23 at production speed, then you must proceed to step 25.

25. With the conveyor running at production speed, press Key 5 until Chain Velocity appears. Note this value because you need to enter it in the following step.

26. Press Key 5 until Maximum Conveyor Speed appears and enter the Chain Velocity value from the previous step. The optimum encoder value for the current line speed is now calculated including the Calibrate Encoder Value, Encoder Prescaler Value, and Gamma/X-ray Sample Cutoff Limit.

27. While the conveyor is running at production speed, place a bottle on the conveyor far enough upstream so that it does not slip on the conveyor as it passes through the FT-50/70.

If the reject is late, check to be sure the encoder coupling is not slipping. Try a rejection with a thin layer of grease on the pad. If the resulting mark in the grease starts in the upstream third of the pad face and is centered, then performance is acceptable. If there are still significant early/late problems, and you are certain that you have a standard conveyor chain, contact the Industrial Dynamics Customer Service.

28. To store the settings in system memory, close dip switch S1-2 and then press Key 5 until Save Default Constants appears.

29. Press the Arrow Key to execute. When Completed appears, open S1-2 to protect the saved settings.

30. Press Key 5 until System Display appears and press the Arrow Key to select the Operate Mode. This returns the FT-50/70 to a secured operating mode and completes the calibration procedure.

31. If you are using this production line to produce more than one type of container, you must repeat this procedure for each different container type (i.e. containers with different diameters, or line speeds).

Unknown Sprocket Size Calibration Procedure

Use this procedure to calibrate standard conveyors with a 1.5-inch pitch, but you don't know the number of teeth on the sprocket directly contacting the underside of the main production transport chain. This procedure initially estimates the number of sprocket teeth, and then allows you to fine tune.

1. Remove the FT-50/70's cover to access dip switch pack S1. When performing the calibration procedures you are required to change the settings for S1-5 and S1-6.

2. Press Key 5 until System Display appears and then press the Arrow Key to enter the Calibrate Mode. You may be required to enter a password if your system is password protected.

3. Press Key 4 until Rejector Status appears and check to be sure the rejector is activated. If it is turned off, press the Arrow Key to turn it on.

4. Open dip switch S1-5.

5. Press Key 5 until Rejector Type appears and use the Arrow Key to select the type of rejector installed in your system.

6. Press Key 5 until Known Chain Pitch & Teeth appears and set to Present.

7. Press Key 5 until Encoder Resolution appears and enter the encoder resolution. The standard encoder is 500 pulse. The following table lists the encoders and the supported resolution.

Note: The encoder resolution is set at the factory during assembly, however if you upgraded the software you should check the encoder type and set it properly.

Description	Resolution
Standard	500
Dual Track	1000
Ultra High Resolution	5000

8. Close Dip Switch S1-5.

9. Measure the diameter of the production container (in millimeters) at the point where the container intersects the trigger beam. This is the containers bottle width at the trigger point.

10. Press Key 5 until Bottle Width At Trig appears and enter (in millimeters) the production container's width at the trigger point.

11. Measure the diameter of the container (in millimeters) at its widest point. This is the containers maximum diameter.

12. Press Key 5 until Maximum Bottle Diameter appears and enter (in millimeters) the production container's maximum diameter.

Executing the Encoder Calibration Routine

Use the largest possible opaque container when executing the Calibrate Encoder Routine. The larger and more opaque the container, the greater the accuracy of the sensor readings. For example, if the test container diameter is 28 mm, the calculation error factor is ± 2 teeth. If the test container diameter is 66 mm, the calculation error factor is ± 1 tooth.

Note: Slipping a short piece of pipe over the container neck is a useful way to increase the width of the bottle at the trigger point. If you choose to do this, you must repeat step 9 in order to enter the pipe diameter.

13. Open dip switch S1-6.

14. Start the conveyor and run it at the highest expected production speed. You may not be able to achieve the highest possible speed unless the filler unit is running.

15. Press Key 5 until Calibrate Encoder appears and press the Arrow Key to execute the encoder calibration routine. This procedure takes several seconds to complete. When Ready is displayed, proceed to the following step.

16. Place the container on the conveyor upstream of the FT-50/70 so the container passes through the inspection tunnel without slipping. The FT-50/70 automatically calculates the prescaler value. It takes several seconds for the FT-50/70 to make this calculation. When Run 16 Containers appears, proceed to the following step.

17. Run the container 16 times (it is not necessary for the containers to pass the rejector), through the FT-50/70 inspection tunnel without slippage. When finished, the FT-50/70 automatically completes the encoder calibration calculations, including the Calibrate Encoder Value, Encoder Prescaler Value, Gamma/X-ray Sample Cutoff Limit, and Conveyor Drive Sprocket Teeth.

18. Close dip switch S1-6 and then stop the conveyor.

19. If you used a container other than a production container for the calibration (or used the pipe method), press Key 5 until Bottle Width At Trig appears and enter (in millimeters) the production container's width at the trigger point (see step 9).

