AcraDyne®
A Division of AIMCO

AcraDyne
iEC DC Tool Controllers
User Guide

AIMCO

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Introduction

Thank you for your purchase of an AcraDyne iEC DC Tool Controller from AIMCO. The iEC represents the most advanced controller for AcraDyne series electric controlled assembly tools and is capable interfacing with all series of AcraDyne tools.

This manual is designed to provide the user of the AcraDyne iEC Controller with a guide to understanding the features and functions of the controller. Programming this controller using AcraDyne's ToolWare software package provides a broad range of operating choices to tackle the most difficult assembly projects with ease. Statistical analysis, communication and system diagnostic features are also built in.

For more detailed programming, data analysis and system monitoring information please refer to the AcraDyne ToolWare Operations section at the back of this manual.

For additional service and support, please contact your AIMCO distributor or contact AIMCO at 1-800-852-1368 between the hours of 7:00 AM—4:00 PM Pacific Time.

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SAFETY REQUIREMENTS

READ AND SAVE THESE INSTRUCTIONS

WARNING!

Ensure that owner/operator has read all Safety Requirements and User Manuals prior to operating.

To avoid electric shock, which may result in personal injury and/or death, electrical supply must be meet the electrical requirements.

Do not operate power tools in explosive atmospheres, such as the presence of flammable liquids, gases or dust.

To avoid electric shock, which may result in personal injury and/or death, electrical connections must be properly grounded.

To avoid electric shock, which may result in personal injury and/or death, electrical wiring between the device, electrical supply and any peripheral equipment must be routed in a secure manner.

Switch device to the "OFF" position and disconnect from any power supply prior to servicing. Lock Out/Tag Out procedures should be followed.

To avoid electric shock, which may result in personal injury and/or death, cords should be kept from heat, sharp edges, or any other potentially hazardous conditions.

When operating a power tool outdoors, use an extension cord suitable for outdoor use.

Keep out of reach of children.

DANGER!

Contact with water, solvents, or other liquid substances may result in personal injury and/or death.

Do not operate equipment under the influence of drugs, alcohol or circumstances in which you are not fully alert.

Use safety equipment. Always wear eye protection.

Ensure the switch is in the off-position before plugging in.

Remove any adjusting key or wrench before turning the power tool on.

Do not wear loose clothing or jewelry. Keep hair, clothing and gloves away from moving parts.

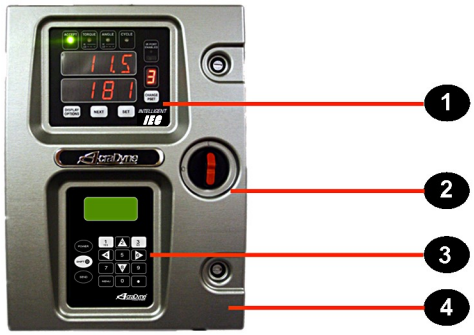
POWER TOOL USE AND CARE

Do not force the power tool. Use the correct power tool for your application.

Do not use the power tool if the power switch does not turn it on and off.

Front Panel

Figure 1



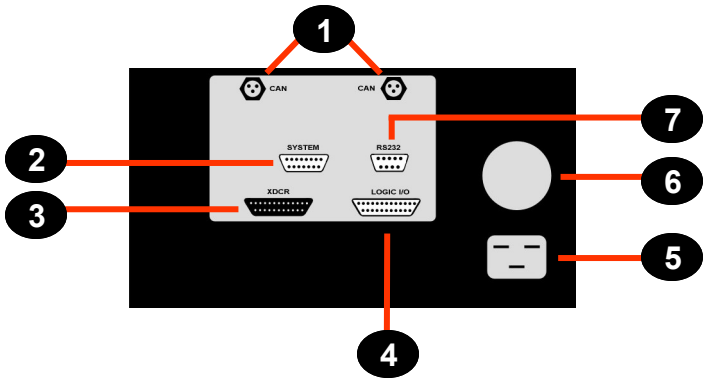
1—Main Display Panel—Annunciation and Display programming (see Page 5 for detail)

2— Power Disconnect Switch— Turns controller on and off

3—Keypad Display Module (KDM)—Onboard Interface for setup and programming (Optional)

Bottom Panel

Figure 2



1—CAN Connectors— For connection of AEC-CIM communication module and peripheral devices

2—System Connector (DB-15 Pin)— For upgrading / changing controller firmware

3—External transducer Connector (DB-25 Pin)— Non active, future feature

4— External I/O Connector (DB-25 Pin)— Input and output of signals for process control

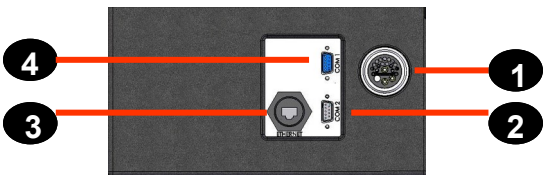
5—Power Cord Connection— IPC-29 Connector

6—Ethernet Connection Access / Light Tower Board Connection/ Bottom Exit Tool Connection (Optional)

7—RS232 Connection (DB-9 Pin)— Serial-data output for communication with peripherals such as bar code readers

Top Panel

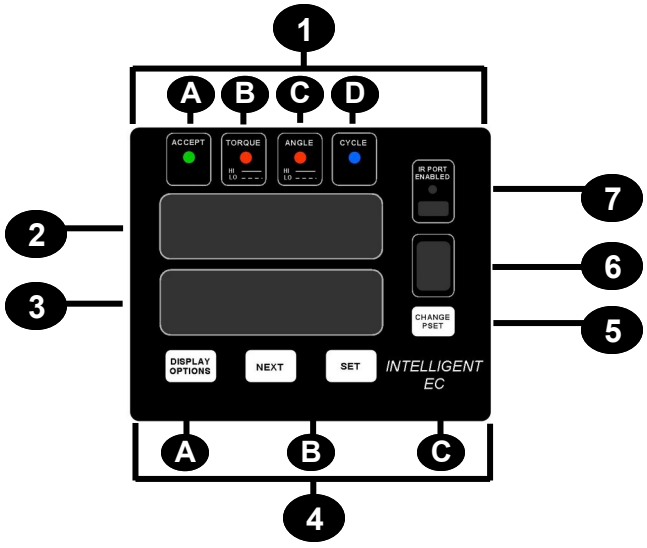
Figure 3



1—Tool Connector (26 Pin) —Standard connection point for tool cable
2—Serial data connection for peripherals
3—Ethernet connection port (2nd connection optional with advanced communication packages)
4—Serial data connection for peripherals

Main Display Panel

Figure 4



1—Rundown Feedback Indicators

A—ACCEPT— Green LED indicates OK rundown
B—TORQUE—Steady red indicates HI, flashing red indicates LO
C—ANGLE—Steady yellow indicates HI, flashing yellow indicates LO
D—CYCLE—Blue LED indicates tool is in rundown cycle

2—Primary Display Field—Displays Parameter Set Target or Rundown torque

3—Secondary Display Field—Selectable Display Choices (Angle etc…)

4—Programmable Display Selection Buttons

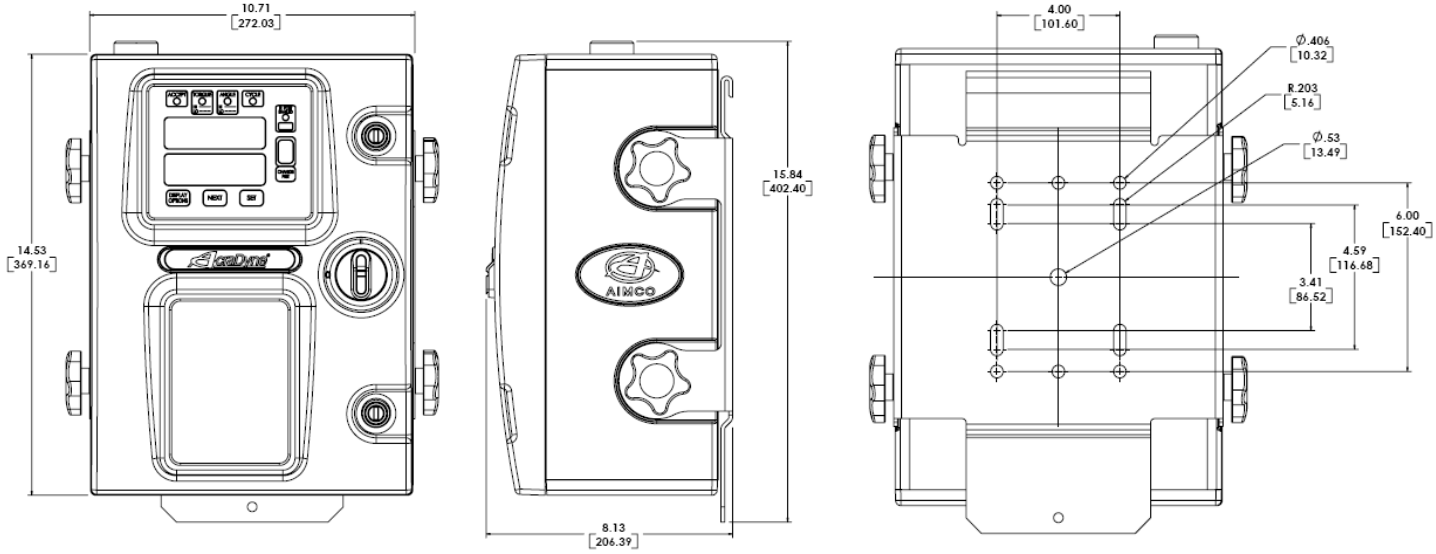
A—Optional Display Access—Accesses the Programmable Options menu
B—NEXT—Scrolls through the different display options for the Secondary Display
C—SET—Sets the selected display option in the Secondary Display

5—CHANGE PSET—Scrolls upwards through programmed Parameter Sets

6—PSET Indicator—displays PSET that is currently operating

7—IR PORT ENABLED—Future function, not currently enabled

Dimensions



Inches / Millimeters

INITIAL SETUP

Step 1

Connect the tool cable to the Tool Connection (Figure 3, pg. 4). The cable consists of a male pinset housed in a molded connection with a notch or a 26-Pin male connector with two opposing locating pins. Align the notch of the tool cable with the notch of the connector or the male and female locating-pins and insert the cable. Next, securely thread the connector cover to the controller body.

