

Operation and Service Training Class

FTM308 - Insight PD & ICG Advanced Programming



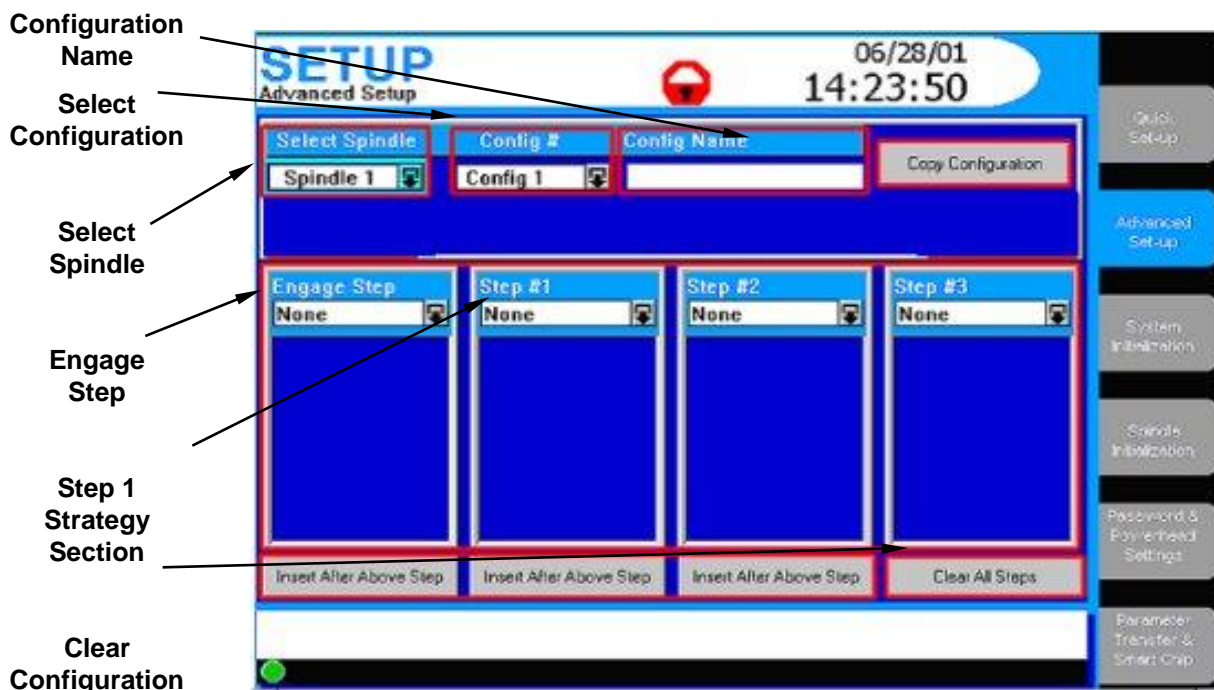
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Introduction to Advanced Set-up

The *Advanced Set-up* Menu Screen allows you to set a very broad range of tightening parameters. This screen is used if a multi-step fastening strategy is required, and is more complex than the simple torque control, angle control, or yield control strategies offered under the Quick Set-up Menu Screen. *Advanced Set-up* may also be used if you want to use one of these three basic strategies, but want to be able to adjust all the possible parameters for the strategy.

Advanced Set-up also gives you access to all of Insight's other, more complex, tightening strategies, such as prevailing torque and drag torque. Finally, *Advanced Set-up* allows you to combine these strategies into a series of up to 128 separate and sequential steps, allowing you to create complex and specialized fastening schemes tailored to your unique assembly requirements.



Configuration Name

A name can be give to a configuration using the expand buttons and the alpha-numeric keys. The box is limited to 14 characters.

Select Configuration

A Configuration is used when setting up a new fastening strategy that will distinguish it. If a number has been previously programmed that strategy's parameters will be displayed. Range: 01-32.

Select Spindle Use this drop box to select either Spindle 1, Spindle 2. This drop box will not be present if your Insight is a one-spindle model.

Engage Step This parameters allow you to specify exactly how the Insight spindle will engage the fastener.

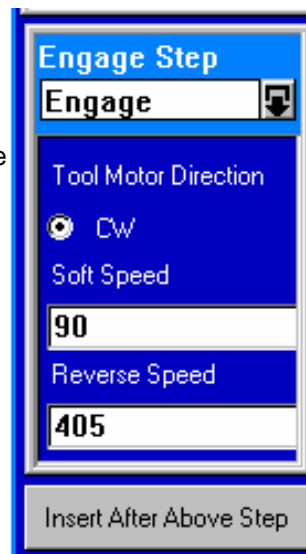
Step # Strategy Drop box to select the strategy desired for each step.

Clear all Steps Pressing this button clears all of the steps for the configuration # listed.

The Engage Step

The Engage Step drop box only displays parameters for the Engage strategy. These parameters allow you to specify exactly how the Insight spindle will engage the fastener. The Engage parameters are listed below:

Tool direction	Clockwise (CW) or Counterclockwise (CCW)
Soft Start Speed	Slow speed (partial trigger pull)
Reverse Speed	RPM of tool in "REV" mode
Acceleration	% rate tool accelerates to its free speed, 100% is max rate
Gang Count	a "gang" is a number of joints that are the same
Auto Increment to	jumps to a different configuration when finished
Cycle timer	If cycle is not complete within this time, it times out
Torque Filter	For extremely hard joints - consult Application Services
Fault backout speed*	
Fault backout angle*	
Final fault backout Hi torque*	
Retry fault action*	
Number of retries*	
Final fault backout angle*	
Fault action*	0 = Take no action, 1 = retry
Tube nut reverse speed	Reverse speed of tool in Tube Nut mode
Tube nut reverse threshold	Torque value tool will shut off in reverse, in Tube Nut mode



* **Fault Action Settings are used when some specific action must be taken on a fault condition**

The engage step is always the first step for any configuration.

The engage step contains parameters that are global for that configuration.

To program the engage step select "Engage" from the engage step drop box.

Then arrow down and press the *Expand* key to access the engage parameters.

Some of these parameters are self explanatory, however The **Gang Count**, **Auto Increment**, and **Torque Filter** parameters require further description

How to Program a Torque Control Strategy in Advanced Set-up

Free Speed	The max speed tool will turn during fastening
Shiftdown Speed	The tool speed during the shiftdown phase
Torque Target	The desired final torque for Torque Control
Torque Hi Limit	The max allowed torque value
Torque Low Limit	The min allowed torque value
Angle Hi Limit	The max angle the joint is allowed to turn
Angle Low Limit	The min angle the joint is allowed to turn
Torque threshold	The torque at which the angle begins to be measured
Shiftdown Point	The point at which the tool speed lowers to the SD speed
Torque Overshoot	The tool is shut off this many units before target torque
E.O.R. Data Select	EOR can be sent for every step in a configuration
Sync Enable	Synchronizes steps with the other tool (Powerhead only)
Activate Yield Override	Turns on "Yield Monitoring"
Yield Point %	Decrease in gradient that signifies the onset of yield
Slope Interval	Interval that the Reference Slope is measured over
Angle into Yield	Angle to turn past yield point to complete run-down
Fail On Yield Override	Determines whether a fault is sent when the bolt yields



Step #1

Torque Control

Free Speed

630

Shiftdown Speed

350

Torque Target

10.00

Insert After Above Step

The Torque Control Strategy is based on reaching a programmed torque target. For any of the Step #n drop boxes, if Torque Control is selected as the strategy, a specific list of parameters is displayed. **Procedure**

1. Press the **Set-up Main Menu** key and then the **Advanced Set-up Sub-Menu** key.
2. In the **Select Spindle** drop box select the spindle # you want to program.
3. In the **Config #** drop box select the configuration # you want to program.
4. Go to the **Engage step** drop box and select **Engage**. (If the Engage parameter default values are acceptable, you can skip to step 6.).
5. Go to the list of parameters just below the **Engage** step drop box and navigate down through the parameter list. You must enter values (or accept the default values) for the **Required Parameters**. As appropriate, you may also enter values or accept the default values for the Optional Parameters.
6. Go to the Step #1 Strategy drop box and select Torque.
7. Go to the list of parameters just below the Step #1 Strategy drop box and navigate down through the parameter list. You must enter values (or accept the default values) for the Required Parameters. As appropriate, you may also enter values or accept the default values for the Optional Parameters.
8. If you want to program additional tightening steps, repeat Steps 6 and 7 as appropriate for the desired step.

Lesson objective: Upon completion of this lesson you will be able to program a simple strategy in Advanced Setup

Before you begin: Be certain to observe all safety precautions in the users manual and have the unit powered up and proper tool connected.



Lab

1. Go to Setup/ Advanced Setup
2. Choose "**Config 1**" and scroll down to the window below the Torque Control step
3. Press the "Expand" key to edit the values
4. Change the Torque Target to **8 Nm**
5. Go to the Run Main Screen and run the tool on a joint
6. What happens?

How to Program an Angle Control Strategy in Advanced Set-up

Angle Control Parameters:

Free Speed	Angle Overshoot
Shiftdown Speed	E.O.R. Data Select
Angle Target	Sync Enable*
Angle Hi Limit	Activate Yield Override*
Angle Low Limit	Yield Point %*
Torque Hi Limit	Slope Interval*
Torque Low Limit	Angle into Yield*
Torque threshold	Fail On Yield Override*
Shiftdown Point	



Step #1

Angle Control

Free Speed

405

Shiftdown Speed

225

Angle Target

360

Insert After Above Step

* Yield Override and Sync work the same as in Torque Control Strategy

The Angle Control Strategy is based on a programmed angle of rotation after the torque threshold is reached. For any of the Step #n drop boxes, if Angle Control is selected as the strategy, its parameters are displayed.

Procedure

1. Press the Set-up Main Menu key and then the Advanced Set-up Sub-Menu key.
2. In the Select Spindle drop box select the spindle # you want to program.
3. In the Config # drop box select the configuration # you want to program.
4. Go to the Engage step drop box and select Engage. (If the Engage parameter default values are acceptable, you can skip to step 6.)
5. Go to the list of parameters just below the Engage step drop box and navigate down through the parameter list. You must enter values (or accept the default values) for the Required Parameters. As appropriate, you may also enter values or accept the default values for the Optional Parameters.
6. Go to the Step #1 Strategy drop box and select Angle.
7. Go to the list of parameters just below the Step #1 Strategy drop box and navigate down through the parameter list. You must enter values (or accept the default values) for the Required Parameters. As appropriate, you may also enter values or accept the default values for the Optional Parameters.
8. If you want to program additional tightening steps, repeat Steps 6 and 7 as appropriate for the desired step.

How to Program a Yield Control Strategy in Advanced Set-up

Yield Control Parameters:

Free Speed	Angle Low Limit
Shiftdown Speed	Torque threshold
Yield Point %	Shiftdown Point
Slope Interval	Angle into Yield
Torque Hi Limit	E.O.R. Data Select
Torque Low Limit	Sync Enable
Angle Hi Limit	



The screenshot shows a vertical menu interface for 'Step #1'. The 'Yield Control' option is selected and highlighted in blue. Below it, several parameters are listed with their corresponding values in white boxes: 'Free Speed' is 405, 'Shiftdown Speed' is 225, and 'Yield Point %' is 50. At the bottom of the screen, there is a button labeled 'Insert After Above Step'.

The Yield Control strategy allows the tightening to be based on the onset of bolt yield. For any Step #n Strategy drop boxes, if Yield Control is selected as the strategy, its parameters will be displayed.

Procedure

1. Press the Set-up Main Menu key and then the Advanced Set-up Sub-Menu key.
2. In the Select Spindle drop box select the spindle # you want to program.
3. In the Config # drop box select the configuration # you want to program.
4. Go to the Engage step drop box and select Engage. (If the Engage parameter default values are acceptable, you can skip to step 6.)
5. Go to the list of parameters just below the Engage step drop box and navigate down through the parameter list. You must enter values (or accept the default values) for the Required Parameters. As appropriate, you may also enter values or accept the default values for the Optional Parameters.
6. Go to the Step #1 Strategy drop box and select Yield.
7. Go to the list of parameters just below the Step #1 Strategy drop box and navigate down through the parameter list. You must enter values (or accept the default values) for the Required Parameters. As appropriate, you may also enter values or accept the default values for the Optional Parameters.

If you want to program additional tightening steps, repeat Steps 6 and 7 as appropriate for the desired step.

Note: For Yield Control, I-R recommends setting the torque threshold value to 30% - 60% of the expected yield torque. In general, soft joints require high percentage values to ensure joint consolidation has occurred before yield detection calculations are commenced.

Advanced Set-up

Insight's 128 possible tightening steps and up to 32 configurations can be programmed in almost any sequence.

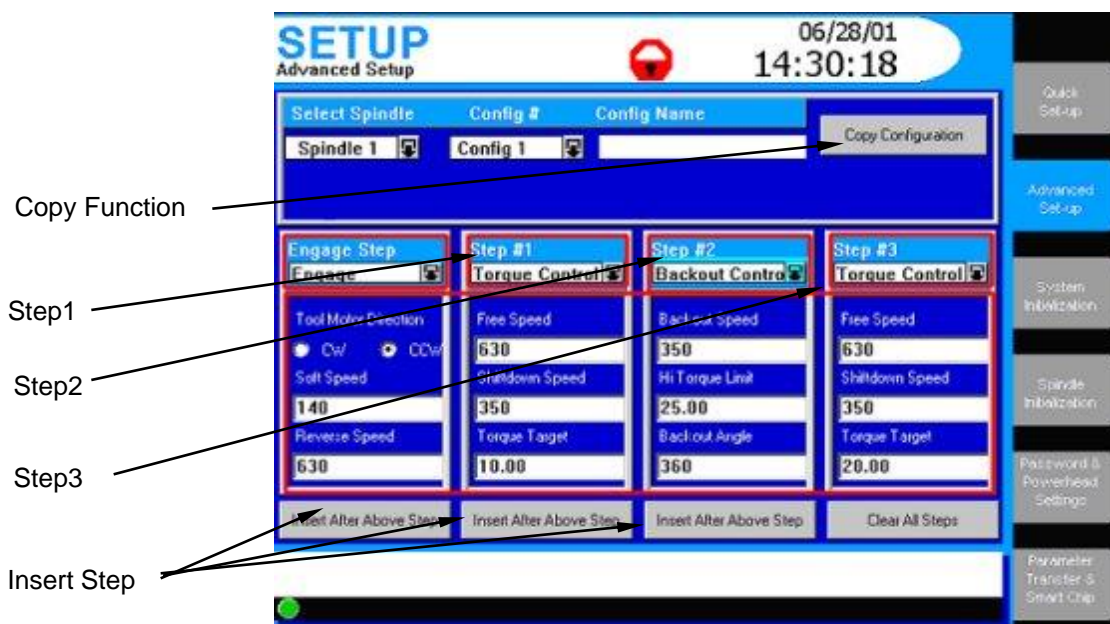
Each step can have its own Free speed, Shiftdown speed and Shiftdown point

E.O.R. data can be selected for any or all steps by checking the E.O.R. data check box.

Each step has a separate angle measurement.

Rule of Thumb:

Use "Steps" for multiple strategies on a single joint
 Use "Gang Count" to run multiple joints of the same type
 Use "Auto Increment" to run multiple joints of different types
 Use any combination of the three



Copy Configuration An existing fastening configuration can be reused, either as is or with slight modifications. Press the copy configuration button to copy the current displayed configuration to a spindle and configuration selected.

Step #1 Drop box can select from a series of available strategies.

Step #2 Drop box can select from a series of available strategies.

Step #3 Drop box can select from a series of available strategies.

Insert Step Pressing this button inserts an empty step to the right of the current step and shift all subsequent steps one step to the right.

Note: To insert a step, press the appropriate "Insert After Above Step" button. A blank step will be added. To delete a step select "None" for the strategy type in the strategy selection drop box.

