User Guide

TesTORK™ V1.0

Wireless Torque / Turn Monitoring System

Tesco Corporation ("TESCO") has made every effort to ensure that this document contains accurate and current information for the TESCO Torque Turn System, however, **the document is intended to be used in conjunction with a complete training program and on-site supervision** and TESCO does not warrant or guarantee that the information contained herein is either complete or accurate in every respect, and the reader hereby protects, indemnifies and holds harmless Tesco Corporation together with its directors, officers, employees and agents from and against all liability for personal injury, death or property damage to any person arising directly or indirectly from the use by the reader of the information contained in the document.

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Revision Information

Version	Date	Description of Changes
Rev 0	August 2013	First release of document for software version 1.0

SAFETY INSTRUCTIONS

The TESCO TesTORK is intended to be used in locations where hazardous gases may likely be present. It meets the requirements of IEC-60079-11 for use in Zone 1 Group IIB.

Note: Only units with either a Special Inspection sticker or Model Certification label shall be used in locations where hazardous gases may be present.

4.1.1 IEC 60079-11

THIS EQUIPMENT IS SUITABLE FOR USE IN ZONE 1, GAS GROUP IIB, OR NON-HAZARDOUS LOCATIONS ONLY.

Warning! EXPLOSION HAZARD - SUBSTITUTION OF COMPONENTS MAY IMPAIR SUITABILITY FOR ZONE 1.

Avertissement! RISQUE D'EXPLOSION - LA SUBSTITUTION DES COMPOSANTS PEUT RENDRE CE MATERIEL INACCEPTABLE POUR LES EMPLACEMENTS DE ZONE 1.

Warning! The TESCO TESTORK UNIT MUST ONLY BE ASSEMBLED AND OPERATED BY QUALIFIED PERSONNEL

ELECTROMAGNETIC COMPATIBILITY NOTICE

FCC

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

IC RSS 210

This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

TABLE OF CONTENTS

Safety Instructions ... **III**
4.1.1 IEC 60079-11 ... III
Electromagnetic Compatibility Notice ... **V**
FCC ... V
IC RSS 210 ... V

CHAPTER 1: ABOUT THIS DOCUMENT ... **1**
Contents ... **1**
Conventions ... **1**

CHAPTER 2: SYSTEM OVERVIEW ... **3**
Introduction ... **3**
Features ... 3
Data logging and reports ... 4
Data Configuration ... 4
User Interface ... 4
How the TesTORK system works ... **5**
What's Included in the TesTORK kit ... **5**
Software Overview ... **6**
Software Functionality ... 6
Select Job dialog box ... 7
Existing Jobs ... 7
New Job ... 8
Main screen - **Add section view controls (i.e. panning, zooming) ... 11
Data fields on left Side of Screen ... 12
Connections Side Panel ... 13
View All Connections ... 13
Add New Section ... 15
Edit Current Selection ... 17
Connection ... 18
Drilling ... 19
Pipe Tally Side Panel ... 21
Reports Side Panel ... 22
Hardware Side Panel ... 23
About WTTTS side panel ... 25

CHAPTER 3: INSTALLATION AND START UP ... **27**
Pre-Installation Activities ... **27**
Verify Casing Data ... 27

Pre-Job Component Inspection 27
Pre-job system test 28
On-Site Rig Up Procedures 29
Installing the TesTORK sub 30
System Start Up 31
Turning the TesTORK on or off 31
Use the following procedures to turn the TesTORK sub on or off: 32
To turn on the TesTORK sub 32
To turn off the TesTORK sub 32
Starting TesTORK Manager software 33
To start TesTORK Manager software 33
To check connection between the TesTORK sub and TesTORK Manager software 34

CHAPTER 4: USING TESTORK MANAGER SOFTWARE 37
Pre-job Activity List 37
About the TesTORK Manager Software Main Window 38
Viewing and Logging Connection Data 39
Logging a Connection Attempt 40
Log a Passed Connection 40
Log a Failed Connection 42
Force Past a Failed Connection 45
Performing a Manual Shoulder Operation 47
To manually set the shoulder point 47
Using the Drilling Control Feature 49
Adding a Job Comment 49
Viewing Pipe Tally Data 50
Generating Reports 51

CHAPTER 5: SYSTEM SETTINGS AND ADMINISTRATION 55
TesTORK System Settings Dialog Box 55
Accessing the System Settings Dialog Box 56
Communications settings 57
WITS tab 57
Base Radio tab 58
Calibration settings 60
. 60
Device Memory tab 61
Raw Data View tab 62
Graph settings 63
Misc settings 64
Installing and Configuring TesTORK Manager Software 66
Computer Requirements 66
Minimum Hardware 66

Supported Operating System. 66
Running WTTS Software 66
To run TesTORK Manager software from a USB flash drive. 66
To run TesTORK Manager software from the host computer desktop 67
To start TesTORK Manager software automatically when the host computer starts. 67
System Start Up 68
To start TesTORK software for the first time on a host computer 68
. 70
CHAPTER 6: TESCO BASE RADIO 71
Introduction. 71
Block Diagram 71
Electromagnetic Compatibility Notice 72
FCC 72
IC RSS 210. 72
Safety. 73
4.1.1 CSA 22.2 No. 213 73
4.1.2 ANSI/ISA 12.12.01 73
User Controls 73
Specifications 74
Environmental. 74
Radio 74
Contact Closures 75
Power 75
Digital Interface. 76
Mounting 76
Operating Instructions 76
Maintenance 76
APPENDIX A: CHANGING THE BATTERY. A-1
Cautions and Warnings A-1
Torque Sub Battery Changing. A-1
APPENDIX B: TTS CHECKLISTS AND FORMS B-1
Job Safety Analysis Worksheet B-2
Torque Turn System: Pre-Job Information Checklist B-4
Torque Turn System: Required Data Sheet B-7
Torque Turn System: Tool Kit Inventory Checklist. B-9
Torque Turn System: Inventory Checklist B-11
Torque Turn System: Final Checklist. B-13

APPENDIX C: DEVICE SPECIFICATIONS C-1

TesTORK Device Network C-1

Wireless Torque and Tension Sub C-2

APPENDIX D: DEVICE HAZARDOUS LOCATION RATINGS. D-1

CHAPTER 1: ABOUT THIS DOCUMENT

CONTENTS

This document contains the following information for the TESCO Wireless Torque Turn System (TesTORK):

- System overview
- Rig up, configuration and calibration
- Operation
- Checklists and general system information

CONVENTIONS

This document uses signal words and symbols to identify the hazards that a person may encounter while assembling, maintaining, servicing or operating this product.

Danger! 	Indicates that the situation could endanger the life of the operator or other personnel if procedures are not followed correctly.
Warning! 	Indicates that the situation could present a serious risk of harm to personnel or severe damage to equipment if procedures are not followed correctly.
Caution 	Indicates that the situation could cause damage to equipment if the procedure is not followed correctly.
	Note Indicates additional information that will enable the user to complete the task more easily.

CHAPTER 2: SYSTEM OVERVIEW

This chapter provides an overview of the functionality and features of the TesTORK™ Wireless Torque / Turn Monitoring System.

INTRODUCTION

The TesTORK Wireless Torque / Turn Monitoring System was developed by TESCO to complement the TESCO Casing Running Tool (CRT). The TesTORK enables operators to accurately monitor torque vs. turns and torque vs. time when making up connections using TESCO top drive systems. RPM is also monitored.

The TesTORK is wireless in operation and functions independently of other rig equipment. The only connection required is an AC power supply to the base radio.

Features

The TesTORK provides the following operational features:

- Real time monitoring of torque load applied by the top drive during casing connections
- Torque load is measured against both time and number of turns for each casing connection.
- Operators can define the characteristics of a satisfactory casing connection by entering connection data specifying torque limits, turn values and hold time for the shoulder and peak toque target.
- During a connection attempt, the user interface (UI) displays real time data showing torque load vs. time and torque load vs. number of turns. The speed (RPM) of the casing during a connection attempt can also be viewed.
- A summary of data from the connection attempt is immediately displayed on the UI when the connection attempt is complete
- Connection attempts are identified as being either a pass or a fail. The operator can also identify a connection as being a forced pass or forced fail. Comments must be added to connections identified in this way.
- Information and data defining a job can be specified before a job begins. Information includes company details, casing data, shoulder data and peak torque data values. Some data can also be changed during a job.
- The TesTORK is calibrated to measure between 0-50000 ft-lbs of toque and can be re-calibrated regularly

- The TesTORKmakes efficient use of battery life which is continually monitored. To preserve battery life, the TesTORK will enter sleep mode after a period of no communication between itself and the base radio.
- The TesTORK uses an auto hunt mode to establish wireless connection with the base radio

Data logging and reports

The TesTORK provides the following data logging and reporting functionality:

- Torque, turn and time data for every connection is logged at 100 times per second
- Every connection attempt is logged and the result displayed
- Operators are prompted to enter comments for failed connections. Comments can also be added following a successful connection.
- Logs and displays connection number, casing depth and the reason for every failed connection
- Reports can be generated that provide information on job statistics, section detail or summaries, and connection details (i.e. shoulder torque values, peak torque values and number of turns)
- A connection can be abandoned if two complete turns (or less) are not completed

Data Configuration

The TesTORK software provides the following data configuration options and functionality:

- Connection data defining the characteristics of a satisfactory casing connection can be changed at any time during a job

  Note: The TesTORK flags and logs all changes to connection data during a job.

- All connection data is saved for future use. This reduces the time required to enter data manually by allowing the operator to reuse similar data from a previous job
- Data is displayed and logged in metric or Imperial units for every connection.

  Note: Units cannot be changed during a connection process.

User Interface

The TesTORK user interface (UI) has the following features:

***The following descriptions will require amending based on how the TesTORK software will be made available to the customers (i.e. pre-installed or on a DVD)**

- TesTORK software is automatically installed and runs from the client CD; users do not have to manually install the program onto a computer
- Operators can enter data and navigate the TesTORK screens with either a touch screen (only some laptop computers) or mouse click
- Interactive torque vs. time and turns graph reports are displayed enabling the operator to:
  - Use pan and zoom controls to view details at any point on the graph

- View torque vs. time, torque vs. turn, or torque vs. time and turns
- Show or hide RPM data by clicking a single button

HOW THE TESTORK SYSTEM WORKS

The TesTORK system is comprised of the following components:

- TesTORK sub
- TesTORK housing
- Base radio (connects to the computer hosting TesTORK Manager software)
- TesTORK Manager software and host computer

The TesTORK sub is installed between the top drive and casing drive system. Sensors in the TesTORK sub provide torque, tension and rotational data. This data is transmitted to the base radio by a wireless transmitter located in the TesTORK housing. The TesTORK sub and TesTORK housing are a single unit referred to as the TesTORK.

The base radio supplies torque, tension and rotational data to the TesTORK Manager software‘s host computer.

The combination of TesTORK system components enable the operator to view and log connection data using the TesTORK Manager software‘s user interface.

See “Appendix C: Device Specifications” for the general schematic overview.

WHAT’S INCLUDED IN THE TESTORK KIT

The TesTORK kit consists of the following items:

- TesTORK with built in wireless transmitter
- Base radio
- Computer
- Custom battery pack.
- Printer with power cord, USB cord, paper and ink cartridges
- USB patch cord

SOFTWARE OVERVIEW

This section provides an overview of TesTORK software including the main screen and dialog boxes available from the main screen.

Software Functionality

Description required

Select Job dialog box

The *Select Job* dialog box appears after starting TesTORK software. This dialog box enables the operator to resume work on an existing job, or start a new job.

Two tabs are available in the *Select Job* dialog box:

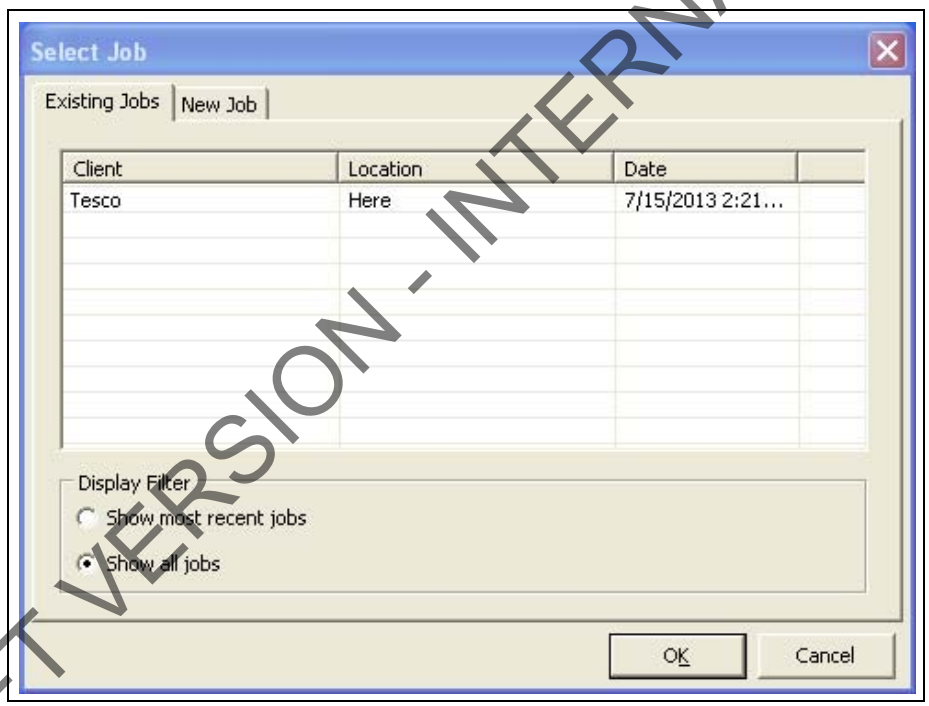
- *Existing Jobs*
- *New Job*

Existing Jobs

The *Existing Jobs* tab provides a list of exiting jobs and enables the operator to select a job and immediately resume work on that job. TesTORK software saves information and connection data from each job monitored by the software.

> **Note:** If no job is selected, the most recent job is automatically re-started when the *OK* button is clicked.

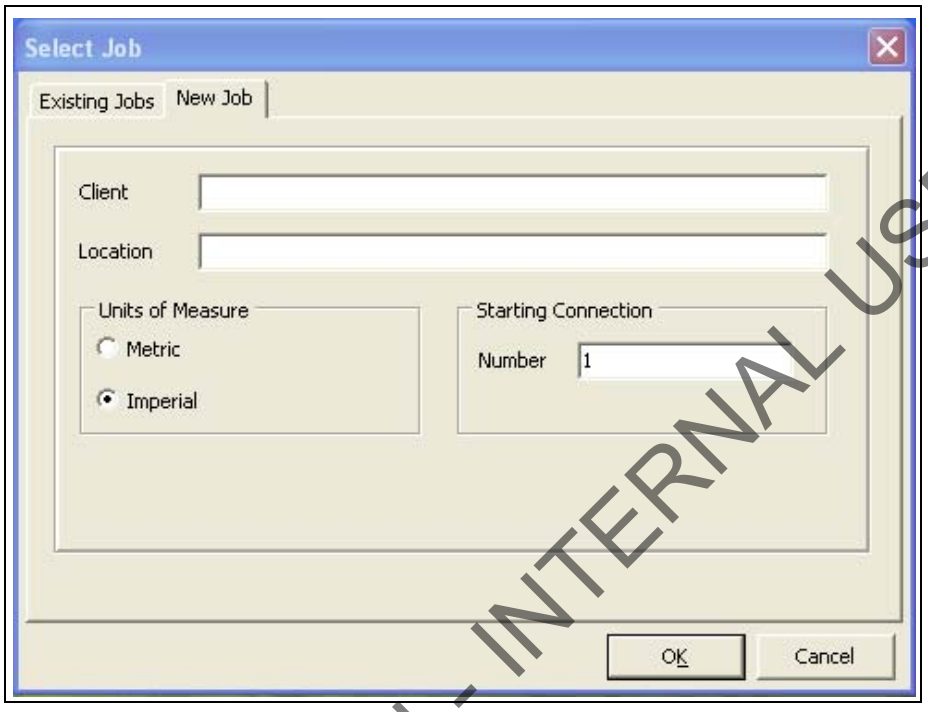
Figure 2-1: Existing Jobs tab



New Job

The *New Job* tab enables the operator to begin a new job by entering information and connection data that define the job. Information is first entered in the *New Job* tab. The *Create New Job* dialog box then appears enabling the operator to enter further information and connection data.