Step 2

Repeat the above process to connect the cable to the AcraDyne tool that will be used with the controller. AcraDyne pistol-style tools manufactured prior to January 2011 are hard–wired on the tool side and require no additional connection.

Step 3

Plug the female end of the power cable into the Power Cable connection (Figure 2, pg. 4).

Step 4

Plug the male end of the power cable into the appropriate power source.

Due to the variety of 220V power outlets worldwide, the standard power cable plug-end provided with the controller may need to be modified to connect to local 220V power outlets.

The iEC Controller is designed to work with either a 110V or 220V input supply. When operating a 3000 series tool on 120V, the maximum speed of the tool is ½ of its catalog speed. Since speed parameters are set as a percentage of maximum, the actual speeds of these tools run on 110V will be ½ of the speed run on 220V.

Step 5

Turn the controller on by rotating the Power Disconnect Switch (Figure 1, pg. 4), to the POWER ON position, represented by the | symbol.

When an iEC with SCC code 2.0 and higher is powered on, three messages will be shown on the display:

SYS INIT- indicates the system is initializing

IEC "#.##" - indicates the firmware version that is operating in the controller

SERVO FIRMWARE (A or B) — indicates the firmware of the controller's servo module

These messages are normal and will clear as the system finishes initializing.

INITIAL SETUP

If the controller is powered on without a tool connected the following message will be shown on the display:

AUT FLT 129

This message is normal and will clear once a tool is connected

Step 6

To turn the controller off, rotate the Power Disconnect Switch to the POWER OFF position, represented by the **0** symbol

To reboot the controller without turning off the Power Disconnect, press and hold the buttons simultaneously for 3 seconds.

NEXT + **SET**

Factory & Default Parameter Sets

Before the user programs the iEC controller for the first time, or after resetting the controller to factory default settings, one of three different groups of parameters may be present in the controller:

DEFAULT WITH NO TOOL CONNECTED—These parameters will start at 10 Nm and increase up to 80 Nm in increments of 10 Nm

DEFAULT WITH TOOL CONNECTED—This will create a group of 3 individual parameter sets, one each at 30%, 60% and 80% of the connected tools maximum torque capacity

TEST PARAMETER SETS—Because every AcraDyne iEC controller is tested before being shipped, some parameter sets that were used in this testing may be present in the controller.

If a parameter set is selected that has a target torque above the maximum capability of the tool, the following message will be shown on the display

EXT FLT 4096

This message will clear when an allowable parameter set is selected ***or*** when the out-of-range parameter set is reprogrammed to be within the capabilities of the tool.

Main Display Functions

Changing Parameter Sets

To change the parameter set that is active, press the **CHANGE PSET** button (Fig. 4) until the desired parameter set number is displayed.

With each separate press of the button the parameter set numeral will advance upwards through the highest parameter set that is programmed and then cycle back to parameter set #1. A maximum of 8 parameter sets can be programmed into the iEC controller.

The display for each type of strategy will vary. The main control parameter (Torque, Angle or both) will be displayed when the Parameter Set is selected. The different strategies will display as follows:

Example: PSET #2, Torque Control Strategy, 25 ft-lb Target

Example: PSET #3, Angle Control Strategy, 270 Degree Target

Example: PSET #4, Torque Control / Angle Control Strategy, 25 ft-lb Target, 270 Degree Target

Note: SCC Firmware Version 3.00 extends the number of parameter sets that can be programmed to 32. The extended parameter sets can be programmed via Toolware 3.0 or greater. For parameter sets 10 -32, the numeric Pset LED will flash the first digit, then the second followed by a pause. If any of the parameter sets are "Linked", the CHANGE PSET button will automatically skip to the first Pset of the Linked Pset group. (For information on Linked parameter sets, see the Setting Parameters section in the ToolWare portion of the user manual.)

Programming the Display Options

The Programmable Display Options feature in the iEC allows the user to select the information that will be displayed in the Secondary Display Field.

Step 1

Press the **DISPLAY OPTIONS** button (Fig. 4) to access the Display Options Menu.

Immediately a message will appear in the Primary Display Field (Fig. 4) that will indicate which display option is currently selected.

! If no rundowns have been conducted since the most recent Power-On of the controller, the Secondary Display Field will display the default information relating to the current display option.

If rundowns have been conducted since the controller was last Powered-On, then the Secondary Display Field will display the value for that option pertaining to the most recent rundown in the current parameter set.

Main Display Functions

Step 2

To scroll through the available display options, press and release the **NEXT** button. Repeated presses will cycle the display options as follows

DFLT > ANGL > BCNT > TOT > OK > NOK > CP > CPK > JTRT

The definition of each Display Option is as follows:

DFLT ***(Default)*** Field is blank if a Torque Control Strategy is programmed. For all other strategies the field will display the angle of rotation from Threshold to Final Torque

ANGL ***(Angle)*** If selected, field will display angle of rotation for the previous rundown, regardless of strategy for the parameter set

BCNT ***(Batch Count)*** Field will display the batch count information for the selected parameter set. Displayed values are current count ***(cc)*** and batch total ***(bt)***, with the information displayed as ***cc.bt.***

TOT ***(Total Count)*** Value shows the total number of rundowns for all parameter sets from midnight to midnight

OK ***(OK Count)*** Value shows the total number of ***acceptable*** rundowns for all parameter sets from midnight to midnight

NOK ***(NOT OK Count)*** Value shows the total number of ***unacceptable*** rundowns for all parameter sets from midnight to midnight

CP ***(Cp Value)*** Statistical value is Cp for selected parameter set based on collection of programmed-minimum number of rundowns. This value is reset upon controller initialization or new Parameter Set Download or Tool Change

CPK ***(Cpk Value)*** Statistical value is Cpk for selected parameter set based on collection of programmed-minimum number of rundowns. This value is reset upon controller initialization or new Parameter Set Download or Tool Change

JTRT ***(Joint Rate)*** Displays joint rate of selected Parameter Set based on previous rundown. The value is displayed in degrees of rotation from the Joint Rate Threshold (***not Parameter Set Threshold)*** to final torque. By default, the Joint Rate Threshold is 10% of target torque

Step 3

When the desired Display Option is selected, press the **SET** button (Fig. 4) to lock this option as the visible display. Once the SET button is pressed, the display screens will clear. Upon completing a rundown cycle, the value for the selected Display Option will be shown in the Secondary Display Field (Fig. 4).

! The selected Display Option will be displayed for *all* Parameter Sets.

Display Optional Values for Individual Rundowns

By scrolling through the Display Options after a rundown cycle, the value for each option can be quickly viewed.

Step 1

Immediately after a rundown cycle, the selected Display Option will be shown in the Secondary Display Field. To view a different Display Option value, press the **NEXT** button before conducting another rundown.

Step 2

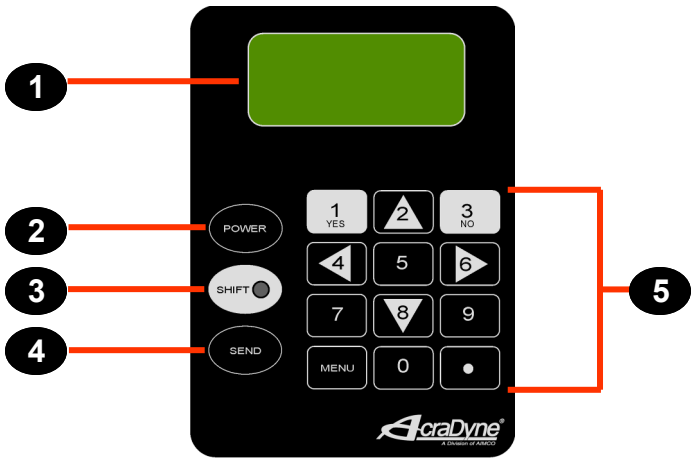
Continue to press the **NEXT** button to scroll though the available options. As each option is selected, the corresponding value will be displayed in the Secondary Display Field.

The Display Option that is last shown before another rundown is conducted will be set as the programmed display option.

!

To stop viewing the Display Option for the most recent rundown, simply conduct another rundown or press CHANGE PSET to select a different parameter set.

Using the Optional Keypad Display Module (KDM)



1—KDM Display Screen
2—KDM Power On / Off Button
3—Shift Button—used to access alternate functions on highlighted buttons
4—SEND Button—Used to send new or edited parameter sets to the tool and controller
5—Numerical / Alternate Function keypad

Parameter Set Terms

ANGLE CONTROL / TORQUE MONITOR—Control strategy in which angle is the control parameter, but torque is monitored.

ANGLE TARGET—Desired value for angle rotation; measured from threshold torque value.

AUTO-SET—Feature that allows manual entry of control parameters, but all others are determined by system defaults.

CYCLE COMPLETE—Torque level that determines the completion of a fastening cycle.

THRESHOLD—The torque value above which the system is, “in cycle” and data points are stored.

DOWNSHIFT TORQUE—Torque level at which the spindle changes from free speed to downshift speed.

ERGO MODE—Ramps the cut-off of power after reaching target torque, providing an ergonomic shutoff during a hand-held tightening operation. (*Can negatively effect cpk calculations*)

HI LIMIT—The upper control limit for torque and/or angle.

LO LIMIT—The lower control limit for torque and/or angle. Must be set lower than target parameter. Any torque/angle lower than this value will be indicated by a yellow light and with a Lo Torque and/or Low Angle error on KDM.

RPM FREE—Spindle output speed at the beginning of a tightening cycle, entered as a percentage of maximum tool speed.

RPM DOWN—Spindle output speed after exceeding downshift torque; entered as a percentage of maximum tool speed.

SSTART—(Soft Start) Speed of output spindle ramps up at a programmable rate to RPM free speed; allows the operator or system to engage the socket onto the fastener in a more controlled fashion.

TARGET TORQUE—Torque level which, when achieved, causes the power to the drive motor to be cut off.

TORQUE CONTROL—Control strategy in which torque is the only control parameter.

TORQUE CONTROL / ANGLE MONITOR—Control strategy in which torque is the control parameter, but rotational angle is monitored. A valuable strategy for controlling torque while also checking for cross threaded or stripped fasteners.

