TPT Contractor©

Twist, Plumb and Tension

Software by GTS

In Association With

PENN-TECH
INTERNATIONAL

Introduces

TPT Contractor©

TPT Contractor©

Twist, Plumb and Tension

Software by GTS

Software

for Contractors with

PENN-TECH INTERNATIONAL

TENSIONMETERS

GTS Griswold Tower Software

TPT Contractor©

Twist, Plumb and Tension

Software by GTS

Table of Contents

(Click on ● to go to each section.)

Griswold Tower Software

TPT Contractor©

Twist, Plumb and Tension

Software by GTS

Capabilities

Back to Table of Contents

Griswold Tower Software

TPT Contractor©

Twist, Plumb and Tension

Software by GTs

Capabilities

TPT Contractor© will handle:

- 12 levels of guys, with or without torque arms
- 3 rings of guy foundations at different elevations and distances from the tower
- 22 different cable sizes and types
- Twist and Plumb Measurements by either Angular or % of Leg Measurement Methods
- Twist and Plumb Report in accordance with TIA-222
- Recommended dial reading for Tension Measurements based on tower geometry and temperature at time of measurement

GTs Griswold Tower Software

TPT Contractor©

Twist, Plumb and Tension

Software by GTs

Capabilities

TPT Contractor© provides:

- Field Calibration Verification Check and Test Certificate
- Screen Shots with all tension data for each cable on the tower
- Tension Report in accordance with TIA-222
- Plan View at each guy level with cable tensions, twist & plumb measurements to assist field crew to better understand how to adjust the tower to correct out-of-tolerance measurements
- Preliminary Measurements Mode, Final Measurements Mode, and Inspector Mode
- Form for tension measurements without tower data

GTs Griswold Tower Software

TPT Contractor©

Twist, Plumb and Tension

Software by GTS

Setup and Use

Back to Table of Contents

Griswold Tower Software

TPT Contractor©

Twist, Plumb and Tension

Software by GTs

Setup and Use

The goal of **TPT Contractor©** is to increase the accuracy of the **T**wist, **P**lumb and **T**ension work being performed by Tower **Contractor**s working on Guyed Towers. Each copy of the software contains the calibration data specific to the **Penn-Tech Tensionmeter** being used.

The following slides are designed to assist contractors in the initial setup of the software and to help them get the most out of the software with the minimum of effort.

GTs Griswold Tower Software

TPT Contractor©

Twist, Plumb and Tension

Software by GTs

Setup and Use

The software runs inside of Microsoft Excel. It is designed to run in versions 2007 and later. It will not operate properly in earlier versions of Excel.

The software will be provided on a USB Jump Drive. We suggest you make a copy onto any computers that might be used with the program. Each copy of the program is calibrated for one Penn-Tech Tensionmeter. The file name represents the Tensionmeter serial number and Calibration Date. For example, if the serial no. is TM 1000-012, calibrated on 1/05/2014, the file name will be **TPT Contractor 1000-012 - 01052014.xlsm**.

GTs Griswold Tower Software

TPT Contractor©

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Software by GTs

Setup and Use

We suggest you keep an original copy of the software on each computer using the software. Then make a copy of the software into a project file before starting work on a new tower. If multiple towers are in one project then either make a folder for each tower or multiple copies of the software, renaming each as the name or number for the tower. This will help keep your files organized and prevent you from having to clear the data from a previous project when starting a new project.

GTs
Griswold Tower Software

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Software by GTS

Setup and Use

Double-click on the file name to start the program. The first time the program starts there may be up to 2 different Security Warnings. You must enable each of these for the program to run correctly.

The program is now ready to use.

The program should start at the Dashboard.

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Twist, Plumb and Tension

Software by GTS

The Dashboard

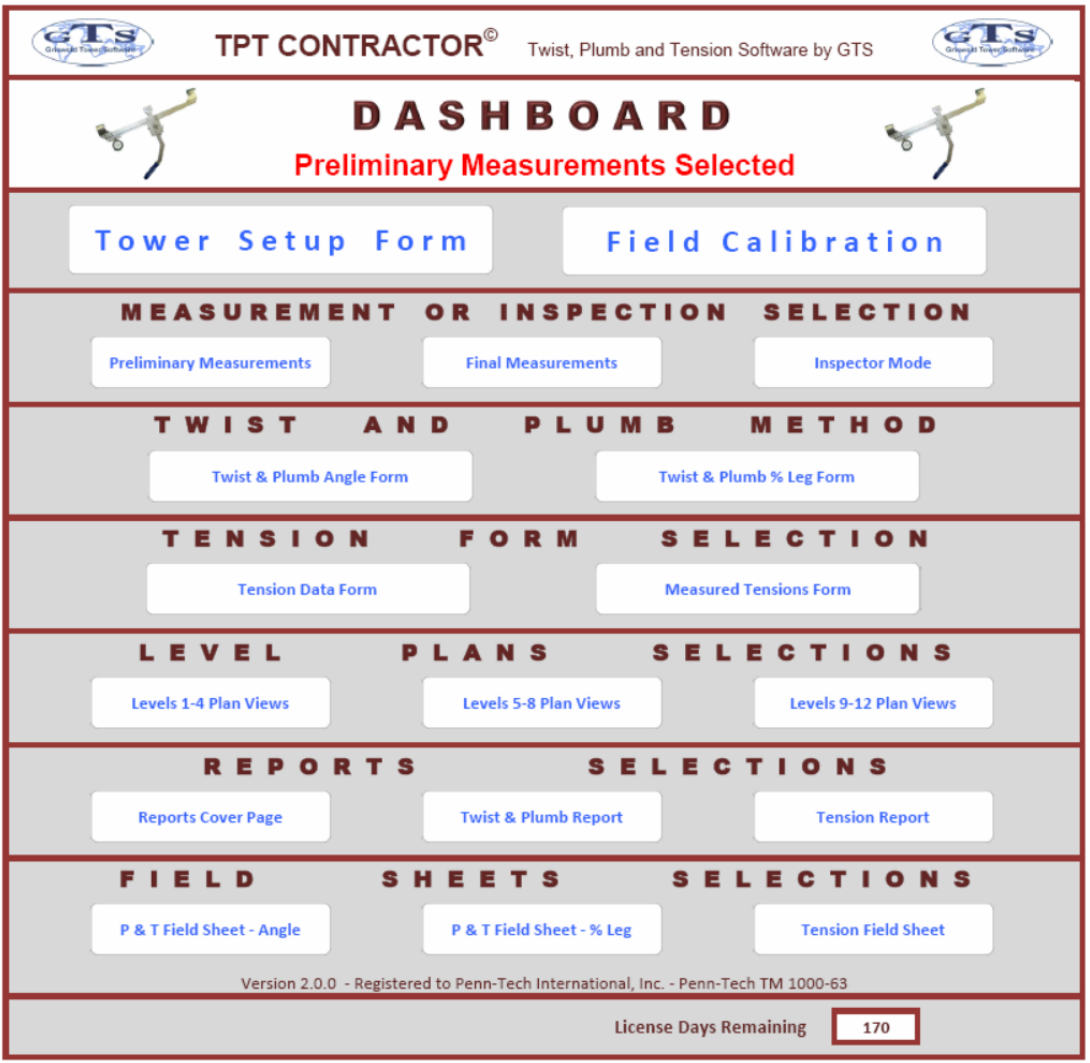
Back to Table of Contents

Griswold Tower Software

TPT Contractor©

Twist, Plumb and Tension

Software by GTS



The Dashboard

The dashboard, shown to the left, has been designed to simplify navigation around the program. It is divided into 7 sections. These are Tower Setup; Preliminary or Final Measurement or Inspection; Twist & Plumb Method Forms; Tension Forms; Level Plans; Report Pages; and Field Sheets.