Figure 2-2: New Job tab

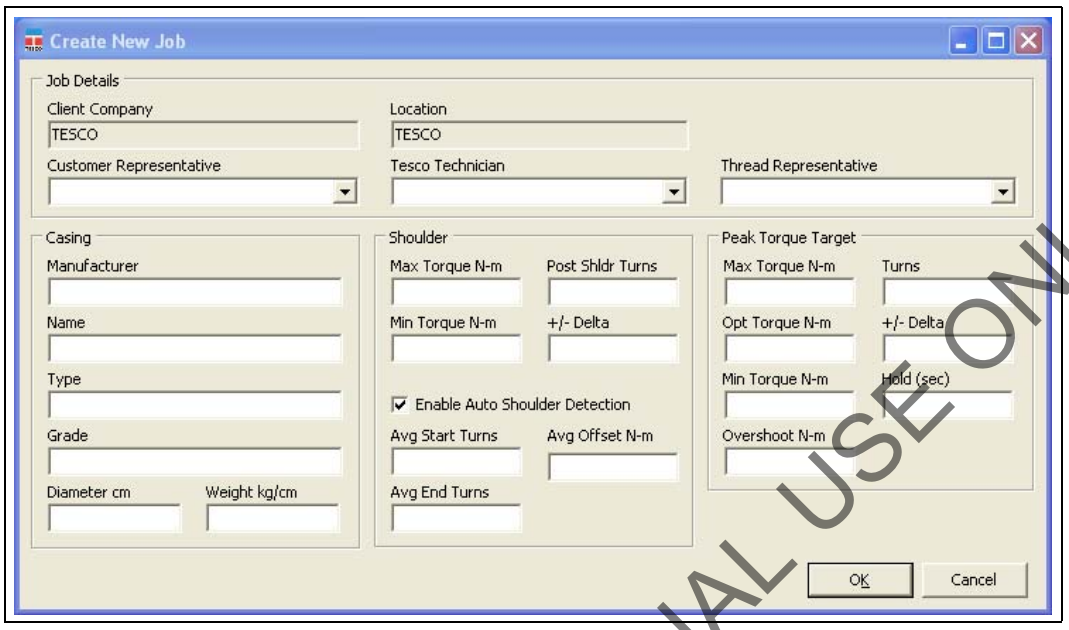


The following items are available in the *New Jobs* tab:

Table 2-1: Create New Job dialog box

Group	Item	Functionality	Description
	Client	Text box	Input of text information
	Location	Text box	Input of text information
Units of Measure	*Metric*	Radio button	Configures all data to be displayed in imperial units
	Imperial	Radio button	Configures all data to be displayed in metric units
Starting Connection	*Number*	Text box	Defines starting connection number

Figure 2-3: Create New Job dialog box



The following items are available in the *Create New Job* dialog box:

Table 2-2: Create New Job dialog box:

Group	Item	Functionality	Description
Job Details	*Client Company*	Text box	Displays the name of the company typed in the *New Job* tab
	Location	Text box	Displays the name of the location typed in the *New Job* tab.
	Customer Representative	Text box	Representative from the customer
	Tesco Technician	Text box	TESCO technician entering the job and connection data
	Thread Representative	Text box	Independent thread expert
Casing	*Manufacturer*	Text box	Casing manufacturer
	Name	Text box	Representative from casing manufacturer
	Type	Text box	Type of casing
	Grade	Text box	Steel grade of casing
	Diameter cm	Text box	Casing diameter value. A correct casing diameter value is vital for accurate calculation of RPM. A metric or diameter vale can be entered pending on the units of measure selection made in the *Select Job* tab. For information on selecting how units are displayed, see Table 2-1 on page 8.
	Weight kg/cm	Text box	Casing weight value. A metric or diameter vale can be entered pending on the units of measure selection made in the *Select Job* tab. For information on selecting how units are displayed, see Table 2-1 on page 8.

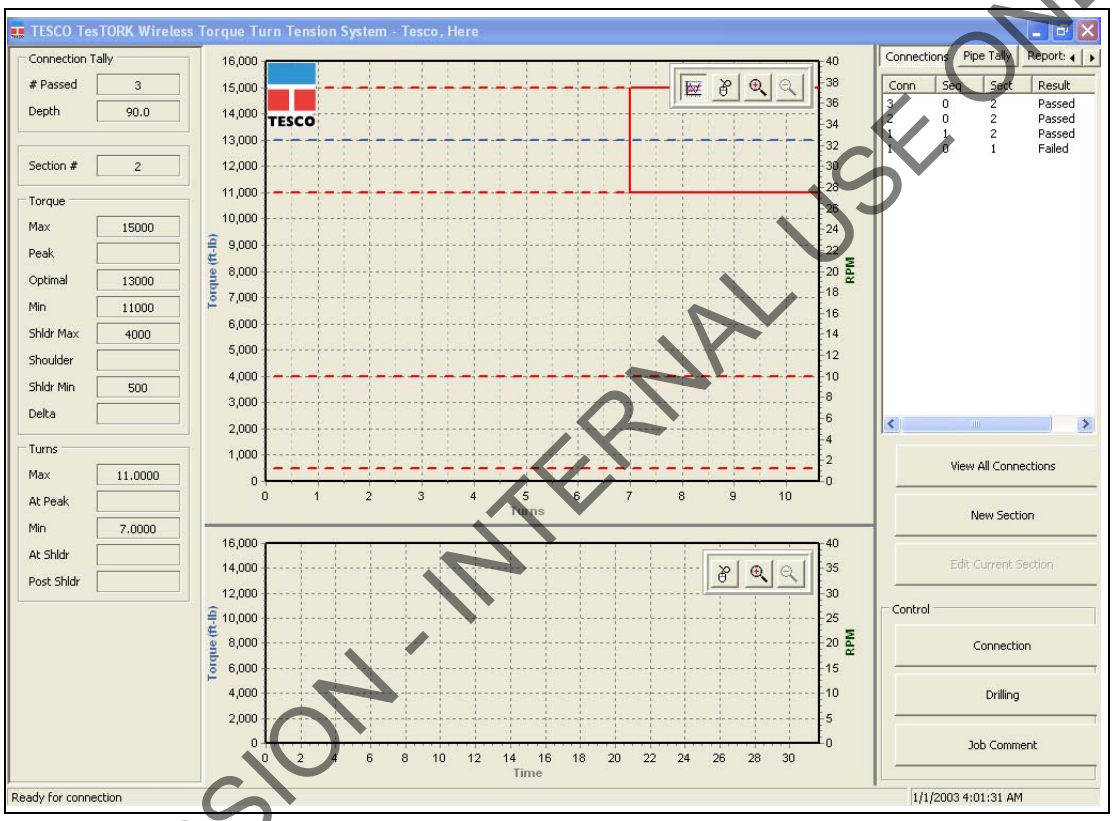
Table 2-2: Create New Job dialog box:

Group	Item	Functionality	Description
Shoulder	Test runs are required to determine the number of turns and the shoulder torque value. Use the Stream Check function. For more information, see ****link to streaming check function required**.		
	Max Torque	Text box	Maximum post-shoulder target range
	Min Torque	Text box	Minimum post-shoulder target range
	Post Shldr Turns	Text box	The amount the casing should turn after 'shouldering' occurs; this value is typically very low.
	+/- Delta	Text box	Allowable variance for the post-shoulder turn.
	Avg Start Turns	Text box	Sets the turn count that pre-shoulder averaging begins at
	Avg End Turns	Text box	Sets the turn count that pre-shoulder averaging ends at
	Avg Offset ft-lb	Text box	Sets the shoulder torque value above the pre-shoulder average
	Auto-Shoulder Mode	Check box	When the auto-shoulder mode is selected the shoulder point can be moved (manually)
Peak Torque Target	Consult your casing manufacturer for the information used in this parameter group.		
	Max Torque ft-lb	Text box	Maximum allowable torque value. A torque value above this setting results in a failed connection result.
	Opt Torque ft-lb	Text box	Optimal torque value
	Min Torque ft-lb	Text box	Minimum allowable torque value. A Torque value below this setting results in a failed connection result.
	Turns	Text box	Number of turns required to reach peak torque
	+/- Delta	Text box	Allowable variance in number of turns required to reach peak torque
	Hold (sec)	Text box	Time required to maintain the optimal torque setting. During this time, variances outside the optimal torque range result in a failed connection result.
	Overshoot ft-lb	Text box	Increased torque value generated by the momentum of the top drive when the casing connection is fully tightened

Main screen - **Add section view controls (i.e. panning, zooming)

The main screen appears after starting TesTORK software and beginning a job. The main screen provides access to information and dialog boxes that enable the operator to accurately monitor torque, turns and RPM while making up connections. The main screen also provides access to data from previous connection attempts, reports and hardware configuration options.

Figure 2-4: Main screen



The following items are available from the main screen:

Table 2-3: Main Screen Interface Elements

Item	Data/Notes
Footer bar	Contains connection status information
Data fields on the left side of the screen	Displays number of passed connections, depth, torque values, turn values, shoulder and post-shoulder torque and turn data
Graphs	Display torque (and RPM) vs. turns and torque (and RPM) vs. time Information is displayed in real time as the connection progresses.

Table 2-3: Main Screen Interface Elements

Item	Data/Notes
Connections button	Provides access to the following dialog boxes: • View All Connections • New Section • Edit Current Section • Connection • Drilling • Job Comment
Pipe Tally tab	Enables the operator to view a list of all connection attempts
Reports tab	Enables the operator to view and print data section and connection data
Hardware tab	Enables the operator to view hardware configuration information. Administrators are able to access and configure the System Settings dialog box
About WTTS tab	Enables the operator to view TesTORK software version information

Data fields on left Side of Screen

The following data is available on the left side of the screen.

Table 2-4: Data fields on left side of screen

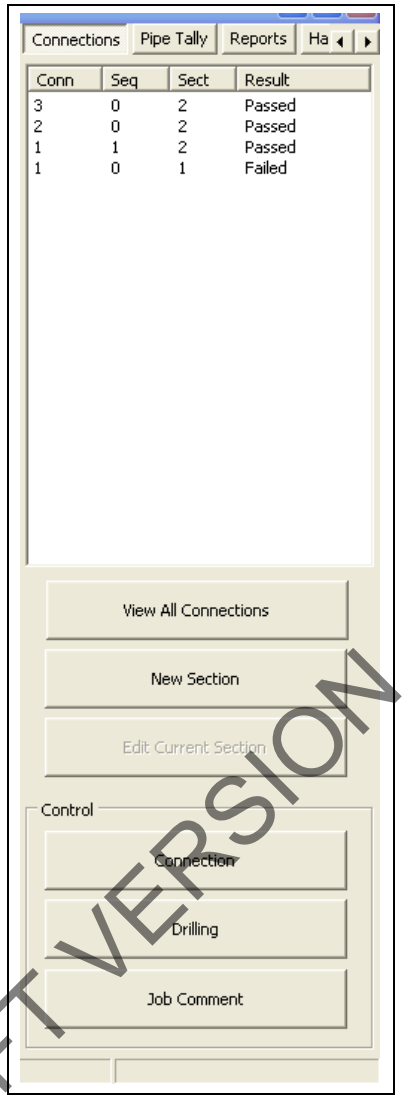
Group	Item	Description
Connection Tally	*# Passed*	Number of connections categorized as being *passed*
	Depth	Current total depth of casing
	Section #	Every change to job information and connection data creates a new section number
Torque	*Max*	Value entered in *Create New Job* or *Add New Section* dialog box
	Peak	Peak torque value during a connection attempt
	Optimal	Value entered in *Create New Job* or *Add New Section* dialog box
	Min	Value entered in *Create New Job* or *Add New Section* dialog box
	Shldr Max	Value entered in *Create New Job* or *Add New Section* dialog box
	Shoulder	System or manually defined value
	Shldr Min	Value entered in *Create New Job* or *Add New Section* dialog box
	Delta	Value entered in *Create New Job* or *Add New Section* dialog box
Turns	*Max*	Value entered in *Create New Job* or *Add New Section* dialog box
	At Peak	How many turns taken to reach the peak torque value during a connection attempt
	Min	Value entered in *Create New Job* or *Add New Section* dialog box
	At Shldr	How many turns taken to reach the shoulder value during a connection attempt. System or manually defined value
	Post Shldr	Value entered in *Create New Job* or *Add New Section* dialog box

Connections Side Panel

The *Connections* side panel enables the operator to access the following dialog boxes and windows:

> **Note:** A list of the results from each attempted connection is also displayed when the *Connections* button is clicked.

Figure 2-5: Connections side panel



View All Connections

Clicking the *View All Connections* button enables the operator to access the *View Connections* window containing details of all casing connections made as part of the current job. The *View Connections* window also features buttons that enable the operator *View Graph*, *View Section* and *Remove Conn* (remove connection).

Figure 2-6: View Connections Window

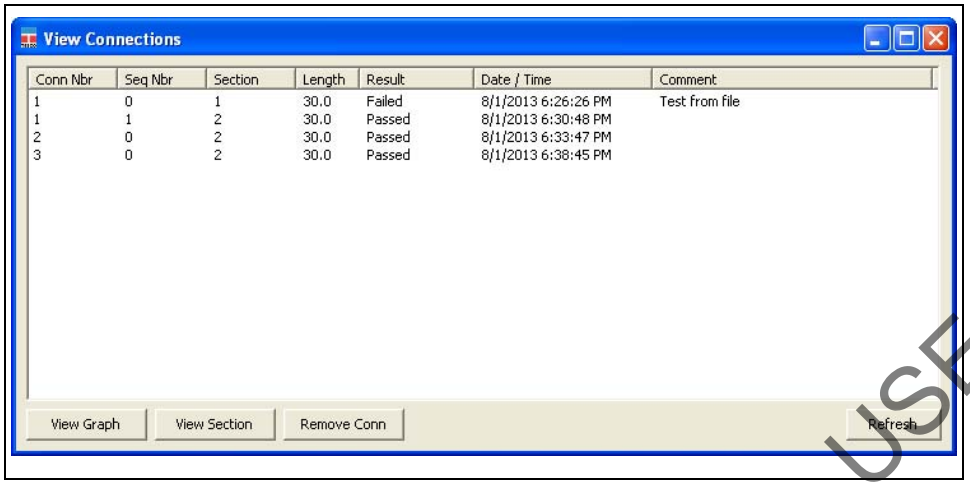


Table 2-5: View Connections Window:

Group	Item	Functionality	Description
Columns	*Conn Nbr (Connection Number)*	Displays the connection number	Running total of connections made
	Seq Number (Sequence Number)	Displays the sequence number	Number of attempts made on a connection
	Section	Displays the Section	Section number
	Length	Displays casing length	Length of casing used in connection
	Result	Display connection result	Can be a passed, failed or forced pass connection
	Date/Time	Displays time and date information	Displays the exact time and date of each connection attempt
	Comments	Displays Comments	The operator can enter comments
Button	*View Graph*	Displays the graph of the selected item.	Displays the graphed connection data from the selected connection attempt
	View Section	Displays job information and connection data.	Displays the job information and connection data for the selected connection attempt
	Remove Conn (remove connection)	Removes the last connection attempt	Removes the last connection attempt from a job

Add New Section

The *Add New Section* window enables the operator to make revisions to the job details and connection data. A new section is created each time a change is made to the job details and connection data following a connection attempt.

However, changes can be made to the job details and connection data without creating a new section if a connection has not yet been attempted.

Figure 2-7: Add New Section Window

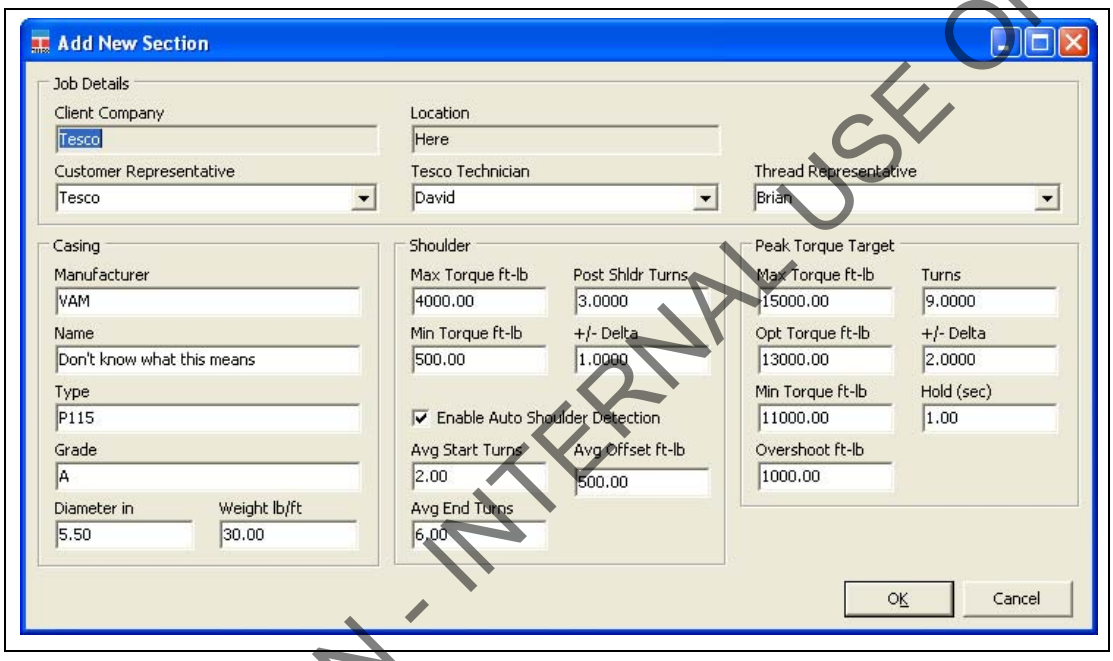


Table 2-6: Add New Section Window:

Group	Item	Functionality	Description
Job Details	*Client Company*	Text box	Displays the name of the company typed in the *New Job* tab
	Location	Text box	Displays the name of the location typed in the *New Job* tab.
	Customer Representative	Text box	Representative from the customer
	Tesco Technician	Text box	TESCO technician entering the job and connection data
	Thread Representative	Text box	Independent thread expert

Table 2-6: Add New Section Window:

Group	Item	Functionality	Description
Casing	*Manufacturer*	Text box	Casing manufacturer
	Name	Text box	Representative from casing manufacturer
	Type	Text box	Type of casing
	Grade	Text box	Steel grade of casing
	Diameter cm	Text box	Casing diameter value. A correct casing diameter value is vital for accurate calculation of RPM. A metric or diameter vale can be entered pending on the units of measure selection made in the *Select Job* tab. For information on selecting how units are displayed, see Table 2-1 on page 8.
	Weight kg/cm	Text box	Casing weight value. A metric or diameter vale can be entered pending on the units of measure selection made in the *Select Job* tab. For information on selecting how units are displayed, see Table 2-1 on page 8.
Shoulder	Test runs are required to determine the number of turns and the shoulder torque value. Use the Stream Check function. For more information.		
	Max Torque	Text box	Maximum post-shoulder target range
	Min Torque	Text box	Minimum post-shoulder target range
	Post Shldr Turns	Text box	The amount the casing should turn after 'shouldering' occurs; this value is typically very low.
	+/- Delta	Text box	Allowable variance for the post-shoulder turn.
	Avg Start Turns	Text box	Sets the turn count that pre-shoulder averaging begins at
	Avg End Turns	Text box	Sets the turn count that pre-shoulder averaging ends at
	Avg Offset ft-lb	Text box	Sets the shoulder torque value above the pre-shoulder average
	Auto-Shoulder Mode	Check box	When the auto-shoulder mode is selected the shoulder point can be moved (manually)
Peak Torque Target	Consult your casing manufacturer for the information used in this parameter group.		
	Max Torque ft-lb	Text box	Maximum allowable torque value. A torque value above this setting results in a failed connection result.
	Opt Torque ft-lb	Text box	Optimal torque value
	Min Torque ft-lb	Text box	Minimum allowable torque value. A Torque value below this setting results in a failed connection result.
	Turns	Text box	Number of turns required to reach peak torque

Table 2-6: Add New Section Window:

Group	Item	Functionality	Description
	+/- Delta	Text box	Allowable variance in number of turns required to reach peak torque
	Hold (sec)	Text box	Time required to maintain the optimal torque setting. During this time, variances outside the optimal torque range result in a failed connection result.
	Overshoot ft-lb	Text box	Increased torque value generated by the momentum of the top drive when the casing connection is fully tightened

Edit Current Selection

Enables the operator to makes changes to a current section's job information and connection data if no connection attempt has yet been made within that section. If a connection attempt has been made, the button is not functional.