Lesson objective: Upon completion of this lesson you will be able to program a stepped strategy in Advanced Setup using Copy and Insert

Before you begin: Be certain to observe all safety precautions in the users manual and have the unit powered up and proper tool connected.

Lab



1. Go to Setup/ Advanced Setup
 2. Choose **"Config 1"**
 3. Press "Copy Configuration" and choose Spindle 1, Configuration 3
 4. Choose **"Config 3"**
 5. Press the "Insert After Above Step" below the "Engage" step.
 6. Set the new step (Step 1) up to be a Torque control with Target **4 Nm**.
 7. Set the Torque Tarrget on the second Torque Control to **10 Nm**
 8. Go to the Run Main Screen and run the tool on a joint
- What happens?

Strategies available in advanced setup

Torque Control (with or without yield override)	Backout
Angle Control (with or without yield override)	Re-Torque
Yield Control	Drag Torque
Jog	Prevailing Torque
Delay	Bypass (Powerhead only)

Jog Control Strategy

The Jog Control strategy allows you to run the tool at a slow speed (the Soft Speed defined in the Engage step) so the tool's socket can easily engage the bolt head. Jog Control must be used in the Step #1 Strategy box. When programmed the jog step will run the tool at the softstart speed until either the jog angle or jog torque is reached. If Jog Control is selected, parameters for Jog Torque, Jog Angle and Sync Enable are listed

Delay Control Strategy

The Delay Control strategy allows you to insert a time delay into the tightening. For any of the Step #n Strategy drop boxes, if Delay Control is selected as the strategy, Delay and Sync Enable parameters are displayed.

How to Program a Backout Strategy in Advanced Setup

The Backout Control strategy allows the user to unfasten bolts for a programmed number of degrees and at a programmed speed. If the torque encountered during the backout exceeds the Torque Hi Limit setting, the operation is aborted.

For any of the Step #n drop boxes, if Backout Control is selected as the strategy, its parameters are displayed. Procedure

1. Press the Set-up Main Menu key and then the Advanced Set-up Sub-Menu key.
2. In the Select Spindle drop box select the spindle # you want to program.
3. In the Config # drop box select the configuration # you want to program.
4. At the appropriate Step #n Strategy drop box select Fault Backout.
5. Go to the list of parameters just below the Step #n Strategy drop box and navigate down through the parameter list. You must enter values (or accept the default values) for the Required Parameters. As appropriate, you may also enter values or accept the default values for the Optional Parameters.

Lesson objective: Upon completion of this lesson you will be able to program a Jog Step

Before you begin: Be certain to observe all safety precautions in the users manual and have the unit powered up and proper tool connected.

Lab



1. Go to Setup/ Advanced Setup
2. Choose "**Config 3**"
3. Change the first Torque Control (Step 1) to a "Jog" step with values:
Torque = **4 Nm**, Angle = **360**
4. Go to the Run Main Screen and run the tool on a joint
What happens?

Lesson objective: Upon completion of this lesson you will be able to program a Delay Step

Before you begin: Be certain to observe all safety precautions in the users manual and have the unit powered up and proper tool connected.

Lab

1. Go to Setup/ Advanced Setup
 2. Choose "**Config 3**"
 3. Press the "Insert After Above Step" below the "Jog" step.
 4. Set the new step (Step 2) up to be a Delay with a Delay Time of **2 Seconds**
 5. Go to the Run Main Screen and run the tool on a joint
- What happens?



Lesson objective: Upon completion of this lesson you will be able to program a Backout Step

Before you begin: Be certain to observe all safety precautions in the users manual and have the unit powered up and proper tool connected.

Lab



1. Go to Setup/ Advanced Setup
 2. Choose "**Config 3**"
 3. Set up Step 4 to be a Backout with Variables:
Backout Speed **100**, High Torque = **20 Nm**, Angle = **360**
 4. Go to the Run Main Screen and run the tool on a joint
- What happens?

How to Program a Yield Override Strategy in Torque Control or Angle Control Strategy in Advanced Setup

As previously described, the Torque Control tightening strategy and the Angle Control tightening strategy are based on reaching a programmed torque or angle target respectively.

The Insight IC Controller has an additional selectable feature in Advanced Setup for these two tightening strategies. This is called Yield Override.

When selecting Torque Control or Angle Control in advanced setup, there is an additional check box for Yield Override. When this option is selected, the tightening strategy works like a normal Torque or Angle strategy except it additionally checks that none of the joint components has yielded before the target torque or angle is reached.

If a yield condition is reached before the target torque or angle is reached, a yield override condition is indicated. If the torque or angle achieved at the yield override condition point lies within the programmed torque or angle limits, the default condition is that the tightening will be accepted. If the user does not want to accept this condition, select Fail on Yield Override, in which case the tightening will be rejected, both torque Hi and Lo lamps will be illuminated and a Yield Override Failure will appear in the Message Box.

In cases where yield is detected before the low limit parameter, Final parameter is below low limit in yield override appears in the Message Box.

Procedure

1. Press the Set-up Main Menu key and then the Advanced Set-up Menu key.
2. In the Select Spindle drop box, select the spindle # you want to select.
3. In the Config # drop box, select the config #.
4. Go to the Engage step drop box and select Engage.
5. Go to the list of parameters just below the Engage step drop box and navigate down through the parameter list. Enter values (or accept the default values) for the Required Parameters. Enter values or accept default values for the Optional Parameters.
6. Scroll down to Yield Override check box to enable this feature.

Re-Torque

This step can only be programmed after a torque or angle step.

the fastener can be Re-torque as long as the number of degrees of rotation to reach the torque from the previous step is less than the *Re-torque Angle*.

The angle accumulated in the re-torque step is added to the angle of the previous step.

Re-torque Control Parameters

The Re-torque Control strategy is used to apply additional torque to a previously tightened joint to overcome relaxation that occurs after tightening. Re-torque Control can only be used after either Torque Control or Angle Control strategies. For any of the Step #n Strategy drop boxes.

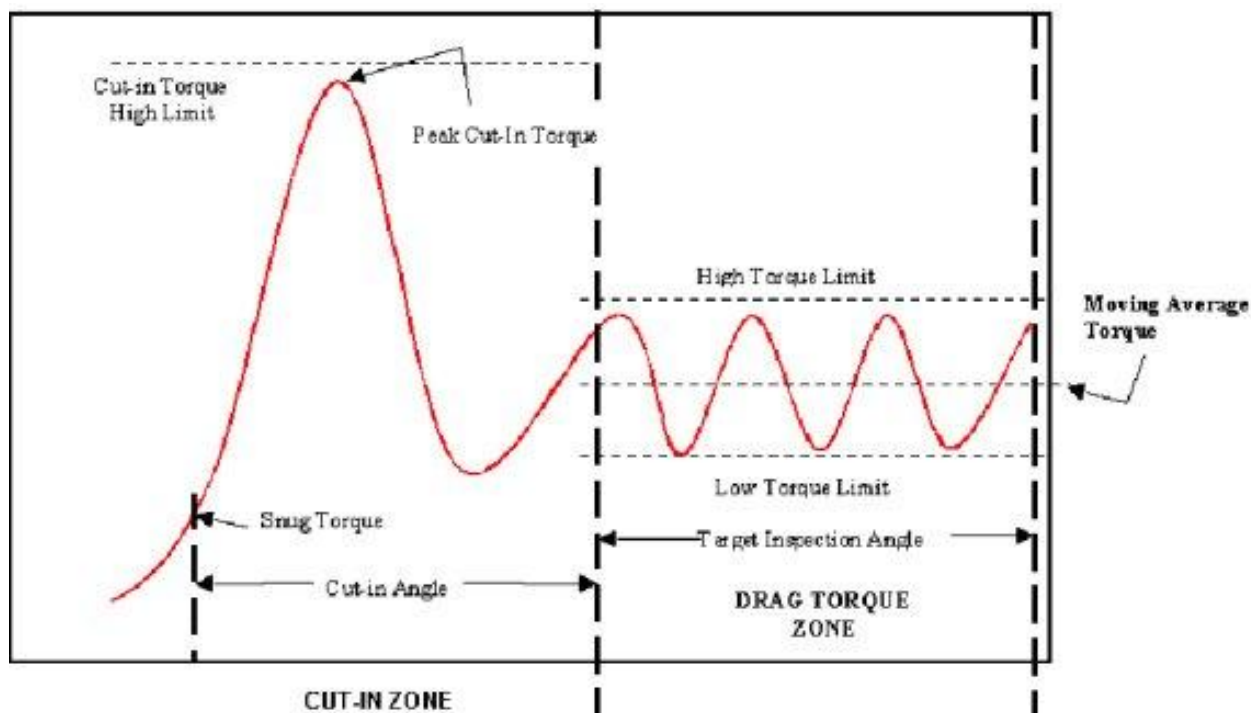
How to Program a Drag Torque Control Strategy in Advanced Setup

Description

Drag torque is the torque required to overcome the inherent friction or pressure force resistance in the movement of an assembly or mechanical component through some predetermined angle. This technique is often used as a quality inspection procedure. A typical application is the measurement of engine crankshaft-turning torque in the automotive industry. In this application, there is usually an initial high inertial peak cut-in torque to get the crankshaft moving, and while this value can be measured over the cut-in zone, it is actually the dynamic torque following this initial torque spike that is the parameter usually required. Similar applications exist for measuring the frictional torque in bearings and hubs.

Drag Torque Must be the Last Step in the Advanced Setup configuration.

PARAMETERS: Free Speed Target Inspection Angle Cut in Angle Torque Cut in High Limit
 High Torque Limit Low Torque Limit Snug Torque E.O.R. Data Select Sync



Procedure

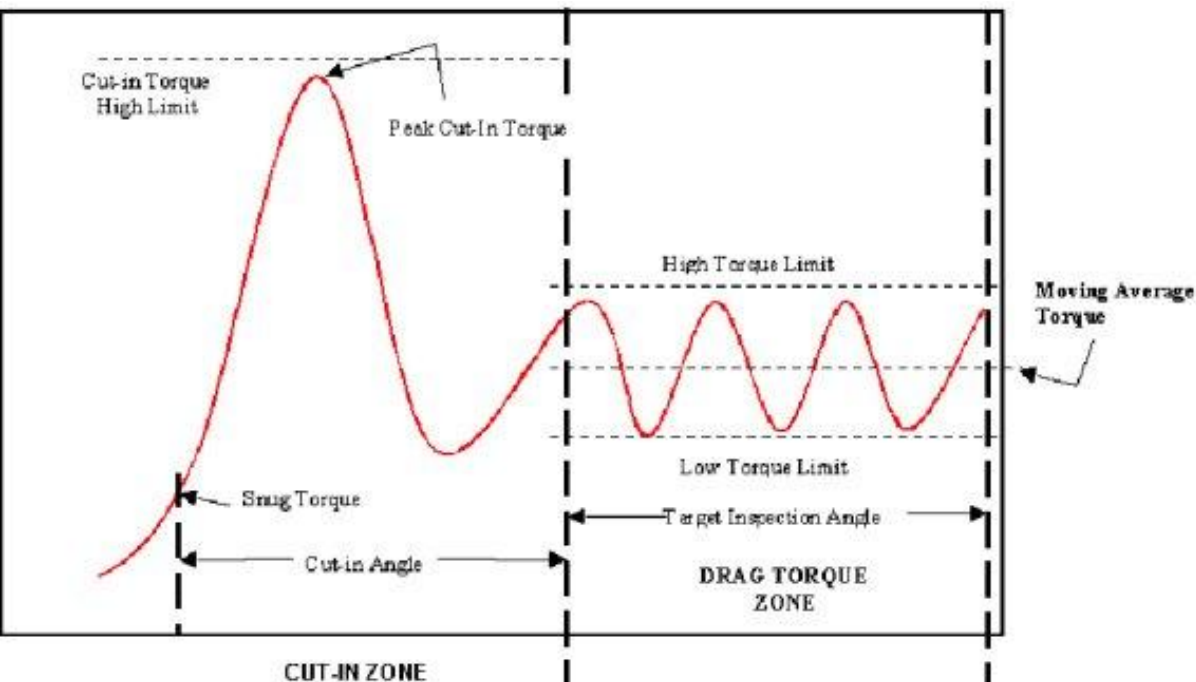
1. Press the Set-up Main Menu key and then the Advanced Set-up Sub-Menu key.
2. In the Select Spindle drop box select the spindle # you want to program.
3. In the Config # drop box select the configuration # you want to program.
4. Go to the Step #1 Strategy drop box and select Drag Torque.
5. Go to the list of parameters just below the Step #1 Strategy drop box and navigate down through the parameter list. You must enter values (or accept the default values) for the Required Parameters. As appropriate, you may also enter values or accept the default values for the Optional Parameters.

Lesson objective: Upon completion of this lesson you will be able to program a Drag Torque Application

Before you begin: Be certain to observe all safety precautions in the users manual and have the unit powered up and proper tool connected.

Lab

1. Go to Setup/ Advanced Setup
2. Choose "**Config 4**"
3. Set up Step 1 for a Drag Torque with Variables:
Cut-In Angle = **360**, Cut-In High Torque = **20 Nm**, Inspection Angle = **720**, High Torque = **5 Nm**, Low Torque = **1 Nm**
4. Go to the Run Main Screen and run the tool **NOT ON A JOINT**
What happens?



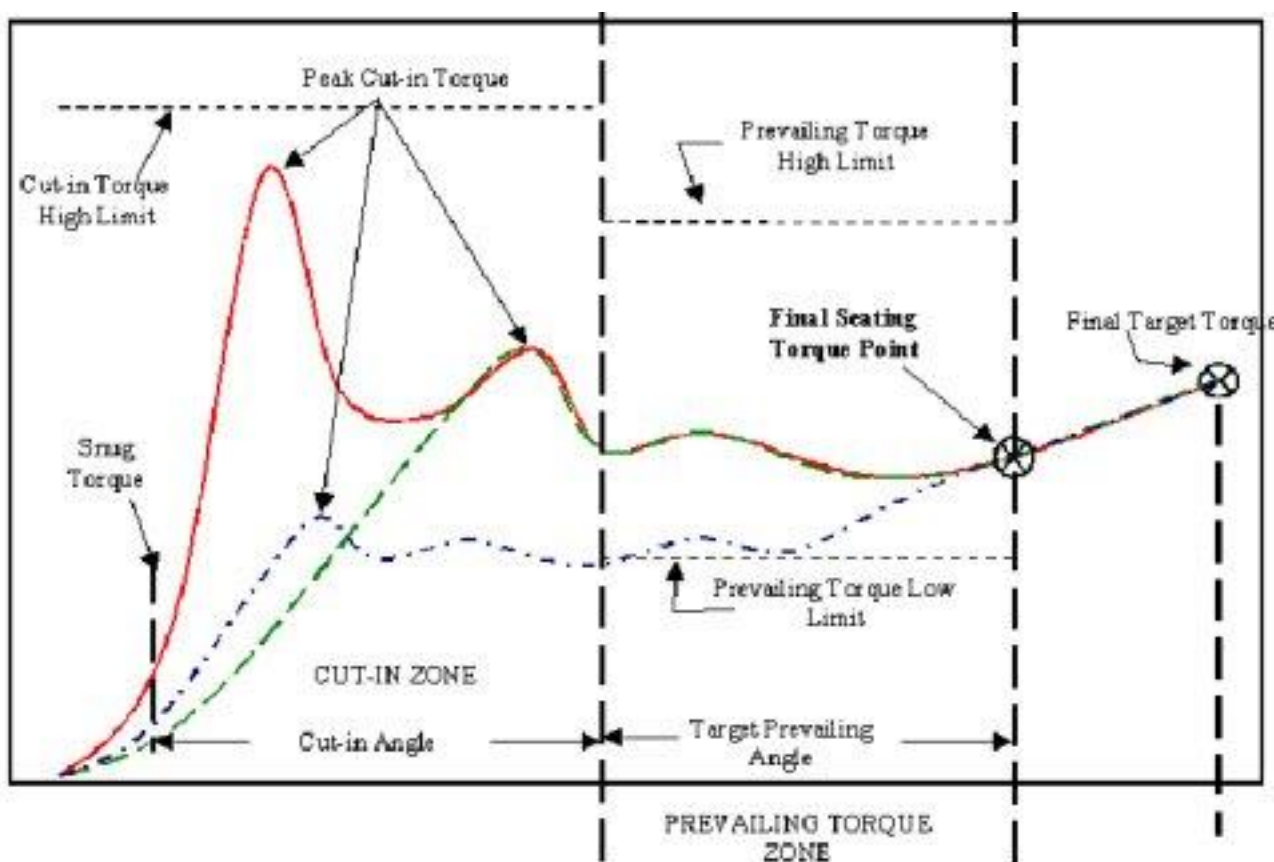
How to Program a Prevailing Torque Control Strategy in Advanced Setup

Description

This is useful for thread forming applications where the thread forming torque may have a value similar to, or even greater than, the final tightening torque.