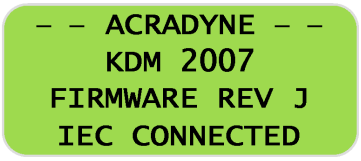
Using the Optional Keypad Display Module (KDM)

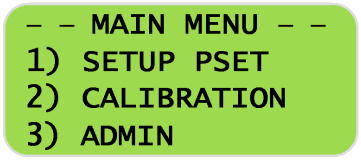
The Optional KDM allows for quick access to the IEC Control programming features. Not all features are accessible by use of the KDM. For access to higher level features (i.e..Batch Programming, Button Options, Linked PSet) please use a PC connected to the controller and the ToolWare software interface program.

Turning the KDM On

After turning on the iEC Controller (described in Initial Set-up, Pg. 6), press the **POWER** button on the KDM.

The following text will be shown on the KDM Display Screen:





Turning the KDM Off

1) Turning off the iEC Controller (detailed in Initial Set-up, Pg. 6)
2) Pressing the **POWER** button on the KDM for 2 seconds.

Note: The KDM does not support Psets above 8, Linked Psets, or Batch Control. These features are available via Toolware 3.0 or greater.

Main Menu: 1) Parameter Setup

Starting from the **Main Menu,** a variety of functions can be accessed through the KDM. Programming, calibration, controller set-up, security set-up, and error analysis can all be achieved through properly using the KDM. The following sections will detail the Menu Structure of the KDM and the various functions within each area.

Setting Up Parameter Sets

This section will detail how to set up parameter (PSETS) sets for assembly by using the KDM. There are two methods of programming a PSET—Quick Start or Configure.

QUICK START:

Quick Start Mode only requires the user to select the desired parameter set and target torque. All other values are set according to the system defaults (further explained in the ADMIN section—see Page 17).

CONFIGURE:

Configure Mode allows the operator to set up a new parameter set or edit all programmable operating functions for an existing parameter set.

Using the Optional Keypad Display Module (KDM)

Accessing Quick Start Parameter Sets

From the MAIN MENU, press **1** for **SETUP PSET**

Press **1** for **QUICK START**

The following text will be displayed on the KDM display screen:

```
  – QUICK START –

1–#) EDIT PSET
#) CONFIG PSET
```

Choose from **EDIT PSET** or **CONFIG PSET. See the following sections for instructions on editing or configuring Quick Start parameter sets.**

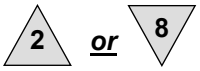
Editing Quick Start Parameter Sets

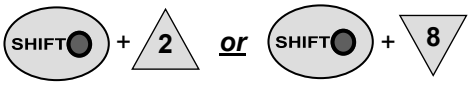
Depending on the number of Parameter Sets that have previously been programmed into the iEC Controller, the user will have the option of choosing from 1 to 8 parameter sets to edit.

Press the number of the Parameter Set that is to be edited. The following text will be displayed on the KDM display screen:

```
– QUICK START –
TORQUE:  ##.#
UNITS:LB-FT
            PS#
```

To change the target torque value in .1 unit increments press

To change the target torque value in 1.0 unit increments press 

After the target torque is entered correctly, press 

Verify that the correct parameter set is active by 

observing the **PSET Indicator** on the Main Display Panel. If the desired parameter set is not active, press **CHANGE PSET** to cycle through the available parameter sets until the appropriate set is displayed.

The tool is now ready to be run to the appropriate target torque value.

Using the Optional Keypad Display Module (KDM)

Configuring New Quick Start Parameter Sets

Depending on the number of Parameter Sets that have previously been programmed into the iEC Controller, the new parameter set will automatically be assigned a value from 2 through 8. Press the number on the KDM that corresponds to the number for the next parameter set to be configured. For example, if the following text were to be displayed in the Quick Start screen:

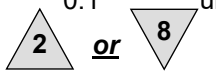
```
- QUICK START -

1-3) EDIT PSET
4) CONFIG PSET
```

the user would press **4** on the key- pad to configure a new Quick Start Pset.

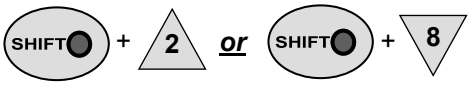
The following text will be displayed on the KDM display screen:

```
- QUICK START -
TORQUE:   ##.#
UNITS:XX-XX
          PS#
```

To change the target torque value in 0.1 unit increments press



To change the target torque value in 1.0 unit increments press



After the target torque is entered correctly, press

Verify that the correct parameter set is active by observing the PSET Indicator on the Main Display Panel. If the desired parameter set is not active, press **CHANGE PSET** to cycle through the available parameter sets until the appropriate set is displayed.

The tool is now ready to be run to the appropriate target torque value.

When exiting from Quick Start mode, all torque values are cleared from the KDM. Upon re-entering Quick Start mode, target torque values for all parameters will be set to the value determined by applying the default percentage to the tool that is connected to the controller.

Configuring a Complete Parameter Set

For a detailed explanation of each of the programmable functions within a parameter set see the list of key terms in **Parameter Set Terms** on page 11.

From the MAIN MENU, press **1** for **SETUP PSET**

Press **2** for **CONFIGURE**

The following text will be displayed on the KDM display screen:

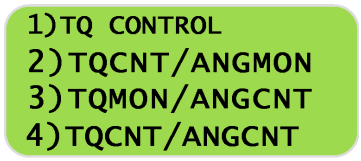
```
-CONFIGURE PSET-

1-#) EDIT PSET
#) CONFIG NEXT
```

Using the Optional Keypad Display Module (KDM)

Depending on the number of Parameter Sets that have previously been programmed into the iEC Controller, the user will have the option of choosing from 1 to 8 parameter sets to edit. If the user chooses to configure a new parameter, the next set will be assigned the next available PSet value, up to 8.

Press the button on the KDM corresponding to the PSET that will be edited or configured.

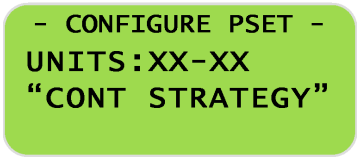
The following text will be displayed on the KDM display screen:



! If editing a parameter set, the Control Strategy (definitions on page 11) of the PSET will be identified by an asterisk.

Press the button on the KDM corresponding to the desired Control Strategy.

The following text will *briefly* be displayed on the KDM display screen:



followed by the following text:

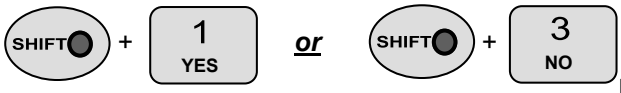
The **PS#** text in the bottom-right corner of the display is for the users reference and identifies the PSET that is being configured or edited.

Entering / Editing Values in the KDM

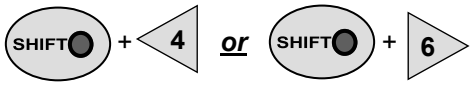
The flashing cursor highlights which field can be changed. Two possibilities exist for entering values into a field, depending on which function is being programmed:

For numeric values, press the appropriate key on the KDM.

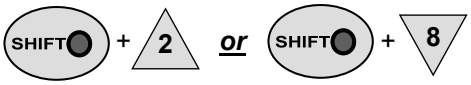
For **YES** or **NO** entries, press



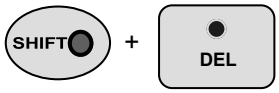
When an **<** and/or **>** symbol appears in the upper-right corner of the KDM display, this notifies the user that additional functions may be accessed by scrolling to the previous or next page of text. To scroll to one of these pages, press



Using the Optional Keypad Display Module (KDM)

To move to and modify the next or previous function, press 

The cursor will then highlight the field that can be modified.

To clear a mistakenly entered value, press 

When all functions have been modified appropriately, press 

Verify that the correct parameter set is active by observing the PSET Indicator on the Main Display Panel. If the desired parameter set is not active, press **CHANGE PSET** to cycle through the available parameter sets until the appropriate set is displayed.

The tool is now ready to be run to the appropriate target torque value.

The AUTO-SET function is under development for future versions of the iEC controller.

! If the user exits the CONFIGURE mode before pressing 

all edits and modifications that have been

! entered will be lost and the entries will revert back to the p value.

Main Menu: 2) Calibration

The Auto Cal is non functional for the user.

Using the Optional Keypad Display Module (KDM)

Main Menu: 3) Administration Functions

Parameter Set Defaults

Parameter set defaults are the values used to calculate control parameters when using either Quick Start or Auto Set. This is also the area where units of measurement for all parameters is set.

To access the Parameter Set Default function:

From the MAIN MENU, press **3** for **ADMIN**

Press **1** for **SETUP PSET**

The following text will be displayed on the KDM display screen:

Navigation and value-entry is the same as described in the section **Setting Up Parameter Sets** on pages 12—16.

All programmable default values are described below:

TQTARGET%: The default ***torque target*** shown when entering quick programming. The value entered is a percentage of the maximum torque of the tool. For example, if the value entered is 80 and the maximum torque of the tool is 30 Nm, the default target torque when entering quick programming will be 27.0 Nm.

TQ+/-%: The default percentage used for ***high and low torque limit***. The value entered is a percentage of target torque.

TQTHOLD%: The default ***torque threshold***. The value entered is a percentage of target torque.

TQDSHIFT%: The default setting for ***torque downshift*** point. The value entered is a percentage of target torque.

CYCCOMP%: The default setting for ***cycle complete*** torque. The value entered is a percentage of target torque.

RPMFREE%: The default setting for ***RPM free speed***. The value entered is a percentage of maximum output speed in revolutions per minute (RPM). 3000 series AcraDyne tools operating at 120V will run at 1/2 of the programmed speed.

RPMDOWN%: The default setting for spindle speed after crossing the downshift torque level. The value entered is a percentage of maximum output spindle speed in revolutions per minute (RPM).

UNITS: The default engineering units for operation. The KDM is only capable of using one engineering unit for all parameter sets. Changing the units in this section will affect all parameters sets.

Using the Optional Keypad Display Module (KDM)

Security

The security function allows the user to set up a password in order to prevent unauthorized persons from altering the programming of the iEC controller. Once the password function is activated, the user will be prompted to enter the correct password whenever attempting to navigate past the Main Menu.