20. Measure the distance in millimeters from the trigger sensor beam to the centerline of the rejector. If you are using a slat rejector measure from the beam to the upstream edge of the slat assembly. Accurate measurement is extremely important for proper calibration.

21. Press Key 4 until Inspect Trig To C/l Rej appears and use the Arrow Key to enter the measurement in millimeters.

22. Press Key 5 until Chain Velocity appears. Note this value because you need to enter it in the following step.

23. Press Key 5 until Maximum Conveyor Speed appears and enter the Chain Velocity value. The optimum encoder value is now calculated including the Calibrate Encoder Value, Encoder Prescaler Value, and Gamma/X-ray Sample Cutoff Limit.

Fine-Tuning the Rejector Timing

To fine-tune the calibration accuracy you may need to adjust the number of sprocket teeth estimated during the Calibrate Encoder Routine. Experiment with a production container and observe the rejector timing. Based on where the rejector pad contacts the container, you must increase or decrease the number of teeth until the bottle contacts the pad correctly.

24. To verify the calibration press Key 4 until Reject Next appears and then press the Arrow Key to enter the number of containers you want to reject consecutively. Choose a number such as 6 or higher to provide enough attempts to make adjustments. When the number reaches zero, you must repeat this step to reactivate the rejector.

25. With the conveyor running very slowly so the reaction delay does not effect the result, place a production container upstream of the FT-50/70 so that it passes through the FT-50/70 without slipping. If the container appears to make contact on the upstream third of the rejector pad, proceed to step 27.

Note: The slat rejectors have a variation factor of ± 0.5 inch. If you are using a slat rejector, average the accuracy over several rejects using a single slat.

26. If the container is not rejected properly, make changes to the measured distance or number of sprocket teeth as follows:

    - Verify the Inspect Trigger to C/L Rejector distance is measured and entered correctly (see steps 8 and 9).
    - Verify the number of conveyor drive sprocket teeth is entered correctly (see step 15).

    The container position at reject can be in error by 0.5 inch for every 12 inches of distance from the inspection trigger to the rejector centerline (or slat assembly). For example:

    - If the Inspection Trigger to Centerline Rejector distance is 24 inches and the container is 1 inch upstream of the rejector when it fires, then the number of drive sprocket teeth should be reduced by one.
    - If the container is 1 inch down stream when the rejector fires, the number of teeth should be increased by one.

27. Run the conveyor at the same speed as in step 17 on page 1-9 and place a bottle on the conveyor far enough upstream so that it does not slip on the conveyor as it passes through the FT-50/70.

    If the reject is late, check to be sure the encoder coupling is not slipping. Try a rejection with a thin layer of grease on the pad. If the resulting mark in the grease starts in the upstream third of the pad face and is centered, then performance is acceptable. If there are still significant early/late problems, and you are certain that you have a standard conveyor chain, contact the Industrial Dynamics Customer Service.

28. If you performed step 27 at production speed, then proceed to step 32 on page 1-11. If you did not perform step 27 at production speed, then you must repeat step 13 on page 1-8 thru step 18 on page 1-9 at production speed. When you finish, return to step 27.

29. Press Key 5 until Chain Velocity appears. Note this value because you need to enter it in the following step.

30. Press Key 5 until Maximum Conveyor Speed appears and enter the Chain Velocity value from the previous step. The optimum encoder value for the current line speed is now calculated including the Calibrate Encoder Value, Encoder Prescaler Value, and Gamma/X-ray Sample Cutoff Limit.

31. While the conveyor is running at production speed, place a bottle on the conveyor far enough upstream so that it does not slip on the conveyor as it passes through the FT-50/70.

32. If the reject is late, check to be sure the encoder coupling is not slipping. Try a rejection with a thin layer of grease on the pad. If the resulting mark in the grease starts in the upstream third of the pad face and is centered, then performance is acceptable. If there are still significant early/late problems, and you are certain that you have a standard conveyor chain, contact the Industrial Dynamics Customer Service.

33. To store the settings in system memory, close dip switch S1-2 and then press Key 5 until Save Default Constants appears.

34. Press the Arrow Key to execute. When Completed appears, open S1-2 to protect the saved settings.

35. Press Key 5 until System Display appears and press the Arrow Key to select the Operate Mode. This returns the FT-50/70 to a secured operating mode and completes the calibration procedure.

36. If you are using this production line to produce more than one type of container, you must repeat this procedure for each different container type (i.e. containers with different diameters, or line speeds).

Non-Standard Conveyor Calibration Procedure

Use this procedure for conveyors that do not have a 1.5-inch chain pitch. You must determine the conveyor's chain pitch and number of teeth per chain segment/link to use this procedure.

If you can not determine the chain pitch and number of teeth per chain segment/link call IDC Customer Support for assistance at:

- 888-434-5832 (North America only)
- 310-325-5633

This procedure estimates the number of encoder pulses per 10 meters of conveyor travel, therefore you must test the accuracy and make adjustments until the proper calibration is achieved.

1. Remove the FT-50/70's cover to access dip switch pack S1. When performing the calibration procedures you are required to change the settings for S1-5 and S1-6.