Connection

The *Connection* dialog box enables the operator to begin monitoring a connection attempt. Once a connection attempt is complete, the *Connection* dialog box displays the connection result pass or fail. The operator can accept the connection result or assigned a *Forced Pass* designation to a connection attempt that failed.

The *Connection* dialog box also enables the operator to start a streaming checking and monitor connection data without logging the data. The operator can also add comments associated wit each connection attempt and edit casing length data.

Figure 2-8: Connection Window

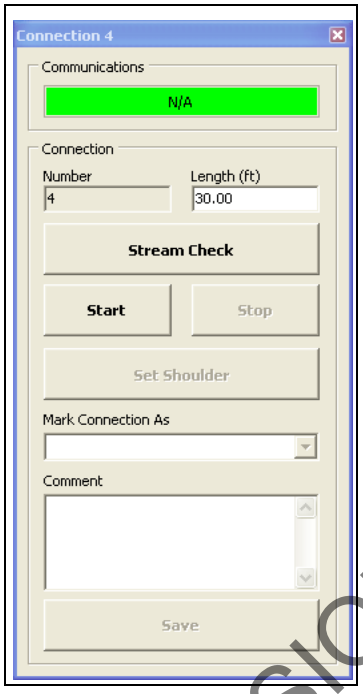


Table 2-7: Connection Window Dialog

Group	Field/Element Name	Data/Notes
Communications	Status Bar	Provides information on the connection status between the TesTORK and TesTORK Manager software. The following connection status messages can be displayed: • *Hunting* - No connection between the TesTORK and TesTORK Manager software • *Idle* - Connection is established between the TesTORK and TesTORK Manager software • *Streaming* - TesTORK Manager software is reievving connection data from the TesTORK

Table 2-7: Connection Window Dialog (Continued)

Group	Field/Element Name	Data/Notes
Connection	Number	Increments with every passed or forced pass connection. Remains the same for a failed connection attempt.
	Length (ft)	Length of current casing (not including thread)
	Stream Check	Displays connection data without logging the data.
	Start	Starts logging a connection attempt. Once the casing has completed two turns, logging cannot be aborted and the result is recorded.
	Stop	Stops logging the connection attempt once complete and returns connection status to *Idle* status.
	Set Shoulder	Enables the operator to manually set a shoulder point. If TesTORK Manager software doesn't automatically detect a shoulder, this button is set by default.
	Mark Connection As	Enables the operator to record a connection attempt as a *Pass, Failed* or *Forced Passed.* A comment must be added if a connection result is over ridden or the connection attempt failed.
	Comment	Enables the operator to add a comment to any connection attempt. However, comments must be added to a *Failed* or *Forced Passed.* attempt.

Drilling

The Drilling Control dialog box enables the operator to view torque and turns data without the data being logged. Data is updated every second rather than at 100 times a second.

Figure 2-9: Drilling Control Window

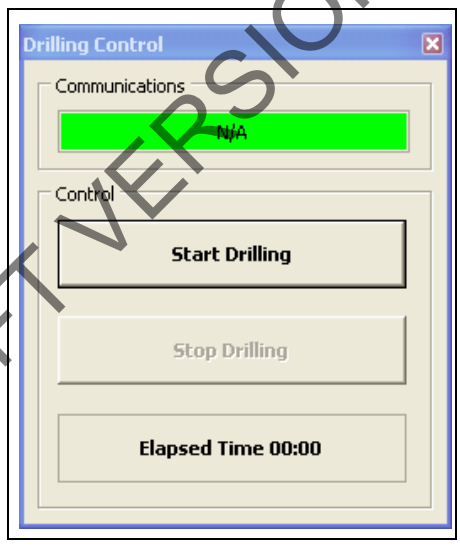


Table 2-8: Drilling Control Window Dialog

Group	Field/Element Name	Data/Notes
Communications	Status Bar	Provides information on the connection status between the TesTORK and TesTORK Manager software. The following connection status messages can be displayed: • *Hunting* - No connection between the TesTORK and TesTORK Manager software • *Idle* - Connection is established between the TesTORK and TesTORK Manager software *Streaming* - TesTORK Manager software is reieving connection data from the TesTORK
Control	Start Drilling	Starts displaying torque and turns data
	Stop Drilling	Returns TesTORK Manager software to *Idle* mode
	Elapsed Time	Time since the *Start* button was pressed

Figure 2-10: Job Comments Window

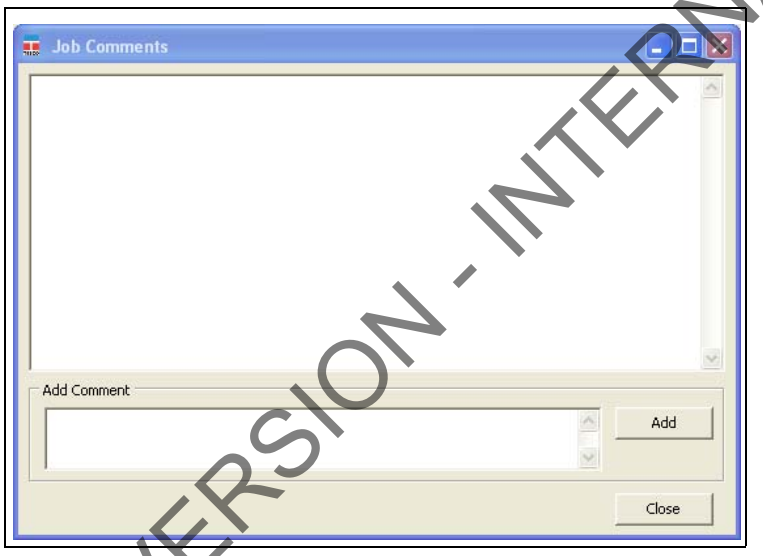


Table 2-9: Job Comments Dialog

Group	Field/Element Name	Data/Notes
	Add Comment	Enables the operator to add comments about a job

Pipe Tally Side Panel

The *Pipe Tally* side panel displays a list of all connection attempts. When a connection attempt is selected the connection data associated with the attempt is displayed:

Figure 2-11: Pipe Tally Window

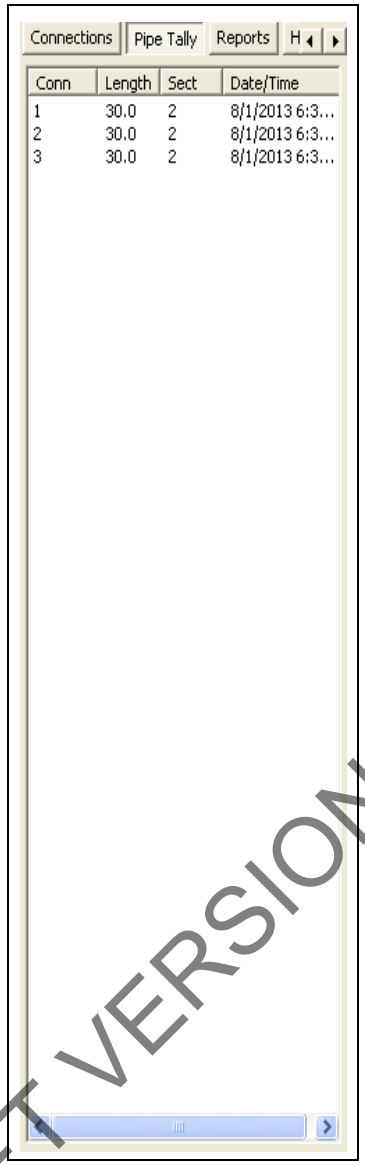


Table 2-10: Pipe Tally Dialog

Group	Field/Element Name	Data/Notes
Pipe Tally	Conn (Connection)	Connection number
	Length	Casing length
	Sect (Section)	Section number
	Date/Time	Time and date connection attempt was started

Reports Side Panel

The *Reports* side panel displays the *Report Selection* window By selecting from the drop down menu, an operator can view accumulated data from a job. Data includes job statistics, individual section details, combined section details and job comments.

Figure 2-12: Reports Window

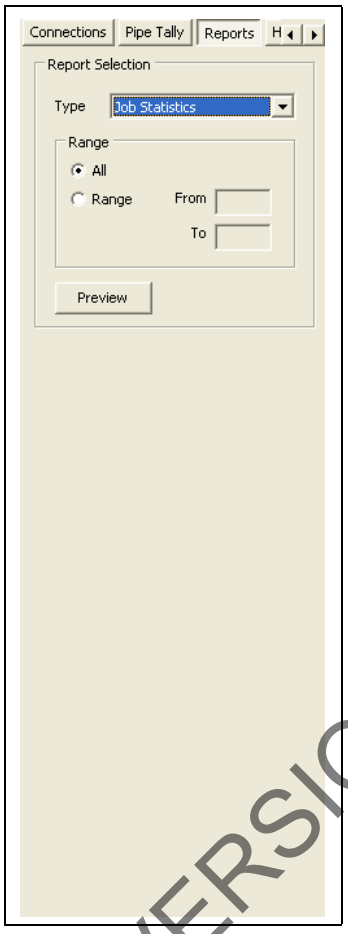


Table 2-11: Reports Window Dialog

Group	Field/Element Name	Data/Notes
Report Selection	Type (Drop Down Menu)	Job Statistics Sections (detail) Sections (summary) Connections
	Range (*All* or *Range*)	Display all items or a range of items
	Preview (Button)	Displays report

Note: For a complete description of each report and the information available, see “Generating Reports” on page 51.

Hardware Side Panel

The *Hardware* side panel displays information about the Wireless Torque Turn Tension System.

Figure 2-13: Hardware Window

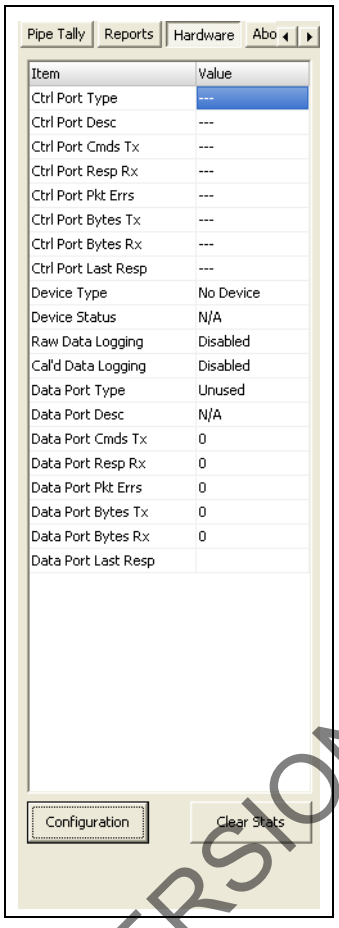


Table 2-12: Hardware Window Dialog

Group	Field/Element Name	Data/Notes
Item	Ctrl Port Type (Control Port Type)	System information
	Ctrl Port Desc (Control Port Description)	System information
	Ctrl Port Cmds Tx	System information
	Ctrl Port Resp Rx	System information
	Ctrl Port Pkt Errs	System information
	Ctrl Port Bytes Tx	System information
	Ctrl Port Bytes Rx	System information
	Ctrl Port Last Resp	System information
	Device Type	System information
	Device Status	System information - Status is *Idle* when communication is established between the TesTORKand TesTORK Manager software
	Raw Data Logging	System information
	Cal'd Data Logging	System information
	Data Port Type	System information
	Data Port Desc	System information
	Data Port Cmds Tx	System information
	Data Port Resp Rx	System information
	Data Port Pkt Errs	System information
	Data Port Bytes Tx	System information
	Data Port Bytes Rx	System information
	Data Port Last Resp	System information
Buttons	Configuration	Enables access to the *TesTork System Settings* dialog box. A password is required. For more information on using the *TesTork System Settings* dialog box, see "" on page 70.
	Clear Stats	**Please supply description

About WTTTS side panel

The *About WTTTS* side panel displays the TESCO Wireless Torque Turn Tension System (WTTTS) Version as well as TESCO contact information.

Figure 2-14: About WTTTS Window

Table 2-13: About WTTTS Dialog Box

Group	Field/Element Name	Data/Notes
About WTTTS	Version	The Current Software Version of the TESCO WTTTS.
	Contact Information	TESCO Corporation Contact Information

CHAPTER 3: INSTALLATION AND START UP

This chapter provides information on installing and starting The TesTORK Wireless Torque / Turn Monitoring System's hardware and software components.

The installation process consists of the following general procedures:

- Pre-installation activities

> **Note:** Once a job has been defined, the TesTORK system components must be inspected and verified before going to the job site.

- Pre-job component inspection
- On-site rig-up procedures
- Installing the Torque Sub
- System start-up

PRE-INSTALLATION ACTIVITIES

Verify Casing Data

Before traveling to the casing running job site, ensure the following information about the casing has been collected from the field supervisors at TESCO (see Pre-Job Information checklist 881031 in "Appendix B: TTS Checklists and Forms").

- casing weight
- casing size
- approximate lengths (tally sheet)
- connection types

Pre-Job Component Inspection

Complete the following steps to ensure that the TesTORK system is complete and functional before traveling to the job site.

1. Ensure that all TesTORK components are present in the pelican case(s).
2. Check all cables for wear or damaged ends. If damage is detected, or if a cable is suspect, pin out the cord and verify its condition.

3. Connect the system together and verify that data is being received at the computer and most importantly check the battery life. If battery life is not enough to complete the job, install new lithium D size batteries before going to site.

Note: See "Appendix A: Changing The Battery" for more information.

4. After completing the initial system verification and confirming that all the required components are present, repack all of the items into the pelican case(s) and crate.
5. Submit the completed checklist to the supervisor to confirm that there is a complete kit prepared for the upcoming job.
6. Use form 881027 as a reference; see "Appendix B: TTS Checklists and Forms"

Pre-job system test

Ensure a pre-job system test is completed (i.e. communication can be established between the TesTORK and TesTORK Manager software) before traveling to the job site.

For example:

1. Connect all equipment.
2. Switch on computer
3. Ensure connection has been established between the TesTORK and TesTORK Manager software

ON-SITE RIG UP PROCEDURES

Complete the following steps to ensure that the correct placement of the TesTORK system's hardware devices after arriving at the job site.

1. Report to the on-site supervisor(s) for orientation and initial introductions.
2. Install the TesTORK sub.

Note: For more information on installing the TesTORK sub, see " Installing the TesTORK sub".

3. Go to the rig floor and determine suitable locations for the following TesTORK system devices:

Danger! Ensure each TesTORK system device is located in a position appropriate to the device's hazardous location rating. For information on TesTORK system device hazardous location ratings, see "Appendix D: Device Hazardous Location Ratings".

Danger! A printer (and USB flash drive if used) must only be used in a safe area. For information on using these items, refer to the manufacturer's instructions and safety data supplied with each device.

- Computer
- Base radio

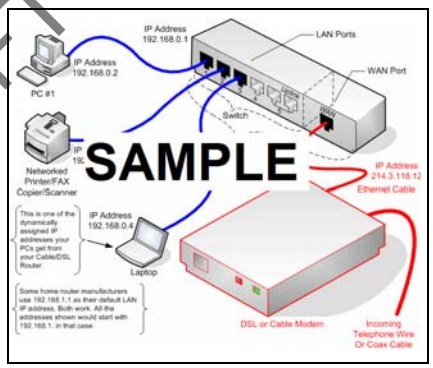
Caution: The base radio must be positioned with its antenna in line of sight with the TesTORK.

- Printer and USB flash drive (optional equipment not supplied by TESCO)

4. Place the TesTORK system devices.
5. Connect the TesTORK system devices as shown in following network diagram:

***The following is a sample network diagram of the type to be added - Talk to Brian**

Figure 3-1: TesTORK system device network diagram



INSTALLING THE TESTORK SUB

Content or cross reference TBD

SYSTEM START UP

After the on-site rig up procedures have been completed and the TesTORK has been installed, the TesTORK system is ready to start.