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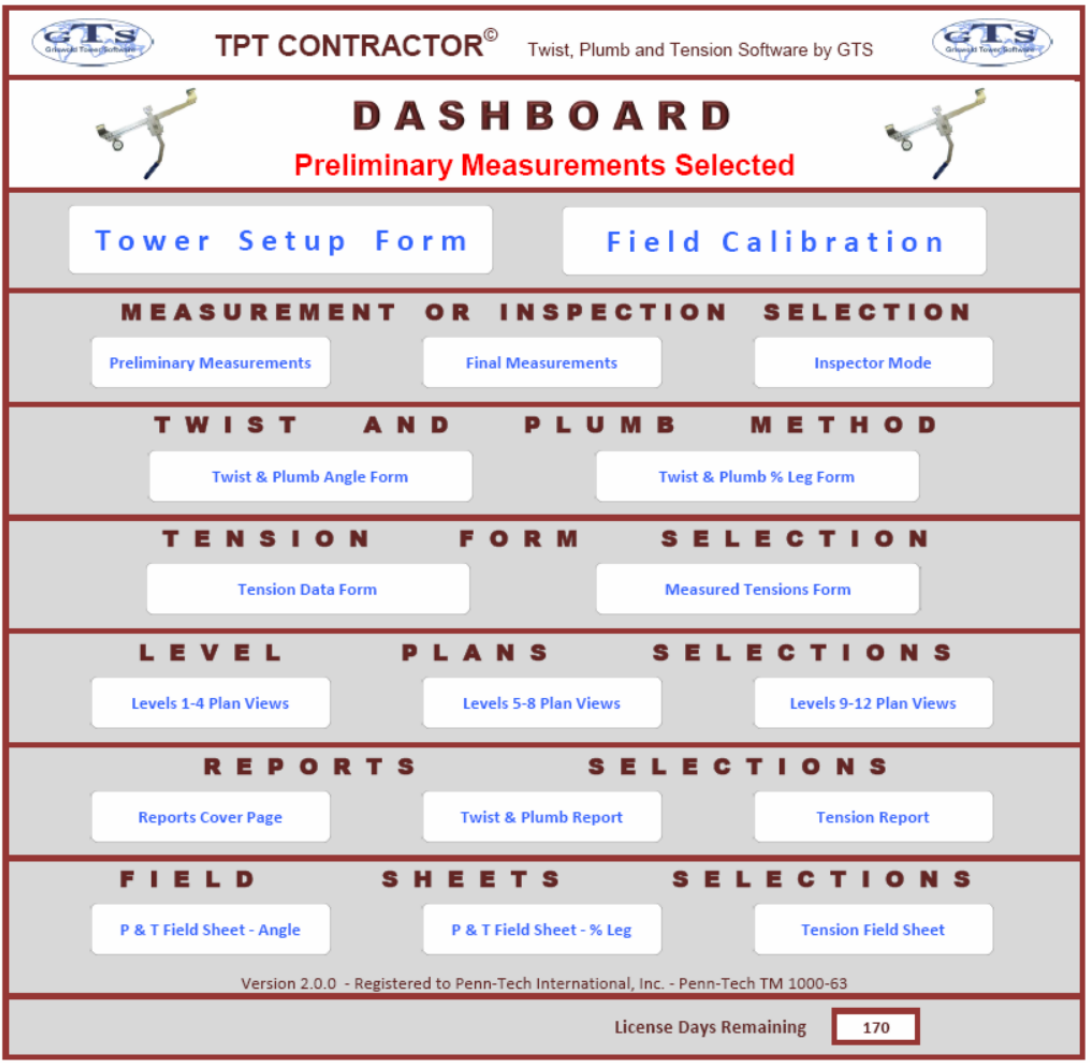
Twist, Plumb and Tension

Software by GTS



The Dashboard

Each of the 18 buttons on the Dashboard takes you to a specific form in the program. Every form also has one or more conveniently located buttons for returning to the Dashboard.

We will use the program with an example tower.