2. Press Key 5 until System Display appears and then press the Arrow Key to enter the Calibrate Mode. You may be required to enter a password if your system is password protected.

3. Press Key 4 until Rejector Status appears and check to be sure the rejector is activated. If it is turned off, press the Arrow Key to turn it on.

4. Open dip switch S1-5.

5. Press Key 5 until Rejector Type appears and use the Arrow Key to select the type of rejector installed in your system.

6. Press Key 5 until Known Chain Pitch & Teeth appears and set to Not Present.

7. Press Key 5 until Encoder Resolution appears and enter the encoder resolution. The standard encoder is 500 pulse. The following table lists the encoders and the supported resolution.

Note: The encoder resolution is set at the factory during assembly, however if you upgraded the software you should check the encoder type and set it properly.

Description	Resolution
Standard	500
Dual Track	1000
Ultra High Resolution	5000

8. Determine your Conveyor Segment Pitch. This information is part of your conveyor manufacture's specifications. If the specifications are not available, measure (in millimeters) 10 conveyor segments (plates) and divide the measurement by 10.

9. Press Key 5 until Conveyor Segment Pitch appears and use the Arrow Key to enter the Conveyor Segment Pitch.

10. Determine the number of teeth that contact each conveyor chain segment. This information is part of your conveyor manufacture's specifications. If the specifications are not available, you must visually count the number of teeth that contact the segment.

11. Press Key 5 until Teeth/Conveyor Segment appears and use the Arrow Key to enter the number of conveyor drive sprocket teeth per conveyor chain segment.

12. Close Dip Switch S1-5.

13. Measure the distance in millimeters from the trigger sensor beam to the centerline of the rejector. If you are using a slat rejector measure from the beam to the upstream edge of the slat assembly. Accurate measurement is extremely important for proper calibration.

14. Press Key 4 until Inspect Trig To C/L Rej appears and use the Arrow Key to enter the measurement in millimeters.

15. Measure the diameter of the production container (in millimeters) at the point where the container intersects the trigger beam. This is the containers bottle width at the trigger point.

16. Press Key 5 until Bottle Width At Trig appears and enter (in millimeters) the production container's width at the trigger point.

17. Measure the diameter of the container (in millimeters) at its widest point. This is the containers maximum diameter.

18. Press Key 5 until Maximum Bottle Diameter appears and enter (in millimeters) the production container's maximum diameter.

19. Press Key 5 until Maximum Line Speed appears and enter the line speed (in cpm) for your conveyor. This value assumes 12mm container spacing for preliminary calculations.

Executing the Encoder Calibration Routine

Use the largest possible opaque container when executing the Calibrate Encoder Routine. The larger and more opaque the container, the greater the accuracy of the sensor readings. For example, if the test container diameter is 28 mm, the calculation error factor is ±2 teeth. If the test container diameter is 66 mm, the calculation error factor is ±1 tooth.

Note: Slipping a short piece of pipe over the container neck is a useful way to increase the width of the bottle at the trigger point. If you choose to do this, you must repeat step 15 in order to enter the pipe diameter.

20. Open dip switch S1-6.

21. Start the conveyor and run it at the highest available speed. You may not be able to achieve the highest expected production speed unless the filler unit is running.

22. Press Key 5 until Calibrate Encoder appears and press the Arrow Key to execute the encoder calibration routine. This procedure takes several seconds to complete. When Ready is displayed, proceed to the following step.

23. Place the container on the conveyor upstream of the FT-50/70 so the container passes through the inspection tunnel without slipping. The FT-50/70 automatically calculates the prescaler value. It takes several seconds for the FT-50/70 to make this calculation. When Run 16 Containers appears, proceed to the following step.

24. Run the container 16 times (it is not necessary for the containers to pass the rejector), through the FT-50/70 inspection tunnel without slippage. When finished, the FT-50/70 automatically completes the encoder calibration calculations, including the Calibrate Encoder Value, Encoder Prescaler Value, Gamma/X-ray Sample Cutoff Limit, and Conveyor Drive Sprocket Teeth.

25. Close dip switch S1-6 and then stop the conveyor.

26. If you used a container other than a production container for the calibration (or used the pipe method), press Key 5 until Bottle Width At Trig appears and enter (in millimeters) the production container's width at the trigger point (step 15).

Fine-Tuning the Rejector Timing

To fine-tune the calibration accuracy you may need to adjust the number of sprocket teeth estimated during the Calibrate Encoder Routine. Experiment with a production container and observe the rejector timing. Based on where the rejector pad contacts the container, you must increase or decrease the number of teeth until the bottle contacts the pad correctly.

27. To verify the calibration press Key 4 until Reject Next appears and then press the Arrow Key to enter the number of containers you want to reject consecutively. Choose a number such as 6 or higher to provide enough attempts to make adjustments. When the number reaches zero, you must repeat this step to reactivate the rejector.

28. With the conveyor running very slowly so the reaction delay does not effect the result, place a production container upstream of the FT-50/70 so that it passes through the FT-50/70 without slipping. If the container appears to make contact on upstream third of the rejector, proceed to step 30 on page 1-16.