Once started, the TesTORK system is ready to begin monitoring and logging connection attempts.

> **Note:** For information on using TesTORK system to monitor and log connection attempts, see “Using TesTORK Manager Software” on page 37.

Start the TesTORK system by completing the following procedures:

1. Turn on the TesTORK
2. Start TesTORK Manager software

Turning the TesTORK on or off

When the TesTORK is turned on it will automatically start looking for a wireless signal from base radio. The TesTORK automatically connects to the base radio (and TesTORK Manager software) once a connections is established.

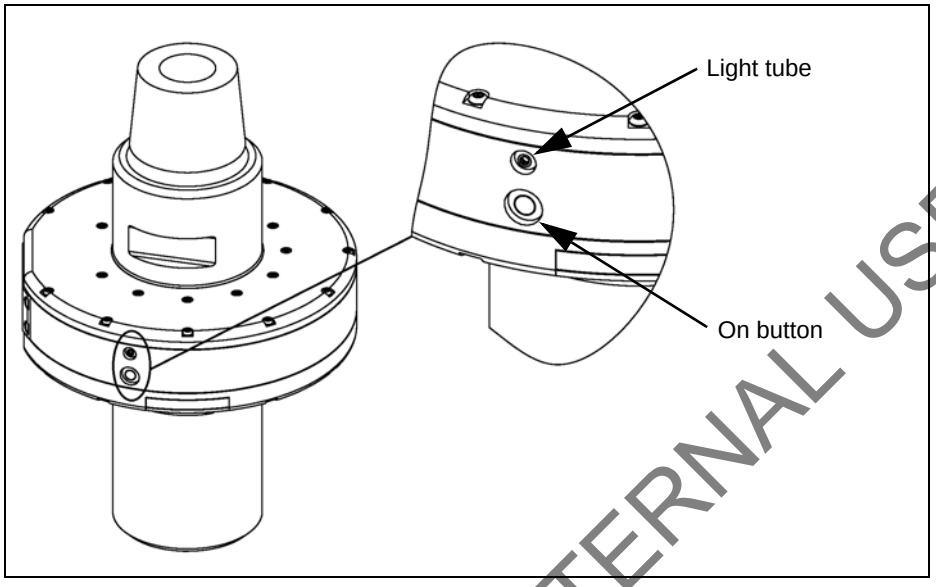
> **Note:** The TesTORK sub is automatically powered off when it does not have a wireless connection for 15 minutes or more. Therefore, when not in use for an extended period on the rig, disconnect power to the receiver to preserve the batteries in the TesTORK.

Use the following procedures to turn the TesTORK sub on or off:

To turn on the TesTORK sub

Push the **Power** button on the side of the TesTORK sub.

Figure 3-2: Turning on the TesTORK



The light tube located above the power button will flash five times

To turn off the TesTORK sub

Push the **Power** button on the side of the TesTORK sub.

The power button will flash five times.

Starting TesTORK Manager software

Use the following procedures to start TesTORK Manager software and check that connection has been established between the TesTORK sub and TesTORK Manager software.

To start TesTORK Manager software

1. Ensure the computer hosting TesTORK Manager software is powered up and the desktop is displayed on the screen.
2. Double-click the **TestTORKManager** program icon located on the Desktop.

   The *Select Job* dialog box appears.

   Note: If this is the first time starting TesTORK Manager software on the host computer, a dialog box appears confirming that a job directory must be set before starting the software. Browse to and select (create) a suitable folder, and then click **OK**.

   TesTORK Manager software uses the selected folder to store log files containing configuration and connection data from each job started in the software.

3. Select one of the following options:

If you want to:	Complete these steps:
Start an existing job	**a.** Ensure the **Existing Jobs** tab is selected. The *Existing Jobs* dialog box appears. **b.** Select a job, and then click **OK**. **Note:** Use the Display Filter buttons to display the most recent jobs or all jobs. The TesTORK Manager software main screen appears.

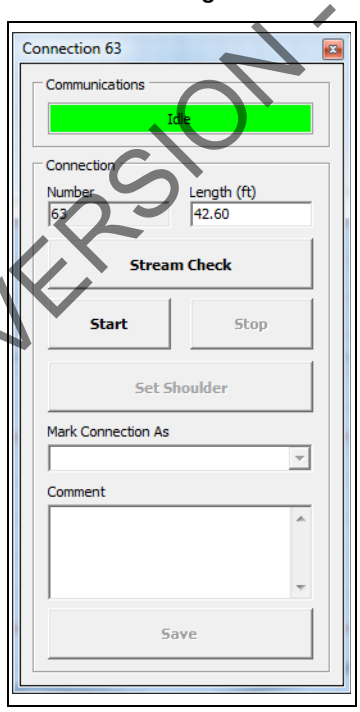
If you want to:	Complete these steps:
Create a new job	**a.** Click the **New Jobs** tab. The *New Jobs* dialog box appears. **b.** Type a client name in the *Client* box. **c.** Type a location in the *Location* box. **d.** Select a unit of measure using the *Units of Measure* radio buttons. **e.** Type a starting connection number in the *Starting Connection* box. **f.** Click **OK**. The *Create New Job* Window appears **g.** Type the relevant information or data in the text boxes. **Note:** For a description of each text box item, see Figure 2-3 on page 9. **h.** Click **OK**. The TesTORK Manager software main screen appears.

To check connection between the TesTORK sub and TesTORK Manager software

1. On the main screen, click the **Connections** button.

   The *Connections* dialog box appears.

Figure 3-3: Connections dialog box



2. Check the *Communications* status box

The message *Idle* is displayed when communication between the TesTORK and TesTORK Manager software is established.

CHAPTER 4: USING TESTORK MANAGER SOFTWARE

***This chapter requires more work and information adding**

This chapter provides information on using the TesTORK Wireless Torque / Turn Monitoring System to monitor and log connection attempts.

The information provided in this chapter is organized into the following sections:

- Pre-job activity list
- About the TesTORK Manager Software Main Window
- Viewing and logging connection data

PRE-JOB ACTIVITY LIST

Ensure the following activities have been completed before beginning a job and using the procedures in this chapter.

Table 1: Pre-job task list

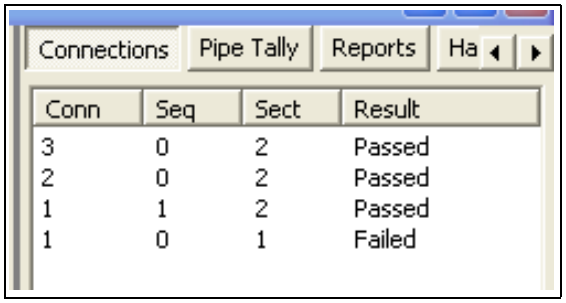
Activity	Reference
Pre-installation activities	page 27
On-site rig-up procedures	page 29
Installation of the TesTORK sub	page 30
System Start-up	page 31
Ensuring a connection has been established between the TesTORK sub and TesTORK Manager software.	page 34

Note: For more information on checking the connectivity between the TesTORK sub and TesTORK Manager software, see “To check connection between the TesTORK sub and TesTORK Manager software” on page 34.

ABOUT THE TESTORK MANAGER SOFTWARE MAIN WINDOW

The TesTORK system's operational features and functionality are accessed by clicking buttons at the top right side of the TesTORK Manager software's main window. As each button is clicked, the panel on the right side of the screen changes enabling access to the operational features associated with each button.

Figure 4-1: Feature buttons



The following operational features are available by clicking the buttons at the top right side of the screen.

Table 2: Operational features

Button	Enables the operator to:
Connections	• View information on completed connections • Add a new section by updating the connection configuration data • Log a connection attempt • Monitoring a drilling operation • Add a job comment
Pipe Tally	View a list of connections
Reports	View and print reports providing information job statistics, sections, connections and job comments
Hardware	View system data. The Hardware panel side panel also enables access to the administrator settings. A password is required to access these settings. For more information, see See "Accessing the System Settings Dialog Box" on page 56.
About TesTORK	View TesTORK Manager software version information

VIEWING AND LOGGING CONNECTION DATA

The *Connections* side panel provides access to all TesTORK Manager software features associated with logging a connection attempt.

Click the *Connections* button to access the following features:

Table 3: Pre-job task list

Side panel	Use this feature to:	Reference
Connection	• Log a passed connection • Log a failed connection • Force past a failed connection	
Drilling	Continually monitor torque and RPM at the at the top drive during a drilling operation	
Job Comment	Add a comment about the job	
View All Connections	View information on each connection attempt for the current job. The following information is available: • Graphs showing the connection attempt data • Configuration data used for each connection attempt	
New Section	Begin a new section by changing the job details or connection configuration data.	
Edit Current Section	Edit a new section before a connection attempt has been made	

Logging a Connection Attempt

This section explains how to use TesTORK Manager software to view and log connection attempts.

> **Note:** Ensure the steps in the "Pre-Job Activity List" have been completed before using the procedures in this chapter. For more information, see See "Pre-job Activity List" on page 37.

The following procedures are explained in this chapter:

Table 4: Viewing and logging connection attempt options

Procedure	Description
Log a passed connection	Use TesTORK Manager software to log a successful connection attempt.
Log a failed connection	Use TesTORK Manager software to log an unsuccessful connection attempt.
Force past a failed connection	It is possible to force a *Pass* status on a failed connection if the operator has determined that the connection is correct, but TesTORK Manager software has not recognized it as such. One situation in which a failed connection might be forced is when the threaded coupling on the top of the casing has been removed. This can cause faults to occur. Torquing two connections at once can create a fault alarm as the shoulders might not synchronize and the applied/registered torque might be more erratic than what was set as parameters for *Fail* status. In this case, it is permitted to force a *Pass* status if the correct end result torque is achieved. The comment section allows comments regarding the reason for the pass; comments are required for all force failed or force passed connections. In addition, the option to increase the connection number to account for the double joint is available. Another situation where a force pass connection might occur is if the operator clicks the *Start* button after the casing has already turned a number times. This will produce a fault that indicates shouldering occurred too early and/or the optimum torque was achieved within too few turns. If it is confirmed that the connection is actually correct, then force pass the connection.

Log a Passed Connection

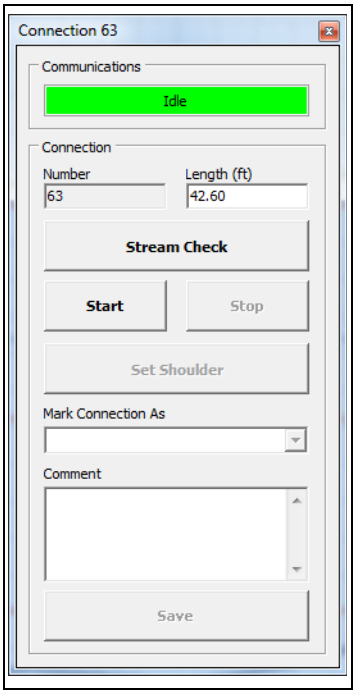
Use the following procedure to accept the *Passed* status assigned to a connection by TesTORK Manager software and continue to the next connection.

> **Note:** The recorded status of a connection attempt assigned a "Passed" status cannot be changed once the connection attempt has been saved.

1. On the main screen, click the **Connections** button.

The *Connections* dialog box appears.

Figure 4-2: Connections dialog box



Note: Change the casing length if required.

Note: The connection number is automatically assigned the next number in the sequence.

Note: Click **Stream Check** to display connection data without logging a connection attempt or determining a shoulder point.

To close the *Connections* dialog box after performing a stream check, click **Stream Check**.

2. Click **Start**.

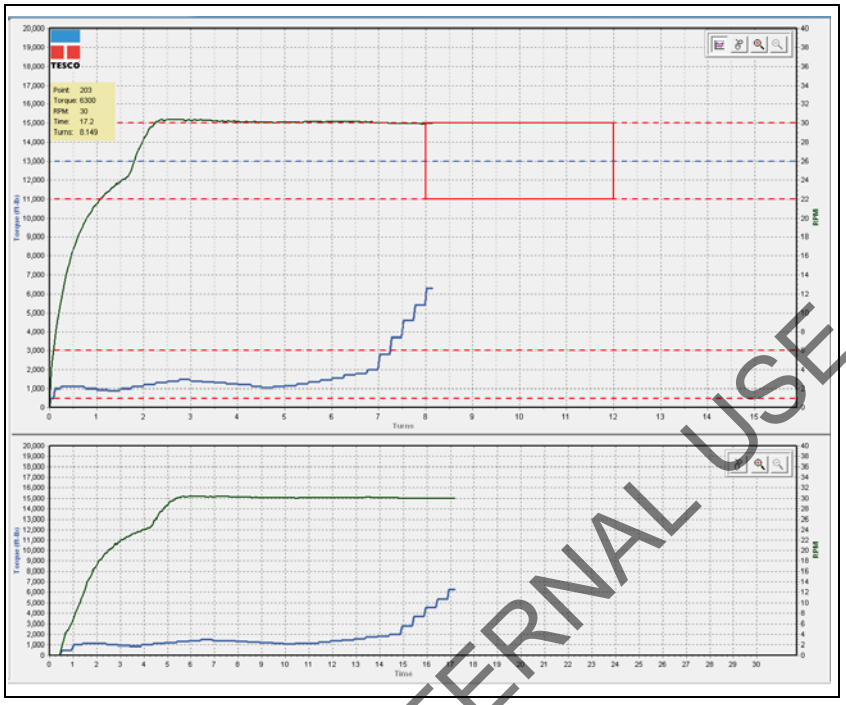
TesTORK Manager software is now ready to begin logging and displaying connection data.

Note: No data is displayed until the top drive operator begins a connection attempt.

3. Start a connection attempt.

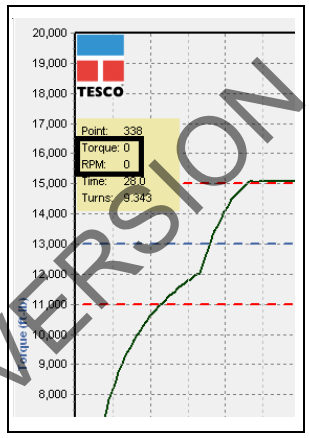
TesTORK Manager software begins logging and displaying connection data.

Figure 4-3: Connection data



4. When the *Torque* and *RPM* values reach zero, click **Stop**.

Figure 4-4: Torque and RPM values



5. Type comments in the *Comment* text box, if required.
6. Click **Save**.

   The connection number and length are added to the running totals and the connection data is logged.

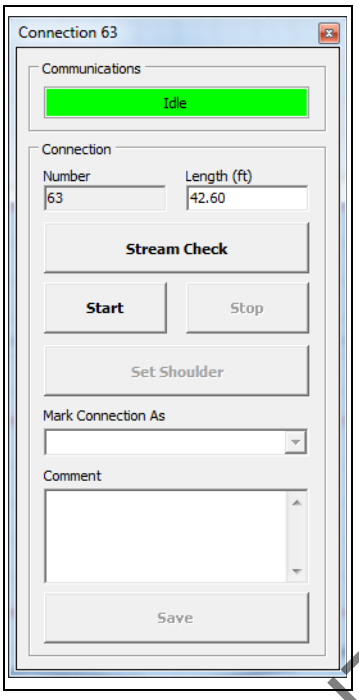
Log a Failed Connection

Use the following procedure to accept the *Failed* status assigned to a connection by the system and continue to the next connection.

1. On the main screen, click the **Connections** button.

   The *Connections* dialog box appears.

Figure 4-5: Connections dialog box



Note: Change the casing length if required.

Note: The connection number is automatically assigned the next number in the sequence.

Note: Click **Stream Check** to display connection data without logging a connection attempt or determining a shoulder point.

To close the *Connections* dialog box after performing a stream check, click **Stream Check**.

2. Click **Start**.

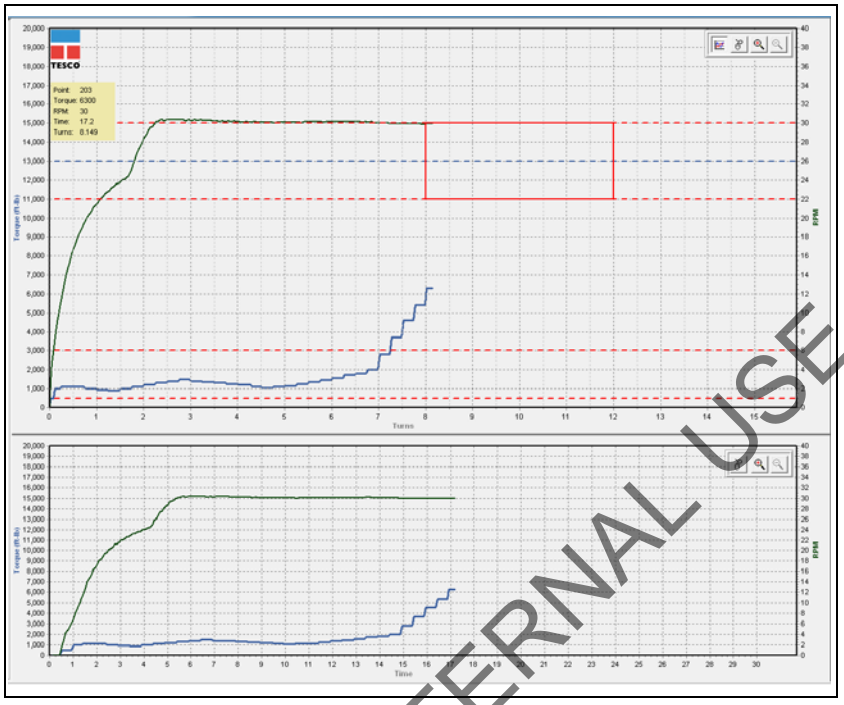
   TesTORK Manager software is now ready to begin logging and displaying connection data.