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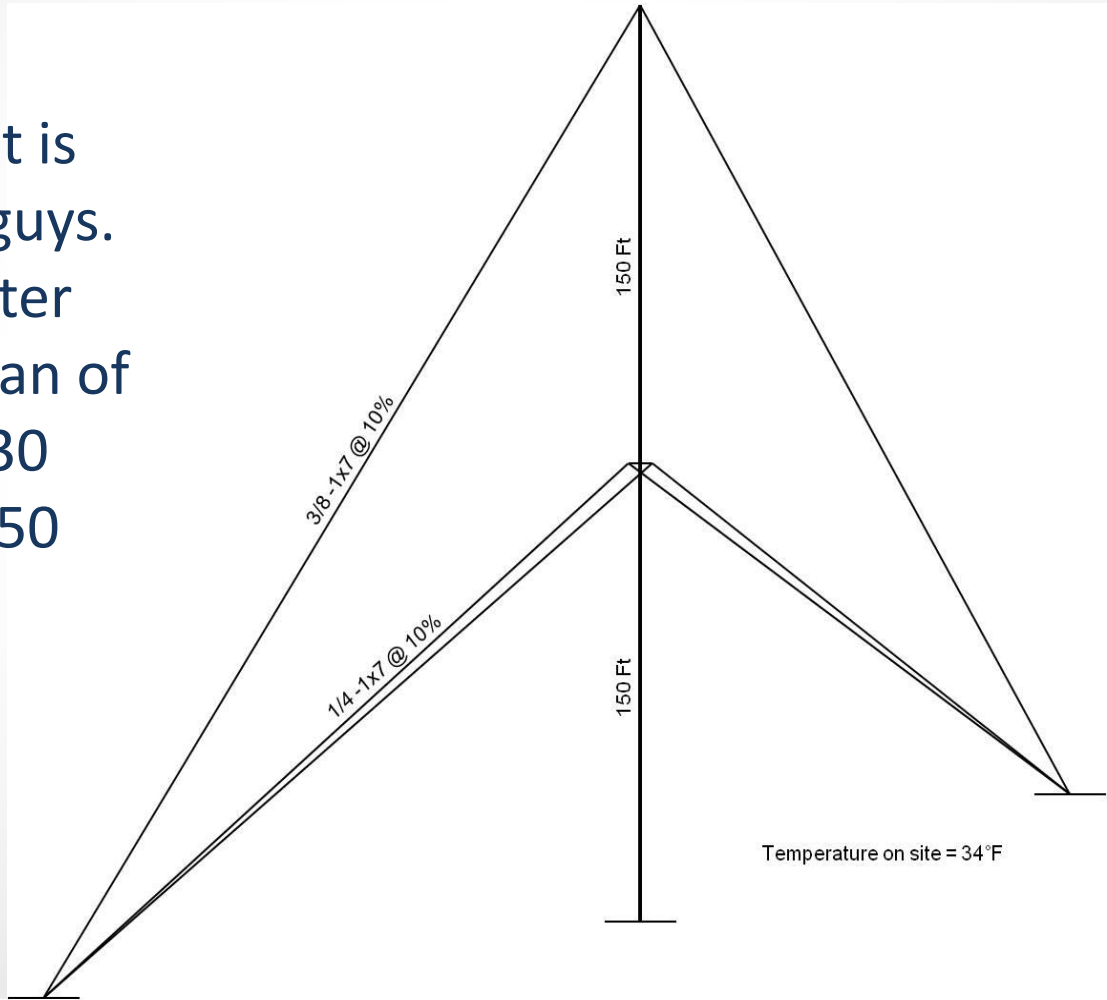
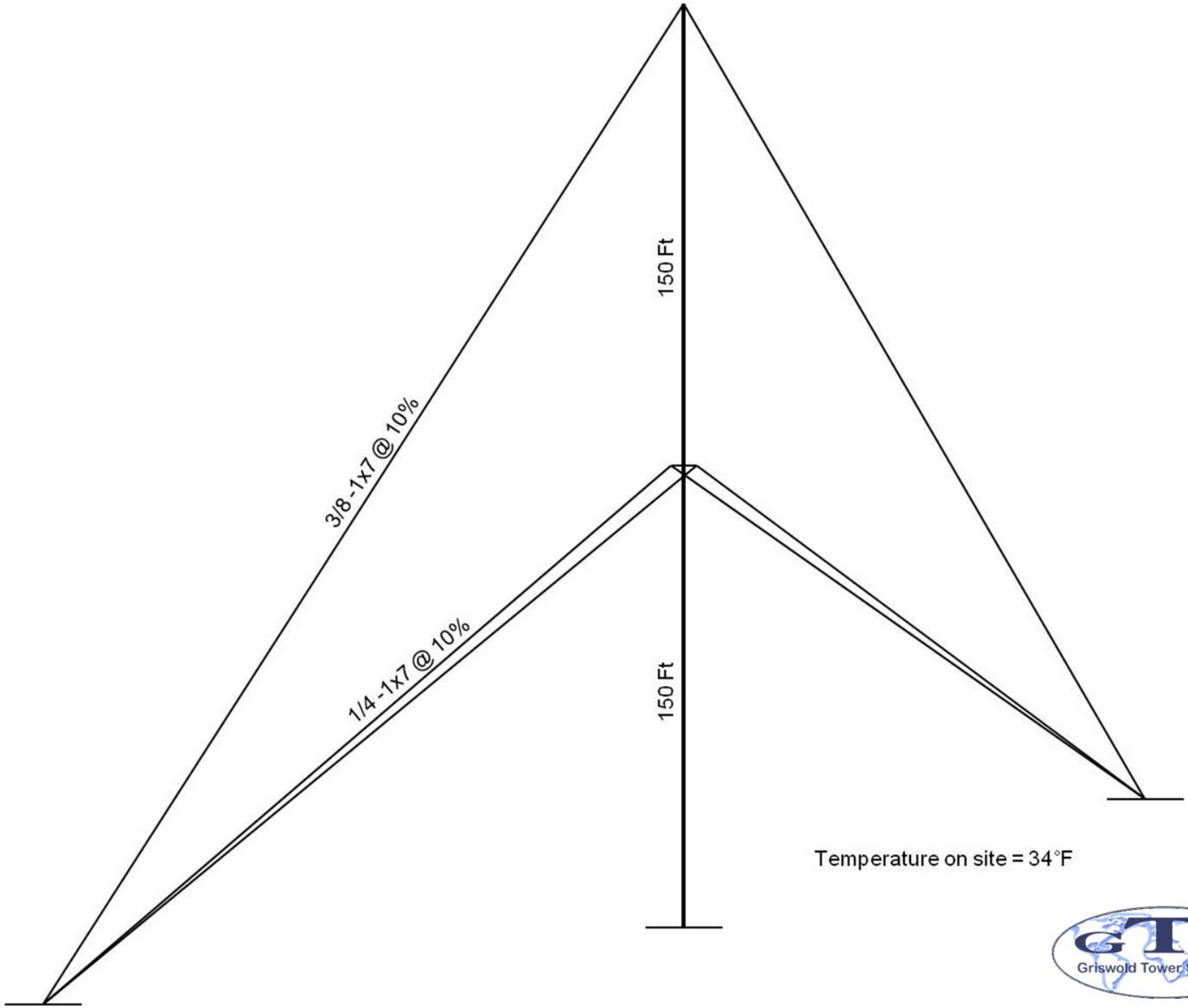
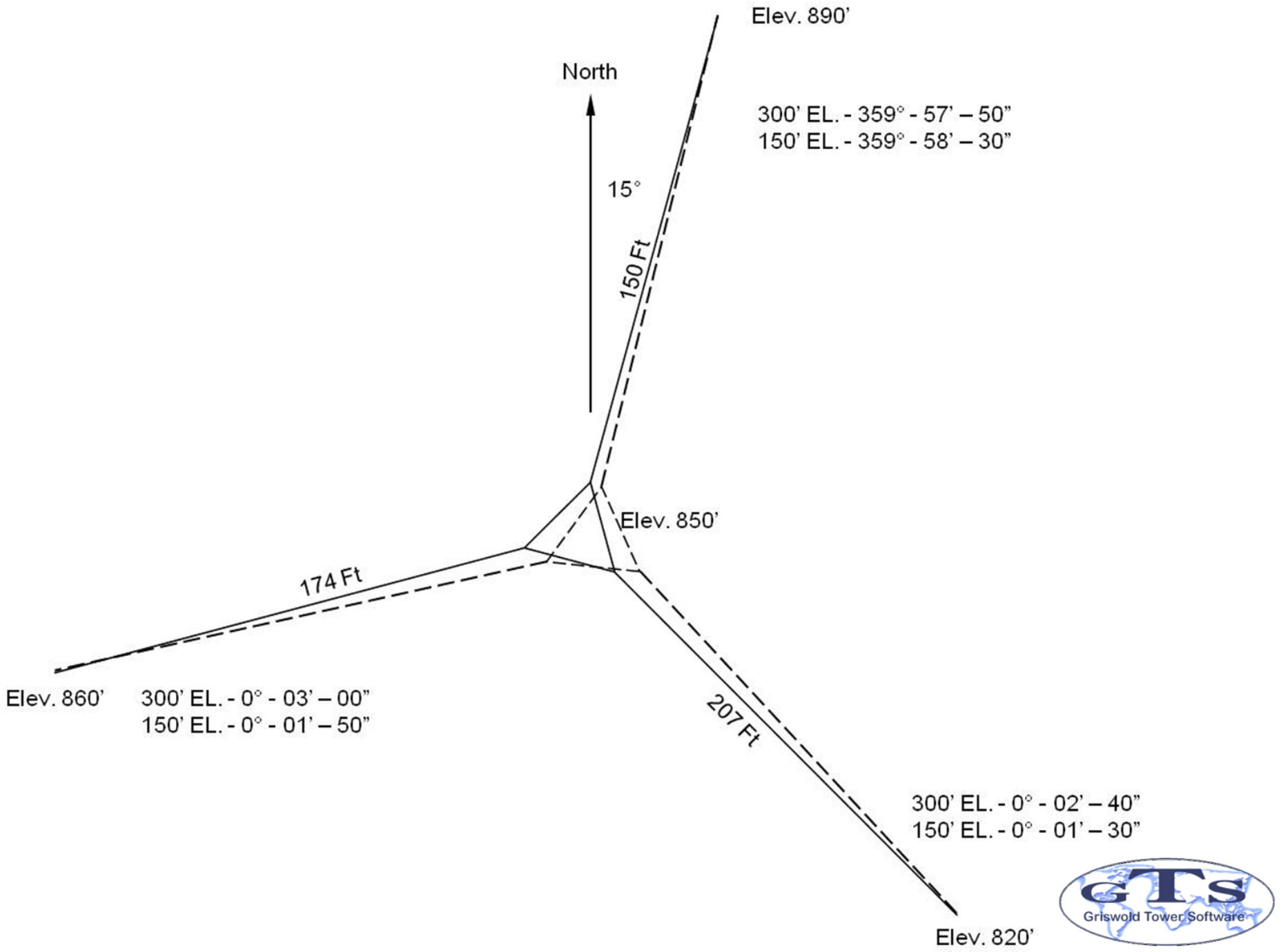
Example Tower