This strategy monitors the initial peak prevailing or driving torque to ensure that it falls between expected limits (cut-in zone). It then checks the subsequent mean and peak prevailing torque as the thread is formed (prevailing zone). Finally, as the fastener seats, the final tightening strategy is invoked which may be torque control, angle control, or yield controlled tightening (tightening zone).

PARAMETERS: Free Speed Cut in angle Cut In Torque High Limit Angle Target High Torque Limit
 Low Torque Limit Angle High Limit Angle Low Limit Snug Torque Slope Cord Length Slope Deviation
 E.O.R. data Select Sync. Enable



Procedure


1. Press the Set-up Main Menu key and then the Advanced Set-up Sub-Menu key.
2. In the Select Spindle drop box select the spindle # you want to program.
3. In the Config # drop box select the configuration # you want to program.
4. Go to the Step #1 Strategy drop box and select Prevailing Torque.
5. Go to the list of parameters just below the Step #1 Strategy drop box and navigate down through the parameter list. You must enter values (or accept the default values) for the Required Parameters. As appropriate or accept the default values for the Optional Parameters.

The System Initialization Screen

You can use the Set-up menu System Initialization screen to set a broad variety of basic Insight IC parameters. These include General parameters (such as plant name and display language), Date/Time parameters (such as time, date format, and enable daylight savings), and Communications parameters (such as baud rate and communications protocols). Below is a typical System Initialization screen.

SETUP

System Initialization




07/20/2003



01:32:18

Enter a name for this system. This will appear at the top of printed reports







General

System Name IR INSIGHT	Plant Name <input type="text"/>	MAC Address: 0030C5010001	Language English 
		Versions	E.O.R. Filter

Date/Time

Time <input type="text"/>	Date Format MM/DD/YY 	Spring Forward Date <input type="text"/>
Date <input type="text"/>	Daylight Savings Disabled 	Fall Back Date <input type="text"/>

Communications

Data Port Comm 1 	Parity None 	Bits Per Character 8 	Comm Protocol None 
Baud Rate 115200 	# of Stop Bits 1 	Multi Drop Address <input type="text" value="00"/>	

Contrast

Up

Down

Quick Set-up

Advanced Set-up

System Initialization

Spindle Initialization

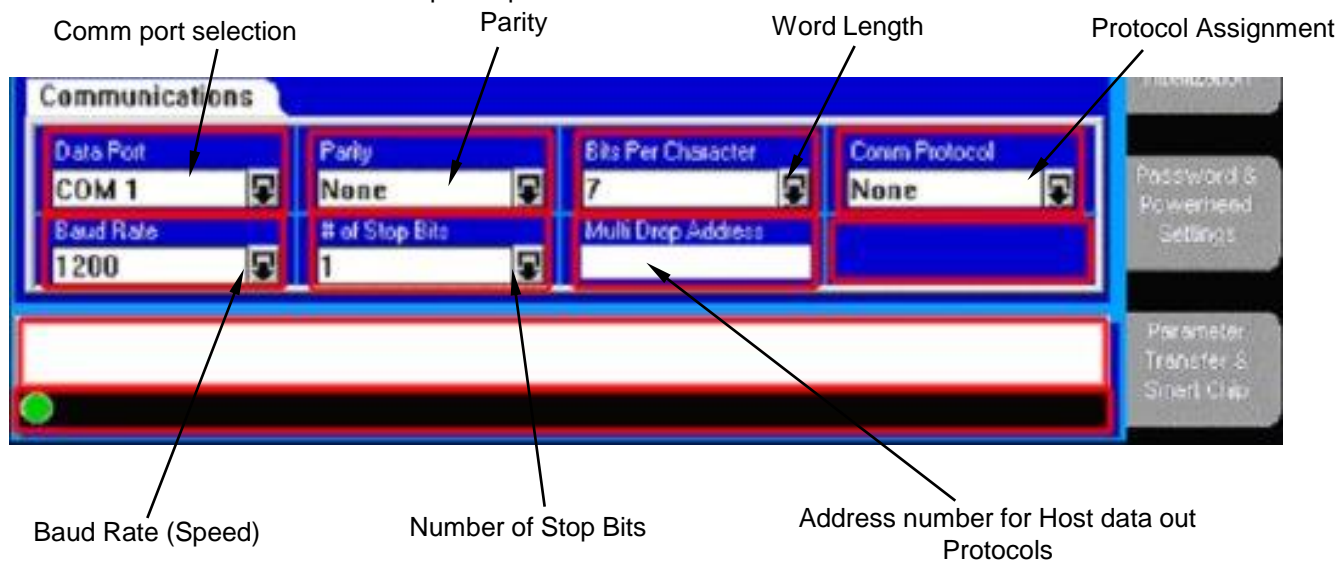
Password & Powerhead Settings

Parameter Transfer

Communication Protocol Setup

There are six options in the Comm Protocol drop box:

1. **None**
2. **Host Data Out** is a handshaking protocol. The host sends a request for data, Insight sends the data, and the host sends a response that the data was received.
3. **Custom Host1** is a special version of Host Data Out for Daimler-Chrysler
4. **E.O.R. Data Out** sends one line of data after every cycle, without a host request. See Appendix 3 for further information.
5. **Bar Code 1** is for a Spindle 1 bar code scanner connected to the COM Port. When you select this option a button labeled Bar Code Settings appears on the lower right corner of the screen. Bar Code use is fully explained in the following section.
6. **Bar Code 2** is the barcode setup for Spindle 2



Comm Port Drop box used to select the communications port setting (data Port). The options are: COM 1, COM 2, COM 3, COM 4, Profibus, DeviceNet or EtherNet.

Parity Drop Box to set parity to None, Odd or Even.

Word Length Drop box used to set the bits per character (set to 7 or 8).

Protocol Assignment Used to select the protocol that will be assigned to the communications port. Options are None, Host Data Out, E.O.R. Data Out, CustomHost1, Barcode SP1, and Barcode SP2.

Baud Rate Drop box to set the communications baud rate. Options are 1200, 2400, 4800, 9600, 19200, 38400, 57600 and 115200.

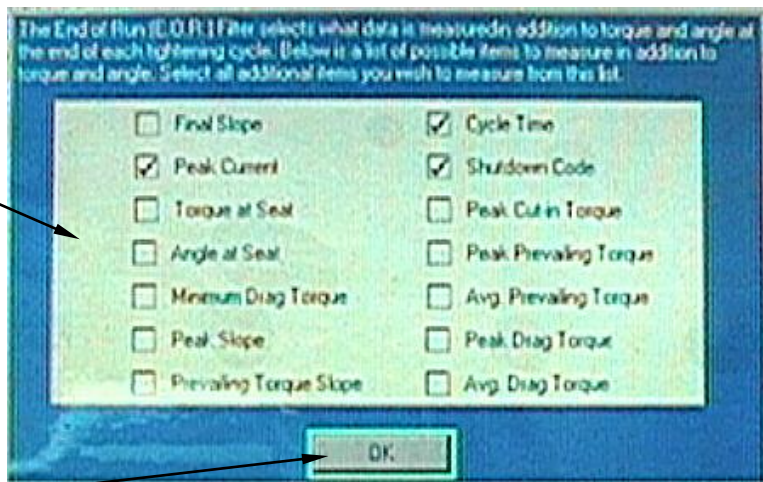
No. Stop Bits Drop box to set the number of stop bit (options 1 or 2).

Host Data Out Address number for the network port's host Data Out Protocol. The allowable range is 00-99.

E.O.R. Data Out

The E.O.R. data out protocol sends one line of data from the selected comm. port for every cycle. The format of this protocol can be changed via the "Edit Data format" function in the Stats Export Cycle Log screen. Clicking on the *Edit Data Format* button on the screen above brings up the following Export screen.

Check the Desired Outputs



Check Here to Accept

Stats - Export Cycle Log can also be used to customize EOR

The screen above lists 14 statistical parameters. As explained in the screen's wizard box, you can select the specific statistical parameters by checking each box. An unchecked box means that parameter will not be exported.

Standard format is as follows:

MM/DD/YY^hh:mm:ss^S^CC^cccccc^TTTTTF^aaaafnn<CR><LF>

^ is a Space

MM is the month the cycle occurred

DD is the day the cycle occurred

YY is the day the cycle occurred

hh:mm:ss is the hours minutes and seconds that the cycle occurred

S is the spindle number of the cycle

CC is the configuration number of the cycle

cccccc is the cycle number

TTTTT is the torque reading (4 digits with a decimal place) of the cycle

F is the status flag for the torque reading: space = OK, H = HIGH, L = LOW

aaaa is the angle reading of the cycle

f is the status flag for the angle reading: space = OK, H = HIGH, L = LOW

nn Two digit Check sum (Mod 256)

<CR> is a Carriage Return

<LF> is a Line Feed

OK

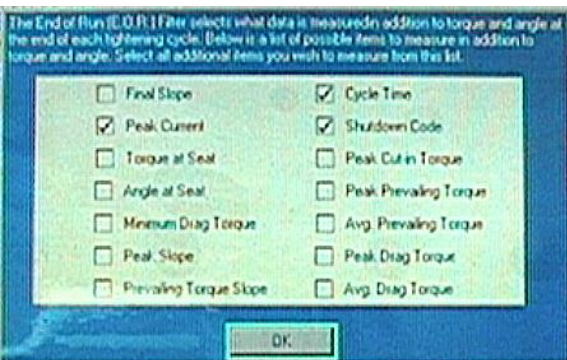
Clicking this button sets the data export order and returns the user to the Setup - System Initialization screen.

Lesson objective: Upon completion of this lesson you will be able to capture an End of Run Report

Before you begin: Be certain to observe all safety precautions in the users manual and have the unit powered up and proper tool connected.

Lab

1. Hook up the RS232 Null Modem Cable to the PC provided and to COM 1 on the IC and open Hyperterminal
2. Select "**COM 1**" and enter the settings:
38400, 8, None, 1
3. Select "**EOR Report**" for the Comm Protocol
4. Go to the Run Main Screen and run the tool on a joint
5. What happens?



6. Change some of the check boxes in the "**EOR Filter**" and run the tool on a joint
What happens this time?

HOST DATA OUT

2B. System Initialization - Host Data Out

Host Data Out is a handshaking protocol. The host sends a request for data, Insight sends the data, and the host sends a response that the data was received

A host computer must poll the Insight for a packet of data via the following command. AASSCC<CR><LF>

Where **AA** is Insight Address Number **SS** is Spindle number and **CC** in the configuration number.

If there is no data the insight will respond with the following. AA@@@@

To clear the Host buffer for a configuration send the command:

AASSCC01<CR><LF>

To clear the Host buffer for all configurations of a spindle, send the command:

AASSCC02<CR><LF>

Data format is as follows: **eeSSCCMMDDYYhhmmttttjkkkkklmmnn**

Where

ee is address number

SS is spindle number

CC is configuration number

MMDDYY is month, day and year

hhmm is hours, minutes (24hr time)

tttt is torque value – four digits plus decimal point

j is torque status – space=OK, H=HIGH, L=LOW

kkkkk is angle value – five digits

l is angle status – space=OK, H=HIGH, L=LOW

mm is last two digits of the cycle number

nn is a check sum – two digits Mod 256

Lesson objective: Upon completion of this lesson you will be able to communicate using Host Data Out

Before you begin: Be certain to observe all safety precautions in the users manual and have the unit powered up and proper tool connected.

Lab

1. Hook up the RS232 Null Modem Cable to the PC provided and to COM 1 on the IC and open Hyperterminal
2. Select "**COM 1**" and enter the settings:
38400, 8, None, 1
3. Set the Multidrop Address to "**01**"
4. Select "**Custom Host1**" for the Comm Protocol
5. Go to the Run Main Screen and run the tool on a joint
6. What happens?

7. Type "**010101**" and press "**Enter**" in Hyperterminal
What happens this time?

Bar Code

Description

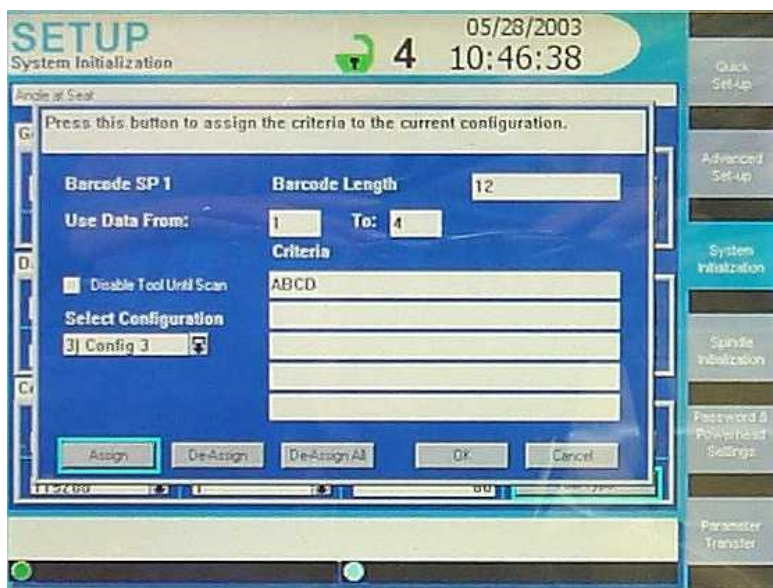
The bar code function allows the Insight IC controller to be connected to any serial ASCII bar code scanner. Each spindle can be equipped with its own scanner or in the case of a powerhead one scanner can be assigned to the powerhead. The bar code function has two main operating modes

Passive Bar Code mode

In this mode bar code data is attached to E.O.R. data and stored in the cycle log, but configurations are not selected via the bar code scan data.

Active Bar Code mode

In this mode configurations are selected via the bar code scan data. The scan data is also attached to the E.O.R. data.



<i>Spindle</i>	The spindle number to which the bar code data is attached
<i>Select Config.</i>	The Configuration to which the Criteria is attached
<i>Barcode Length</i>	Enter the size of the bar code. Range = 1-40 characters (Default value+20).
<i>Used Data From</i>	Defines where in the bar code string the software looks for the Starting position of the configuration selection criteria (Range = 1-39).
<i>Use Data To</i>	Defines where in the bar code string the software looks for the end position of the configuration selection criteria (Range = 1-39).
<i>Criteria</i>	Bar Code Value to assign to the configuration. The Character No. must = the Use Data boxes.
<i>Assign</i>	This Button assigns the displayed spindle and config to the criteria.
<i>De-Assign</i>	This button de-links the displayed spindle and config from the criteria.
<i>De-Assign All</i>	This button de-links the displayed spindle and all configs from the criteria.
<i>Disable Tool Until Scan</i>	When Checked the tool will be disabled until it receives the bar code scan
<i>OK</i>	This button will save all changes and return to the system Initialization Screen.
<i>Cancel</i>	Use this button to cancel all changes and return to the System Initialization Screen.