! If the user changes the password and then loses or forgets the new password, the Factory Default password will still allow the user to access all menus and functions. Please call your AIMCO sales representative for assistance in entering the Factory Default Password.

To access the ADMIN SECURITY function:

From the MAIN MENU, press **3** for **ADMIN**

Press **2** for **SECURITY**

The following text will be displayed on the KDM display screen:

```
  -ADMIN SECURITY-
1) ENABLE PWORD
2) CHANGE PWORD
```

If the password function is already enabled, the text will read **1) DISABLE PWORD**

To activate the password function, press **1) ENABLE PWORD**

To enter a new password, press **2) CHANGE PWORD**

The following text will be displayed on the KDM display screen:

```
NEW PWORD:
```

Enter a 4-digit password. Once the four digits are entered, the user will automatically be prompted to confirm the password.

When the correct password is confirmed, the following text will *briefly* be displayed on the KDM display screen:

```
PASSWORD CORRECT
SAVING PASSWORD
PASSWORD: ####
```

Using the Optional Keypad Display Module (KDM)

Tool Information

This section of the ADMIN menu provides the user with useful information regarding the tool that is currently connected to the iEC controller. This information may be needed for reference when setting up parameter sets or calibrating the tool.

The items that can be viewed in TOOL INFO are:

ID: The serial number for the tool
Tq: The maximum torque rating of the tool, in the units that are selected in PSET DEFAULTS
Speed: The maximum output-spindle speed of the tool in revolutions per minute (RPM)
CAL: The scaled value that correlates the voltage signal of the transducer to a torque value

To access the ADMIN SECURITY function:

From the MAIN MENU, press **3** for **ADMIN**

Press **3** for **TOOL INFO**

Reset Factory Defaults

The **RESET DEFAULTS** menu allows the user to quickly reset the iEC Controller setting to the original factory default values.

The values that can be reset are:

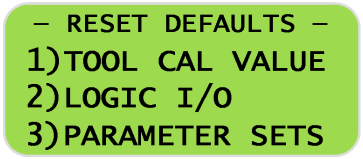
1) TOOL CAL VALUE
2) LOGIC I/O
3) PARAMETER SETS

To access the RESET DEFAULTS MENU:

From the MAIN MENU, press **3** for **ADMIN**

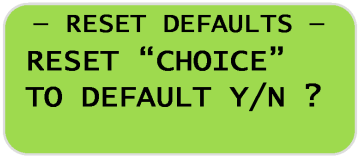
Press **4** for **RESET DEFAULTS** (this choice can also be viewed by scrolling to the next text page to view the additional ADMIN MENU options)

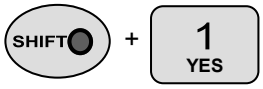
The following text will be displayed on the KDM display screen:

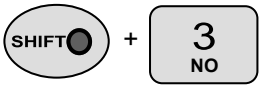
The user can then select the values 

to reset by pressing the corresponding number on the keypad.

The user will be prompted to confirm the desire to reset values with the following text:



To select Y and confirm the desire to reset the values, press 

To cancel the reset process, press 

Error Codes

By default, the iEC Controller only displays Error Codes in the Primary and Secondary Display Fields of the Main Display Panel (Figures 1 & 4). These errors will display automatically when recorded. Error codes are listed in Appendix A in this users guide. For additional information on Error Codes contact AcraDyne Technical Support or your AIMCO representative.

Filter Frequency

The Filter Frequency is non functional for the user.

Using the Optional Keypad Display Module (KDM)

Adaptive Control

ADAPTIVE CONTROL provides the user with a function to allow the iEC Controller to adapt to the joint dynamics of a particular application and to adjust the target torque accordingly in order to provide accurate and repeatable performance.

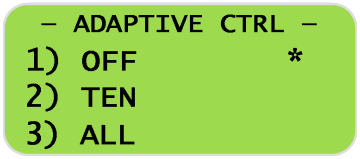
ADAPTIVE CONTROL works only in Torque Control or Torque Control / Angle Monitor Strategies.

The user may access the ADAPTIVE CONTROL function by following these steps:

From the MAIN MENU, press **3** for **ADMIN**

Press **7** for **ADAPTIVE CONTROL**

The following text will be displayed on the KDM display screen:



The currently active choice is noted by an asterisk to the right of the option.

The Factory Default setting for ADAPTIVE CONTROL is **1) OFF.**

To enable or disable ADAPTIVE CONTROL, press the number on the keypad corresponding to the desired choice.

There are two modes of operation for ADAPTIVE CONTROL:

Adapt To 10 Rundowns:

The Control Target Torque is adjusted by the difference between the mean of the first 10 rundowns and the hi/lo limit mean.

Adapt To All Rundowns:

The Control Target Torque is adjusted by a *percentage* of the difference between the mean of each consecutive 10 rundowns and the high/low limit mean. This percentage is programmable through advanced user access.

ADAPTIVE CONTROL should be used only in specific situations. Please contact AcraDyne Technical Support or your AIMCO representative for information on using and adjusting ADAPTIVE CONTROL.

!

Networking

The controller has several networking options available including Ethernet and hardwired field bus. All parameters pertaining to networking are configured in the web interface via its Ethernet.

Ethernet

Each Ethernet connection can be configured to communicate with most popular plant equipment including data collection servers, laptop software, and PLCs.
Ethernet ports by default are set to an IP address of 10.10.30.150 and need to be changed before being put into service.

To gain initial access to the controller:

- Configure a computer's Ethernet port to an IP address of 10.10.30.xxx. Do not set it to 10.10.30.150 that address is assigned to the controller. 10.10.30.99 works in most cases.
- Connect an Ethernet crossover cable from the computer to the controller.
- Launch the computers web browser. Type the controller IP address (10.10.30.150) into its address bar.
- Navigate to the communications page.
- Set the desired IP Address, IP Mask, and Gateway.
- Cycle power on the controller and connect it to the network.

Web Interface

The controller's web interface is available from any computer on that has access on the local network. To access the web interface launch a browser and type the controller IP address into its address bar.

From the interface you will have access to the controller's status, internal data files, and parameters. The pages do not automatically refresh but selecting refresh from the browser will reload the latest information from the controller. Data files will be standard ASCII text in CSV (comma separated variables) format that can be opened in Microsoft Excel and other programs.

On pages with parameters there will be a submit button to apply any changes. All parameters on the page are submitted when the button is hit. When submitted each parameter will get range checked against allowable limits. If a parameter is outside of its range it will be limited to its minimum or maximum value. When the page is redrawn the edit fields will contain each parameters final value.

Security

The web interface has an option to add a user password for security. A password is never required to view the web pages on the controller. It is only required to make a change to a parameter. If the controller password is not set (a zero length string) the user will not be prompted to enter a password for any changes. The controller is shipped from the factory without a password.

Networking

The security feature utilizes the authentication built into the browser. When a change to a parameter is made the controller checks the programmed password. If a password is required the controller will request it from the browser and in turn the browser will prompt the user. The browser will request a “User name” and “password”. Since the controller only contains one password (one user) the “User name” can be left blank. Once the password is entered it is returned to the controller were it will be checked and if it is correct the parameters are saved. If it is incorrect the controller will request it from the browser again.

After a password has been entered most browsers will cache it and return on subsequent request without prompting the user. So as long as the browser is not closed it would not be necessary to enter the password on every change to the parameters.

To remove a password from the controller it just needs to be set to a zero length string and saved via the submit button. Of course this action requires the existing password. If the password is lost or unknown contact your AIMCO representative for a method of retrieval.

FTP

The controller has the ability to provide an FTP server to allow the transfer of stored rundown data. For security reason it is turned off by default. Changing the setting to from off to on or on to off will not take effect till power is cycled on the controller. Once enabled the FTP server will allow anonymous logins. The only files available are the rundown results in CSV and TXT format. These can be transferred to the client and deleted. No other FTP server features are supported.

Toolsnet

The controller has the ability to send rundown data to a ToolsNet server. Once the controller is on the local network there are five parameters that must be set to store data correctly on the server.

1. **Server IP Address:** This is the IP address of the Toolsnet server. If the server is on another subnet you will also have to verify the gateway in the Ethernet settings.
2. **Server Port Number:** This is the TCP port the server is listening on for a new connection. The default for this is 6547 but it should be verified with the local Toolsnet server administrator.
3. **Station Id:** This is used to identify the data in the Toolsnet database. Work with your local Toolsnet server administrator to set this correctly.
4. **System Number:** This is used to identify the data in the Toolsnet database. Work with your local Toolsnet server administrator to set this correctly.
5. **Station Number:** This is used to identify the data in the Toolsnet database. Work with your local Toolsnet server administrator to set this correctly.

PFCS

The controller has the ability to communicate over the Chrysler PFCS protocol over Ethernet or one of the serial ports. Once the controller is connect to the desired network there are several parameters used to configure it’s behavior on the PFCS network.

1. **Server IP Address:** This is the IP address of the PFCS server. If the server is on another subnet you will also have to verify the gateway in the Ethernet settings. This parameter is not used for a serial connection to PFCS.
2. **Server Port Number:** This is the TCP port the server is listening on for a new connection. This parameter is not used for a serial connection to PFCS.
3. **Ack Time Out (sec):** The amount of time the controller will wait for an acknowledge from the PFCS server.
4. **No. Retries:** The number of times the controller will retry a message if it is not answered by the PFCS server.
5. **Reconnect Time Out (sec):** The amount of time the controller will wait before attempting to reconnect to the PFCS server.
6. **Connection Inactivity Time (sec):** The amount of time the controller will wait before send a keep alive message.
7. **Auto Machine Id:** If set to a 1 the controller will request a machine ID from PFCS. If it is a 0 it will use the programmed one from each parameter set.

Networking

Open Protocol

The controller has the ability to accept an “Open” protocol connection. This connection is available over Ethernet and/or the standard serial ports. Through this connection you can enable/disable the tool, set the active parameter set, collect rundown data, and much more.