Note: The slat rejectors have a variation factor of ± 0.5 inch. If you are using a slat rejector, average the accuracy over several rejects using a single slat.

29. If the container is not rejected properly, make changes to the measured distance or number of sprocket teeth as follows:

    - Verify the Inspect Trigger to C/L Rejector distance is measured and entered correctly (step 13).
    - Verify the number of conveyor drive sprocket teeth is entered correctly (step 10).

    The container position at reject can be in error by 0.5 inch for every 12 inches of distance from the inspection trigger to the rejector centerline (or slat assembly). For example:

- If the Inspection Trigger to Centerline Rejector distance is 24 inches and the container is 1 inch upstream of the rejector when it fires, then the number of drive sprocket teeth should be reduced by one.
- If the container is 1 inch down stream when the rejector fires, the number of teeth should be increased by one.

30. Run the conveyor at the same speed as in step 21 on page 1-14 and place a bottle on the conveyor far enough upstream so that it does not slip on the conveyor as it passes through the FT-50/70.

If the reject is late, check to be sure the encoder coupling is not slipping. Try a rejection with a thin layer of grease on the pad. If the resulting mark in the grease starts in the upstream third of the pad face and is centered, then performance is acceptable. If there are still significant early/late problems, and you are certain that you have a standard conveyor chain, contact the Industrial Dynamics Customer Service.

31. If you performed step 30 at production speed, then proceed to step 34 on page 1-16. If you did not perform step 30 at production speed, then you must repeat step 20 on page 1-14 thru step 25 on page 1-15 at production speed. When you finish, return to step 30.

32. Press Key 5 until Chain Velocity appears. Note this value because you need to enter it in the following step.

33. Press Key 5 until Maximum Conveyor Speed appears and enter the Chain Velocity value from the previous step. The optimum encoder value for the current line speed is now calculated including the Calibrate Encoder Value, Encoder Prescaler Value, and Gamma/X-ray Sample Cutoff Limit.

34. While the conveyor is running at production speed, place a bottle on the conveyor far enough upstream so that it does not slip on the conveyor as it passes through the FT-50/70.

35. If the reject is late, check to be sure the encoder coupling is not slipping. Try a rejection with a thin layer of grease on the pad. If the resulting mark in the grease starts in the upstream third of the pad face and is centered, then performance is acceptable. If there are still significant early/late problems, and you are certain that you have a standard conveyor chain, contact the Industrial Dynamics Customer Service.

36. To store the settings in system memory, close dip switch S1-2 and then press Key 5 until Save Default Constants appears.

37. Press the Arrow Key to execute. When Completed appears, open S1-2 to protect the saved settings.

38. Press Key 5 until System Display appears and press the Arrow Key to select the Operate Mode. This returns the FT-50/70 to a secured operating mode and completes the calibration procedure.

39. If you are using this production line to produce more than one type of container, you must repeat this procedure for each different container type (i.e. containers with different diameters, or line speeds).

Calibrating Baseline Seven or Older Units

The following calibration procedures apply only to FT-50 units that have baseline seven or older of the system software installed. This section does not apply to FT-70 units because they were not manufactured prior to baseline eight. There are three different procedures depending upon your situation:

- Standard Conveyor Calibrating Procedure for standard conveyors with a 1.5 inch pitch and you know the number of drive sprocket teeth. For more information see Standard Calibration Procedure on page 19.
- Unknown Sprocket Size Calibrating Procedure for standard conveyors with a 1.5 inch pitch, but you don't know the number of drive sprocket teeth.For more information see Unknown Sprocket Size Calibration Procedure on page 22.
- Non-Standard Conveyor Calibrating Procedure for conveyors that do not have a 1.5 inch pitch. For more information see Non-Standard Conveyor Calibration Procedure on page 27.

Note: Attempt to find out the number of conveyor sprocket teeth. This will save you configuration time by allowing you to use the Standard Calibration Procedure. It also increases the initial calibration accuracy.

Standard Calibration Procedure

Use this procedure if you have a standard conveyor with a 1.5-inch chain pitch and you know the number of drive sprocket teeth.

1. Remove the FT-50/70's cover to access dip switch pack S1. When performing the calibration procedures you are required to change the settings for S1-5 and S1-6.

2. Press Key 5 until System Display appears and press the Arrow Key to enter the Calibrate Mode. You may be required to enter a password if your system is password protected.

3. Open dip switch S1-5.

4. Press Key 5 until Rejector Type appears and use the Arrow Key to select the proper rejector type.

5. Check to be certain the rejector is activated by pressing Key 4 until Rejector Status appears. If it is turned off, press the Arrow Key to turn it on.

6. Locate the Reaction Delay and Rejector Pulse Width for your rejector in the following table. You will enter these values in the following steps.