The sample tower at the right is 300 feet tall with 2 levels of guys. The next 2 slides provide better views of the elevation and plan of the tower. The face width is 30 inches with torque arms at 150 feet.




150 Ft
150 Ft
3/8 -1x7 @ 10%
1/4 -1x7 @ 10%
Temperature on site = 34°F
GTS
Griswold Tower Software


Elev. 890'
North
300' EL. - 359° - 57' – 50"
150' EL. - 359° - 58' – 30"
15°
150 Ft
Elev. 850'
174 Ft
Elev. 860'
300' EL. - 0° - 03' – 00"
150' EL. - 0° - 01' – 50"
207 Ft
300' EL. - 0° - 02' – 40"
150' EL. - 0° - 01' – 30"
Elev. 820'
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Tower Setup Form

Back to Table of Contents

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Twist, Plumb and Tension

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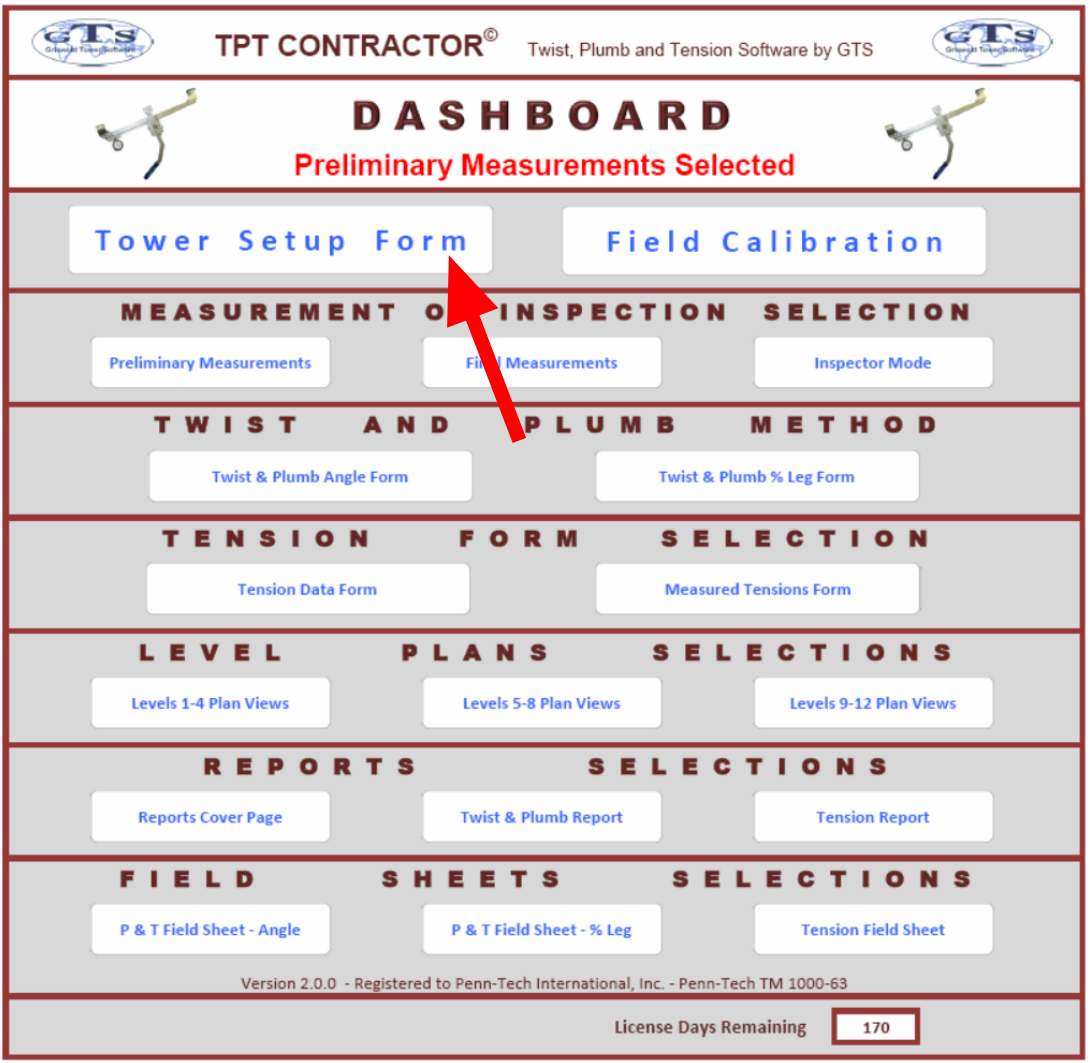

The Dashboard

Press the “Tower Setup Form” button.