1. **Port Number:** The TCP port number the controller listens on to accept an Open protocol connection via Ethernet. The default port is 4545 but can be changed if required.
2. **Cable Loss Detection:** Only used for a serial Open protocol connection. If set to 1 the controller will close the connection on a time-out. If it is set to 0 the controller will not close the connection. See the latest Open protocol specification for details on time-outs and keep alive messages.
3. **Cell ID:** Optional variable that is passed through the Open protocol connection.
4. **Channel ID:** Optional variable that is passed through the Open protocol connection.
5. **Controller Name:** Optional variable that is passed through the Open protocol connection.

To set up a serial port for Open protocol set the function on the desired COM port to “Open Protocol” and cycle the power on the controller.

Networking

The Controller supports the following MIDs. See the latest Open protocol specification for details on each MID.

MID	Description	Note
0001	Communication start	
0003	Communication stop	
0010	Parameter set numbers upload request	
0012	Parameter set data upload request	
0013	Parameter set data upload reply	
0018	Select Parameter set	
0020	Reset Parameter set batch size	
0040	Upload tool data	Rev 1 and 2 supported
0042	Disable tool	
0043	Enable tool	
0050	Vehicle Id Number download request	
0051	Vehicle Id Number upload subscribe	
0054	Vehicle Id Number upload unsubscribe	
0060	Last tightening result data subscribe	Rev 1-2 and 999 supported
0063	Last tightening result data unsubscribe	
0070	Alarm subscribe	
0073	Alarm Unsubscribe	
0080	Read time upload request	
0082	Set Time in the Torque Controller	
0150	Identifier download request	
214-215	IO device status messages	
216-219	Relay function subscription	Relays 1 ,2, 5-8, 11, 19-22, 24 only
220-223	Digital In function subscription	Input 1, 3, 8, 9, 16-18, 53 only
9999	Keep alive message	

Networking

Chrysler PFCS

The controller has the ability to connect to the Chrysler PFCS network. Once the controller is on the local network there are several parameters that must be set to work correctly.

1. **Server IP Address:** This is the IP address of the Chrysler server. If the server is on another subnet you will also have to verify the gateway in the Ethernet settings.
2. **Server Port Number:** This is the TCP port the server is listening on for a new connection.
3. **Ack Time Out:** This is the amount of time the controller will wait for an acknowledge message from the server. The default is 3 seconds.
4. **No. Retries:** The number of retries the controller will attempt before disconnecting. The default value is 3.
5. **Reconnect Time Out:** The amount of time the controller will wait before attempting to re-connect to the server. The default value is 20 seconds.
6. **Connection Inactivity Time:** The amount of time the controller will wait between connection attempts. The default value is 120 seconds.
7. **Auto Machine Id:** If set to “Yes” (default) the machine ID will be provided by the Chrysler PFCS server upon connection. If set to “No” the machine ID is entered per parameter set on the “Advanced” tab on the web interface. This will result in each parameter set having its own ID.

Networking

AIMCO Database

The controller has the ability to send rundown data to an AIMCO data collection server. Once the controller is on the local network there are two parameters that must be set to store data correctly on the server.

1. **Server IP Address:** This is the IP address of the AIMCO data collection server. If the server is on another subnet you will also have to verify the gateway in the Ethernet settings.
2. **Server Port Number:** This is the TCP port the server is listening on for a new connection. See your local AIMCO data collection server administrator for the correct port number.

Networking

Modbus TCP
The controller will accept a connection from a Modbus TCP master.

Controller Outputs
The Controller's outputs are located at address 0 and contain one status word.

	Controller Outputs															
	Bits															
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Address 0	Handshake			Job Complete			Healthy	Running	Process number							

Bit	Name	Function
0-7	Process Number	Process number echo. Latched while it is in a job.
8	Running	Indicates the tool is running.
9	Healthy	Indicates the controller has no faults.
10	Not used	
11	Not used	
12	Job Complete	Indicates the job is complete. Will go off when Enable input goes off.
13	Not used	
14	Not used	
15	Handshake	Echo of the Handshake input

Controller Inputs
The Controller inputs are located at address 1024 and 1036. Address 1024 contains one control word and 1036 contains the 20 character VIN.

	Controller Inputs															
	Bits															
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Address 1024	Handshake						Abort	Enable	Process number							

Bit	name	Function
0-7	Process Number	Process number input. The enable must be off to change the Process Number. On a change to the Process Number the batch is also reset.
8	Enable	On the rising edge of Enable the tool will be enabled.
9	Abort	If Abort is on the tool will be disabled.
10	Not used	
11	Not used	
12	Not used	
13	Not used	
14	Not used	
15	Handshake	Will be echoed to the Handshake output

Networking

Profibus/DeviceNET

The controller can have an optional Profibus or DeviceNET interface. These interfaces are accomplished through the use of a serial bridge. The serial bridge is provided by MKS Instruments, Inc . See the latest MKS documentation for details on sending and receiving messages.

Logical I/O

The controller has five status bytes of outputs.

		Controller Outputs							
		Bit							
		7	6	5	4	3	2	1	0
Byte	0							Tool Ready	Tool Enable
	1				Bypass	Batch Complete	Msg Received	Status NOK	Status OK
	2								
	3		Buzz Slow	Buzz Fast	Red	Yellow	Green	Blue	White
	4			Pause	Red Flashing	Yellow Flashing	Green Flashing	Blue Flashing	White Flashing

Byte	Bit	Name	Function
0	0	Tool Enable	The enabled state of the tool.
	1	Tool Ready	On if the tool is ready to run. Will be off if tool is disabled or there is a fault on the controller.
	2-7	Not used	
1	0	Status OK	Rundown status on for an accept. This bit is timed and will be on for ½ second.
	1	Status NOK	Rundown status on for a reject. This bit is timed and will be on for ½ second.
	2	Msg Received	On to indicate a message has been received from the MKS module and the inputs have changed. This bit is timed and will be on for ½ second.
	3	Batch Complete	Indicates the batch is complete. Will go off when batch is reset or when the tool enable is turned off.
	4	Bypass	State of the bypass input.
	5-7	Not used	
2	0-7	Not used	
3	0-6	Light Tower Status	Bitwise status of the Light Tower lights.
	7	Not used	
4	0-5	Light Tower Status	Bitwise status of the Light Tower lights.
	6-7	Not used	

		Controller Inputs							
		Bit							
		7	6	5	4	3	2	1	0
Byte	0					PSET			
	1		PLC Enable	White Flash	Pause				Tool Enable
	2-11	Sequence Number							
	12-31	Serial Number							

Byte	Bit	Name	Function
0	0-7	PSET	Set the active parameter set of 1-32. If 0 the active parameter set is left unchanged.
1	0	Tool Enable	If PLC Enable is 0 this input is ignored. If PLC Enable is 1 this bit can be used to enable or disable the tool.
	1-3	Not used	
	4	Pause	Setting Pause to 1 cause the light stack to strobe. Setting it to 0 put the light stack back into its normal operation.
	5	White Flash	Setting White Flash to 1 cause the light stack to flash the white light. Setting it to 0 put the light stack back into its normal operation.
	6	PLC Enable	Setting PLC Enable to 1 allows the Tool Enable bit. Setting it to 0 disables the Tool Enable function.
	7	Not used	
2-11	0-7	Sequence Number	10 character Sequence Number.
12-31	0-7	Serial Number	20 character Serial Number.

Ethernet/IP

The controller will accept a connection from an Ethernet/IP master. The controller has two connection assemblies. One for the controller's output image (Assembly Instance 100). The default size of this is 34 bytes. If fastening results are not included then the size is 2 bytes. And one for the controller's input image (Assembly Instance 112) with a size of 32 bytes.

Logic I/O

The controller has two status bytes of outputs (Assembly instance 100).

		Controller Outputs							
		Bit							
		7	6	5	4	3	2	1	0
Byte	0							Tool Ready	Tool Enable
	1				Bypass	Batch Complete		Status NOK	Status OK

Networking

Optionally the controller can include the fastening results in the output image. Including the fastening results increases the output size to thirty four bytes of data.

		Controller Outputs							
		Bit							
		7	6	5	4	3	2	1	0
Byte	0							Tool Ready	Tool Enable
	1				Bypass	Batch Com-plete		Status NOK	Status OK
	2-5	Final Torque (Real)							
	6-9	Torque Low Limit (Real)							
	10-13	Torque Target (Real)							
	14-17	Torque High Limit (Real)							
	18-21	Final Angle (Real)							
	22-25	Angle Low Limit (Real)							
	26-29	Angle Target (Real)							
	30-33	Angle High Limit (Real)							

Each value will be sent as a real (IEEE 754 float) and can be configured as little or big endian to match the receiving equipment.

Byte	Bit	Name	Function
0	0	Tool Enable	The enabled state of the tool.
	1	Tool Ready	On if the tool is ready to run. Will be off if tool is disabled or there is a fault on the controller.
	2-7	Not used	
1	0	Status OK	Rundown status on for an accept. This bit is timed and will be on for ½ sec-ond.
	1	Status NOK	Rundown status on for a reject. This bit is timed and will be on for ½ sec-ond.
	2	Not used	
	3	Batch Complete	Indicates the batch is complete. Will go off when batch is reset or when the tool enable is turned off.
	4	Bypass	State of the bypass input.
	5-7	Not used	

Networking

The reading of the results data should be done at the rising edge of the “Status OK” and “Status NOK”. This will insure the correct results are captured consistently. All the results are zeroed after the “Status OK” and “Status NOK” are turned off.

The controller consumes thirty two bytes of inputs (Assembly instance 112).

		Controller Inputs							
		Bit							
		7	6	5	4	3	2	1	0
Byte	0	PSET							
	1		PLC Enable	White Flash	Pause				Tool Enable
	2-11	Sequence Number							
	12-31	Serial Number							

Byte	Bit	Name	Function
0	0-7	PSET	Set the active parameter set of 1-32. If 0 the active parameter set is left un-changed.
1	0	Tool Enable	If PLC Enable is 0 this input is ignored. If PLC Enable is 1 this bit can be used to enable or disable the tool.
	1-3	Not used	
	4	Pause	Setting Pause to 1 cause the light stack to strobe. Setting it to 0 put the light stack back into its normal operation.
	5	White Flash	Setting White Flash to 1 cause the light stack to flash the white light. Setting it to 0 put the light stack back into its normal operation.
	6	PLC Enable	Setting PLC Enable to 1 allows the Tool Enable bit. Setting it to 0 disables the Tool Enable function.
	7	Not used	
2-11	0-7	Sequence Number	10 character Sequence Number.
12-31	0-7	Serial Number	20 character Serial Number.