Rejector	Air Pressure (psig)	Reaction Delay (msecs)	Pulse Width (msecs)
Standard Proline (Cans)	65	20	10
New H.S. Proline (Cans)	65	11	10
Standard Proline (Bottles)	40†	22†	9†
New H.S. Proline (Bottles)	65	25	25
Servotec	65	NA*	NA*
LS2, LS3 Old Cylinder	65	11	7
HS LS3 New Cylinder	40	6	4
HL Slat Cylinder	65	20	15
Diverter, Small Shoe	65	27	Variable**
Diverter, Large Shoe	65	20	Variable**

† This setting is only an estimate, refer to the Proline Rejector Manual for complete details.
* These values are automatically calculated. No adjustment is required
** Enter the number of consecutive containers to be rejected.

7. Press Key 4 until Rejector Pulse Width appears and use the Arrow Key to enter the value from the table.

8. Press Key 4 until Rejector Reaction Delay appears and use the Arrow Key to enter the value from the table.

9. Adjust the rejector air pressure regulator to the value from the table.

10. Measure the width of the production container (in millimeters) at the point where the container intersects the trigger beam.

11. Press Key 4 until Bottle Width At Trig appears and enter (in millimeters) the production container's width at the trigger point that you established in the previous step.

12. Measure the distance from the trigger sensor beam to the centerline of the rejector. If you are using a slat rejector, measure from the beam to the leading edge of the first slat. Accurate measurement is extremely important for proper calibration.

13. Press Key 4 until Inspect Trig To C/L Rej appears and use the Arrow Key to enter the measurement in millimeters.

14. Close dip switch S1-5.

15. Determine the following parameters of your system. For more information see Conversion Factors on page 1.

    - Number of Conveyor Teeth_____
    - Maximum Conveyor Speed (meters/min)_____
    - Maximum Conveyor Speed (feet/min)_____
    - Approximate Containers Per Minute (cpm)_____

16. Using the Baseline Seven Calibration Parameters Table, located at the end of this section, find the parameter values you determined in the previous step. If your values fall between values in the table, use the higher table value. You will enter these values in the following steps.

17. Select the encoder installed in your system from the Baseline Seven Calibration Parameters Table (500, 1000, or 5000) and note the Encoder Calibrate Value and Encoder Prescaler Value associated with the line that containers your parameter values.

18. Press Key 5 until Calibrate Encoder Value appears and use the Arrow Key to enter the Calibrate Encoder Value from the table.

Note: If you receive an out of range error when setting the Encoder Prescaler Value, reduce the Calibrate Encoder Value to 1500, enter the Encoder Prescaler Value, and then go back and enter the proper Calibrate Encoder Value.

19. Press Key 5 until Encoder Prescaler Value appears and use the Arrow Key to enter the Prescaler Value from the table.

20. To verify the calibration press Key 4 until Reject Next appears and then press the Arrow Key to enter the number of containers you want to reject consecutively. Choose a number such as 6 or higher to provide enough attempts to make adjustments. When the number reaches zero, you must repeat this step to reactivate the rejector.

21. Place a production container upstream of the FT-50 so that it passes through the FT-50 and is rejected by the rejector. Repeat this procedure until the Reject Next counter is zero. If the container is not rejected properly, one of the following has occurred:

    - One or more of the values you entered during the procedure are incorrect (usually the number of sprocket teeth). Check the values and then repeat the calibration procedure.
    - Containers are slipping on the conveyor. This can occur at high line speeds. Slow the line speed until the container no longer slide.
    - The physical encoder coupling is slipping. Check the encoder installation to be sure it is functioning properly.
    - You do not have a standard conveyor. For more information see Non-Standard Conveyor Calibration Procedure on page 27.

22. Stop the conveyor.

23. Press Key 5 until System Display appears and press the Arrow Key to select the Operate Mode. This returns the FT-50 to a secured operating mode and completes the calibration procedure.

Unknown Sprocket Size Calibration Procedure

Use this procedure to calibrate standard conveyors with a 1.5-inch pitch, but you don't know the number of drive sprocket teeth. This procedure estimates the number of sprocket teeth, therefore you must fine tune the number of teeth to achieve proper calibration.

1. Remove the FT-50's cover to access dip switch pack S1. When performing the calibration procedures you are required to change the settings for S1-5 and S1-6.

2. Press Key 5 until System Display appears and press the Arrow Key to enter the Calibrate Mode. You may be required to enter a password if your system is password protected.

3. Open dip switch S1-5 and press Key 5 until Rejector Type appears and use the Arrow Key to select the proper rejector type.

4. Check to be certain the rejector is activated by pressing Key 4 until Rejector Status appears. If it is turned off, press the Arrow Key to turn it on.

5. Locate the Reaction Delay and Rejector Pulse Width for your rejector in the following table. You will enter these values in the following steps.