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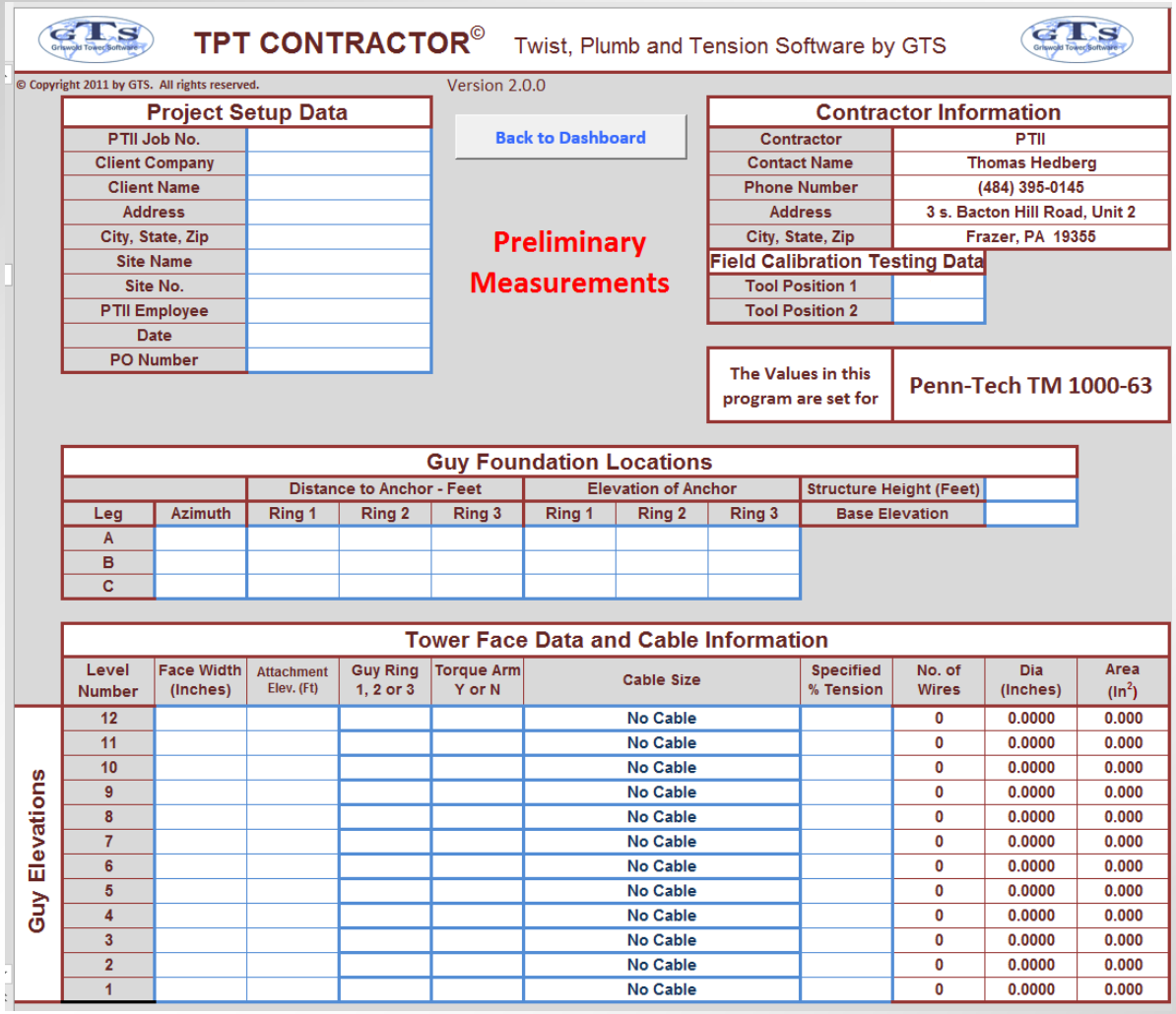

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Project Setup Data

PTII Job No.	
Client Company	
Client Name	
Address	
City, State, Zip	
Site Name	
Site No.	
PTII Employee	
Date	
PO Number	

Back to Dashboard

Preliminary Measurements

Contractor Information

Contractor	PTII
Contact Name	Thomas Hedberg
Phone Number	(484) 395-0145
Address	3 s. Bacton Hill Road, Unit 2
City, State, Zip	Frazer, PA 19355

Field Calibration Testing Data

Tool Position 1	
Tool Position 2	

The Values in this program are set for	Penn-Tech TM 1000-63

Guy Foundation Locations

		Distance to Anchor - Feet			Elevation of Anchor			Structure Height (Feet)	
Leg	Azimuth	Ring 1	Ring 2	Ring 3	Ring 1	Ring 2	Ring 3	Base Elevation	
A									
B									
C									

Tower Face Data and Cable Information

Guy Elevations

Level Number	Face Width (Inches)	Attachment Elev. (Ft)	Guy Ring 1, 2 or 3	Torque Arm Y or N	Cable Size	Specified % Tension	No. of Wires	Dia (Inches)	Area (In^2)
12					No Cable		0	0.0000	0.000
11					No Cable		0	0.0000	0.000
10					No Cable		0	0.0000	0.000
9					No Cable		0	0.0000	0.000
8					No Cable		0	0.0000	0.000
7					No Cable		0	0.0000	0.000
6					No Cable		0	0.0000	0.000
5					No Cable		0	0.0000	0.000
4					No Cable		0	0.0000	0.000
3					No Cable		0	0.0000	0.000
2					No Cable		0	0.0000	0.000
1					No Cable		0	0.0000	0.000

Example Tower

The screen to the left shows what you see when you go to the **"Tower Setup Form"**.

Griswold Tower Software

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Back to Dashboard

Preliminary Measurements

Project Setup Data

PTII Job No.	
Client Company	
Client Name	
Address	
City, State, Zip	
Site Name	
Site No.	
PTII Employee	
Date	
PO Number	

Contractor Information

Contractor	PTII
Contact Name	Thomas Hedberg
Phone Number	(484) 395-0145
Address	3 s. Bacton Hill Road, Unit 2
City, State, Zip	Frazer, PA 19355

Field Calibration Testing Data

Tool Position 1	
Tool Position 2	

The Values in this program are set for	Penn-Tech TM 1000-63

Guy Foundation Locations

		Distance to Anchor - Feet			Elevation of Anchor			Structure Height (Feet)	
Leg	Azimuth	Ring 1	Ring 2	Ring 3	Ring 1	Ring 2	Ring 3	Base Elevation	
A									
B									
C									

Tower Face Data and Cable Information

Guy Elevations

Level Number	Face Width (Inches)	Attachment Elev. (Ft)	Guy Ring 1, 2 or 3	Torque Arm Y or N	Cable Size	Specified % Tension	No. of Wires	Dia (Inches)	Area (In^2)
12					No Cable		0	0.0000	0.000
11					No Cable		0	0.0000	0.000
10					No Cable		0	0.0000	0.000
9					No Cable		0	0.0000	0.000
8					No Cable		0	0.0000	0.000
7					No Cable		0	0.0000	0.000
6					No Cable		0	0.0000	0.000
5					No Cable		0	0.0000	0.000
4					No Cable		0	0.0000	0.000
3					No Cable		0	0.0000	0.000
2					No Cable		0	0.0000	0.000
1					No Cable		0	0.0000	0.000

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Back to Dashboard

First input the Project Setup Data

Project Setup Data

PTII Job No.	2017-70123
Client Company	Joe's Towers
Client Name	Tim Smith
Address	123 Rock Lane
City, State, Zip	Nowhere, NV 56567
Site Name	Midland
Site No.	334-GT
PTII Employee	Daniel Boone
Date	2/17/2017
PO Number	JT-334-GT-2017

Contractor Information

Contractor	PTII
Contact Name	Thomas Hedberg
Phone Number	(484) 395-0145
Address	3 s. Bacton Hill Road, Unit 2
City, State, Zip	Frazer, PA 19355

Field Calibration Testing Data

Tool Position 1	
Tool Position 2	

The Values in this program are set for	Penn-Tech TM 1000-63

Guy Foundation Locations

		Distance to Anchor - Feet			Elevation of Anchor			Structure Height (Feet)	
Leg	Azimuth	Ring 1	Ring 2	Ring 3	Ring 1	Ring 2	Ring 3	Base Elevation	
A									
B									
C									

Tower Face Data and Cable Information

Guy Elevations

Level Number	Face Width (Inches)	Attachment Elev. (Ft)	Guy Ring 1, 2 or 3	Torque Arm Y or N	Cable Size	Specified % Tension	No. of Wires	Dia (Inches)	Area (In^2)
12					No Cable		0	0.0000	0.000
11					No Cable		0	0.0000	0.000
10					No Cable		0	0.0000	0.000
9					No Cable		0	0.0000	0.000
8					No Cable		0	0.0000	0.000
7					No Cable		0	0.0000	0.000
6					No Cable		0	0.0000	0.000
5					No Cable		0	0.0000	0.000
4					No Cable		0	0.0000	0.000
3					No Cable		0	0.0000	0.000
2					No Cable		0	0.0000	0.000
1					No Cable		0	0.0000	0.000