Error Proofing

Barcode Reader

The max length of a barcode is 20 characters if it is longer the leading characters will be lost and the last 20 will be used. Since barcode readers send their characters in burst there is no need to program in a length. The software just waits for the reader to stop sending. Once the barcode is read the results are stored as the VIN.

Barcode Options

When a good barcode is received it can optionally reset the batch and/or enable the tool. A good barcode is determined by the VIN Pattern Matching option. If the barcode matches one of the parameter sets VIN matching patterns it will be considered a good read.

Reset Batch on Good Barcode scan
If enabled, controller will reset the batch count on a good barcode scan.

Enable Tool on Good Barcode scan
If enabled, controller will enable the tool on a good barcode scan.

VIN Pattern Matching

All new VINs from barcode readers, Profibus, DeviceNET, Ethernet/IP or protocols are checked against for a VIN match against each PSET (starting from #1 and through #8). If a match is found the PSET is changed. In order to qualify as a match the received barcode must be at least as long as the match string. The match string can contain "don't care" characters ('.') as a wild card. In the example below a barcode of "Abc123" selects PSET #1, "abc567" selects PSET #2, "def" selects PSET #4, "ABc" selects PSET #5, and "AB" does nothing.

Pset	Process Number	VIN Match	Machine ID
1	1	Abc	TM01
2	2	abc	TM02
3	3	DEF	TM03
4	4	def	TM04
5	5	..c	TM05
6	6		TM06
7	7		TM07

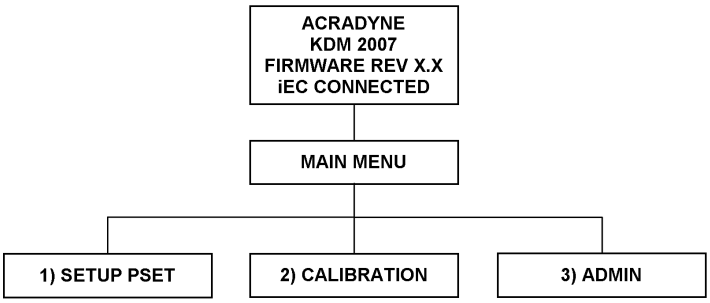
APPENDIX A: Error Codes & Descriptions

Error Code #	Fault	Description
AUT1		
1	TID Timeout	Tool ID board communication timeout
32	Tool GND	Ground circuit problem between controller and tool
64	Power On Throttle	RUN command on during power up
128	Button Timeout	Button (run, fwd, rev) communication timeout
256	Button State	Illegal button state (example fwd and rev)
512	Undefined Voltage	Tool voltage parameter undefined
2048	Tool Update Req'd.	Tool parameter file is not compatible with controller version
4096	Illegal Tool	Tool type is not compatible with controller
CYC1		
1	Free Run Timeout	Tool has run below threshold level with no load for 5+ seconds
2	Load Run Timeout	Tool has run above threshold level for 15+ seconds
4	Hall Error	Motor communication signal error
8	Tool Offset	Tool cannot reach target torque due to transducer error
64	Tool Level	Tool transducer output beyond electrical limits
512	Locked Rotor	Motor has stalled for 100+ milliseconds
1024	Drive Fault	Motor drive shut down or not responding
EXT1		
1	PSet Value	Illegal parameter set value
8	TID Param Value	Tool ID board communication error
32	TID Param Timeout	Tool ID board communication error
4096	Target Value Fault	Torque target out of range of tool capabilities
EXT2		
1	TID EE Write	Communication timeout while writing to tool memory
2	Drive Comm	Communication timeout reading / writing to motor drive
4	Vbus	Measured controller voltage is not within required limits
8	Drive Update Req	Drive firmware not compatible with low speed control

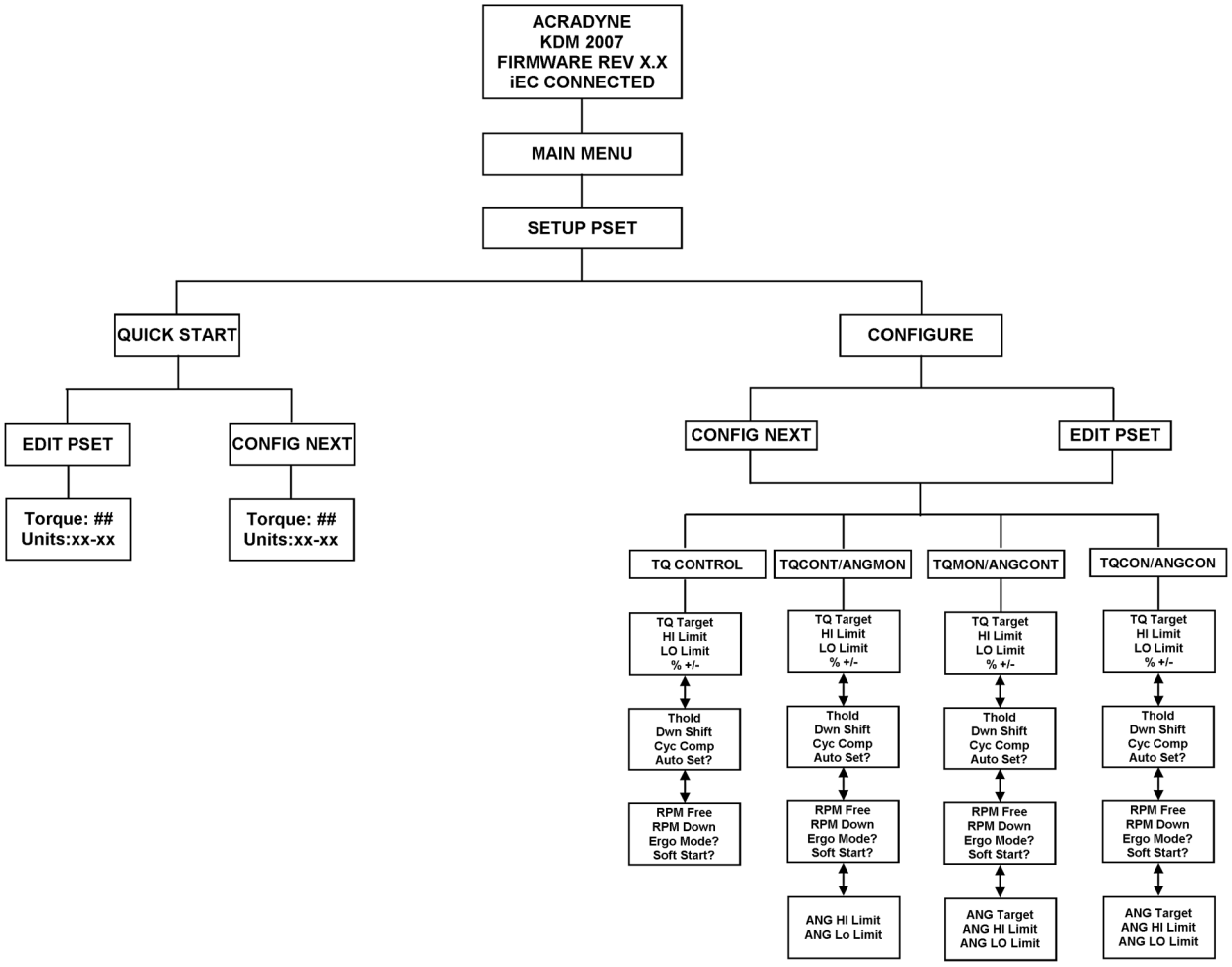
NOTE—Multiple Error Codes will be displayed as the sum of each error code number indicated in the table above; for example, AUT1: 129 represents AUT1: 128 and AUT1: 1, which would be a tool ID board timeout and a button timeout