Rejector	Air Pressure (psig)	Reaction Delay (msecs)	Pulse Width (msecs)
Standard Proline (Cans)	65	20	10
New H.S. Proline (Cans)	65	11	10
Standard Proline (Bottles)	40†	22†	9†
New H.S. Proline (Bottles)	65	25	25
Servotec	65	NA*	NA*
LS2, LS3 Old Cylinder	65	11	7
HS LS3 New Cylinder	40	6	4
HL Slat Cylinder	65	20	15
Diverter, Small Shoe	65	27	Variable**
Diverter, Large Shoe	65	20	Variable**

† This setting is only an estimate, refer to the Proline Rejector Manual for complete details.
* These values are automatically calculated. No adjustment is required
** Enter the number of consecutive containers to be rejected.

6. Press Key 4 until Rejector Pulse Width appears and use the Arrow Key to enter the value from the table.

7. Press Key 4 until Rejector Reaction Delay appears and use the Arrow Key to enter the value from the table.

8. Adjust the rejector air pressure regulator to the value from the table.

9. Measure the width of the production container (in millimeters) at the point where the container intersects the trigger beam.

10. Press Key 4 until Bottle Width At Trig appears and enter (in millimeters) the production container's width at the trigger point that you established in the previous step.

11. Measure the distance from the trigger sensor beam to the centerline of the rejector. If you are using a slat rejector, measure from the beam to the leading edge of the first slat. Accurate measurement is extremely important for proper calibration.

12. Press Key 4 until Inspect Trig To C/L Rej appears and use the Arrow Key to enter the measurement in millimeters.

13. Close dip switch S1-5, start the conveyor and run it at maximum production speed.

Note: Use the largest possible opaque container when executing the Calibrate Encoder Routine. The larger and more opaque the container, the greater the accuracy of the sensor readings. For example, if the test container diameter is 28 mm, the calculation error factor is ± 2 teeth. If the test container diameter is 66 mm, the calculation error factor is ± 1 tooth.

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14. Press Key 5 until Calibrate Encoder appears and then press the Arrow Key to execute the encoder calibration routine. This procedure takes several seconds. When READY is displayed proceed to the following step.

15. Place one container on the conveyor upstream of the FT-50. After the container passes through the FT-50 it automatically calculates the Encoder Prescaler Value and Calibrate Encoder Value. It takes several seconds for the FT-50 to make the calculation. When Run 16 Containers is displayed proceed to the following step.

16. Run 16 containers through the inspection tunnel on the conveyor. You do not have to run the conveyor at maximum production speed for this step. When finished the FT-50 automatically performs the encoder calibration calculations including estimating the number of sprocket teeth.

17. Press Key 5 until Calibrate Encoder Value appears and note the value.

18. Press Key 5 until Encoder Prescaler Value appears and note the Enc Pulses.

19. Using the Baseline Seven Calibration Parameters Table located at the end of this section, locate in the columns associated with your encoder type (500, 1000, or 5000) the row that contains both the Calibrate Encoder Value and the Encoder Prescaler Value you noted in step 17 and step 18.

20. If you do not find an exact match, locate the nearest Calibrate Encoder Value (higher or lower) in the table that **does not** change the Encoder Prescaler Value, and use the values in that row.

21. Press Key 5 until Calibrate Encoder Value appears and enter the value from the table.

Note: If you receive an out of range error when setting the Encoder Prescaler Value, reduce the Calibrate Encoder Value to 1500, enter the Encoder Prescaler Value, and then go back and enter the proper Calibrate Encoder Value.

---

22. Press Key 5 until Encoder Prescaler Value appears and enter the value from the table.

Fine Tuning the Calibration Accuracy

To fine-tune the calibration you must experiment with a production container and observe the rejector timing— based on where the rejector pad (or slat) contacts the container, you must increase or decrease the Calibrate Encoder Value until the bottle contacts the pad directly at its center (or leading edge for slat rejectors).

Note: If your FT-50 fill level inspection parameters are set correctly, you can use a reject production container instead of setting the Reject Next function. The FT-50 will correctly sense the container as a reject and automatically activate the rejector.

---

23. Press Key 4 until Reject Next appears and then press the Arrow Key to enter the number of containers you want to reject consecutively. Choose a number such as 6 or higher to provide enough attempts to make adjustments. When the number reaches zero, you must repeat this step to reactivate the rejector.

Note: If you are using a slat rejector skip the following step. Instead, run the conveyor slowly and watch to see where contact is made. There is a 1-inch contact variance factor, so try to average the contacts as close to the leading edge as possible. You may need to increase the Number of Slats value.

---

24. Apply a thin coat of grease across the entire surface of the rejector pad. When the pad contacts the bottle a mark is left in the grease on the pad. This allows you to see where contact is made.

25. Start the conveyor and run a production container through the FT-50 and past the rejector.

26. Inspect the rejector pad for the marking in the grease. Your goal is for the mark to be in the exact center of the pad. If it is not, press Key 5 to change the values for Encoder Prescaler Value and Calibrate Encoder Value as follows:

    - If the mark is towards the leading edge of the pad, the rejector is firing early. Locate the next lower Conveyor Teeth value in the Baseline Seven Calibration Parameters Table and enter the Encoder Prescaler Value and Calibrate Encoder Value associated with it.