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Twist, Plumb and Tension Software by GTS

Version 2.0.0

Back to Dashboard

Preliminary Measurements

Project Setup Data	
PTII Job No.	2017-70123
Client Company	Joe's Towers
Client Name	Tim Smith
Address	123 Rock Lane
City, State, Zip	Nowhere, NV 56567
Site Name	Midland
Site No.	334-GT
PTII Employee	Daniel Boone
Date	2/17/2017
PO Number	JT-334-GT-2017

Contractor Information	
Contractor	PTII
Contact Name	Thomas Hedberg
Phone Number	(484) 395-0145
Address	3 s. Bacton Hill Road, Unit 2
City, State, Zip	Frazer, PA 19355

Field Calibration Testing Data	
Tool Position 1	
Tool Position 2	

The Values in this program are set for	Penn-Tech TM 1000-63

Guy Foundation Locations

		Distance to Anchor - Feet		Elevation of Anchor		Structure Height (Feet)	
Leg	Azimuth	Ri			Ring 3	Base Elevation	
A	15						
B	135						
C	255						

Next input the 3 Azimuths of the Guys and Guy Foundations. Use only numbers. Don't use any letters or special characters such as the degree symbol (˚).

Tower Face Data and Cable Information

Guy Elevations

Level Number	Face Width (Inches)	Attachment Elev. (Ft)	Guy Ring 1, 2 or 3	Torque Arm Y or N	Cable Size	Specified % Tension	No. of Wires	Dia (Inches)	Area (In^2)
12					No Cable		0	0.0000	0.000
11					No Cable		0	0.0000	0.000
10					No Cable		0	0.0000	0.000
9					No Cable		0	0.0000	0.000
8					No Cable		0	0.0000	0.000
7					No Cable		0	0.0000	0.000
6					No Cable		0	0.0000	0.000
5					No Cable		0	0.0000	0.000
4					No Cable		0	0.0000	0.000
3					No Cable		0	0.0000	0.000
2					No Cable		0	0.0000	0.000
1					No Cable		0	0.0000	0.000

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Twist, Plumb and Tension Software by GTS

Version 2.0.0

Back to Dashboard

Preliminary Measurements

Project Setup Data

PTII Job No.	2017-70123
Client Company	Joe's Towers
Client Name	Tim Smith
Address	123 Rock Lane
City, State, Zip	Nowhere, NV 56567
Site Name	Midland
Site No.	334-GT
PTII Employee	Daniel Boone
Date	2/17/2017
PO Number	JT-334-GT-2017

Contractor Information

Contractor	PTII
Contact Name	Thomas Hedberg
Phone Number	(484) 395-0145
Address	3 s. Bacton Hill Road, Unit 2
City, State, Zip	Frazer, PA 19355

Field Calibration Testing Data

Tool Position 1	
Tool Position 2	

The Values in this program are set for **Penn-Tech TM 1000-63**

Guy Foundation Locations

		Distance to Anchor - Feet			Elevation of Anchor			Structure Height (Feet)	
Leg	Azimuth	Ring 1	R				3	Base Elevation	
A	15	150.0							
B	135	204.0							
C	255	174.0							

Input the Distances to Each of the Guy Fan plates. Use only numbers. Don't use any letters or special characters such as feet (') or inches (").

Tower Face Data and Cable Information

Guy Elevations

Level Number	Face Width (Inches)	Attachment Elev. (Ft)	Guy Ring 1, 2 or 3	Torque Arm Y or N	Cable Size	Specified % Tension	No. of Wires	Dia (Inches)	Area (In^2)
12					No Cable		0	0.0000	0.000
11					No Cable		0	0.0000	0.000
10					No Cable		0	0.0000	0.000
9					No Cable		0	0.0000	0.000
8					No Cable		0	0.0000	0.000
7					No Cable		0	0.0000	0.000
6					No Cable		0	0.0000	0.000
5					No Cable		0	0.0000	0.000
4					No Cable		0	0.0000	0.000
3					No Cable		0	0.0000	0.000
2					No Cable		0	0.0000	0.000
1					No Cable		0	0.0000	0.000

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Version 2.0.0

Project Setup Data	
PTII Job No.	2017-70123
Client Company	Joe's Towers
Client Name	Tim Smith
Address	123 Rock Lane
City, State, Zip	Nowhere, NV 56567
Site Name	Midland
Site No.	334-GT
PTII Employee	Daniel Boone
Date	2/17/2017
PO Number	JT-334-GT-2017

Back to Dashboard

Preliminary Measurements

Contractor Information	
Contractor	PTII
Contact Name	Thomas Hedberg
Phone Number	(484) 395-0145
Address	3 s. Bacton Hill Road, Unit 2
City, State, Zip	Frazer, PA 19355

Field Calibration Testing Data	
Tool Position 1	
Tool Position 2	

The Values in this program are set for	Penn-Tech TM 1000-63

Guy Foundation Loc

		Distance to Anchor - Feet			Elevati		t)	300
Leg	Azimuth	Ring 1	Ring 2	Ring 3	Ring 1			850
A	15	150.0			890.0			
B	135	204.0			820.0			
C	255	174.0			860.0			

Input the Elevations of the Fan Plates, the Tower Base, and the Height of the tower.
The Base Elevation can be set to "0" and the Elevations of the Anchors set to Plus or Minus from "0".

Tower Face Data and

Level Number	Face Width (Inches)	Attachment Elev. (Ft)	Guy Ring 1, 2 or 3	Torque Arm Y or N	Cable Size	% Tension	Wires	Dia (Inches)	Area (In^2)
12					No Cable		0	0.0000	0.000
11							0	0.0000	0.000
10							0	0.0000	0.000
9							0	0.0000	0.000
8							0	0.0000	0.000
7					No Cable		0	0.0000	0.000
6					No Cable		0	0.0000	0.000
5					No Cable		0	0.0000	0.000
4					No Cable		0	0.0000	0.000
3					No Cable		0	0.0000	0.000
2					No Cable		0	0.0000	0.000
1					No Cable		0	0.0000	0.000

Guy Elevations

Again, use only numbers. Don't use any letters or special characters such as feet (') or inches (").

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Version 2.0.0

Project Setup Data	
PTII Job No.	2017-70123
Client Company	Joe's Towers
Client Name	Tim Smith
Address	123 Rock Lane
City, State, Zip	Nowhere, NV 56567
Site Name	Midland
Site No.	334-GT
PTII Employee	Daniel Boone
Date	2/17/2017
PO Number	JT-334-GT-2017

Back to Dashboard

Preliminary Measurements

Contractor Information	
Contractor	PTII
Contact Name	Thomas Hedberg
Phone Number	(484) 395-0145
Address	3 s. Bacton Hill Road, Unit 2
City, State, Zip	Frazer, PA 19355

Field Calibration Testing Data	
Tool Position 1	
Tool Position 2	

The Values in this program are set for	Penn-Tech TM 1000-63

Guy Foundation Locations

		Distance to Anchor - Feet			Elevation of Anchor			Structure Height (Feet)	300
Leg	Azimuth	Ring 1	Ring 2	Ring 3	Ring 1	Ring 2	Ring 3	Base Elevation	850
A	15	150.0			890.0				
B	135	204.0			820.0				
C	255	174.0			860.0				

Tower Face Data and Cable Information

Guy Elevations

Level Number	Face Width (Inches)	Attachment Elev. (Ft)	Guy Ring 1, 2 or 3	Torque Arm Y or N	Cable Size	Specified % Tension	No. of Wires	Dia (Inches)	Area (In^2)
12							0	0.0000	0.000
11							0	0.0000	0.000
10							0	0.0000	0.000
9							0	0.0000	0.000
8							0	0.0000	0.000
7					No Cable		0	0.0000	0.000
6					No Cable				
5					No Cable				
4					No Cable				
3									
2	30.0	300.00							
1	30.0	150.00							

Again, use only numbers. Don't use any letters or special characters such as feet (') or inches (").