Appendix B: KDM Menu Structures

Main Menu Structure

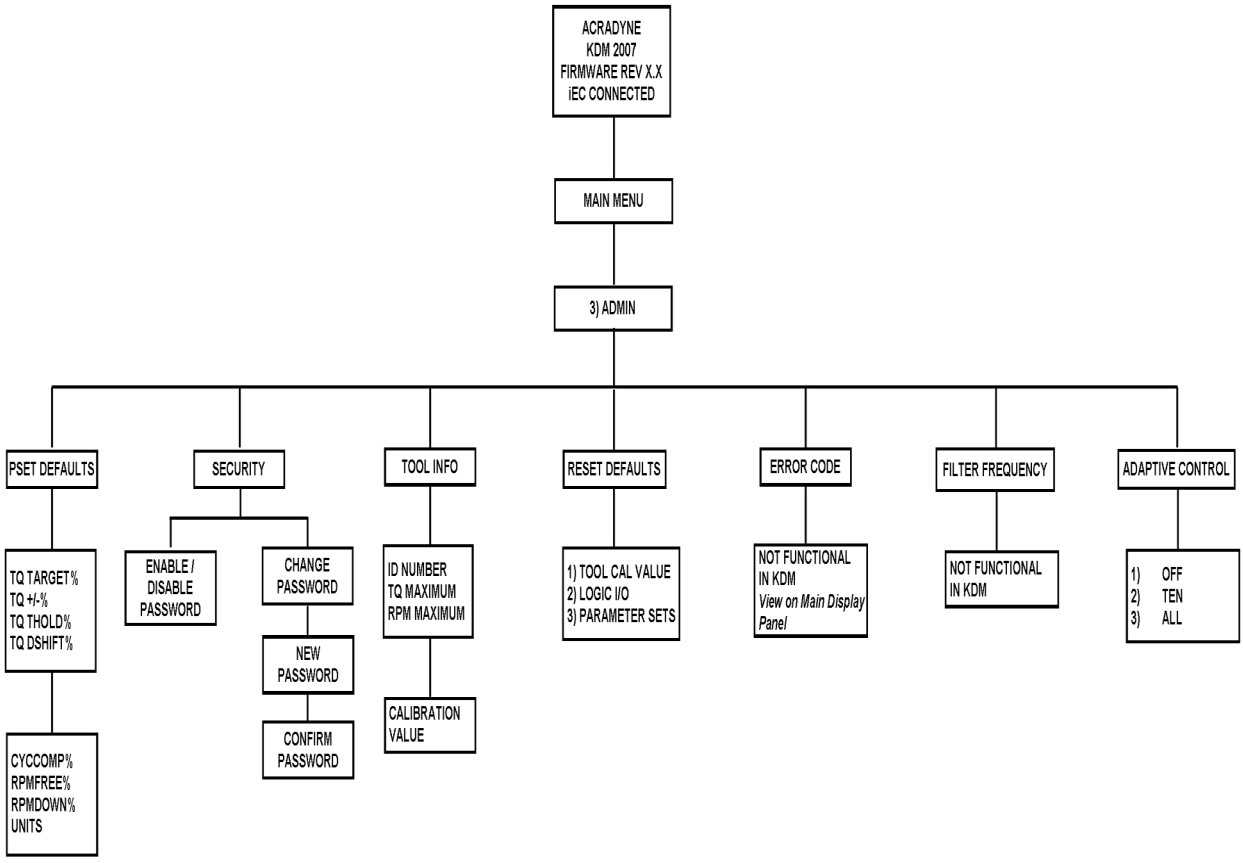


Parameter Set-up Menu



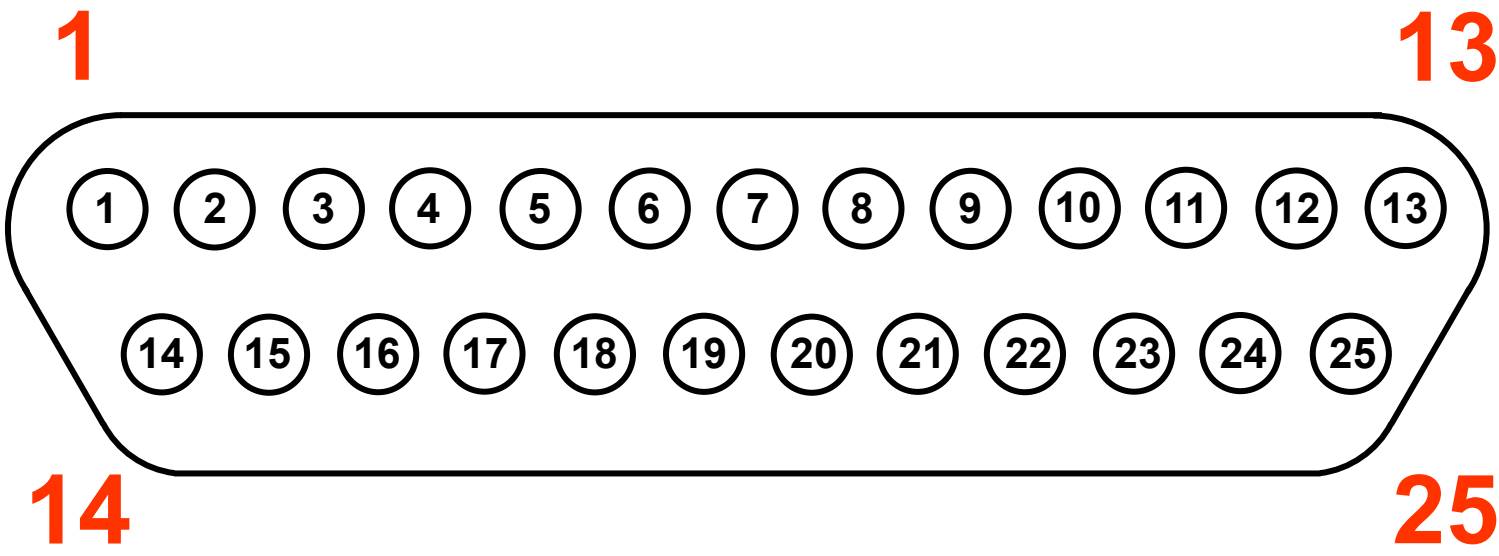
APPENDIX B: KDM Menu Structures

Administration Menu



APPENDIX C: I/O Diagram & Definitions

iEC2, iEC3 and iEC4 series controllers have a range of Input / Output (I/O) capabilities. By referencing the diagram below , the user can access the controllers I/O functions for a variety of line control and error proofing functions. A connector kit is available (PT # 23490) from AIMCO to make connection to the I/O port on the iEC controller easier; contact your AIMCO sales representative for ordering information.



Pin #	Definition	Pin #	Definition
1	Output—Accept	**14**	Output—Torque Low
2	Output—Reject	**15**	Output—Angle High
3	Output—In Cycle	**16**	Output—Angle Low
4	Output—Torque High	**17**	Output—Batch Complete
5	Output—1-4 Common	**18**	Output—5-8 Common
6	Input—Run Forward	**19**	Input—Analog 1
7	Input—Run Reverse	**20**	Input—Analog 2
8	Input—Disable Tool		
9	Input—PSET Bit 1	**21**	GND
10	Input—PSET Bit 2	**22**	GND
11	Input—PSET Bit 3	**23**	+24VDC
12	Input—Reset Batch	**24**	+24VDC
13	Input—Decrement Batch	**25**	+24VDC

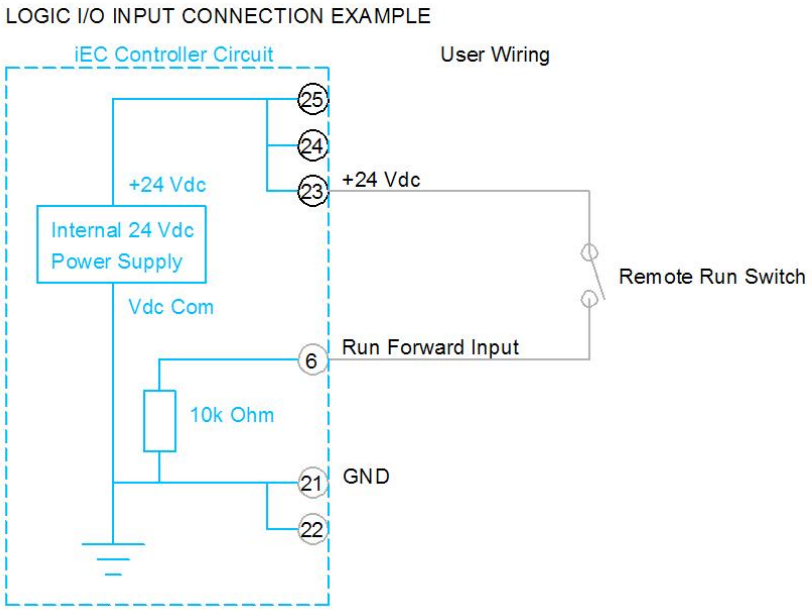
APPENDIX C: I/O Diagram & Definitions

LOGIC I/O CONNECTIONS

NOTE: Turn off the system before connecting to the LOGIC I/O port. There may be risk of damaging the controller.

24Vdc Supply: The internal 24Vdc power can supply up to 2 amps.

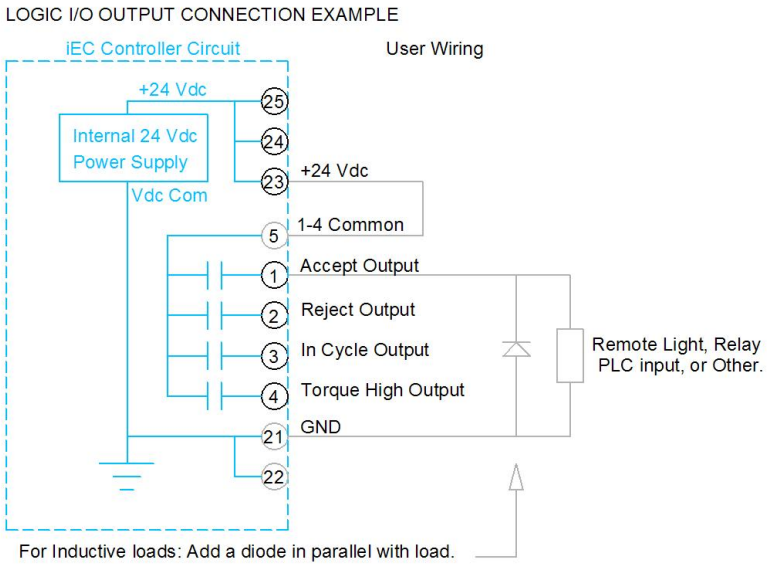
Inputs: The inputs are a sinking configuration with the common connected to the ground pins. 24Vdc is logic ON and 0Vdc is logic OFF.



LOGIC I/O CONNECTIONS

Outputs: The outputs are normally open relay contacts. The relays are rated for 24Vdc, 1 amp.

Note: If the outputs are driving an inductive load such as a solenoid or large relay, it is recommended to add a diode in parallel with the load to prevent voltage surges.



APPENDIX C: I/O Diagram & Definitions

I/O Definitions

Output 1, Accept

DB25 pin 1. The relay closes after achieving the target torque or target angle. The output is programmable for latched or timed operation using ToolWare.

Output 2, Reject

DB25 pin 2. The relay closes if the final torque or angle is outside of the High/Low limits. The output is programmable for latched or timed operation using ToolWare.

Output 3, In Cycle

DB25 pin 3. The relay is programmable for operating at threshold torque or on throttle pull. The relay closes when the torque level passes the threshold torque value when setup for “at threshold”. The relay closes when the throttle is pulled when setup for “at throttle”.

Output 4, Torque High

DB25 pin 4. The relay closes if the final torque exceeds the torque high level. The output is programmable for latched or timed operation using ToolWare.

Output 5, Torque Low

DB25 pin 14. The relay closes if the final torque falls below the torque low level. The output is programmable for latched or timed operation using ToolWare.

Output 6, Angle High

DB25 pin 15. The relay closes if the final angle exceeds the angle high level. The angle is measured from the torque threshold level. The output is programmable for latched or timed operation using ToolWare.

Output 7, Angle Low

DB25 pin 16. The relay closes if the final angle falls below the angle low level. The angle is measured from the torque threshold level. The output is programmable for latched or timed operation using ToolWare.