Bar Code Setup for Passive Mode

To setup the controller for passive bar code operation, follow the directions below.

Go to the Setup System Initialization screen.

Go to the Data Port drop box and select the communications port to which the bar code scanner will be connected.

Set the Baud Rate, Parity, # of Data Bits and # of Stop Bits to the same values as set up for your bar code scanner.

Go to the Comm Protocol drop box and select Barcode SP1 for spindle 1 or Barcode SP2 for spindle 2.

Navigate to the Barcode Setup button and press ENTER.

NOTE: If this is the first time you have setup a scanner for this spindle you will get a warning message indicating that a bar code setup file was not found. Press the ENTER key and a default file will be created.

Enter the number of characters that are in the bar code scan into the box labeled Barcode Length.

Navigate to the OK button and press ENTER

Bar Code in Active Mode

Bar Code Setup for Active Mode

To setup the controller for active bar code operation follow the directions below.

Go to the Setup System Initialization screen.

Go to the Data Port drop box and select the communications port the bar code scanner will be connected to.

Set the Baud Rate, Parity, # of Data Bits and # of Stop Bits to the same values as setup for you bar code scanner.

Go to the Comm. Protocol drop box and select Barcode SP1 for spindle 1 or Barcode SP2 for spindle 2.

Navigate to the Barcode Setup button and press ENTER.

NOTE: If this is the first time you have setup a scanner for this spindle you will get a warning message indicating that a bar code setup file was not found. Press the ENTER key and a default file will be created.

Enter the number of characters that are in the bar code scan into the box labeled Barcode Length.

Into the box labeled Use data From, enter the position of the first character in the bar code that specifies the section that will determine which configuration the scan should switch the controller to. In the box labeled **to**, **enter the last character in the bar code that specifies the section that will determine which configuration the scan should switch the controller to.**

For example if your bar code has the following structure:

XXXXYYXX

Where: X= any character in the bar code

Y= characters whose values determine which configuration to switch to.

Then "Use Data From **4 to 6**" should be the entry, as the first Y is at character position 4 and the last Y is in character position

The actual characters for the bar code section YYY are called the criteria. Different criteria values will instruct the controller to switch to different configurations

Select the first configuration to set criteria, from the configuration selection drop box.

Navigate to the top criteria box and press the Expand key. Use the numeric keypad to enter in the criteria value.

Note: the keypad will be in alphanumeric mode so once the desired character is on screen, press the right arrow key to move to the next character position. When all characters have been entered press the ENTER key. The numbers of characters entered into each criteria entry box must match exactly the number of characters specified in the **Data From** and **To** entry boxes. Repeat until all criteria for all configurations have been entered.

Navigate to the OK button and press ENTER.

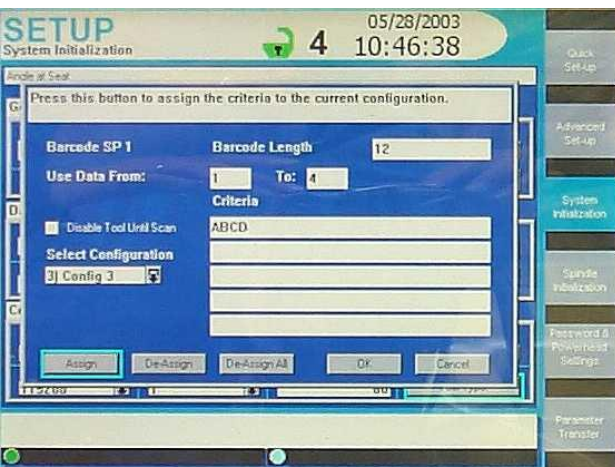
Lesson objective: Upon completion of this lesson you will be able to bring a Barcode onto the Run Main Screen

Before you begin: Be certain to observe all safety precautions in the users manual and have the unit powered up and proper tool connected.

Lab



1. Connect the 9-Pin Adapter to COM3 on the side of the IC
2. Connect the Barcode Scanner to the adapter and plug it in
3. Select "**COM 3**" and enter the settings:
9600, 8, None, 1
4. Select "**Barcode SP1**" for the Comm Protocol
5. Press the "**Barcode Setup**" button
6. Enter "**8**" for the "Barcode Length" and press "**OK**"
7. Go to the Run Main Screen and choose "Barcode" as one of the variables (VAR1 or VAR2)
8. Scan a **Pepsi** can
9. Run the tool on a joint
10. What happens?

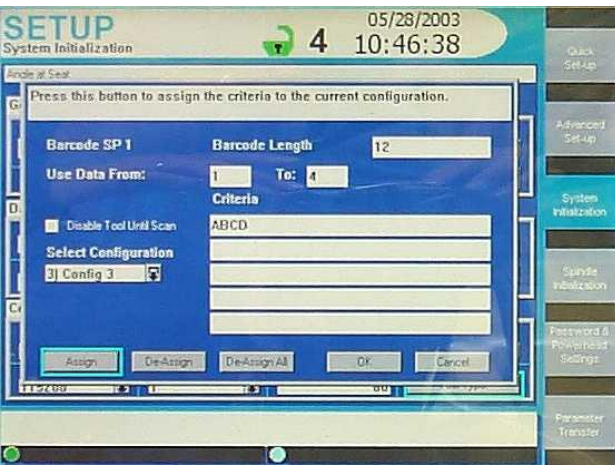


11. Scan a **Diet Pepsi** can and run the tool
What happens this time?

Lesson objective: Upon completion of this lesson you will be able to change configurations using the Barcode input

Before you begin: Be certain to observe all safety precautions in the users manual and have the unit powered up and proper tool connected.

Lab



1. Connect the 9-Pin Adapter to COM3 on the side of the IC
2. Connect the Barcode Scanner to the adapter and plug it in
3. Select "COM 3" and enter the settings:
9600, 8, None, 1

4. Select "**Barcode SP1**" for the Comm Protocol
5. Press the "**Barcode Setup**" button
6. Enter "**8**" for the "Barcode Length"
7. Choose "**Config 1**"
8. Use data from "**8**" to "**8**"
9. Enter "**3**" into the first "Criteria" box
10. Press "**Assign**"
11. Choose "**Config 2**"
12. Use data from "**8**" to "**8**"
13. Enter "**8**" into the first "Criteria" box
14. Press "**Assign**"
15. Press "**OK**"

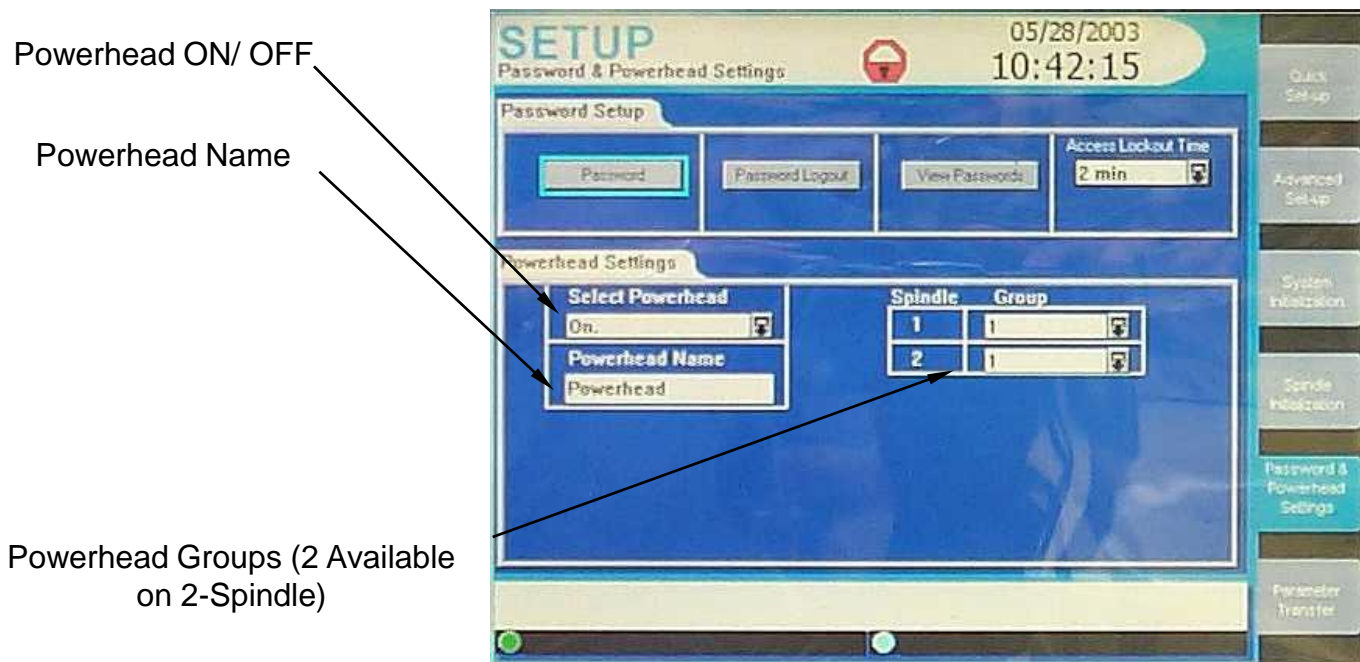
Go to the Run Main Screen and choose "Barcode" as one of the variables (VAR 1 or VAR 2)

8. Scan a **Pepsi** can
9. Run the tool on a joint
10. What happens?

11. Scan a **Diet Pepsi** can and run the tool
- What happens this time?

A. Powerheads

- Powerheads are groups of spindles that run the same program
- Powerheads only require a start signal on the first spindle and send out a global Pass or Fail
- Steps can be synchronized individually
- In Order to Activate Powerhead:
 - A tool must be on each spindle
 - Tools must be Machine Mount
 - Barcode must be disabled
 - Tubenut must be disabled



Programming Spindles in a Powerhead

You can program the two spindles in a powerhead in a variety of ways. The spindles can be programmed identically, or the spindles can be divided into groups. If divided into groups, those spindles in a group must be programmed the same. The Insight IC keeps track of the spindles in a powerhead and how they are grouped and programmed. If you attempt to change the programming for a spindle that is part of a powerhead, the Insight will bring up a dialogue box for you to confirm the change. If confirmed, the Insight automatically changes the programming for the spindles in that group, where appropriate.

Powerhead Specific Operations and Functions

General: Retry Fault Backout Strategy

This is a strategy that can be programmed in the engage step using various parameters that allows the controller to retry a spindle or spindles when a tightening fault occurs. Whenever a retry fault backout is initiated, the spindle(s) will backout the specified number of degrees and restart the tightening from step 1. The parameters in the engage step that make up fault backout are as follows:

Fault Backout Angle

This parameters defines the number of degrees the spindle will rotate during the backout phase. This parameter can be set to different values for each spindle.

Fault Backout Speed

This parameter sets the speed that the tool will run during the fault backout operation. This parameter can be set to different values for each spindle.

Number of Retries

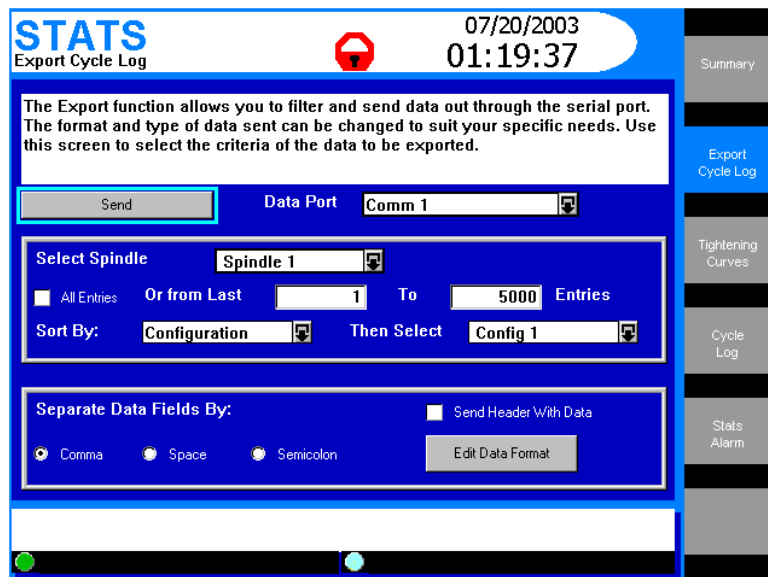
This defines the number of times a spindle can retry the fastening if a tightening fault occurs. If set to one, the spindle will retry once if a tightening fault occurs. This value must be the same for all spindles in a group or if "Retry Fault Action" is set to 3, the value must be the same for all spindles in a powerhead.

Retry Fault Action

This parameter defines what spindles will backout when a tightening fault occurs. If this parameter is set to zero, then retry fault backout operation is disabled. If set to 0, 1, or 2, this parameter must be set to the same value for all spindles in a group. If this parameter is set to a value of 3, then it must be set to the same value for all spindles in the powerhead.

Retry Fault Action Value	Operation
0	Faulted spindle stops, no retry
1	Only faulted spindles retry
2	All spindles in faulted spindles group, retry
3	All spindles in powerhead retry

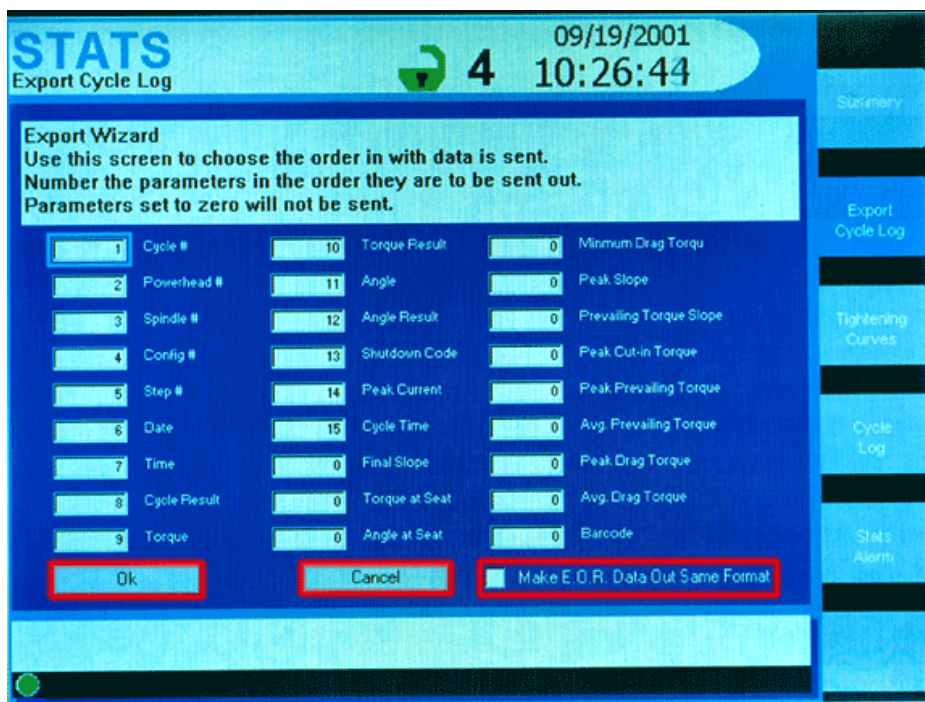
Using the *Statistics Export* screen, you can select, filter, and format cycle data and export that data, via the serial port, to a PC or other device. Below is a typical *Statistics Export* screen.