- If the mark is towards the trailing edge of the pad, the rejector is firing late. Locate the next higher Conveyor Teeth value in the Baseline Seven Calibration Parameters Table and enter the Encoder Prescaler Value and Calibrate Encoder Value associated with it.

Note: If you receive an out of range error when setting the Encoder Prescaler Value, reduce the Calibrate Encoder Value to 1500, enter the Encoder Prescaler Value, and then go back and enter the proper Calibrate Encoder Value.

27. Repeat the step 25 and step 26 until the positioning is correct.

28. Stop the conveyor.

29. Press Key 5 until System Display appears and press the Arrow Key to select the Operate Mode. This returns the FT-50 to a secured operating mode and completes the calibration procedure.

Non-Standard Conveyor Calibration Procedure

Use this procedure for conveyors that do not have a 1.5-inch chain pitch. This procedure estimates the number of encoder pulses per 10 meters of travel, therefore you must test the accuracy and make adjustments to the Calibrate Encoder Value until the proper calibration is achieved.

1. Remove the FT-50's cover to access dip switch pack S1. When performing the calibration procedures you are required to change the settings for S1-5 and S1-6.

2. Press Key 5 until System Display appears and then press the Arrow Key to enter the Calibrate Mode. You may be required to enter a password if your system is password protected.

3. Open dip switch S1-5 and press Key 5 until Rejector Type appears and use the Arrow Key to select the proper rejector type.

4. Check to be certain the rejector is activated by pressing Key 4 until Rejector Status appears. If it is turned off, press the Arrow Key to turn it on.

5. Locate the Reaction Delay and Rejector Pulse Width for your rejector in the following table. You will enter these values in the following steps.

Rejector	Air Pressure (psig)	Reaction Delay (msecs)	Pulse Width (msecs)
Standard Proline (Cans)	65	20	10
New H.S. Proline (Cans)	65	11	10
Standard Proline (Bottles)	40†	22†	9†
New H.S. Proline (Bottles)	65	25	25
Servotec	65	NA*	NA*
LS2, LS3 Old Cylinder	65	11	7
HS LS3 New Cylinder	40	6	4
HL Slat Cylinder	65	20	15
Diverter, Small Shoe	65	27	Variable**
Diverter, Large Shoe	65	20	Variable**

† This setting is only an estimate, refer to the Proline Rejector Manual for complete details.
* These values are automatically calculated. No adjustment is required.
** Enter the number of consecutive containers to be rejected.

6. Press Key 4 until Rejector Pulse Width appears and use the Arrow Key to enter the value from the table.

7. Press Key 4 until Rejector Reaction Delay appears and use the Arrow Key to enter the value from the table.

8. Adjust the rejector air pressure regulator to the value from the table.

9. Measure the width of the production container (in millimeters) at the point where the container intersects the trigger beam.

10. Press Key 4 until Bottle Width At Trig appears and enter (in millimeters) the production container's width at the trigger point that you established in the previous step.

11. Measure the distance from the trigger sensor beam to the centerline of the rejector. If you are using a slat rejector, measure from the beam to the leading edge of the first slat. Accurate measurement is extremely important for proper calibration.

12. Press Key 4 until Inspect Trig To C/L Rej appears and use the Arrow Key to enter the measurement in millimeters.

13. Close dip switch S1-5.

14. Start the conveyor and run it at maximum production speed.

Note: Use the largest possible opaque container when executing the Calibrate Encoder Routine. The larger and more opaque the container, the greater the accuracy of the sensor readings. For example, if the test container diameter is 28 mm, the calculation error factor is ± 2 teeth. If the test container diameter is 66 mm, the calculation error factor is ± 1 tooth.

---

15. Press Key 5 until Calibrate Encoder appears and then press the Arrow Key to execute the encoder calibration routine. This procedure takes several seconds. When READY is displayed proceed to the following step.

16. Place one container on the conveyor upstream of the FT-50. After the container passes through the FT-50 it automatically calculates the Encoder Prescaler Value and Calibrate Encoder Value. It takes several seconds for the FT-50 to make the calculation. When Run 16 Containers is displayed proceed to the following step.

17. Run 16 containers through the inspection tunnel on the conveyor. You do not have to run the conveyor at maximum production speed for this step. When finished the FT-50 automatically performs the encoder calibration calculations.

Fine Tuning the Calibration Accuracy

To fine-tune the calibration you must experiment with a production container and observe the rejector timing— based on where the rejector pad (or slat) contacts the container, you will need to increase or decrease the Calibrate Encoder Value until the bottle contacts the pad directly at its center (or leading edge for slat rejectors).

18. Press Key 4 until Reject Next appears and then press the Arrow Key to enter the number of containers you want to reject consecutively. Choose a number such as 6 or higher to provide enough attempts to make adjustments. When the number reaches zero, you must repeat this step to reactivate the rejector.

Note: If you are using a slat rejector skip the following step. Instead, run the conveyor slowly and watch to see where contact is made. There is a 1-inch contact variance factor, so try to average the contacts as close to the leading edge as possible. You may need to increase the Number Of Slats value.