Output 8, Batch Done

DB25 pin 17. The relay closes after completing the batch count. The output is programmable for latched or timed operation using ToolWare. The batch count is also set using ToolWare.

Output 1-4 Common

DB25 pin 5. Connects to the common pins of output relays 1-4.

Output 5-8 Common

DB25 pin 18. Connects to the common pins of output relays 5-8.

Analog In 1

DB25 pin 19. Analog input 1, for future use.

APPENDIX C: I/O Diagram & Definitions

Analog In 2

DB25 pin 20. Analog input 2, for future use.

Input 1, Run Forward

DB25 pin 6. Runs tool forward. Buttons from I/O must be selected using ToolWare.

Input 2, Run Reverse

DB25 pin 7. Runs tool reverse. Buttons from I/O must be selected using ToolWare.

Input 3, Disable Tool

DB25 pin 8. Prevents the tool from running.

Input 4, Pset Bit 1

DB25 pin 9. Binary bit one for selecting parameter sets. See chart below.

Input 5, Pset Bit 2

DB25 pin 10. Binary bit two for selecting parameter sets. See chart below.

Input 6, Pset Bit 3

DB25 pin 11. Binary bit three for selecting parameter sets. See chart below.

Input 7, Reset Batch

DB25 pin 12. Sets the batch count to zero.

Input 8, Decrement Batch

DB25 pin 13. Decreases the batch count by one.

GND

DB25 pins 21 and 22. 0VDC.

+24VDC

DB25 pins 23-25. +24VDC

Parameter selection chart

	Pset 1	Pset 2	Pset 3	Pset 4	Pset 5	Pset 6	Pset 7	Pset 8
Bit 1	0	1	0	1	0	1	0	1
Bit 2	0	0	1	1	0	0	1	1
Bit 3	0	0	0	0	1	1	1	1

APPENDIX D: Light Assignment for Light Tower and Key Bypass

Light Color	Judgment
Green	Accept
Red	High Torque
Red Flashing	Low Torque
Yellow	High Angle
Yellow Flashing	Low Angle
Blue	Bypass
White	Tool Enabled
White Flashing	Assignable
Lights Strobe	Assignable

APPENDIX E: Dual Trigger Lever Functionality for Gen 3-4 tools

- Tool will not run unless both switches are pressed within 1 second of each other.
- If the 1 second timer times out, both switches must be released to reset the timer.
- If either trigger is released the tool stops.
- To restart the tool, both switches must be released and pressed within 1 second of each other again.
- Note: Logic I/O Run Forward and Run Reverse commands bypass the second trigger functionality.
- Note: Exceptions to second trigger function exist for Tube Nut Homing sequence.
- Note: The latching throttle feature is prevented in tools with dual triggers.

APPENDIX F: TUBE NUT Homing Sequence

- **Tubenut Homing Option: Home on Release and Repress of Trigger:**
  - If Single Trigger Lever:
    - Once the rundown is complete, releasing the lever and pressing it again is required to return the socket to home.
    - The tool will stop if the lever is released during homing, and will continue when the lever is again pressed.
    - Once the homing is complete, releasing the lever and pressing it again is required to start the next rundown cycle.
  - If Dual Trigger Levers are Installed:
    - Once the rundown is complete, releasing one of the levers, and pressing it again is required to return the socket to home.
    - Both levers must be pressed and held to return to home.
    - If either lever is released before the homing is complete the tool will stop. Homing will continue when both levers are again pressed.
    - Once the homing is complete, releasing both levers and pressing them again (within 1 second of each other) is required to start the next rundown cycle.
  - Arming Note:
    - If the arming timer times out the tool must be re-armed before homing can continue

- **Tubenut Homing Option: Auto Home on Release of Trigger:**
  - If Single Trigger Lever
    - Once the cycle is complete releasing the lever is required to return the socket to home.
    - Homing will continue until complete, regardless of lever position.
    - Once the homing is complete, releasing the lever and pressing it again is required to start the next rundown cycle.
  - If Dual Trigger Levers are Installed
    - Once the cycle is complete releasing either lever is required to return the socket to home.
    - Homing will continue until complete, regardless of either lever position.
    - Once the homing is complete, releasing both levers and pressing them again (within 1 second of each other) is required to start the next rundown cycle.
- **Tubenut Homing Option: Do Not Home:**
    - Once the cycle is complete the tool will not home and the tool is ready for the next cycle
    - Releasing the lever and pressing it again is required to start the next rundown cycle.

Notes: Using Logic I/O to run a Tubenut Tool.

- Once the rundown is complete, the run signal will need to be toggled in order to start homing.
- Once the homing is complete, the run signal will need to be toggled in order to start the next rundown cycle.
- Lever positions are ignored when using logic IO

APPENDIX G: FAQ'S

Q: HOW CAN I IMPROVE THE TOOL'S REPEATABILITY?
Generally speaking, slowing the tool down will improve its repeatability. Reducing the RPM FREE% value will give the tool more time to react as it approaches the target torque. Reducing the DOWNSHIFT TQ and/or RPM DOWN% may also have the same effect. Keep in mind that tool's RPM and Downshift points can affect ergonomics and overall productivity also; testing and running the tool on an application are the only ways to verify that the parameter set meets all requirements of the manufacturing process. Consistency of the joint characteristics must also be considered.

Q: HOW SHOULD I ADJUST THE SETTINGS FOR HARD JOINTS?
Because of how quickly torque rises upon reaching threshold torque, the tool should slow down to minimize overshooting the target torque. Two speed adjustments may be necessary. Maintain a reasonable RPM FREE% and RPM DOWN% during the rundown. Reduce the DWNSHIFT (downshift torque) setting to give the tool more time to react once hitting the threshold torque. A value slightly above the THOLD (threshold torque) is recommended.

Q: HOW SHOULD I ADJUST THE SETTINGS FOR SOFT JOINTS?
A softer joint requires more tightening time. You can afford to increase the speed during the rundown and still maintain acceptable repeatability. Increase the DWNSHIFT (downshift torque) setting a little at a time to decrease cycle time while still meeting the torque limit requirements.

Q: THE TOOL DOESN'T OPERATE WHEN I PRESS THE LEVER.
One common cause of this is choosing the improper tool for the parameter set; if the target torque value is above the tool's maximum rating then the tool will not run and "FLT EXT1 4096" will be displayed on the Main Display Panel. Another common reason for this problem is that the control ring on the tool is in a position that is programmed as NEUTRAL, the MFB button has been programmed for a non running scenario or the tool is running off I/O. Refer to the ToolWare Users Guide to correct this situation.

Q: HOW DO I CHANGE THE UNITS OF MEASURE?
The units of measure for torque is a universal setting for all parameter sets. To change the units, go to the Admin menu on the KDM and choose Pset Defaults. Keep in mind that the controller does not convert values for you. If you have a parameter setting of 10 Nm and you change the units to ft-lbs, the new setting is 10 ft-lbs. Changing the units of measure using Toolware allow for calculation of values. Refer to the Toolware users guide for more details. Lastly, being a universal setting, all parameter sets will use the same unit of measure.

Q: SHOULD I USE ERGO MODE?
At higher torque settings, using the Ergo Mode may seem more comfortable for some operators. The Ergo Mode releases the torque over a longer period of time, resulting in more gentle torque reaction. It's a personal preference; some operators prefer the Ergo Mode and some prefer to disable it. Ergo Mode is only enabled with 2000 series AcraDyne tools and may have a negative effect on cPk calculations.

APPENDIX G: FAQ'S

Q: ANGLE MEASUREMENT SEEMS TOO HIGH.
The controller starts to measure angle of rotation during the rundown when THOLD (threshold torque) is reached. If the threshold torque setting is below the prevailing torque of the joint, the tool will start measuring angle before the fastener is seated, resulting in a higher angle reading than anticipated. Ensure that the threshold torque value is above any anticipated prevailing torque of the joint.

Q: HOW CAN I RESET TO ALL THE FACTORY SETTINGS?
There are three groups of settings that can be reset - parameter sets, logic inputs/outputs, and calibration value. Within the ADMIN menu of the KDM, select RESET DEFAULTS. Resetting the parameter sets will erase all existing parameter set values. Resetting logic inputs/outputs will revert to the factory installed settings. Resetting the calibration value will revert the tool's calibration value to the factory setting burned into the tool's identification board. Resetting defaults is easily done using Toolware as well. Refer to the Toolware users guide for details.

Q: WHAT IS ADAPTIVE CONTROL?
Upon reaching target torque, the controller signals the tool to shut off and the tool stops. Depending on the speed of the tool and the joint rate, the final torque output may be higher than the target torque. This difference in torque is called "overshoot". Adaptive Control averages and centers the final torque readings around the target torque value. It averages the overshoot torque on 10 consecutive rundowns. After that, it pre-targets the tool to shut off before reaching the target so that the final reading is closer to your target torque setting. For example, if the target torque is 10 Nm, and the average of 10 readings is 10.2 Nm, using adaptive control will calculate the average overshoot torque of 0.2 Nm (10.2 - 10.0) and the tool will shut off at 9.8 Nm, so that the final torque reading is 10.0 Nm. Because of the way Cpk is measured, having more readings above the target torque decreases the Cpk value. Using Adaptive Control will result in a higher Cpk value since the range of the final torque readings is more centered on your target torque setting.

Q: WHAT IS THE CAL VALUE?
The cal value of an AcraDyne tool is based on a scale of 0 - 256 points. By adjusting this value, the torque values generated by the tool's transducer can be correlated with a torque value as determined by a master calibration transducer. Using the Calibrate Torque or Calibrate Angle features in Toolware with a Master Transducer can insure that your AcraDyne tool is operating in specification against the Master Transducer in your facility. Refer to the Toolware user's guide for details

Q: WHAT OTHER METHODS EXIST FOR PROGRAMMING THE iEC CONTROLLER?
By connecting the controller to a computer through the CAN connection or an existing Ethernet system, ToolWare can be used to conduct a wide range of programming, diagnostic and analytical procedures. For more information on ToolWare, refer to the ToolWare Users Guide section of this manual or contact your AIMCO sales representative.

Notes:

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LIT-MAN921 Rev. 07/2020