Wizard Box	Displays information or instructions for the screen element that is highlighted.
Send	After you have selected and formatted the cycle parameters using other elements on this screen, click this button to send the data to an external device over the serial port.
Data Port	Use this drop box to select the serial port for exporting data (COM 1, COM 2, COM 3, or COM 4, floppy disk, or flash memory disk).
All Entries	Check this box if you want to export all cycle data in memory.
From Last	If you want to export data from only a portion of the fastening cycles, enter the range here.
Sort By	Use this drop box to select the cycle sorting parameter. Options include Configuration, Cycle Results, Torque Results, or Angle Results.
Then Select	This drop box will display different options depending upon the Sort By parameter. If the user sorts by Configuration, he can select either all configurations or a specific one (by number from 1 to 32). If the user sorts by Cycle Result, Torque Result, or Angle Result, he can select either Pass/ Fail or Pass/High/Low, as appropriate.
Separate Data Fields by	The user has three check boxes to specify data separation: either a comma, a space, or a semi-colon.
Send Header with Data	Checking this box allows a data header to be specified.
Edit Data Format	Clicking this button brings up a second Export screen to select the specific statistical data for export. Below is additional information on this screen.
Message Box	The Message Box summarizes system status and provides warnings and alarms.

EXPORT CYCLE LOG

Clicking on the *Edit Data Format* button on the screen above brings up the following Export screen.



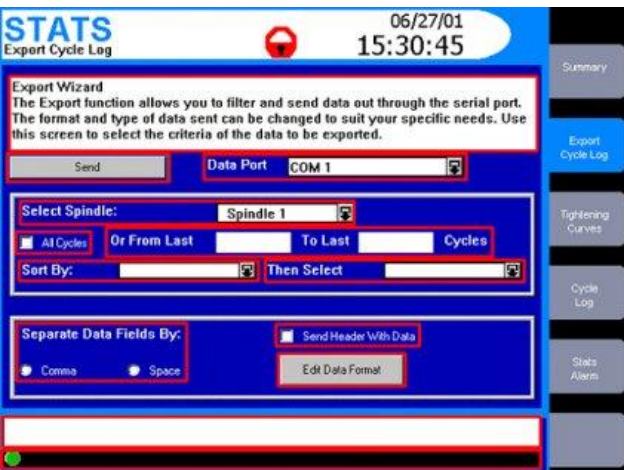
The screen above lists 26 statistical parameters. As explained in the screen's wizard box, you can select the specific statistical parameters and their order by entering a sequential number in each parameter box. Entering a zero means that parameter will not be exported.

Make E.O.R. Data Out Same Format	Checking this box gives the "End of Run Data Out" serial protocol the same format as the statistics export data.
OK	Clicking this button sets the data export order and returns the user to the main Export screen.
Cancel	Clicking this button cancels all changes and returns the user to the main Export screen.
Message Box	The Message Box summarizes system status and provides warnings and alarms.

Lesson objective: Upon completion of this lesson you will be able to manipulate the cycle log output to a PC

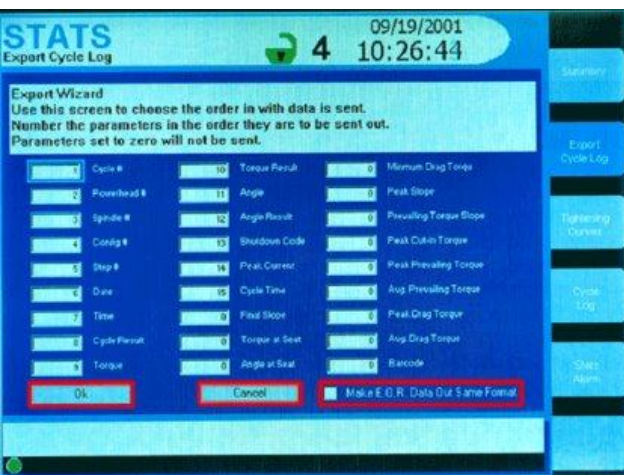
Before you begin: Be certain to observe all safety precautions in the users manual and have the unit powered up and proper tool connected.

Lab



1. Hook up the RS232 Null Modem Cable to the PC provided and to **COM 1** on the IC and open Hyperterminal
2. In the Stats/ Export Cycle Log screen, choose **COM1** as the Data Port.
3. Select "**All Cycles**" and press "**Send**"

What happens at the PC?

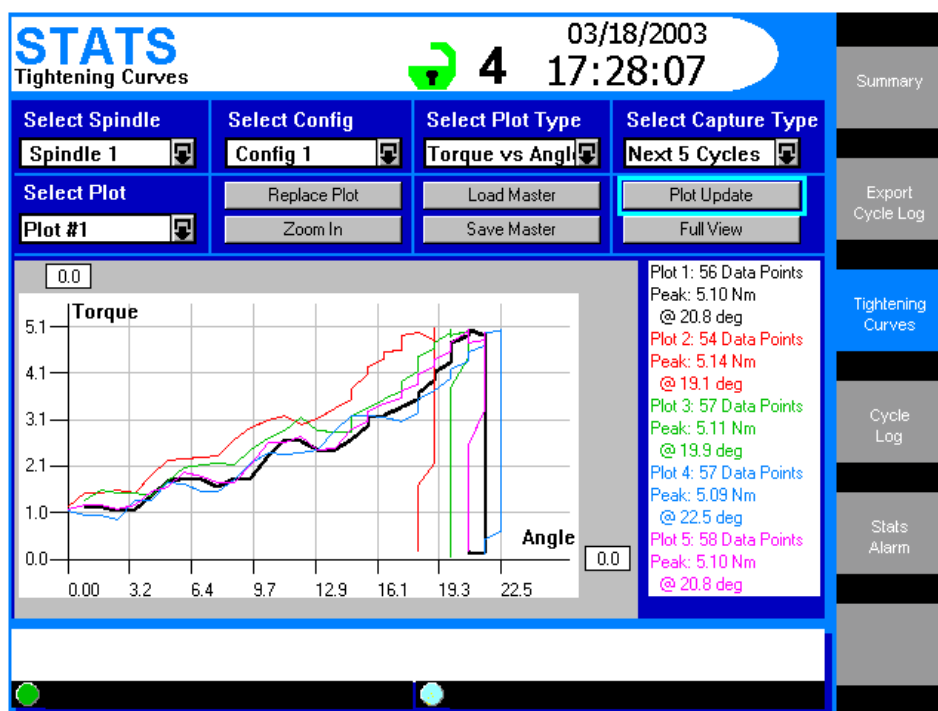


4. Press Edit Data Format
5. Enter "**7**" for Date and "**6**" for Time and press "**OK**"
6. Press "**Send**" again

What happens this time?

Statistics Menu: Tightening Curves Screen

To improve a fastening sequence or to resolve fastening problems, it is often important to understand the tightening curve in detail. With this screen, the user can view tightening curves and zoom in on those curves to analyze them. In addition, important aspects of the curve—such as the number of data points, peak torque value, and so on—are automatically calculated and displayed.

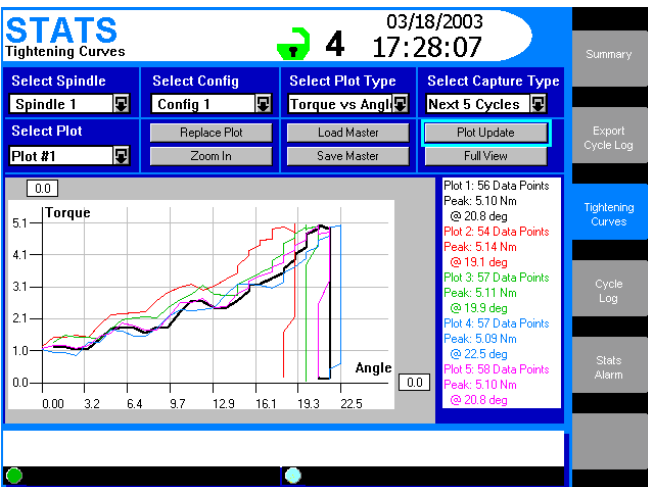


Select Spindle	Use this drop box to select the spindle # or powerhead whose tightening curves will display. This drop box will not be present if your Insight is a one-spindle model.
Select Config	Use this drop box to select the tightening configuration # whose curves will display. The options include configuration 01 through 32.
Select Plot Type	Use this drop box to select the plot type: Torque vs. Angle, Torque vs. Time, or Current vs. Time.
Select Capture Type	Use this drop box to select which fastening curves will be captured and displayed. Options include Last Cycle, Last Reject, Next Cycle, Next 2 Cycles, Next 5 Cycles.

Lesson objective: Upon completion of this lesson you will be able to compare various plots in the Stats - Tightening Curves Screen

Before you begin: Be certain to observe all safety precautions in the users manual and have the unit powered up and proper tool connected.

Lab



1. In Stats/ Tightening Curves, select “**Next Cycle**” as the Capture Type.

2. Run a joint with the tool.

What happens?

3. Select “**Next 5 Cycles**” as the Capture Type

4. Run the tool on the joint five more times

What happens this time?

5. Press the “**Save Master**” key and save the last cycle as “**Master 1**”

6. Change the torque target to 12Nm and return to the Stats/ Tightening Curves Screen

7. Run a cycle with the new settings

8. Press “**Load Master**” and select “**Master 1**”

What happens this time?

Statistics Menu: Tightening Curves Screen continued

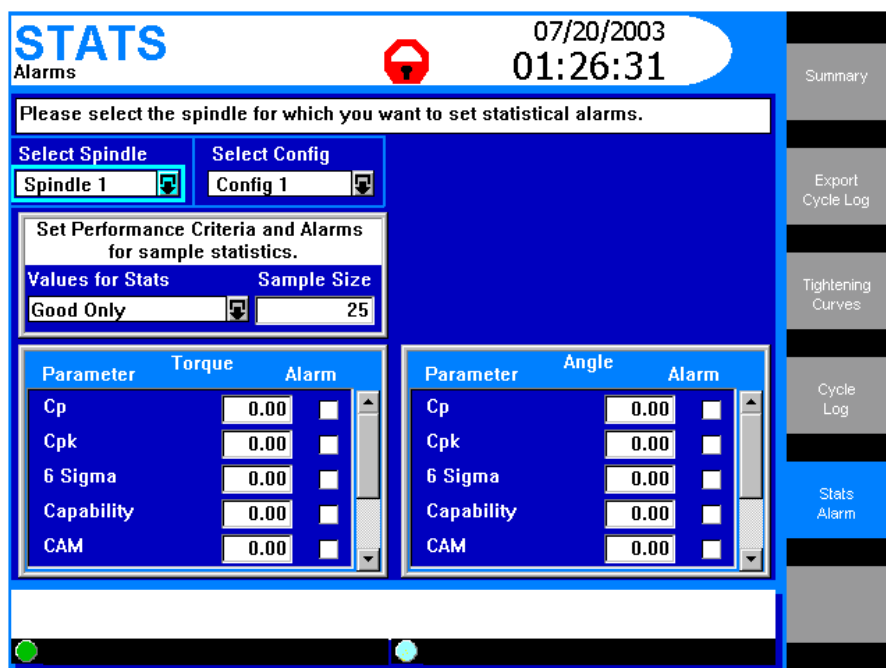
Select Plot	If you have multiple plots displayed on the screen, use this drop box to select one for analysis. The selected plot becomes a solid line, distinguishing it from the other plots displayed.
Replace Plot	Clicking this button replaces the plot selected in the Select Plot drop box with the next valid plot.
Load Master	You may have tightening curves stored in memory that you want to use as a reference or master; a curve against which you can compare other fastenings. Pressing this button brings up a float box that allows you to select one of the stored curves and display it on the screen as the master plot. The button name then toggles to Remove Master, and now pressing it removes the master and displays the previous curve.
Plot Update	Pressing this button removes any plots on the screen (except a Master plot) and places new plots on the screen, as determined by the setting in the Select Capture Type drop box.
Zoom In	Clicking this button will zoom in on the tightening curve displayed on the screen. The button name then toggles to Zoom Out, and now clicking it returns the display to normal scale. When zoomed in, use the left and right arrow keys to move along the plot.
Save Master	You may have a particular tightening curve that you want to use as a reference or master; a curve against which you can compare other fastenings. Select the plot you want to save with the Select Plot drop box, then press this button to save it as the Master plot. A float box comes up that allows you to select a location to save the plot.
Full View	This button expands the plot window to full screen. Pressing the Close button on the bottom of the expanded screen will return the screen to normal view.
Plot Window	The tightening curves you have selected with the buttons and drop boxes above display here. Below is additional information on how to analyze the plot(s) displayed.
Plot Summary Window	This window to the right of the tightening curves lists information about the plots displayed. This includes the Plot Number, the number of data points used to create the plot, the Peak Angle, and the Peak Torque (or Peak Time or Peak Current, depending upon the selection made in the Select Plot Type drop box).
Message Box	The Message Box summarizes system status and provides warnings and alarms.

You can examine in detail the tightening curve displayed in the screen's main window by navigating to the plot window and pressing the Expand key. This allows you to take control of the cross hairs in the plot window. (The cross hairs will appear on the curve selected in the Select Plot drop box.) Use the directional keypad's arrow keys to move the cross hairs to the region of interest on the tightening curve.

Note: That the numerical values for the curve at the cross hairs location display on the screen.

Statistics Menu: Statistics Alarm Set-Up Screen

In many applications it is important to systematically monitor tightening performance using statistical parameters. This screen allows the user to set alarms that will indicate deviations from selected fastening statistics, thereby alerting the Insight operator to a potential quality problem. Below is a typical *Statistics Alarm Set-Up* screen.



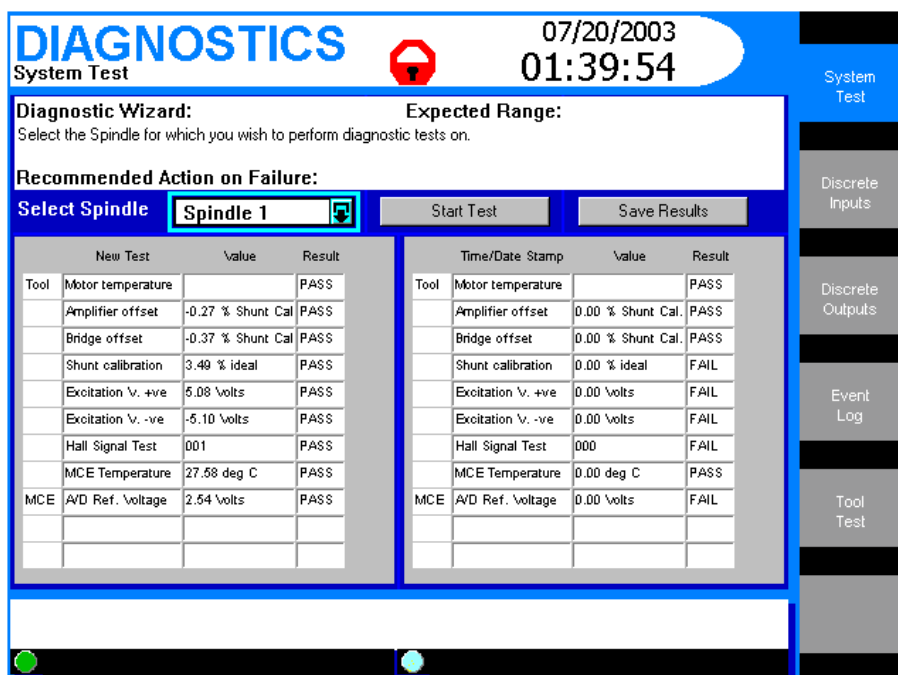
Select Spindle	Use this drop box to select the spindle # for which the alarms will display. This drop box will not be present if your Insight is a one-spindle model.
Select Config	Use this drop box to select the tightening configuration whose statistics alarms will display. The options include configuration 01 through 32.
Values for Stats	Use this drop box to select what tightening results are included in your statistical calculation. The options are Good Only, All, or All but hardware faults.
Sample Size	Using the numeric keypad, enter a sample size. This will be the number of samples used to calculate the sample statistics.
Main Window	This window has two boxes, to set the alarms for both torque and angle. The user can set alarms for all of the statistical parameters listed in these boxes, and can individually turn those alarms on or off.
Message Box	The Message Box summarizes system status and provides warnings and alarms.