Note: No data is displayed until the top drive operator begins a connection attempt.

3. Start a connection attempt.

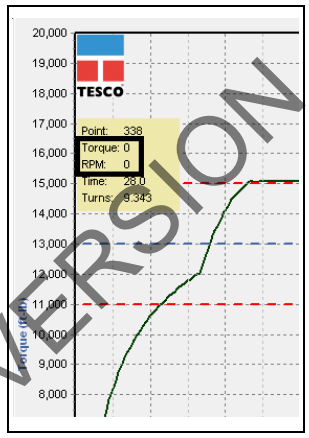
TesTORK Manager software begins logging and displaying connection data.

Figure 4-6: Connection data



4. When the *Torque* and *RPM* values reach zero, click **Stop**.

Figure 4-7: Torque and RPM



Failed is displayed in the *Mark Connection* drop-down list.

5. Type comments in the *Comment* text box.

Note: A comment must be typed in the *Comment* text box before clicking Save.

6. Click **Save**.

The connection number and length are added to the running totals and the connection data is logged.

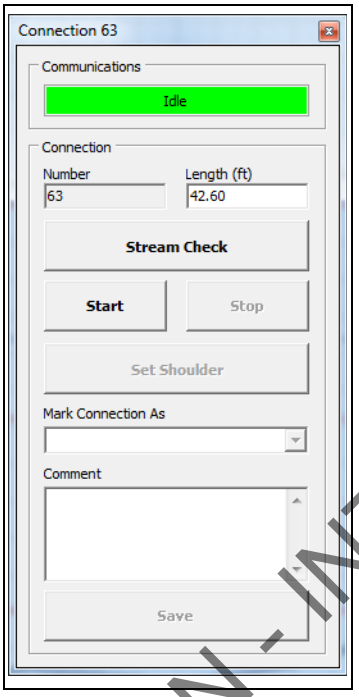
Force Past a Failed Connection

Use the following procedure to assign a *Force Past* result to a connection attempt assigned a *Failed* status by the system, and continue to the next connection.

1. On the main screen, click the **Connections** button.

   The *Connections* dialog box appears.

Figure 4-8: Connections dialog box



Note: Change the casing length if required.

Note: The connection number is automatically assigned the next number in the sequence.

Note: Click **Stream Check** to display connection data without logging a connection attempt or determining a shoulder point.

To close the *Connections* dialog box after performing a stream check, click **Stream Check**.

2. Click **Start**.

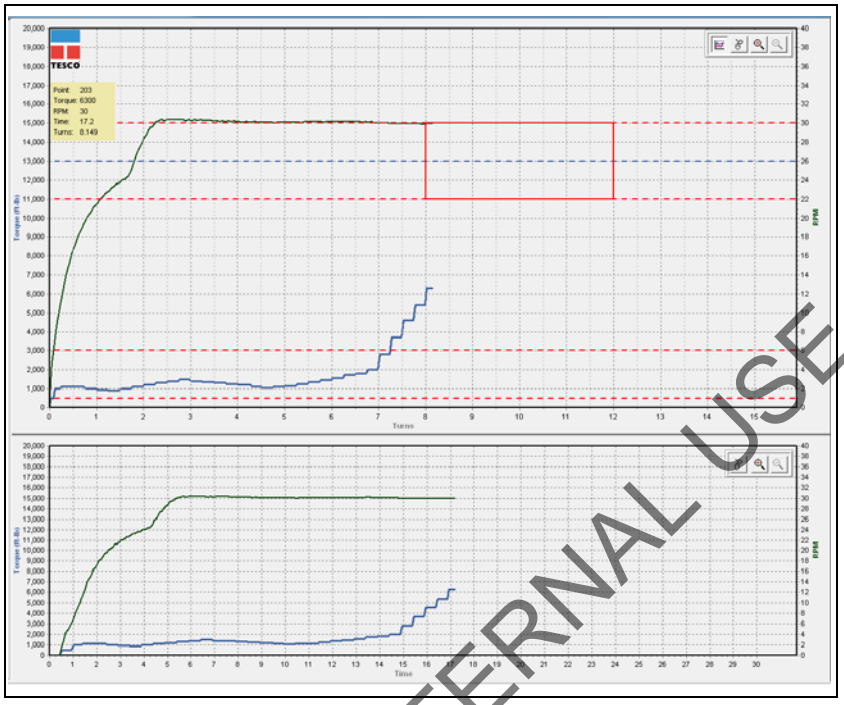
   TesTORK Manager software is now ready to begin logging and displaying connection data.

Note: No data is displayed until the top drive operator begins a connection attempt.

3. Start a connection attempt.

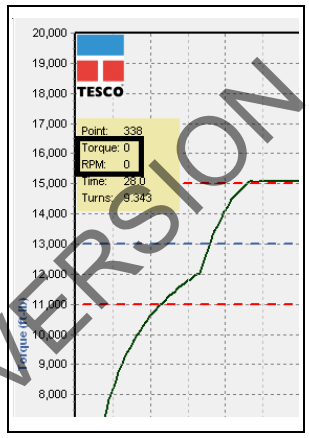
TesTORK Manager software begins logging and displaying connection data.

Figure 4-9: Connection data



4. When the *Torque* and *RPM* values reach zero, click **Stop**.

Figure 4-10: Torque and RPM



Failed is displayed in the *Mark Connection* drop-down list.

5. Select Forced Pass from the *Mark Connection* drop-down list.

6. Type comments in the *Comment* text box.

Note: A comment must be typed in the *Comment* text box before clicking Save.

7. Click **Save**.

The connection number and length are added to the running totals and the connection data is logged.

Performing a Manual Shoulder Operation

****The wording in this section requires checking and amending**

TesTORK Manager software enables the operator to manually change the shoulder point if the software doesn't detect a shoulder during a connection attempt.

The program then recalculates the delta turn and delta torque from the new shoulder point values.

When a new job folder is created, the shoulder detection method automatically defaults to *Auto Shoulder Detection* mode.

Note:

In Auto Mode, everything works the same as previously described. If the shoulder detection method needs to be changed to MANUAL, then the operator must go to the *Connection* dialog box and select manual shoulder.

Note: Notice the Shoulder Target values have been disabled and the **Shoulder Target Mode** has been changed to **Manual Shoulder**. The Main Screen also indicates that Manual Shoulder mode has been selected.

Note: Selecting **Manual Shoulder** disables alarms associated with automatic shouldering.

To manually set the shoulder point

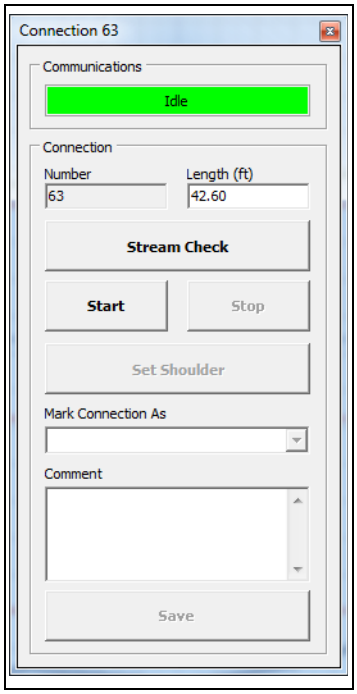
****Needs finishing**

Use the following procedure to manually set the shoulder point.

1. On the main screen, click the **Connections** button.

The *Connections* dialog box appears.

Figure 4-11: Connections dialog box



Note: Change the casing length if required.

Note: The connection number is automatically assigned the next number in the sequence.

Note: Click **Stream Check** to display connection data without logging a connection attempt or determining a shoulder point.

To close the *Connections* dialog box after performing a stream check, click **Stream Check**.

2. Click **Start**.

TesTORK Manager software is now ready to begin logging and displaying connection data.

Note: No data is displayed until the top drive operator begins a connection attempt.

3. Start a connection attempt.

This content requires adding: On the connection dialog box click "Set Shoulder". This message is displayed if the software doesn't find a shoulder it auto click "Set Shoulder"

Using the Drilling Control Feature

**Content required for this section

Adding a Job Comment

**Content required for this section

VIEWING PIPE TALLY DATA

Clicking the *Pipe Tally* button enables the operator to view information and data on each connection attempt completed during the current job.

***This section requires more information adding and the procedures to generate reports documenting.**

GENERATING REPORTS

***This section requires more information adding and the procedures to generate reports documenting.**

The section explains how to use TesTORK Manager software to generate reports that provide information on connections attempts made during the current job.

Figure 4-12: Summary Report Window

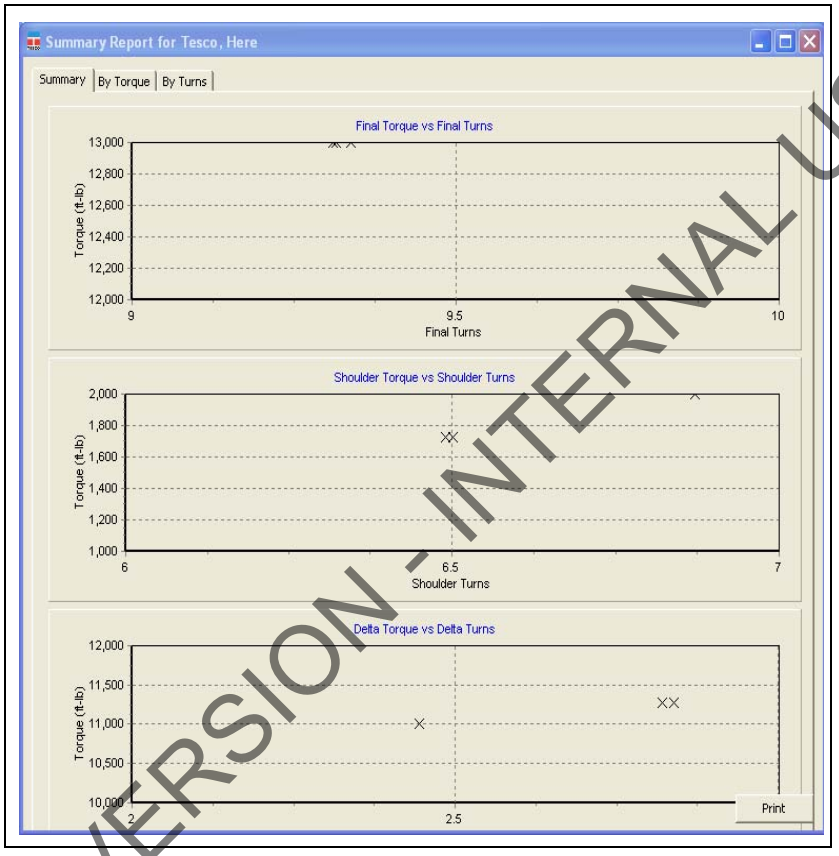


Table 4-1: Summary Report Window Dialog

Group	Field/Element Name	Data/Notes
Charts	Final Torque vs Final Turns	
	Shoulder Torque vs Shoulder Turns	
	Delta Torque vs Delta Turns	

Figure 4-13: Summary Report By Torque Window

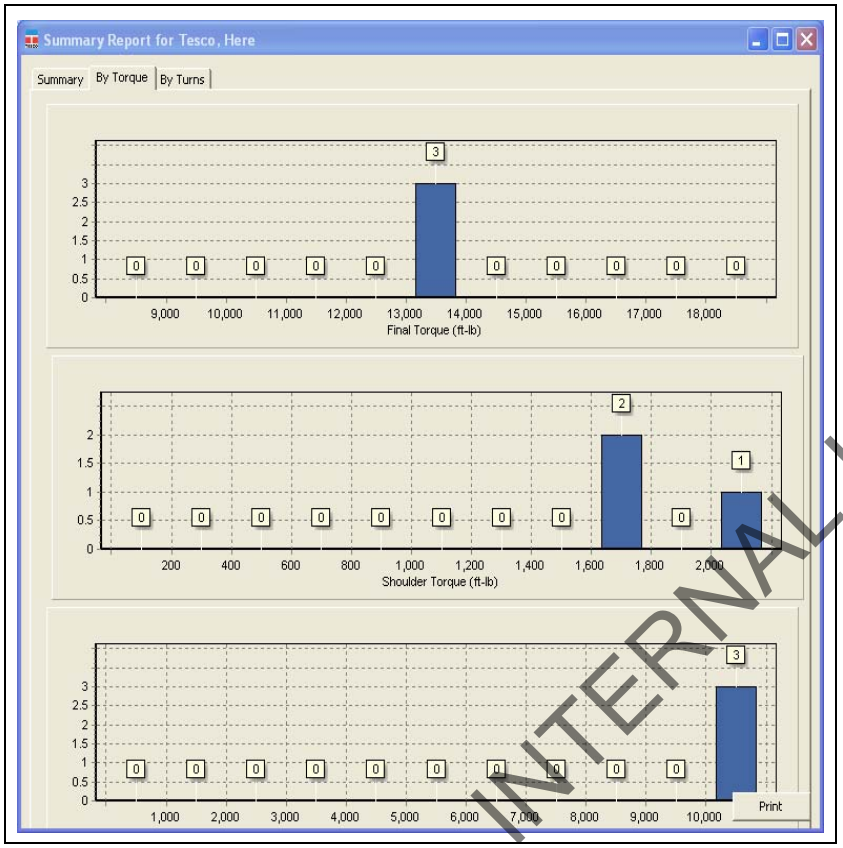


Table 4-2: Summary Report By Torque Window Dialog

Group	Field/Element Name	Data/Notes
Charts	Final Torque (ft-lb)	
	Shoulder Torque (ft-lb)	
	Delta Torque (ft-lb)	

Figure 4-14: Summary Report By Turns Window

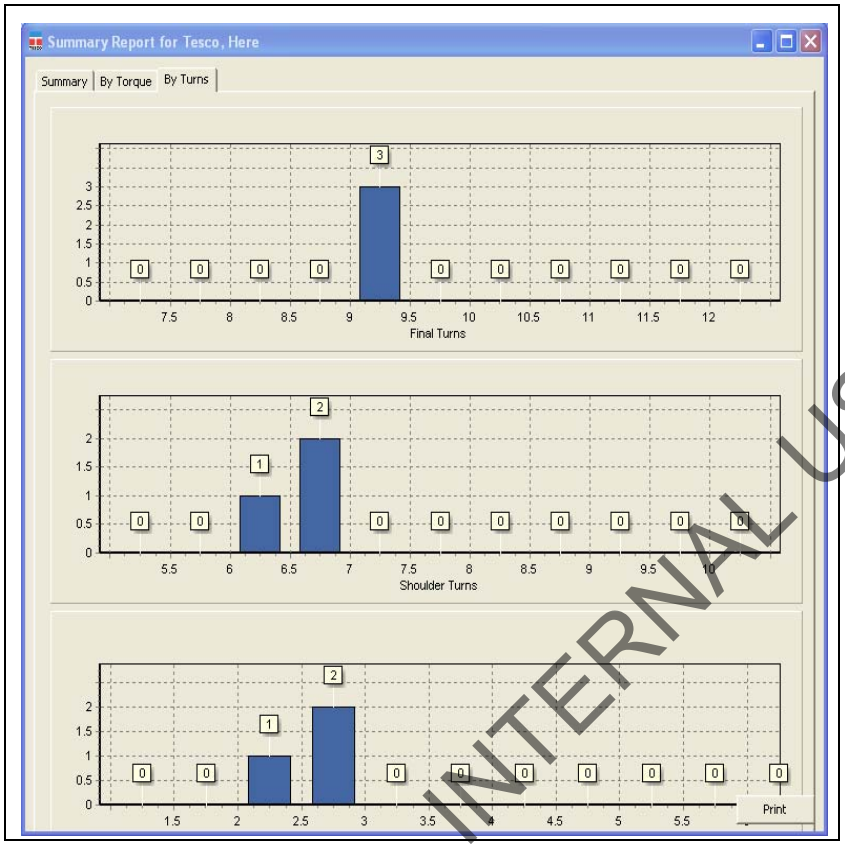


Table 4-3: Summary Window By Turns Dialog

Group	Field/Element Name	Data/Notes
Charts	Final Turns	
	Shoulder Turns	
	Delta Turns	

The TTS provides view and print report data.

Note: For screen shots and dialog box elements, see "Reports Side Panel" on page 22.

CHAPTER 5: SYSTEM SETTINGS AND ADMINISTRATION

This chapter provides information on configuring TesTORK system settings. All changes to TesTORK system settings are made in the *TesTORK System Settings* dialog box. An administrator passed word is required to access this dialog box.

This chapter also provides information on installing and running TesTORK Manager software.

Note: *Note required confirming how TesTORK Manager software is normally supplied, i.e. installed and fully configured on the host computer.

This chapter assumes that the installation, configuration, and calibration procedures for the TesTORK Wireless Torque / Turn Monitoring System have been completed.

TESTORK SYSTEM SETTINGS DIALOG BOX

Caution: The TesTORK Wireless Torque / Turn Monitoring System is supplied by TESCO with all system settings fully configured. Limited changes to these settings with be required during normal operation.

Changes to TesTORK system settings must only be made by suitable qualified personal.

***Statement requires verifying and amending as required**

The *TesTORK System Settings* dialog box features the following tabs enabling access to the various TesTORK system settings.

Table 5-1: TesTORK System Settings dialog box features

Tab	Description of settings
Communications	Two tabs are available that feature TesTORK communication settings and TesTORK base radio communication settings. A *Data logging* configuration option is also available.
Calibration	***Please supply description**
Graph Settings	Enables configuration of graph display settings including; graph axis settings, auto-shoulder parameters, rpm averaging and connection filtering options.