Input the Face Width and Guy Attachment Elevations (Height from the Base of the tower).

NOTE:
The face width is measured from center to center of the legs on one face.

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Version 2.0.0

Back to Dashboard

Preliminary Measurements

Project Setup Data

PTII Job No.	2017-70123
Client Company	Joe's Towers
Client Name	Tim Smith
Address	123 Rock Lane
City, State, Zip	Nowhere, NV 56567
Site Name	Midland
Site No.	334-GT
PTII Employee	Daniel Boone
Date	2/17/2017
PO Number	JT-334-GT-2017

Contractor Information

Contractor	PTII
Contact Name	Thomas Hedberg
Phone Number	(484) 395-0145
Address	3 s. Bacton Hill Road, Unit 2
City, State, Zip	Frazer, PA 19355

Field Calibration Testing Data

Tool Position 1	
Tool Position 2	

The Values in this program are set for: **Penn-Tech TM 1000-63**

Guy Foundation Locations

		Distance to Anchor - Feet			Elevation of Anchor			Structure Height (Feet)	300
Leg	Azimuth	Ring 1	Ring 2	Ring 3	Ring 1	Ring 2	Ring 3	Base Elevation	850
A	15	150.0			890.0				
B	135	204.0			820.0				
C	255	174.0			860.0				

Tower Face Data and Cable Information

Guy Elevations

Level Number	Face Width (Inches)	Attachment Elev. (Ft)	Guy Ring 1, 2 or 3	Torque Arm Y or N	Cable Size	Specified % Tension	No. of Wires	Dia (Inches)	Area (In^2)
12					No Cable		0	0.0000	0.000
11					No Cable		0	0.0000	0.000
10					No Cable		0	0.0000	0.000
9					No Cable		0	0.0000	0.000
8					No Cable		0	0.0000	0.000
7					No Cable		0	0.0000	0.000
6					No Cable		0	0.0000	0.000
5					No Cable		0	0.0000	0.000
4					No Cable		0	0.0000	0.000
3								0.0000	0.000
2	30.0	300.00	1					0.0000	0.000
1	30.0	150.00	1					0.0000	0.000

Using the Dropdown Buttons, input the Guy Ring for each of the Guy Attachment Elevations

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Version 2.0.0

Back to Dashboard

Preliminary Measurements

Project Setup Data

PTII Job No.	2017-70123
Client Company	Joe's Towers
Client Name	Tim Smith
Address	123 Rock Lane
City, State, Zip	Nowhere, NV 56567
Site Name	Midland
Site No.	334-GT
PTII Employee	Daniel Boone
Date	2/17/2017
PO Number	JT-334-GT-2017

Contractor Information

Contractor	PTII
Contact Name	Thomas Hedberg
Phone Number	(484) 395-0145
Address	3 s. Bacton Hill Road, Unit 2
City, State, Zip	Frazer, PA 19355

Field Calibration Testing Data

Tool Position 1	
Tool Position 2	

The Values in this program are set for **Penn-Tech TM 1000-63**

Guy Foundation Locations

		Distance to Anchor - Feet			Elevation of Anchor			Structure Height (Feet)	300
Leg	Azimuth	Ring 1	Ring 2	Ring 3	Ring 1	Ring 2	Ring 3	Base Elevation	850
A	15	150.0			890.0				
B	135	204.0			820.0				
C	255	174.0			860.0				

Tower Face Data and Cable Information

Guy Elevations

Level Number	Face Width (Inches)	Attachment Elev. (Ft)	Guy Ring 1, 2 or 3	Torque Arm Y or N	Cable Size	Specified % Tension	No. of Wires	Dia (Inches)	Area (In^2)
12					No Cable		0	0.0000	0.000
11					No Cable		0	0.0000	0.000
10					No Cable		0	0.0000	0.000
9					No Cable		0	0.0000	0.000
8					No Cable		0	0.0000	0.000
7					No Cable		0	0.0000	0.000
6					No Cable		0	0.0000	0.000
5					No Cable		0	0.0000	0.000
4					No Cable		0	0.0000	0.000
3								000	0.000
2	30.0	300.00	1					000	0.000
1	30.0	150.00	1	Yes				000	0.000

Using the Dropdown Buttons, select levels with Torque Arms

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Twist, Plumb and Tension Software by GTS

Version 2.0.0

Back to Dashboard

Preliminary Measurements

Project Setup Data	
PTII Job No.	2017-70123
Client Company	Joe's Towers
Client Name	Tim Smith
Address	123 Rock Lane
City, State, Zip	Nowhere, NV 56567
Site Name	Midland
Site No.	334-GT
PTII Employee	Daniel Boone
Date	2/17/2017
PO Number	JT-334-GT-2017

Contractor Information	
Contractor	PTII
Contact Name	Thomas Hedberg
Phone Number	(484) 395-0145
Address	3 s. Bacton Hill Road, Unit 2
City, State, Zip	Frazer, PA 19355

Field Calibration Testing Data	
Tool Position 1	
Tool Position 2	

The Values in this program are set for **Penn-Tech TM 1000-63**

Guy Foundation Locations

		Distance to Anchor - Feet			Elevation of Anchor			Structure Height (Feet)	300
Leg	Azimuth	Ring 1	Ring 2	Ring 3	Ring 1	Ring 2	Ring 3	Base Elevation	850
A	15	150.0			890.0				
B	135	204.0			820.0				
C	255	174.0			860.0				

Tower Face Data and Cable Information

Guy Elevations

Level Number	Face Width (Inches)	Attachment Elev. (Ft)	Guy Ring 1, 2 or 3	Torque Arm Y or N	Cable Size	Specified % Tension	No. of Wires	Dia (Inches)	Area (In^2)
12					No Cable		0	0.0000	0.000
11					No Cable		0	0.0000	0.000
10					No Cable		0	0.0000	0.000
9					No Cable		0	0.0000	0.000
8					No Cable		0	0.0000	0.000
7					No Cable		0	0.0000	0.000
6					No Cable		0	0.0000	0.000
5					No Cable		0	0.0000	0.000
4					No Cable		0	0.0000	0.000
					No Cable		0	0.0000	0.000
					3/8" Dia EHS 1x7 - (Orange)		7	0.3750	0.080
					1/4" Dia EHS 1X7 - (Yellow)		7	0.2500	0.028

Using the Dropdown Buttons, input the cable sizes for the Guy Attachment Elevations