The Diagnostics Menus

The *Diagnostics* menu allows the user to check the overall system health of the Insight IC Fastening System with Graphics Display. This function also diagnoses system problems. The user can view diagnostic test results and store them for future reference. The *Diagnostics* menu has five sub-menu screens.

System Test Screen

With this screen the user can request and display diagnostics test results on the tightening tools (spindles) and on the Motor Controllers (MCs). Below is a typical *System Test* screen graphic.



DIAGNOSTICS
System Test

07/20/2003
01:39:54

Diagnostic Wizard:
Select the Spindle for which you wish to perform diagnostic tests on.

Expected Range:

Recommended Action on Failure:

Select Spindle: **Spindle 1** [Start Test] [Save Results]

Tool	New Test	Value	Result
Motor temperature			PASS
Amplifier offset	-0.27 % Shunt Cal		PASS
Bridge offset	-0.37 % Shunt Cal		PASS
Shunt calibration	3.49 % ideal		PASS
Excitation V. +ve	5.08 volts		PASS
Excitation V. -ve	-5.10 volts		PASS
Hall Signal Test	001		PASS
MCE Temperature	27.58 deg C		PASS
MCE A/D Ref. Voltage	2.54 volts		PASS

Tool	Time/Date Stamp	Value	Result
Motor temperature			PASS
Amplifier offset	0.00 % Shunt Cal.		PASS
Bridge offset	0.00 % Shunt Cal.		PASS
Shunt calibration	0.00 % ideal		FAIL
Excitation V. +ve	0.00 volts		FAIL
Excitation V. -ve	0.00 volts		FAIL
Hall Signal Test	000		FAIL
MCE Temperature	0.00 deg C		PASS
MCE A/D Ref. Voltage	0.00 volts		FAIL

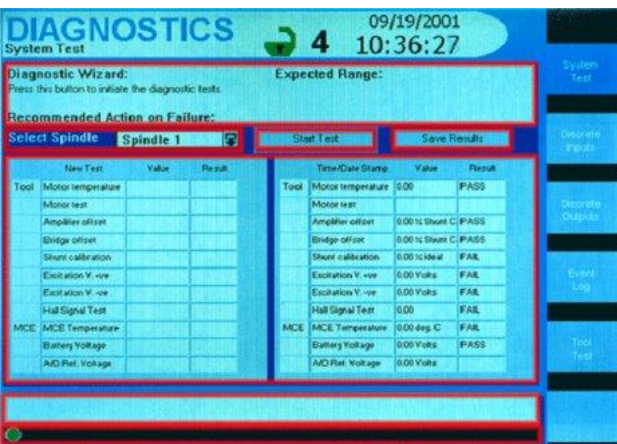
System Test
Discrete Inputs
Discrete Outputs
Event Log
Tool Test

Wizard Box	Displays information or instructions for the screen element that is highlighted.
Select Spindle	Use this drop box to select either Spindle 1, Spindle 2, or a Powerhead for testing. This drop box will not be present if your Insight is a one-spindle model.
Start Test	This button initiates the system diagnostics test. The test results are then displayed on the left-hand side of the screen's main window.
Save Results	This button stores the system diagnostics test results and displays them on the right-hand side of the screen's main window.
Main Window	When the user performs a systems test, the results are displayed as a table on the left-hand side of this window (the side labeled NEW). If there are test results already displayed there, they are overwritten. If the Save Results button is pressed, the test results displayed on the left-hand side of the window are moved to the right-hand side and stored, overwriting any stored test results previously displayed there. Below is additional information on the specific test results displayed in this window.
Message Box	The Message Box summarizes system status and provides warnings and alarms.

Lesson objective: Upon completion of this lesson you will be able to run and interpret a System Test

Before you begin: Be certain to observe all safety precautions in the users manual and have the unit powered up and proper tool connected.

Lab



1. In Diagnostics/ System Test, press the **“Start Test”** key.
What happens?

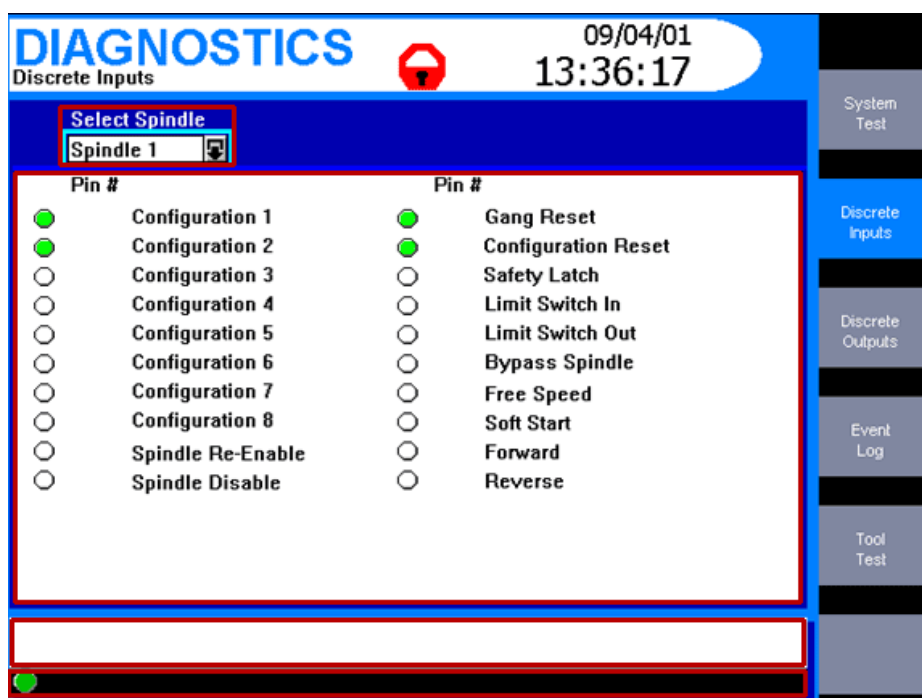
2. Press **“Save Results”**
3. Disconnect the tool from the side of the controller
4. Press **“Start Test”** again
What happens this time?

5. Compare results - On the left is the system with the tool missing,
on the right is a healthy system.
6. Turn power off and reconnect the tool.
7. Turn power back on.

Discrete Inputs Screen

On the left side panel of the Insight controller are Spindle I/O (Input/Output) connectors. With this screen, the user can run a test to determine whether any of the required input signals are absent. Below is a typical *Discrete Input Test* screen graphic.

1. All input indicators refer to the inputs on the left side of the cabinet.
2. Inputs from the tool (throttle and reverse switch) are only indicated on this screen for QE-Series tools and not D-Series tools.



Screen Element	Function
Select Spindle	Use this drop box to select either Spindle 1, Spindle 2, or a Powerhead for testing. This drop box will not be present if your Insight is a one-spindle model.
Main Window	The spindle input signals are listed on the screen. If the input signal is present, the circle to the left of the signal will be filled-in. If no signal is present, the circle will be white. The spindle connector pin letter designation that corresponds to the signal input is also shown. Below is additional information on the input signals displayed in this window.
Message Box	The Message Box summarizes system status and provides warnings and alarms.

INSIGHT IC Inputs

CONFIG 1 and 2	Tell the Insight IC which configurations to run
CONFIG 3 thru 8*	Additional Configuration inputs
SPINDLE DISABLE	Disables the selected spindle (in 2-Line Enable/ Disable Mode only)
SPINDLE RE-ENABLE	Re-enables the selected spindle (must be held HIGH for 1-Line Enable/ Disable, but may be pulsed for 2-Line Enable/ Disable)
GANG RESET*	Resets the GANG COUNT to 0
CONFIG RESET*	Resets the Configuration # to the lowest configuration number
SAFETY LATCH*	This is the other "Free Speed" input when the Start Mode is set to "Dual". When both of these inputs are used, it works as a "2-Hand No-Tie-Down" circuit.
LIMIT SWITCH IN*	This works the same as the "Spindle Re-Enable" input and is for use with safety equipment such as a guard or a light curtain.
LIMIT SWITCH OUT*	This works the same as the "Spindle Disable" input and is for use with safety equipment such as a guard or a light curtain.
BYPASS SPINDLE*	Sets the indicated spindle to bypass in a POWERHEAD configuration
FREE SPEED	Allows the spindle to turn at the set FREE SPEED
SOFT START	Allows the spindle to turn at the set SOFT START speed
FORWARD	Sets the spindle to turn in the FORWARD direction
REVERSE	Sets the spindle to turn in the REVERSE direction
RESET OUTPUTS*	Resets all OUTPUTS to the non-active condition

* Extra I/O Systems Only

Grey denotes version 1.2.x software forward

Binary Input Configuration

Binary Configuration
Selection

0 = OFF 1 = ON

Insight IC with Extra I/O and Insight PFS Only
 Insight IC with Extra I/O Only

Insight IC with
Standard I/O

Configurations

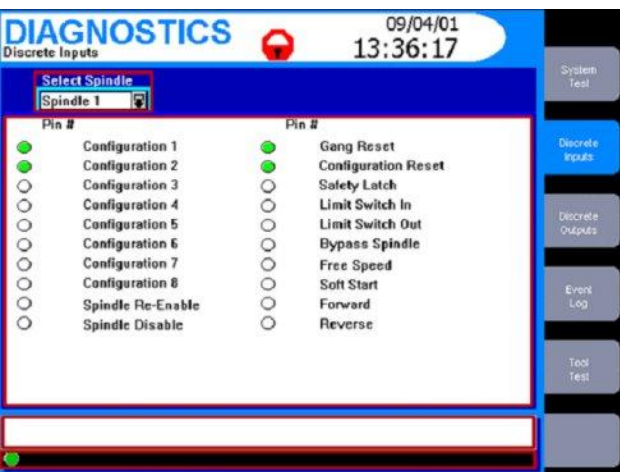
Insight IC with
Extra I/O (not
available for
PFS Graphics)

		Inputs				
		Config 1	Config 2	Config 3	Config 4	Config 5
Insight IC with Standard I/O	1	0	0	0	0	0
	2	1	0	0	0	0
	3	0	1	0	0	0
	4	1	1	0	0	0
	5	0	0	1	0	0
	6	1	0	1	0	0
	7	0	1	1	0	0
	8	1	1	1	0	0
	9	0	0	0	1	0
	10	1	0	0	1	0
	11	0	1	0	1	0
	12	1	1	0	1	0
	13	0	0	1	1	0
	14	1	0	1	1	0
	15	0	1	1	1	0
	16	1	1	1	1	0
	17	0	0	0	0	1
	18	1	0	0	0	1
	19	0	1	0	0	1
	20	1	1	0	0	1
Insight IC with Extra I/O (not available for PFS Graphics)	21	0	0	1	0	1
	22	1	0	1	0	1
	23	0	1	1	0	1
	24	1	1	1	0	1
	25	0	0	0	1	1
	26	1	0	0	1	1
	27	0	1	0	1	1
	28	1	1	0	1	1
	29	0	0	1	1	1
	30	1	0	1	1	1
	31	0	1	1	1	1
	32	1	1	1	1	1

Lesson objective: Upon completion of this lesson you will be able to control a tool through the I/O

Before you begin: Be certain to observe all safety precautions in the users manual and have the unit powered up and proper tool connected.

Lab



1. Turn the system power OFF

At the IC Controller

2. Connect the BLACK wire with WHITE stripes from the pigtail cable to the FREE SPEED input (I-5)
3. Connect the GREEN wire with WHITE stripes from the pigtail cable to the SOFT START input (I-6)
4. Connect the ORANGE wire with BLACK stripes from the pigtail cable to the FORWARD input (I-7)
5. Connect the WHITE wire with BLACK stripes from the pigtail cable to the REVERSE input (I-8)

At the I/O Trainer Box

6. Connect the BLACK wire with WHITE stripes from the pigtail cable to the FREE SPEED
7. Connect the GREEN wire with WHITE stripes from the pigtail cable to the SOFT START
8. Connect the ORANGE wire with BLACK stripes from the pigtail cable to the FORWARD
9. Connect the WHITE wire with BLACK stripes from the pigtail cable to the REVERSE
10. Turn the system power ON
11. Go to Diagnostics/ Discrete Inputs
12. Push the Free Speed Button.

What happens?

13. In Setup/ Spindle Initialization, set the tool to **"Machine Mount"** and choose **"External Discrete"** for the Configuration selection.
14. With the direction switch in **"Forward"**, press **"Free Speed"**.

What happens this time?

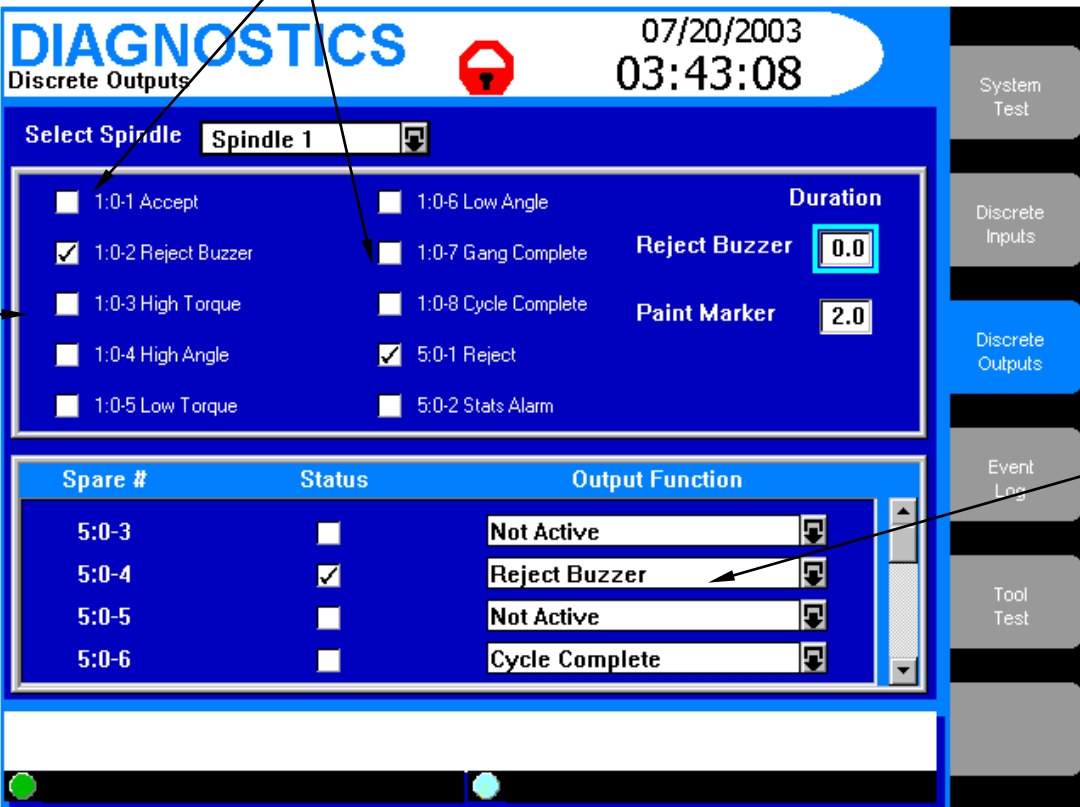
Discrete Outputs Screen

When you first select this screen, the system will ask you to enter in a spindle number.

Once the user enters this screen the spindle selected will be disabled and will not run until the user exits this screen or selects another spindle.

On the left side of the Insight controller are Spindle I/O (input/output) connectors. With this screen, you can artificially activate an output signal. This function is typically used for troubleshooting; for example, to send a signal to an external device (such as a PLC) to verify the device is operating correctly. To manually activate an output, check the checkbox next to the output name.

Check Boxes to Activate Outputs



Fixed Outputs

Programmed Spare Outputs

Spare #	Status	Output Function
5:0-3	<input type="checkbox"/>	Not Active
5:0-4	<input checked="" type="checkbox"/>	Reject Buzzer
5:0-5	<input type="checkbox"/>	Not Active
5:0-6	<input type="checkbox"/>	Cycle Complete

Variable Timer Outputs (Paint Marker and Reject Buzzer)

The variable timer is one of the features of the Insight IC. It is used to setup the programmable timer discrete outputs.