Table 5-1: TesTORK System Settings dialog box features

Tab	Description of settings
Misc	Enables configuration of were TesTORK Manager software saves job data. Also enables setting of the administrator password, the units of measure and closing a job file.

Accessing the System Settings Dialog Box

Use the following procedure to access the *TesTORK System Settings* dialog box.

1. Click the **Hardware** button located at the top left of the screen.

   The hardware information side panel appears.

   Note: For more information, see “Hardware Side Panel” on page 23.

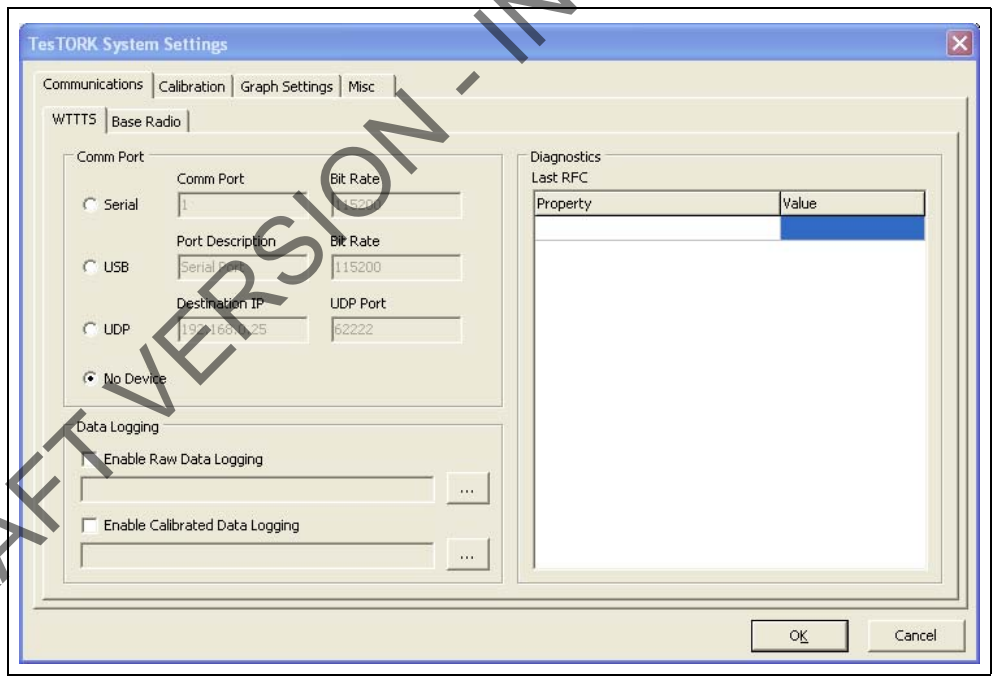
2. Click **Configuration**.

   The *Administrator Password Required* dialog box appears

3. Type the administrator password in the *password* text box, and then click **Enter**.

   The *TesTORK System Settings* tabbed dialog box appears.

Figure 5-1: TesTORK System Settings tabbed dialog box



Communications settings

Caution: The TesTORK Wireless Torque / Turn Monitoring System is supplied with all communication settings fully configured. Only limited changes to these settings may be required during normal operation.

Changes to TesTORK Communications settings must only be made by suitable qualified personal.

***Statement requires verifying and amending as required**

The *Communications* settings tabbed dialog box features the following two tabs:

- WTTS
- *Base Radio*

Note: For a screen shot of the Communications settings tab, see "TesTORK System Settings dialog box features" on page 55.

WTTS tab

The following system settings are available from the *WTTS* tab:

Table 5-2: WTTS tab settings

Group	Field/Element Name	Data/Notes
Comm Port	Serial (Radio Button)	Comm Port
	USB (Radio Button)	Port Description
	UDP (Radio Button)	Destination IP
	No Device (Radio Button)	There is no TesTORK Device
Data Logging	Enable Raw Data Logging (Check box)	If the *Enable Raw Data Logging* box is checked the user can select where to save the log file by clicking on the "**...**" button.
	Enable Calibrated Data Logging (Check box)	If the Enable Calibrated Data Logging is checked the user can select where to save the log file by clicking on the "**...**" button.

Table 5-2: WTTS tab settings

Group	Field/Element Name	Data/Notes
Diagnostics (Last RFC)	Link State	
	Last RFC	
	Temperature	
	Battery Life	
	Battery Type	
	Pressure	
	RPM	
	Last Reset	
	RF Channel	
	Current Mode	
	RFC Rate	
	RFC Timeout	
	Stream Rate	
	Stream Timeout	
	Pairing Timeout	

Base Radio tab

****The following are advanced IT settings - Statement required to that effect**

The following system settings are available from the *Base Radio* tab:

Table 5-3: Base Radio tab settings

Group	Field/Element Name	Data/Notes
Comm Port	Serial (Radio Button)	Comm Port
	USB (Radio Button)	Port Description
	UDP (Radio Button)	Destination IP
	No Device (Radio Button)	There is no TesTORK Device
Commands	WTTS Chan	***Please provide explanation**

Table 5-3: Base Radio tab settings

Group	Field/Element Name	Data/Notes
Diagnostics (Last Status)	Link State	***Please provide explanation to cover all the following parameters:**
	Last RFC	
	Temperature	
	Battery Life	
	Battery Type	
	Pressure	
	RPM	
	Last Reset	
	RF Channel	
	Current Mode	
	RFC Rate	
	RFC Timeout	
	Stream Rate	
	Stream Timeout	
	Pairing Timeout	

Calibration settings

Caution: The TesTORK Wireless Torque / Turn Monitoring System is supplied with all calibration settings fully configured. Only limited changes to these settings may be required during normal operation.

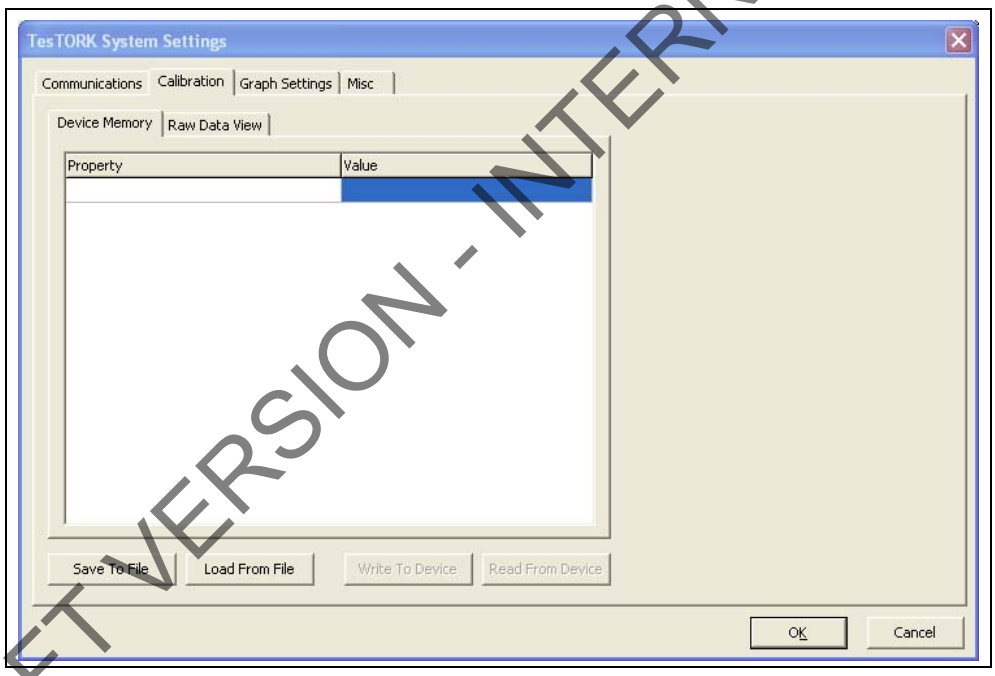
Changes to TesTORK Communications settings must only be made by suitable qualified personal. .

****The following features are not yet implemented**

The *Calibration* settings tabbed dialog box features the following two tabs:

- *Device Memory*
- *Raw Data View*

Figure 5-2: Calibration settings tabbed dialog box



Device Memory tab

The following system settings are available from the *Device Memory* tab:

Table 5-4: Device Memory tab settings

Group	Field/Element Name	Data/Notes
Device Memory	Cal Version	***Please provide explanation to cover all the following parameters:**
	Cal Revision	
	Serial Number	
	Manufacturer Info	
	Manufacturer Date	
	Torque 000 Offset	
	Torque 000 Span	
	Torque 180 Offset	
	Torque 180 Span	
	Tension 000 Offset	
	Tension 000 Span	
	Tension 090 Offset	
	Tension 090 Span	
	Tension 180 Offset	
	Tension 180 Span	
	Tension 270 Offset	
	Tension 270 Span	
	Gyro Offset	
	Gyro Span	
	Pressure Offset	
	Pressure Span	
Buttons	Save To File	Save Calibration Data to User-Specified File Location
	Load From File	Load Calibration Data from a User-Specified Location.
	Write To Device	
	Read From Device	

Raw Data View tab

The following system settings are available from the *Raw Data View* tab:

Table 5-5: Raw Data View tab settings

Group	Field/Element Name	Data/Notes
Device Memory	Cal Version	***Please provide explanation to cover all the following parameters:**
	Cal Revision	
	Serial Number	
	Manufacturer Info	
	Manufacturer Date	
	Torque 000 Offset	
	Torque 000 Span	
	Torque 180 Offset	
	Torque 180 Span	
	Tension 000 Offset	
	Tension 000 Span	
	Tension 090 Offset	
	Tension 090 Span	
	Tension 180 Offset	
	Tension 180 Span	
	Tension 270 Offset	
	Tension 270 Span	
	Gyro Offset	
	Gyro Span	
	Pressure Offset	
	Pressure Span	
Buttons	Save To File	Save Calibration Data to User-Specified File Location
	Load From File	Load Calibration Data from a User-Specified Location.
	Write To Device	
	Read From Device	

Graph settings

The *Graph Settings* tab enables configuration of how connection data is displayed during a connection attempt. ***Requires further explanation/notes adding**

Figure 5-3: Calibration settings dialog box

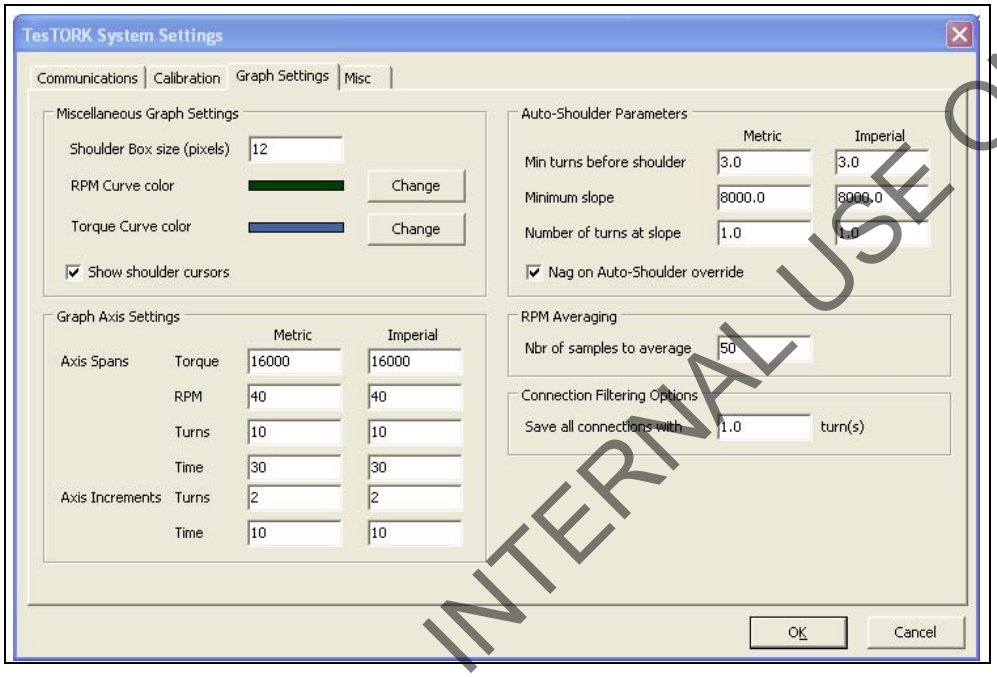


Table 5-6: Graph settings

Group	Field/Element Name	Data/Notes
Miscellaneous Graph Settings	Shoulder Box size (pixels)	
	RPM Curve Color	Specify the Color of the RPM Curve Graph
	Torque Curve Color	Specify the Color of the Torque Curve Graph
	Show shoulder cursors (Checkbox)	If checked, shoulder cursors are displayed in the graph
Graph Axis Settings (Axis Spans)	Torque	***Please supply an explanation of the following descriptions:**
	RPM	
	Turns	
	Time	
Graph Axis Settings (Axis Increments)	Turns	
	Time	

Table 5-6: Graph settings

Group	Field/Element Name	Data/Notes
Auto-Shoulder Parameters	Min turns before shoulder	
	Minimum slope	
	Number of turns at slope	
	Nag on Auto-Shoulder override (Checkbox)	
RPM Averaging	Nbr of samples to average	

Misc settings

The *Misc* tab enables configuration of the following features:

- Change the location of the job directory where TesTORK Manager software saves all configuration data
- Configure the system administrator password
- Define the unit of measure used to display connection data
- Close a job

***Requires further explanation/notes adding**

Figure 5-4: System Settings -> Misc Window

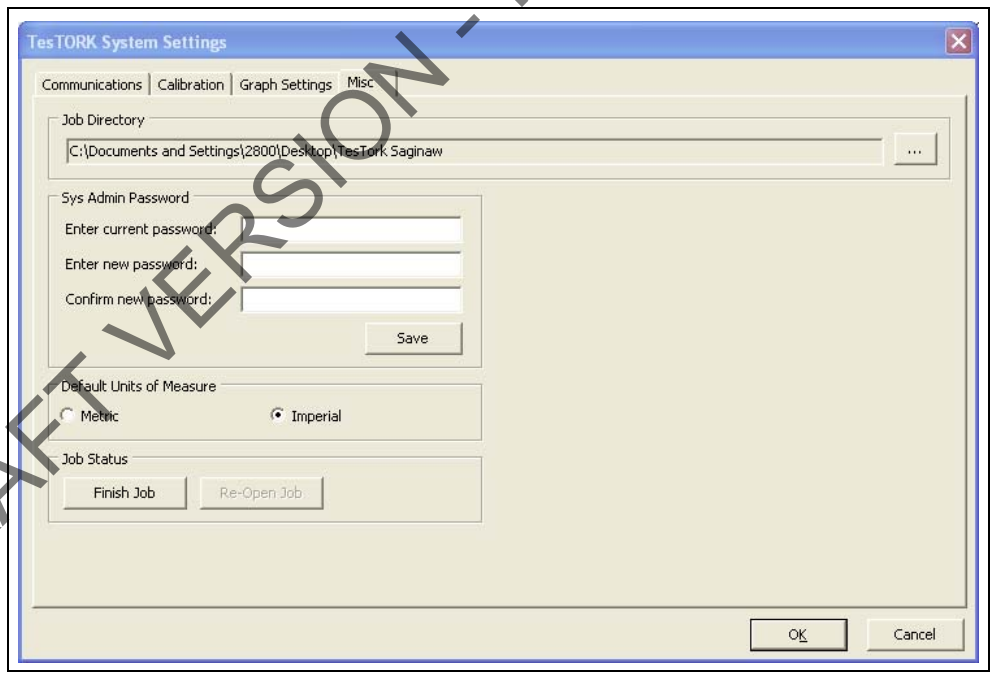


Table 5-7: System Settings -> Misc Dialog

Group	Field/Element Name	Data/Notes
Job Directory	Location of Job Directory	The user can navigate to the desired job directory by clicking the "**...**" button.
Sys Admin Password	Enter current password	Enter the Current Password into the Text field
	Enter new password	Enter the New Password into the Text Field
	Confirm new password	Confirm the New Password by Entering it in the Text Field
	Save (Button)	Save the New Password
Default Units of Measure	Metric/Imperial (Radio Buttons)	Select with Which Units of Measurement the WTTTS will Display
Job Status	Finish Job (Button)	
	Re-Open Job (Button)	

INSTALLING AND CONFIGURING TESTORK MANAGER SOFTWARE

***The following contents of this chapter are dependent on how TesTORK Manager software will be made available to the customer. Confirmation is required on whether the software will be supplied installed and configured on a computer, or supplied on a DVD.**

Computer Requirements

The following computer requirements are the minimum hardware and software requirements for the computer hosting WTTS software.

Minimum Hardware

- Dedicated hardware platform
- 2 GB of RAM

Supported Operating System

Windows® 7 or Windows 8 operating system

Running WTTS Software

WTTS software is designed to be a portable program. The following options for running the software are provided.

- The operator can run WTTS software directly from a USB flash drive.
- The operator can run TesTORK Manager software directly from the host computer's desktop.
- TesTORK Manager software can be configured to start automatically when the computer hosting the software starts.

To run TesTORK Manager software from a USB flash drive

Use the following procedure to run TesTORK Manager software directly from a USB flash drive:

1. Insert the USB flash drive into an available USB port on the computer hosting TesTORK Manager software.

   Note: If the contents of the AutoPlay dialog box doesn't appear, navigate to the USB flash drive folder containing the TesTORK Manager software executable file.

2. Double click the WTTS software executable file.

   The *Select Job* dialog box appears.

To run TesTORK Manager software from the host computer desktop

Use the following procedure to run TesTORK Manager software directly from the host computer's desktop:

1. **1.** Insert the USB flash drive.