19. Apply a thin coat of grease across the entire surface of the rejector pad. When the pad contacts the bottle a mark is left in the grease on the pad. This allows you to see where contact is made.

20. Start the conveyor and run a production container through the FT-50 and past the rejector.

21. Inspect the rejector pad for the marking in the grease. Your goal is for the mark to be in the exact center of the pad. If it is not press Key 5 until Calibrate Encoder Value appears and use the Arrow Key to change the value as follows:

    - If the mark is towards the leading edge of the pad, the rejector is firing early. Increase the Calibrate Encoder Value until the proper positioning is achieved.
    - If the mark is towards the trailing edge of the pad, the rejector is firing late. Decrease the Calibrate Encoder Value until the proper positioning is achieved.

22. Stop the conveyor, press Key 5 until System Display appears, and then press the Arrow Key to select the Operate Mode. This returns the FT-50 to a secured operating mode and completes the calibration procedure.

Baseline Seven Calibration Parameters Table

Conveyor Sprocket Teeth	Maximum Conveyor Speed (M/min)	Maximum Conveyor Speed (Ft./min)	Approx. CPM	500 Pulse Encoder		5000 Pulse Encoder		1000 Pulse Encoder	
				Calibrate Encoder Value	Encoder Prescaler Value	Calibrate Encoder Value	Encoder Prescaler Value	Calibrate Encoder Value	Encoder Prescaler Value
18	50	164	641	7290	2	7674	19	7290	4
18	80	262	1025	4860	3	4860	30	4860	6
18	95	311	1217	3645	4	4166	35	4166	7
18	130	426	1666	2916	5	3037	48	2916	10
18	160	524	2051	2430	6	2471	59	2430	12
19	55	180	705	6907	2	7270	19	6907	4
19	85	278	1089	4604	3	4604	30	4604	6
19	115	377	1474	3453	4	3453	40	3453	8
19	140	459	1794	2762	5	2819	49	2762	10
19	170	557	2179	2302	6	2341	59	2302	12
20	45	147	576	6561	2	8748	15	8748	3
20	60	196	769	6561	2	6561	20	6561	4
20	90	295	1153	4374	3	3280	30	3280	6
20	120	393	1538	3280	4	3280	40	3280	8
20	150	492	1923	2624	5	2624	50	2624	10
21	45	147	576	6249	2	8332	15	8332	3
21	60	213	769	6249	2	6578	19	6249	4
21	95	328	1217	4166	3	4166	30	4166	6
21	125	426	1602	3124	4	3124	40	3124	8
21	160	541	2051	2499	5	2499	50	2499	10
22	45	147	576	5965	2	8521	14	7953	3
22	65	213	833	5965	2	5965	20	5965	4
22	100	328	1282	3976	3	3976	30	3976	6
22	130	426	1666	2982	4	3059	39	2982	8
22	165	541	2115	2386	5	2386	50	2386	10
23	50	164	641	5705	2	7607	15	7607	3
23	70	229	897	5705	2	5705	20	5705	4

Conveyor Sprocket Teeth	Maximum Conveyor Speed (M/min)	Maximum Conveyor Speed (Ft./min)	Approx. CPM	500 Pulse Encoder		5000 Pulse Encoder		1000 Pulse Encoder	
				Calibrate Encoder Value	Encoder Prescaler Value	Calibrate Encoder Value	Encoder Prescaler Value	Calibrate Encoder Value	Encoder Prescaler Value
23	105	344	1346	3803	3	3803	30	3803	6
23	140	459	1794	2852	4	2852	40	2852	8
23	175	574	2243	2282	5	2282	50	2282	10
24	50	164	641	5468	2	7811	14	7290	3
24	70	229	897	5468	2	5468	20	5468	4
24	105	344	1346	3645	3	3771	29	3645	6
24	145	475	1858	2734	4	2734	40	2734	8
24	180	590	2307	2187	5	2187	50	2187	10
25	50	164	641	5249	2	7499	14	6999	3
25	75	246	961	5249	2	5249	20	5249	4
25	105	344	1346	3499	3	3749	28	3499	6
25	150	492	1923	2624	4	2624	40	2624	8
25	190	623	2435	2099	5	2099	50	2099	10
26	55	180	705	5047	2	7210	14	6729	3
26	75	246	961	5047	2	5313	19	5047	4
26	110	360	1410	3364	3	3605	28	3364	6
26	155	508	1987	2523	4	2532	40	2523	8
26	180	590	2307	2018	5	2194	46	2018	10
27	60	196	769	4860	2	6480	15	6480	3
27	80	262	1025	4860	2	4860	20	4860	4
27	120	393	1538	3240	3	3240	30	3240	6
27	160	524	2051	2430	4	2492	39	2430	8
27	195	639	2500	1944	5	2025	48	1944	10
28	60	196	769	4686	2	6249	15	6249	3
28	85	278	1089	4686	2	4686	20	4686	4
28	125	410	1602	3124	3	3124	30	3124	6
28	170	557	2179	2343	4	2343	40	2343	8
28	210	689	2692	1874	5	1874	50	1874	10

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