The timer can be set on the Diagnostics Menu-Discrete Outputs screen by entering the required timer value from 0.1seconds to 9.9 seconds. The output will remain “ON” until the timer expires for any value other than zero. The default value is zero and the timer is disabled.

INSIGHT IC Outputs

ACCEPT	HIGH when tightening sequence is "OK"
REJECT BUZZER*	HIGH, for 0.0-9.9sec when tightening sequence is not "OK"
HIGH TORQUE	HIGH when Torque value is above the HIGH TORQUE LIMIT
HIGH ANGLE	HIGH when Angle value is above the HIGH ANGLE LIMIT
LOW TORQUE	HIGH when Torque value is below the LOW TORQUE LIMIT
LOW ANGLE	HIGH when Angle value is below the LOW ANGLE LIMIT
GANG COMPLETE*	HIGH when # of "OK" tightenings=GANG COUNT, within a CYCLE
CYCLE COMPLETE	HIGH when either a "OK" or not "OK" tightening is completed
REJECT	HIGH when tightening sequence is not "OK"
STATS ALARM *	HIGH when one or more STATS ALARMS are outside limits
PROGRAMMABLE	(as defined by user) The following are programmable outputs:
Not Active	No output
Accept	As above
Reject	As above
Cycle Complete	As above
High Torque	As above
Low Torque	As above
High Angle	As above
Low Angle	As above
Gang Complete	As above
Not Active	No output
Accept	As above
Spindle in Bypass	Selected spindle is set to not run (bypassed) in POWERHEAD mode

PROGRAMMABLE OUTPUTS

(continued)

Reject Buzzer	HIGH, for 0.0-9.9sec when tightening sequence is not "OK"
Paint Marker	HIGH, for 0.0-9.9sec when tightening sequence is "OK"
In Cycle	HIGH when tightening sequence has started, but not completed
Stats Alarm	HIGH when one or more STATS ALARMS are outside limits
Powerhead Accept	HIGH when Powerhead tightening sequence is "OK"
Powerhead Reject	HIGH when Powerhead tightening sequence is not "OK"
Powerhead Cycle Complete	HIGH when Powerhead sequence is complete
Powerhead In Cycle	HIGH when Powerhead sequence has started, but not completed
Powerhead Paint Marker	HIGH, for 0.0-9.9sec when Powerhead sequence is "OK"
Powerhead Reject Buzzer	HIGH, for 0.0-9.9 sec when Powerhead sequence is not "OK"
System Ready	<p>The System Ready output is active when all of the following conditions are true:</p> <ul style="list-style-type: none"> • The RISC processor has successfully booted and downloaded all programmed parameters to the MCE • A tool is connected to the MCE and the MCE power board is powered • There are no system faults (See Below) • System not in cycle • System is ready to start next cycle
OR	
	<ul style="list-style-type: none"> • Spindle is in Bypass (Powerhead mode only)

Config Out 1 thru 8

When the controller receives a configuration input from either a bar code reader or internal selection, it shall send out the selected configuration via the "Config Out X" outputs.

The 16-position socket tray (PFS-SOCKET-16F) can be used to compare this selected configuration with the configuration selected by the user via the socket selection. If they match the "Correct Out" line from the socket tray is set high (this will be sent to the ENABLE input of the controller).

Lesson objective: Upon completion of this lesson you will be able to install and operate a Configurable Outputs

Before you begin: Be certain to observe all safety precautions in the users manual and have the unit powered up and proper tool connected.

Lab

1. Turn the system power OFF

At the IC Controller

2. Connect the RED wire with WHITE stripes from the pigtail cable to the extra output (O-8)

At the I/O Trainer Box

3. Connect the RED wire with WHITE stripes from the pigtail cable to EXTRA 2

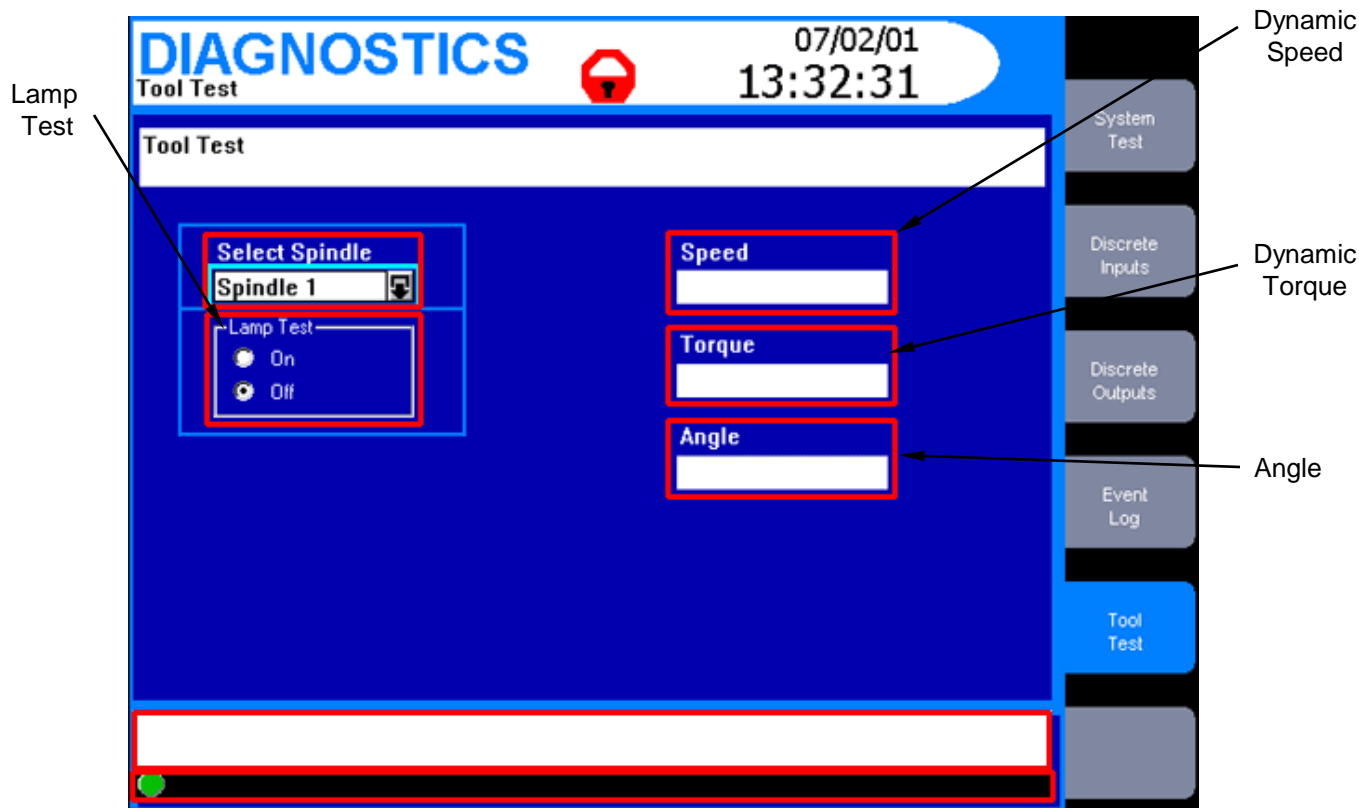
4. Turn the system power ON
5. Go to Diagnostics/ Discrete Outputs
6. Set the Reject Buzzer Duration to 1 second
7. Select "Reject Buzzer" from the pull-down menu for the Extra Output below.
8. Quickly check and un-check the box next to the extra output. What happens?



9. Cause the tool to fail by prematurely releasing the trigger during run-down.

What happens this time?

- When you first select this screen, the system will ask you to enter in a spindle number.
- Once the user enters this screen the spindle selected will be placed in a “Diagnostic Mode”.
- In the Diagnostic mode the spindle will not run any configuration selected, and will shut down if 20% of max tool torque is reached.



Screen Element	Function
Select Spindle	Use this drop box to select either Spindle 1, Spindle 2, or a Powerhead for testing. This drop box will not be present if your Insight is a one-spindle model.
Lamp Test (ON/OFF)	The Lamp Test will cycle through all of the lights on the “Result” section of the Insight IC front panel. It will also cycle through the lights on the tool. Yellow should match with yellow, red with red, etc.
Speed	This box shows the speed of the tool when the trigger is pulled.
Torque	This box shows the torque on the tool when the trigger is pulled.
Angle	This box shows the angle the tool rotates through after the trigger is pulled.

Various Networks

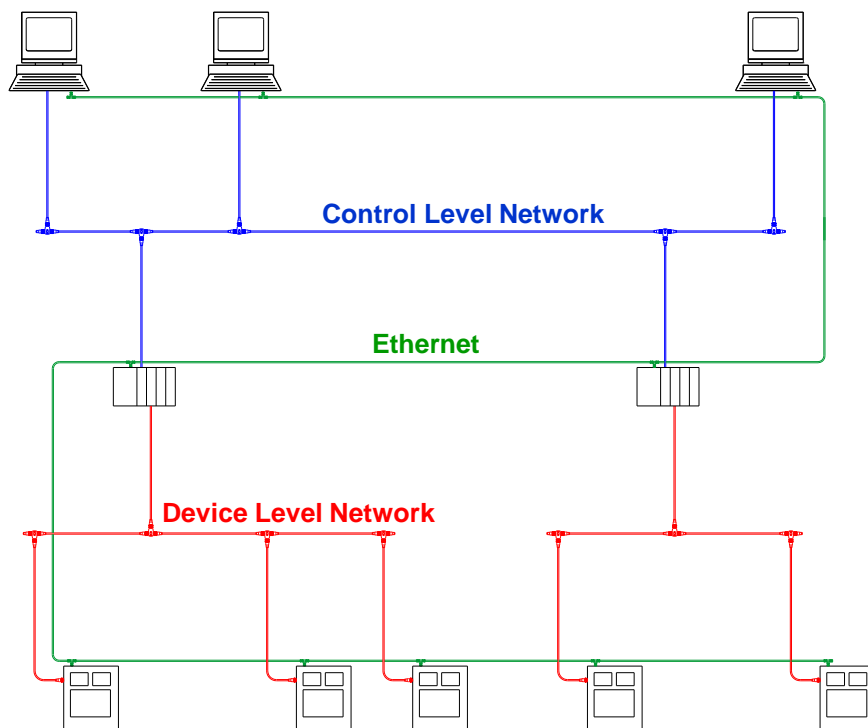
Supervisory PC's

Cell or Line Controllers

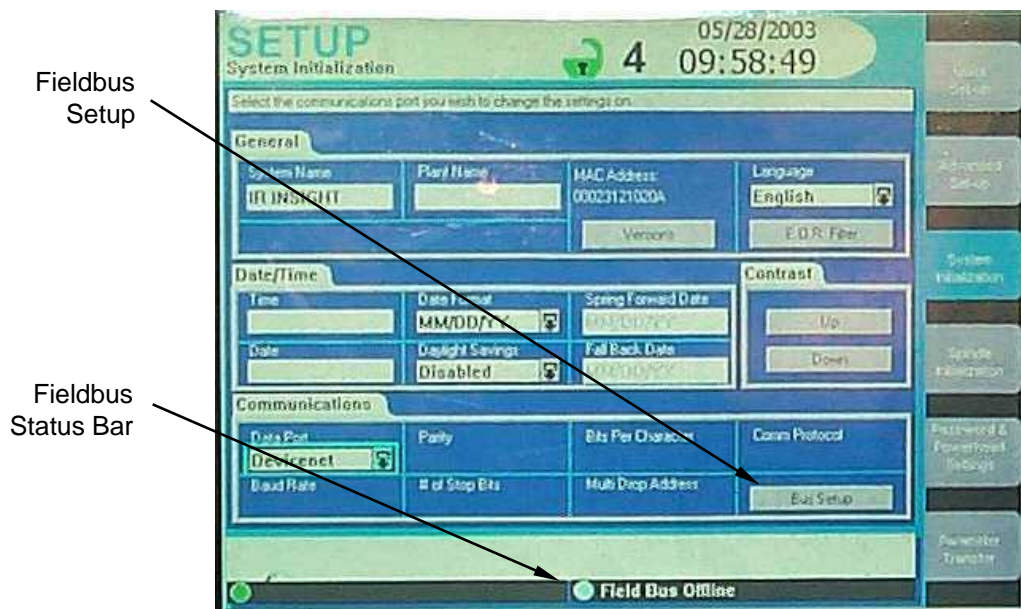
PLC or PC

Devices

AutoStream, Insight IC,
or Intelift

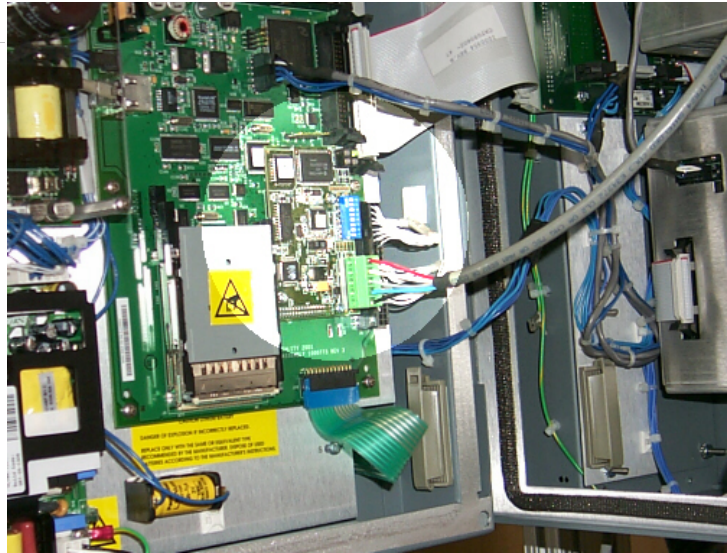


The Insight IC supports DeviceNet and Profibus on the Device Network Level. Because of Ingersoll-Rand's advanced interface, these device-level networks act more like a combination of device and control level networks.



Installing the "Anybus Card"

The "Anybus" Fieldbus card is attached to the RISC board with three screws. A cable connects the Fieldbus to the outside of the controller.



Setting Up DeviceNet or Profibus

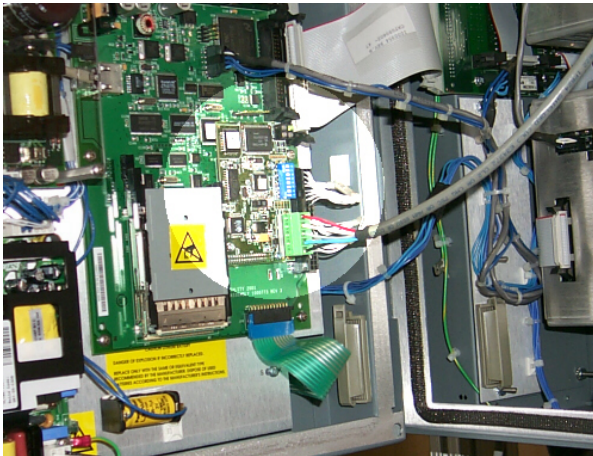
DeviceNet can be set up in the Setup/System Initialization Screen by choosing DeviceNet as the port and pressing the Fieldbus Setup key.



Operation	Selects whether or not the Fieldbus is to be used
Address	Each device on a network needs a different, unique address. This can be any number from 1 to 63.
Baud Rate	DeviceNet and Profibus can communicate at various speeds. The faster the communication, the shorter the network must be.
Tool Control	This is enabled if the control of the tool configurations and operation will be over the Fieldbus network.
EOR Data	If enabled, the system puts End-of-Run data on the network.
Barcode Source	The barcode can come from the network (DeviceNet/ Profibus), the COM port, or None.
Record Barcode	If enabled, the system puts serial number data on the network.