   Note: If the contents of the AutoPlay dialog box doesn't appear, navigate to the containing the TesTORK Manager software executable file.

2. Browse to and right-click the WTTS software executable file, and then click **Copy**.
3. Browse to the host computer's desktop.
4. Right-click, and then click **Paste**.

   The TesTORK Manager software executable file is pasted on the host computer's desktop.

To start TesTORK Manager software automatically when the host computer starts

Use the following procedure to configure TesTORK Manager software to start automatically when the computer hosting the software starts:

1. Insert the USB flash drive. If the contents of the AutoPlay dialog box doesn't appear, navigate to the folder containing the TesTORK Manager software executable file.
2. Browse to and right-click the TesTORK Manager software executable file, and then click **Copy**.
3. Select **Start** > **All Programs** > **Startup**
4. Right click on the *Startup* folder, and then click **Open**.

   The *Startup* folder opens in Windows Explorer.
5. Right click the *Startup* folder, and then click **Paste**.
6. TesTORK Manager software will now start automatically when the computer hosting the software starts.

   Note: To stop TesTORK Manager software from starting automatically, repeat steps 3-4. Then delete the WTTS software shortcut icon from the startup folder.

SYSTEM START UP

TesTORK software is a portable application that runs on a compatible computer without being installed in a way that modifies the computer's configuration information.

> **Note:** For information the computer requirements required to run TesTORK software, see "TesTORK System Settings Dialog Box" on page 55.

The TesTORK software executable file can be stored and started from a host computer's desktop. TesTORK software can also be stored and started from portable storage device such as a USB drive.

A single folder is created when the TesTORK software is started for the first time. The folder provides a location for all configuration data and data logs for each job. This enables operators to start TesTORK software and resume work on an existing job without reentering any configuration data. New configuration data is entered each time a new job is started.

Use the following procedures to start TesTORK software for the first time on a host computer

To start TesTORK software for the first time on a host computer

1. Ensure the Torque Turn System TesTORK computer is powered up and the desktop is displayed on the screen.
2. Double-click the **TestTORKManager** program icon located on the Desktop.

   A dialog box appears confirming that a job data directory must be set before starting the software.
3. Click **OK**.

   The *Browse For Folder* dialog box appears.

   > **Note:** TesTORK software uses the selected folder to store log files containing configuration and connection data from each job started in the software.
4. Browse to and select (or create) a suitable folder, and then click **OK**.

   The *Select Job* dialog box appears.

5. Select one of the following options:

If you want to:	Complete these steps:
Start an existing job	**a.** Ensure the *Existing Jobs* tab is selected. **b.** Select a job, and then click **OK**. Use the Display Filter buttons to display the most recent jobs or all jobs. The TesTORK main screen appears.
Create a new job	**a.** Click the **New Jobs** tab. The *New Jobs* dialog box appears. **b.** Type a client name in the *Client* box. **c.** Type a location in the *Location* box. **d.** Select a unit of measure using the *Units of Measure* radio buttons. **e.** Type a starting connection number in the *Starting Connection* box. **f.** Click **OK**. The *Create New Job* Window appears **g.** Type the relevant information or data in the text boxes. For a description of each text box item, see Figure 2-3 on page 9. **h.** Click **OK**. The TesTORK Manager software main screen appears.

CHAPTER 6: TESCO BASE RADIO

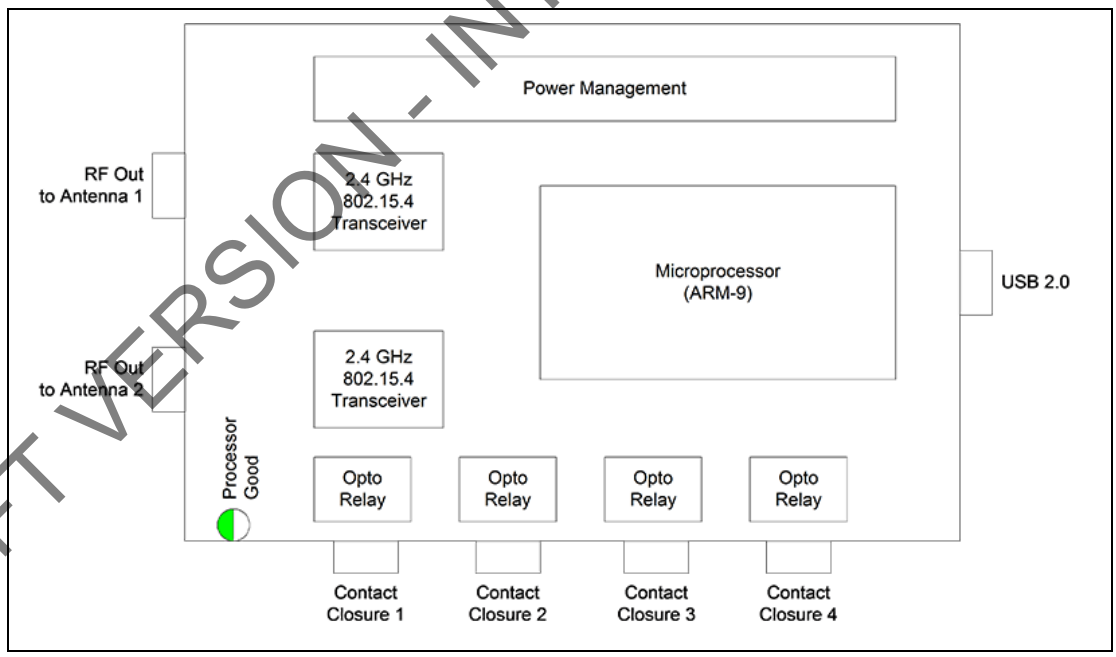
INTRODUCTION

The TESCO Base Radio is a high performance communications system designed to provide wireless communications with a variety of TESCO products, including:

- TESCO Wireless Torque Turn System (WTTTS)
- TESCO Cement Plug Tracking System (CPTS)
- TESCO Compact Casing Drive System (CCDS)

BLOCK DIAGRAM

Figure 6-1: TESCO Base Radio Block Diagram



ELECTROMAGNETIC COMPATIBILITY NOTICE

FCC

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

The grantee is not responsible for any changes or modifications not expressly approved by the party responsible for compliance. Such modifications could void the user's authority to operate this device.

This device has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This device generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this device does cause harmful interference to radio or television reception, which can be determined by turning this device off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between this device and receiver.
- Connect this device into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

IC RSS 210

This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

SAFETY

The TESCO Base Radio is intended to be used in locations where hazardous gases may occasionally be present. It meets the requirements of IEC-60079-11 for use in Zone 2 Group IIB; CSA 22.2 No. 213 and ANSI/ISA 12.12.01-2012 Class 1 Division 2, gas groups C and D.

Note: Only units with either a Special Inspection sticker or Model Certification label shall be used in locations where hazardous gases may be present.

4.1.1 CSA 22.2 No. 213

THIS EQUIPMENT IS SUITABLE FOR USE IN CLASS 1, DIVISION 2, GROUPS C AND D, OR NON-HAZARDOUS LOCATIONS ONLY.

Warning! EXPLOSION HAZARD - SUBSTITUTION OF COMPONENTS MAY IMPAIR SUITABILITY FOR CLASS 1, DIVISION 2.

Avertissement! RISQUE D'EXPLOSION - LA SUBSTITUTION DES COMPOSANTS PEUT RENDRE CE MATERIEL INACCEPTABLE POUR LES EMPLACEMENTS DE CLASSE 1, DIVISION 2.

Warning! EXPLOSION HAZARD - DO NOT DISCONNECT EQUIPMENT UNLESS POWER HAS BEEN SWITCHED OFF OR THE AREA IS KNOWN TO BE NON-HAZARDOUS.

Avertissement! RISQUE D'EXPLOSION - AVANT DE DECONNECTER L'EQUIPEMENT, COUPER LE COURANT OU S'ASSURER QUE L'EMPLACEMENT EST DESIGNE NON DANGEREUX

4.1.2 ANSI/ISA 12.12.01

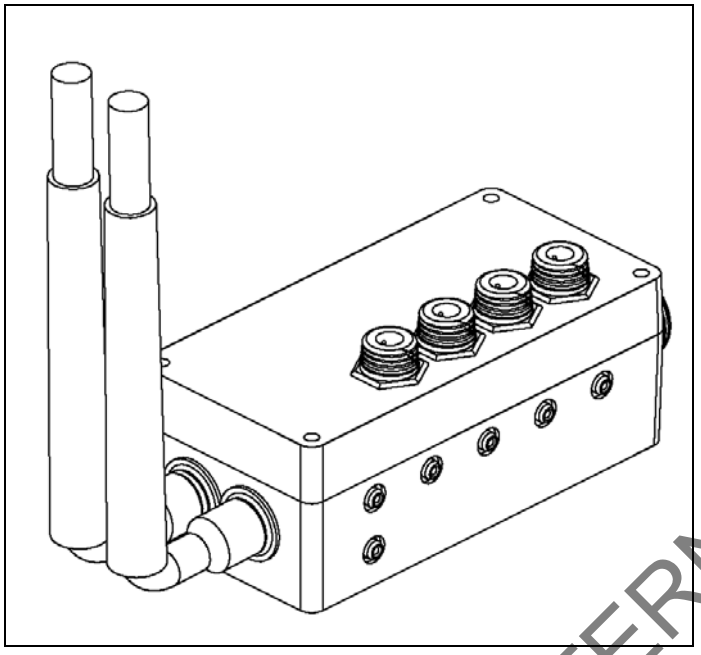
USER CONTROLS

The TESCO Base Radio is designed to be used as part of a TESCO Wireless System. All control of the Base Radio is through the TESCO Software.

There are no physical user controls on the TESCO Base Radio.

SPECIFICATIONS

Figure 6-2: Base Radio



Environmental

The TESCO Base Radio is designed for outdoor use.

Table 6-1: TESCO Base Radio Environmental Specifications

Operating Temperature Range	-40 °C to +70 °C.
Storage Temperature	-40 °C to +85 °C.
Operating and Storage Humidity	10% to 95%
Ingress Protection	IP66 (when used with recommended connectors or dust caps)

Radio

The TESCO Base Radio contains two radio transceivers. This allows the TESCO Base Radio to receive streaming real time measurement data from the Wireless Torque Turn Tension System on one channel while at the same time monitor supervisory devices such as the TESCO Compact Casing Drive System on the other channel.

Both radio channels are under control of the same microprocessor and the software ensures that the two radio channels operate on different frequency channels and never transmit at the same time.

The following specifications apply to both radio links:

Table 6-2: Radio Specifications

Parameter	Specification
Protocol	Subset of IEEE 802.15.4
Modulation	GMSK, DSSS at 250 kb/s, 2 Mchip/s
FCC/IC Emission Designator	2M42G7D
Frequency Band	2.405 to 2.480 GHz (channel centers)
Standard Channels	Channel 11 (2.405 GHz center) Channel 15 (2.425 GHz center) Channel 20 (2.450 GHz center) Channel 25 (2.475 GHz center)
Channel Bandwidth	3 MHz max. (TBV)
RF Transmit Power	-5 dBm max.
Connector	WTTTS: N-Type General Purpose: RP-TNC
Allowable Antenna Gain	+5 dBi max.

Contact Closures

The TESCO Base Radio provides up to four opto-isolated solid-state contact closures that may be used for a variety of control alerting purposes. The state of these closures is set through the main application software.

Table 6-3: Contact Closure Specifications

Parameter	Specification
Configuration	Form A (Normally Open)
Load Current	100 mA max.
Off-State Voltage	350 V Peak (AC or DC)
On-State Resistance	35 ohms max, (t < 1 s); 50 ohms max, (continuous)
Isolation Voltage	1500 Vrms min.
Turn-On Time	1 ms max.
Turn-Off Time	1 ms max.
Connector	*Amphenol* USBBF TV 2 1 G 13-13

Power

Power to the TESCO Base Radio is provided by the host computer through the USB connector.

Table 6-4: Base Radio Power Specifications

Parameter	Specification
Input Voltage Range	4.5 - 5.5 Vdc

Table 6-4: Base Radio Power Specifications

Parameter	Specification
Current	200 mA max.

Digital Interface

The interface to the computer is by means of a single USB connector.

Table 6-5: Digital Interface Specifications

Parameter	Specification
Connector Type	USB Type-B
Interface Standard	USB 2.0, Serial Port Protocol

MOUNTING

The TESCO Base Radio may be mounted to the back of the *Labresav* computer by means of the Mounting Adapter, TESCO part number 5036743.

Alternatively, it may be mounted in any convenient location within reach of the computer.

Note: If mounted in a location exposed to weather, ensure that all unused connectors have dust-caps installed and properly fitted.

When both radio channels are used, to minimize the risk of generating emissions that could interfere with other radio systems, ensure the two antennas are spaced at least 8” (20 cm) apart.

In order to comply with the requirements for exposure to radio frequency energy, all antennas must be mounted at least 8” (20 cm) from all persons.

OPERATING INSTRUCTIONS

The TESCO Base Radio is intended to be used only as part of a TESCO Wireless System. To operate the TESCO Base Radio, connect it by means of a USB cable to a computer running the TESCO Wireless System software.

MAINTENANCE

The TESCO Base Radio contains no user serviceable parts.

APPENDIX A: CHANGING THE BATTERY

CAUTIONS AND WARNINGS

Warning! This equipment contains intrinsically safe circuitry. Substitution of components may impair intrinsic safety.

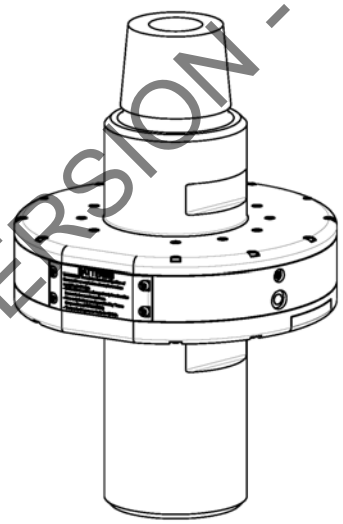
To reduce the risk of ignition of a flammable or explosive atmosphere when servicing the battery be sure the battery seals are seated properly and sealing surfaces are clean.

- The battery is rechargeable
- The battery is Class 1 Div 1 certified
- The battery terminals are the same left to right. The battery can be inserted upside down provided the terminals are facing inwards.

TORQUE SUB BATTERY CHANGING

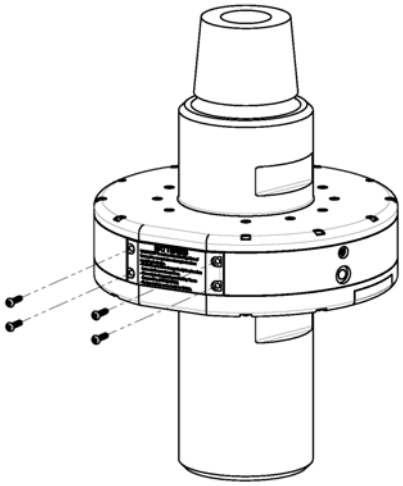
1. Turn the sub so the battery compartment is easily accessible.

Figure A-1: Place the TesTORK



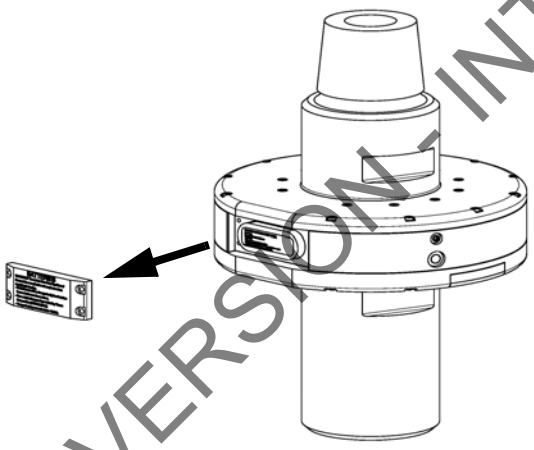
2. Using a 5/16” hex key, remove the four cap screws securing the battery compartment cover plate.

Figure A-2: Remove cap screws



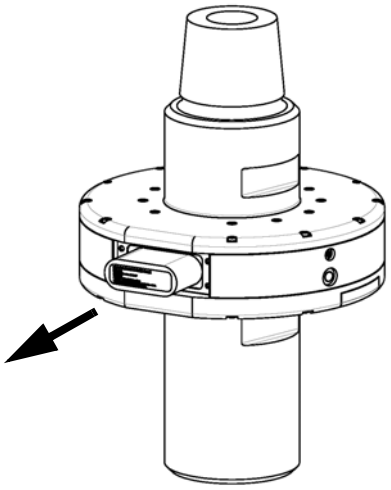
3. Remove the battery compartment cover plate.

Figure A-3: Remove battery cover



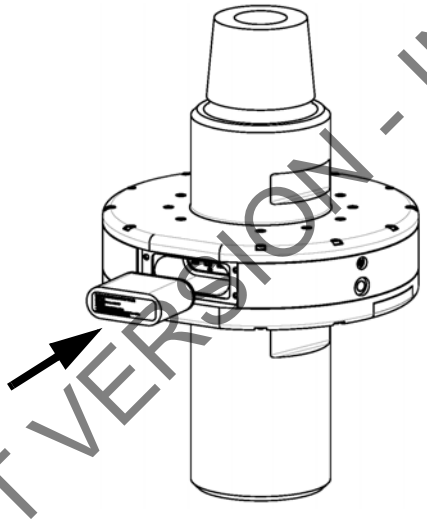
4. Pull out the existing battery.

Figure A-4: Remove battery cover



5. Push in the new battery.

Figure A-5: Refit battery



6. Replace the battery compartment cover plate and secure with the four cap screws.

Note: The TesTORK system will automatically power up when the battery is fitted in the battery compartment.

APPENDIX B: TTS CHECKLISTS AND FORMS

The following forms are available for the Torque Turn System. See the following pages for examples of each form.

*** Some of the following checklist require updating**

- Form #881020 - Job Safety Analysis Sheet
- Form #881051 - Wireless Torque Turn System Pre-Job Information Sheet
- Form #881032 - Torque Turn System Required Data Sheet
- Form #881028 - Torque Turn System Tool Kit Inventory List
- Form #2400003 - Wireless Torque Turn System Inventory List
- Form #881042 - Final Checklist

JOB SAFETY ANALYSIS WORKSHEET

Form Description

The Job Safety Analysis Sheet is an internal document for all TESCO workers including field, shop, and office employees.

This document is to be filled out by the supervisor at the beginning of each job.

Job Safety Analysis Worksheet

TESCO

Job #:	Job Location:	Analysis Made By:
Date:	Job Supervisor:	Analysis Reviewed With:

Personal Protective Equipment Required and/or Recommended

☐ Hard Hat ☐ Steel Toe Boots ☐ Gloves ☐ Safety Glasses ☐ Apron ☐ Respirator ☐ Safety Harness ☐ Face Shield ☐ Rubber Gloves

☐ Other: _____ _____ _____

Sequence of Basic Job Step	Potential Accidents or Hazards	Recommended Safe Job Procedures	Name of Person Performing Review

TORQUE TURN SYSTEM: PRE-JOB INFORMATION CHECKLIST

Form Description

The pre-job information checklist is a collection of rig information.

The pre-job information checklist is partially filled out by the TESCO Service Manager then sent to the field office to collect the remaining information. The information on this checklist is used by the job supervisor responsible for the torque turn job in the field.

Wireless Torque Turn System
Pre-Job Information Checklist

Operator:	
Office Contact:	
Phone Number:	Fax Number:
Email:	
Operator Field Representative:	
Phone Number:	Fax Number:
Email:	
Drilling Contractor:	Rig Number:
Office Contact:	
Phone Number:	Fax Number:
Email:	
Rig Manager:	
Phone Number:	Fax Number:
Email:	
Legal land description and well name where rig is located:	
Directions to the rig:	
Information on the last run of casing string:	
Depth: ☐ft ☐m	Size: ☐in ☐mm
Current well status:	
Anticipated timing of casing job:	
Job description/special instructions:	

Depth:	☐ft ☐m	Length of string:	☐ft ☐m
Casing Manufacturer:		Size:	☐in ☐mm
Weight:	☐lb/ft ☐kg/m	Grade:	
Special/Drift (ID):	☐in ☐mm	Thread Type:	
Make-up torque:			
Minimum:	Optimum:	Maximum:	☐ft·lbs ☐N-m

Wireless Torque Turn System
Pre-Job Information Checklist

Top Drive in use:							
TESCO:	☐ EMI	☐ ECI	☐ HCI	☐ HS	☐ HC	☐ HMI	Details:
VARCO:		Model:			Grabber Model:		
CANRIG:		Model:			Grabber Model:		
NATIONAL:		Model:			Grabber Model:		
OTHER:		Model:			Grabber Model:		
RPM Sensor Assembly installed on the CDS that was identified for this job						☐ Yes	☐ No
Redundancy Concerns							
Spare laptop:	☐ Yes	☐ No		Spare Laptop Battery:		☐ Yes	☐ No
Spare RPM Sensor Assembly:	☐ Yes	☐ No		Spare Cables:		☐ Yes	☐ No
Receiver Box	☐ Yes	☐ No		Transmitter Box		☐ Yes	☐ No
Wireless Torque Sub	☐ Yes	☐ No					
Equipment and accessories required as per the job quote:							
Torque monitoring:							
Other:							
Complete the information below before sending to rig:							
Completed by				Signature:			
Fax this completed survey to the attention of:							
Fax Number:				Phone Number:			

TORQUE TURN SYSTEM: REQUIRED DATA SHEET

Form Description

The required data sheet is used for information collection and is to be filled out by TESCO personnel after information has been received from the rig on the Pre-Job Information Check-list (form # 881031).

If some information is not received from the rig, the TESCO job supervisor will be required to supply the remaining information while on site. A rig survey is required.

Torque Turn System Required Data Sheet

The following casing information is required to set the parameters for the Torque/Turn or Torque/Time monitors. Tesco will ONLY use operator supplied data. Rig Survey checklist must be completed by a Tesco Representative.

		Rig Survey Required
Oil Company:	Well Name:	☐
Drilling Supervisor:	L.S.D.:	☐
Drilling Engineer:	Contractor:	☐
Wellsite Supervisor:	Rig Number:	☐
Wellsite Phone Number:	Top Drive Make:	☐
	Top Drive Model:	☐
Projected Casing Depth:		☐
Project Date of Job:		
Calibration check interval: Every joints (Tesco recommends checking a minimum of once at the mid-point.)		☐
Casing Information		
Manufacturer:		☐
Connection Name:		☐
Casing Grade:		☐
Casing Weight:	☐ lb/ft or ☐ kg/m (Check unit of measure)	☐
Torque Target		
Minimum Make Up Torque:	☐ lbf-ft or ☐ N-m (Check unit of measure)	☐
Optimum Make Up Torque:	☐ lbf-ft or ☐ N-m	☐
Maximum Make Up Torque:	☐ lbf-ft or ☐ N-m	☐
Maximum Make Up RPM:		☐
Shoulder Target		
Turns to Shoulder:	Turns +/-:	☐
Post-Shoulder Turns:	Turns +/-:	☐
Trigger Torque:	☐ lbf-ft or ☐ N-m (Check unit of measure)	☐
Maximum Shoulder RPM:		☐
The above information was supplied and approved by the following:		
Name (print):		
Position/title of approver:		
Date:		
Signature:		

TORQUE TURN SYSTEM: TOOL KIT INVENTORY CHECKLIST

Form Description:

The tool kit inventory checklist provides information for the job supervisor who is responsible to maintain control of all tools.

***This checklist requires updating**

Torque Turn System
Tool Kit Inventory Checklist

Item	Description	Part #	Qty	Origin	Item Size	Going to Site	Leaving Site
1	Battery - for Flashlight	1623	1	USA	Spring Top	☐	☐
2	Flashlight	2766	1			☐	☐
3	Bulb - for Flashlight	6054	4	Hong Kong	6 Volt	☐	☐
4	Duct Tape - Roll	1584	2	USA	2"	☐	☐
5	Stainless Steel Wire - Roll	2909	1	CHINA	0.032"	☐	☐
6	Tie Wrap - Plastic	5381	100	USA	¼" x 12"	☐	☐
7	Tie Wrap - Plastic	805	100	USA	5/16" x 30"	☐	☐
8	Tie Wrap - Plastic	806	50	USA	1/8" x 7"	☐	☐
9	Hex Key Set - Short Arm	1289	1	USA	0.028" to 5/8"	☐	☐
10	Hex Key Set - Short Arm - Metric	1286	1	USA	0.7 mm to 10 mm	☐	☐
11	Fluke Meter - Process 787	18012	1	USA		☐	☐
12	Fuse for Fluke Meter	0487	2	USA	11 Amp	☐	☐
13	Fuse for Fluke Meter	0491	2	USA	44/100 Amp	☐	☐
14	Alligator Clip	3794	2	USA	Red and Black	☐	☐
15	Solder 60/40	6465	1	CANADA	60/40	☐	☐
16	Solder for Pyropen	7475	1	CANADA	3/32/Silver	☐	☐
17	Butane for Pyropen	1650	1	USA	145 g	☐	☐
18	Pyropen	1524	1	USA	cordless	☐	☐
19	Vise Grip	1400	1	USA	10”	☐	☐
20	Side Cutting Pliers	1368	1	TAIWAN	7”	☐	☐
21	Wire Stripper	1526	1	USA		☐	☐
22	Unidriver	1380	1	TAIWAN	13 PC.	☐	☐
23	Utility Knife	1293	1	JAPAN	L2hd	☐	☐
24	Small Torque Wrench	5814	1	USA		☐	☐
25	Terminating Screw Driver	4277	1	USA	1/8”x6”	☐	☐
26						☐	☐
27						☐	☐

The Above information was collected by?

Going to site	Name (print):	Signature:
Leaving site	Name (print):	Signature:

TORQUE TURN SYSTEM: INVENTORY CHECKLIST

Form Description *This checklist requires updating

The inventory list is to be filled out by the job supervisor prior to arriving and leaving the job site.

The purpose of this list is to keep track of all equipment and to assist with information needed to prepare exportation papers for the equipment.

Wireless Torque Turn System: Inventory Checklist

Unit Number:

Inventory Checklist								
Item No.	Tesco Part Number	Item Description	Country of Origin	Size (in)	QTY	Weight (lbs)	Going to Site	Leaving Site
1	770128 - ?	Pelican Case #1	USA	31.5" x 23 x 18 - ?	1		☐	☐
2	5034205 - ?	Computer, Laversab 2900	USA		1	30 - ?	☐	☐
3		Power Cord for Computer	USA		1	1	☐	☐
4	5031416	TesTORK	?	28" x 16" x 16"	1	500 - ?	☐	☐
5	5033583	Base Radio	?	?	1	35 - ?	☐	☐
7	771035 - ?	TesTork Sub Carrying Bracket	USA	20" x 19" x 13"	1	30	☐	☐
8		USB Patch Cord, c/w Laversab Computer	USA		1		☐	☐
9	770032 - ?	Printer c/w Dual Voltage PSU	USA		1	4	☐	☐
10	730673 - ?	Printer USB Cord	?		1		☐	☐
11		Spare Printer Ink Cartridges (Black and Color)			2		☐	☐
12		Ream of 8.5" x 11" Paper	USA	28" x 16" x 16"	2	10	☐	☐
13	5033019	Spare TesTORK Battery	?	?	1		☐	☐
14	5033586	Battery Charger	?	?	1	10	☐	☐

TORQUE TURN SYSTEM: FINAL CHECKLIST

Form Description

The final checklist is to be completed by the job supervisor before leaving the job site.

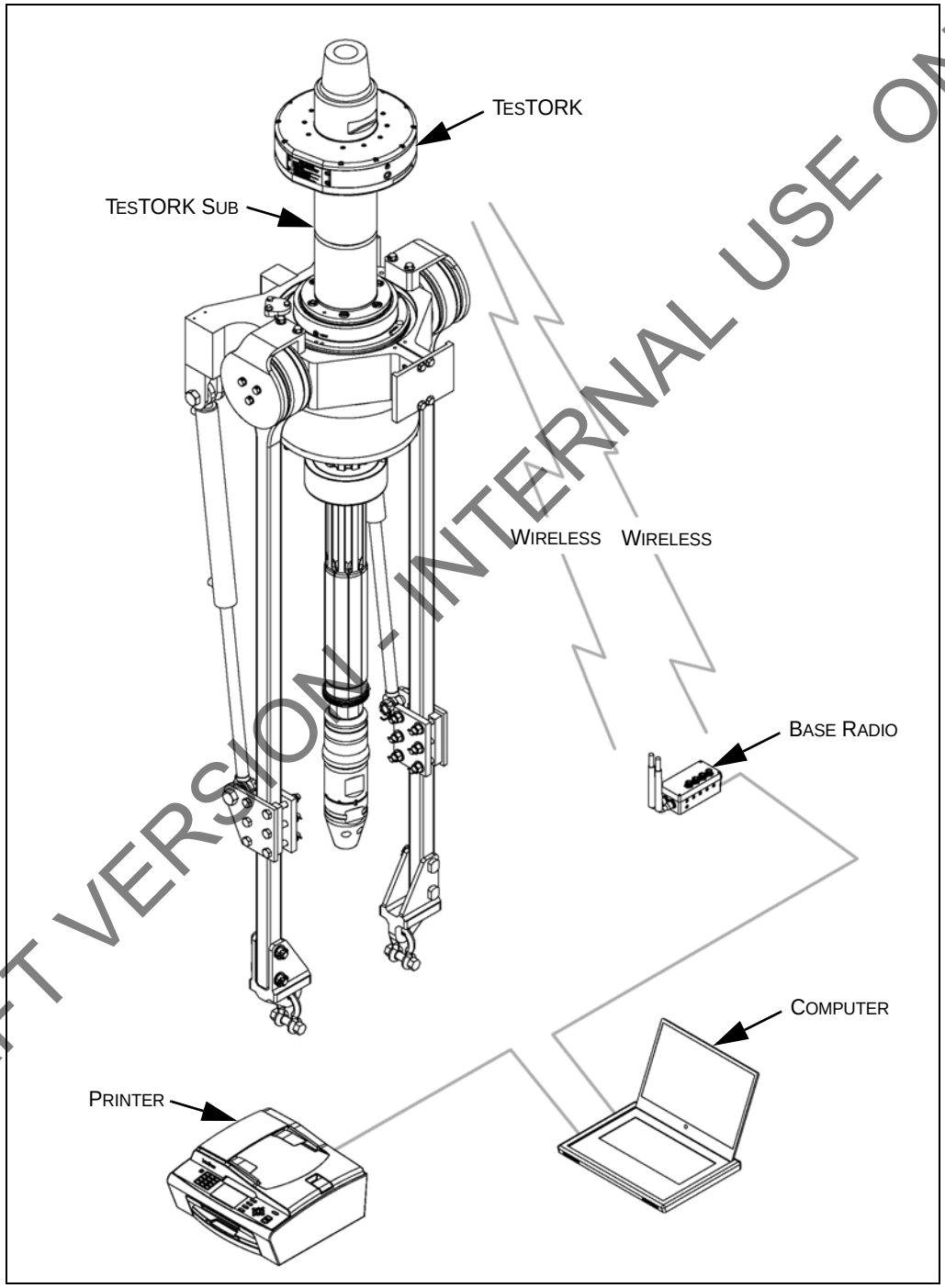
The purpose of this checklist is to ensure that the crew is equipped with all the tools needed to complete the job.

Torque Turn System: Final Checklist

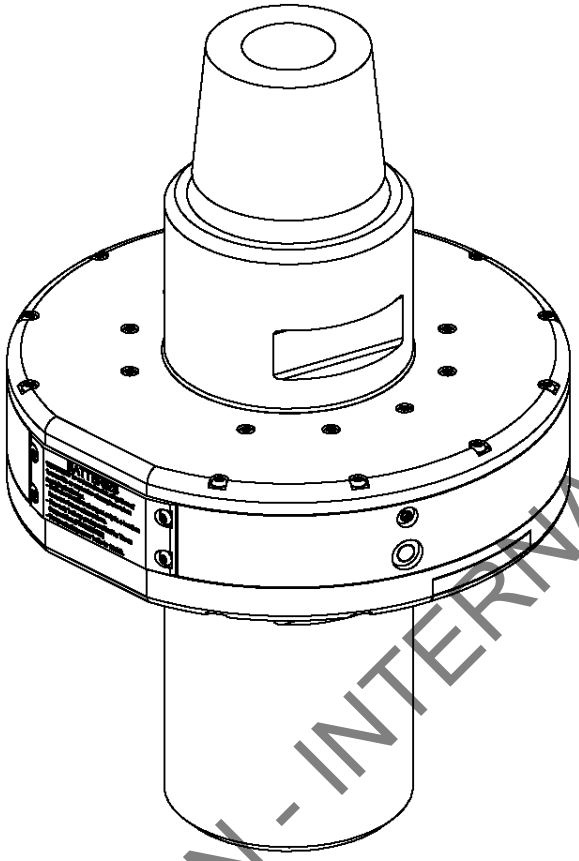
Final Check List Item	Complete	Comments
Box 1 on Truck	☐	
Box 2 on Truck	☐	
Casing Tool on Truck	☐	
Tool Box on Truck	☐	
Pre-Job Forms Completed	☐	
Directions To The Rig	☐	
Communications Devices	☐	
Personal Computer	☐	
Fuel For The Vehicle	☐	
Additional Items	☐	
	☐	
	☐	
	☐	
	☐	
	☐	
	☐	
	☐	
The above check was performed by:		
Name (print):		Signature:

APPENDIX C: DEVICE SPECIFICATIONS

TESTORK DEVICE NETWORK



WIRELESS TORQUE AND TENSION SUB



Description	Details
Function	Measure and transmit torque and tension values at a rate of 100 Hz
Location	Between top drive and CDS tool
	Designed for UL & CSA Class 1, Div. 1 Hazard Location (pending certification)
Connection	API 6-5/8” Regular Thread Pin Up
	API 6-5/8” Regular Thread Box Down
	Battery Powered, No electrical connections
Primary Load Rating	500 ton - API 8C

APPENDIX D: DEVICE HAZARDOUS LOCATION RATINGS

The following table provides information on the hazardous location rating for each TesTORK system device. ***Please check the following information for accuracy**

Table D-1: Device hazardous location ratings

Device	TESCO Part number	International Electrical Commission (IEC)	Canadian Standards Association (CSA) / Underwriters Laboratories (UL)
TesTORK housing (including TesTORK sub)	5031416	Zone 1	
Base radio	5033583		Class 1 Div 2
TESCO supplied computers: • Industrial touch-screen PC • Laptop	 5034206 5034206		 Class 1 Div 2 Class 1 Div 2
Battery pack - rechargeable Battery pack - non rechargeable		Zone 1 (when fitted in TesTORK housing) Zone 1 (when fitted in TesTORK housing)	
Battery charger	5033586	**Not yet rated**	**Not yet rated**