Lesson objective: Upon completion of this lesson you will be able to install and operate a Fieldbus interface to the IC

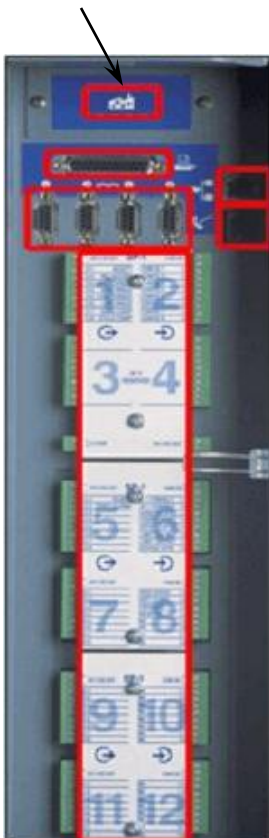
Before you begin: Be certain to observe all safety precautions in the users manual and have the unit powered up and proper tool connected.



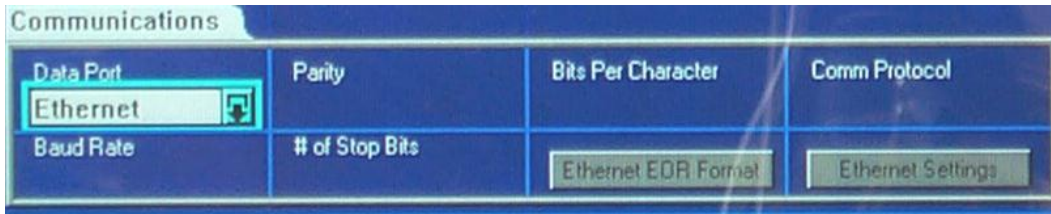
Lab

1. Install the "Anybus" DeviceNet card as shown onto the RISC board with the three screws provided
2. Set all of the DIP switches to ON
3. Plug the connector into the "Anybus" card
4. In Setup/ System Configuration, set up DeviceNet as shown
5. In "Barcode Setup", set the Barcode Length to 8.
6. Recycle power and communicate over DeviceNet using a laptop (see instructor)

Fieldbus panel



- In Order to Activate Ethernet:
 - An IP Address must be assigned
 - Monitoring software must be installed on a networked server
 - A 10Mbps Ethernet connection must be attached to the IC



The Communications window shows the following fields:

Data Port Ethernet	Parity	Bits Per Character	Comm Protocol
Baud Rate	# of Stop Bits	Ethernet EOR Format	Ethernet Settings

- Assigning an IP Address:

Desired Address

Subnet Mask

A valid Entry consists of four numbers from 0 to 255 separated by decimals.

	Actual	Desired
IP Address	192.168.4.2	192.168.4.2
Subnet Mask	255.255.255.0	255.255.255.0
Gateway	0.0.0.0	0.0.0.0
ICS Hosts Connected	0	

Buttons: Save, Cancel

- Ethernet EOR Data:

Entering zero will remove the field from the report. Entering a number will order the fields accordingly.

1	Cycle Number	0	Torque Units	0	Final Slope
2	Powerhead Cycle	11	Measured Angle	0	Torque at Seat
0	Powerhead Numb	12	Angle Result	0	Angle at Seat
3	Spindle Number	13	Shutdown Code	0	Min Drag Torque
4	Config Number	14	Peak Current	0	Peak Slope
5	Step Number	15	Cycle Time	0	Prevailing Torque
0	Step Strategy	0	Strategy	0	Peak Cut-in Torq.
6	Date	0	Torque High Limit	0	Peak Prevailing T
7	Time	0	Torque Low Limit	0	Avg Prevailing To
8	Overall Cycle Re	0	Angle High Limit	0	Peak Drag Torque
9	Measured Torque	0	Angle Low Limit	0	Avg Drag Torque
10	Torque Result	0	Control Point	0	Bar Code

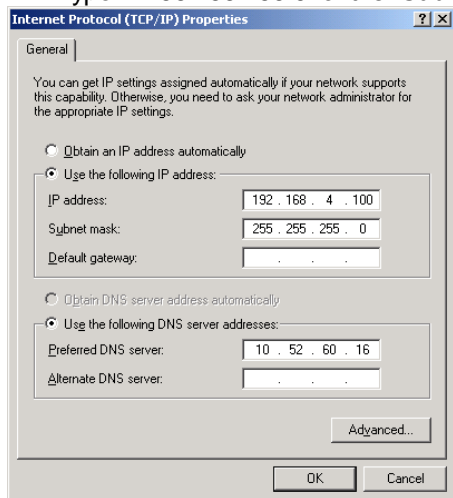
Buttons: OK, Cancel

Description:

This procedure shows how to load Insight IC software using FTP (File Transfer Protocol).

Setup Procedure:

1. From the “Start” menu select “Settings” then “Control Panel”
2. From the Control Panel double click “Network” icon.
3. In the “Configuration” tab, scroll down until you find “TCP/IP -> (your network card name that you will connect to the Insight-IC box).
4. Click “Properties” and you will get into another screen.
5. Click on “Specify an IP address”
6. Type in **192.168.4.100** for the “IP Address”
7. Type in **255.255.255.0** for the “Subnet Mask”



8. Click “OK”. Restart the computer if required.
9. Connect an RJ-45 Ethernet Crossover Cable from the PC to the Insight-IC box directly. If you are using a hub then use 2 RJ-45 Patch Cables.

Note: You can tell the difference between Ethernet Patch Cable and Crossover Cable by looking at the wire colors at the ends. Both ends of a Patch Cable will look the same, but some wires will be in different positions on a Crossover Cable.

Follow this next step if upgrading from 1.1.x to another version of 1.1.x, or from 1.2.x to another version of 1.2.x. Skip this step if there are no tightening programs loaded in the controller:

10. Save the Parameter/Configuration Data by using the SETUP SCREEN - PARAMETER TRANSFER - SAVE DATA buttons and select the device installed in the unit – PCMCIA Flash Card or Floppy Drive

Follow these next steps if upgrading from 1.1.x to a version of 1.2.x. Skip this step if there are no tightening programs loaded in the controller:

10. Print Parameter/Configuration Data to a PCMCIA card, printer, or floppy disk by going to RUN/VIEW PARAMETERS and pushing the green PRINT key. Choose Spindle #1 and choose *Parallel Port* if you have a printer connected, *Floppy Disk*, or *PCMCIA Flash Disk*.

Repeat this for Spindle #2 if this is a 2-Spindle IC.

Note: If the system does not currently have a PCMCIA card installed, you must power down, install the card, and power back up again.

11. Turn OFF power to the Insight unit.

12. Put a jumper on pins 5 and 6 of J15 located on RISC board.



13. Connect RJ-45 crossover Ethernet cable from PC to Insight unit.

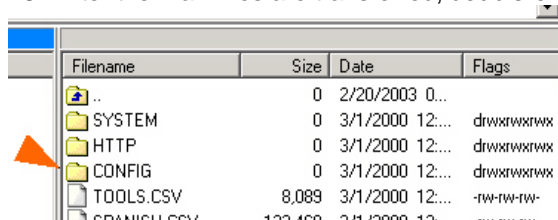
14. Run LeechFTP. Go to the to the correct software folder in the middle panel and double-click the 192.168.4.2 bookmark.

15. Turn ON power to the Insight Unit and wait until the connection is made and you see the folders on the Insight unit(about one minute).

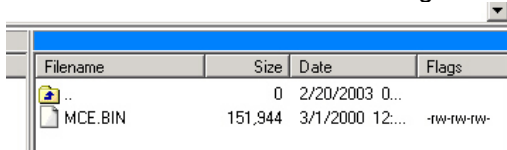
16. Move the jumper to pins 7 and 8 of J15 located on RISC board.

17. Highlight the file(s) you want to transfer and either click the UPLOAD icon.

18. After the main files are transferred, double-click on the “Config” directory on the Insight IC

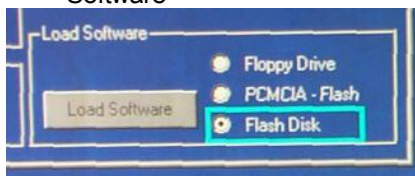


19. Transfer mce.bin into the "Config" directory (Verify that the file transferred by refreshing)



20. Remove the jumper and cycle power

21. In Setup/ Parameter Transfer, select "Flash Disk" ("FTP" in version 1.2.3) and select "Load Software"



22. Accept the loading of the mce.bin file (If the file transfer window stays on 0% for more than 5 seconds, hit the green "Enter" key and repeat the previous step.)
23. After the file has loaded and has been transferred to the MCE's, recycle power

Note: Version 1.2.3 will not automatically update MCE #2. Remove the CANBus connector from MCE #1 (lower MCE) and repeat steps 21 & 22 to update MCE #2.

Follow this next step if upgrading from 1.1.x to another version of 1.1.x, or from 1.2.x to another version of 1.2.x. Skip this step if there were no tightening programs loaded in the controller:

24. Reload the Parameter/Configuration Data by using the SETUP SCREEN - PARAMETER TRANSFER - LOAD DATA buttons and select the device installed in the unit – PCMCIA Flash Card or Floppy Drive

Follow these next steps if upgrading from 1.1.x to a version of 1.2.x. Skip this step if there were no tightening programs loaded in the controller:

24. Open the file called PRMDMP1.TXT and key in all the variables back into the SETUP/ SPINDLE INITIALIZATION, SETUP/ SYSTEM INITIALIZATION, and SETUP/ ADVANCED SETUP for Spindle #1.

Repeat this for the file called PRMDMP2.TXT for Spindle #2 if this is a 2-Spindle IC.

See AS 112403 JM for LeechFTP Setup Instructions

Lesson objective: Upon completion of this lesson you will be able to load software onto the Insight IC using FTP (Ethernet)

Before you begin: Be certain to observe all safety precautions in the users manual and have the unit powered up and proper tool connected.

Assuming that an FTP program such as "Leech FTP" is loaded onto the computer, these are the steps to follow to upload new software to the RISC board and MCE's:

Insight IC FTP Procedure

Save the Parameter/Configuration Data by using the SETUP SCREEN - PARAMETER TRANSFER - SAVE DATA buttons and select the device installed in the unit...

Turn OFF power to the Insight unit.

Put a jumper on pins 5 and 6 of J15 located on RISC board.



Connect RJ-45 crossover Ethernet cable from PC to Insight unit.

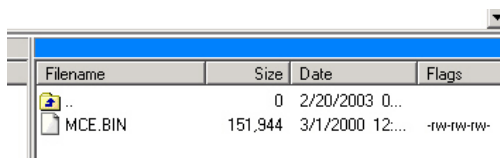
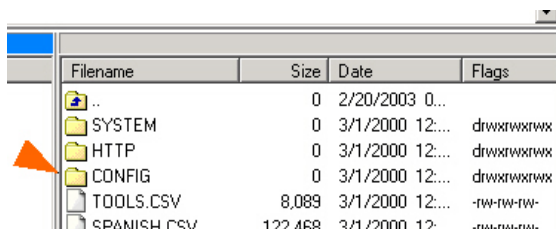
Have LeechFTP running, navigate to the correct software folder and double-click the 192.168.4.2 bookmark.

Turn ON power to the Insight Unit and wait until the connection is made and you see the folders on the Insight unit (about one minute).

Move the jumper to pins 7 and 8 of J15 located on RISC board.

Highlight the file(s) you want to transfer and either click the UPLOAD icon or drag the file(s) to the Insight unit window.

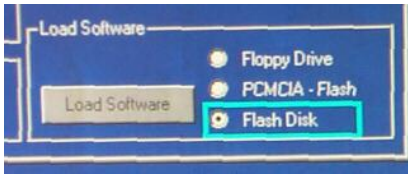
Double-click on the "Config" directory on the Insight IC



Transfer mce.bin into the "Config" directory (Verify that the file transferred by refreshing)

Remove the jumper and recycle power

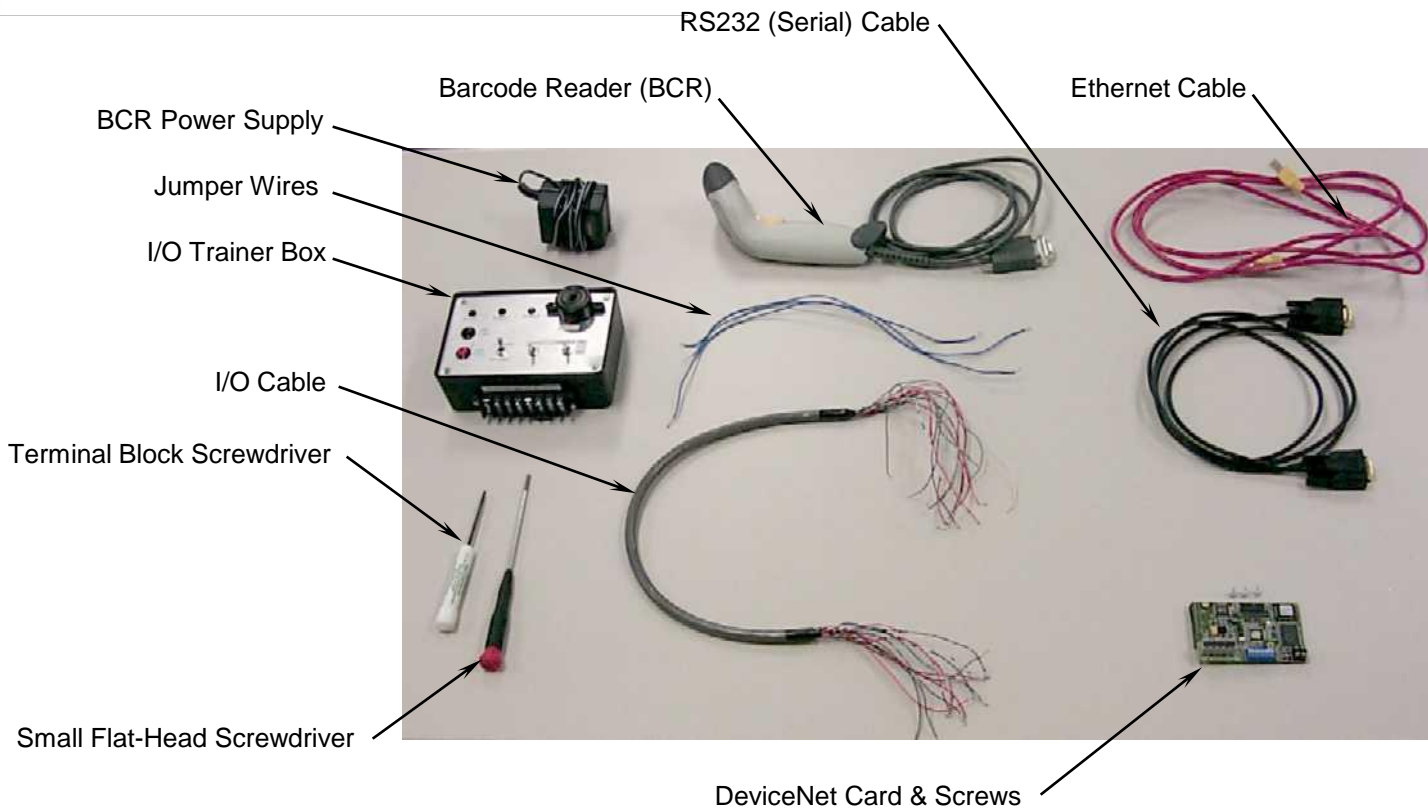
In Setup/ Parameter Transfer, select "Flash Disk" and select "Load Software"



Accept the loading of the mce.bin file (If the file transfer window stays on 0% for more than 5 seconds, hit the green "Enter" key and repeat the previous step)

After the file has loaded and has been transferred to the MCE's, recycle power

Reload the Parameter/Configuration Data saved in step 1 by using the Load Data button from the appropriate device.



I/O Trainer Front View



I/O Trainer IC Outputs



I/O Trainer IC Inputs