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Project Setup Data	
PTII Job No.	2017-70123
Client Company	Joe's Towers
Client Name	Tim Smith
Address	123 Rock Lane
City, State, Zip	Nowhere, NV 56567
Site Name	Midland
Site No.	334-GT
PTII Employee	Daniel Boone
Date	2/17/2017
PO Number	JT-334-GT-2017

Back to Dashboard

Preliminary Measurements

Contractor Information	
Contractor	PTII
Contact Name	Thomas Hedberg
Phone Number	(484) 395-0145
Address	3 s. Bacton Hill Road, Unit 2
City, State, Zip	Frazer, PA 19355

Field Calibration Testing Data	
Tool Position 1	
Tool Position 2	

The Values in this program are set for	Penn-Tech TM 1000-63

Guy Foundation Locations

		Distance to Anchor - Feet			Elevation of Anchor			Structure Height (Feet)	300
Leg	Azimuth	Ring 1	Ring 2	Ring 3	Ring 1	Ring 2	Ring 3	Base Elevation	850
A	15	150.0			890.0				
B	135	204.0			820.0				
C	255	174.0			860.0				

Tower Face Data and Cable Information

Guy Elevations

Level Number	Face Width (Inches)	Attachment Elev. (Ft)	Guy Ring 1, 2 or 3	Torque Arm Y or N	Cable Size	Specified % Tension	No. of Wires	Dia (Inches)	Area (In^2)
12					No Cable		0	0.0000	0.000
11					No Cable		0	0.0000	0.000
10					No Cable		0	0.0000	0.000
9					No Cable		0	0.0000	0.000
8					No Cable		0	0.0000	0.000
7					No Cable		0	0.0000	0.000
6					No Cable		0	0.0000	0.000
5					No Cable		0	0.0000	0.000
4					No Cable		0	0.0000	0.000
3					No Cable		0	0.0000	0.000
2	30.0	300.0			3/4" EHS	10	7	0.3750	0.080
1	30.0	150.0			1/2" EHS	10	7	0.2500	0.028

Use only numbers. Don't use any letters or special characters such as the percent symbol (%).

Input the Percent of Breaking Strength (Specified % Tension) for each of the Cables

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Twist, Plumb and Tension

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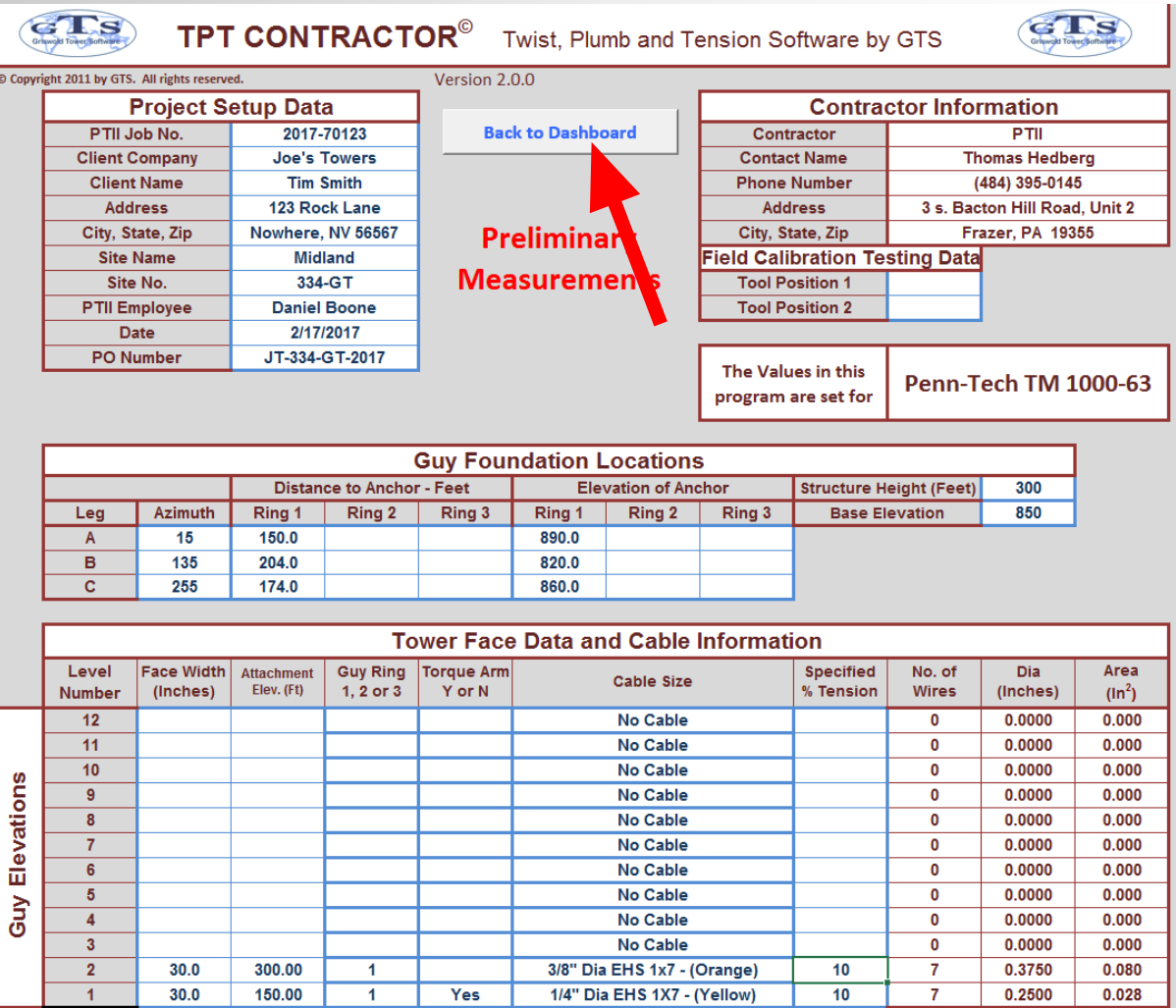

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Project Setup Data

PTII Job No.	2017-70123
Client Company	Joe's Towers
Client Name	Tim Smith
Address	123 Rock Lane
City, State, Zip	Nowhere, NV 56567
Site Name	Midland
Site No.	334-GT
PTII Employee	Daniel Boone
Date	2/17/2017
PO Number	JT-334-GT-2017

Back to Dashboard

Preliminary Measurements

Contractor Information

Contractor	PTII
Contact Name	Thomas Hedberg
Phone Number	(484) 395-0145
Address	3 s. Bacton Hill Road, Unit 2
City, State, Zip	Frazer, PA 19355

Field Calibration Testing Data

Tool Position 1	
Tool Position 2	

The Values in this program are set for: Penn-Tech TM 1000-63

Guy Foundation Locations

		Distance to Anchor - Feet			Elevation of Anchor			Structure Height (Feet)	300
Leg	Azimuth	Ring 1	Ring 2	Ring 3	Ring 1	Ring 2	Ring 3	Base Elevation	850
A	15	150.0			890.0				
B	135	204.0			820.0				
C	255	174.0			860.0				

Tower Face Data and Cable Information

Guy Elevations

Level Number	Face Width (Inches)	Attachment Elev. (Ft)	Guy Ring 1, 2 or 3	Torque Arm Y or N	Cable Size	Specified % Tension	No. of Wires	Dia (Inches)	Area (In^2)
12					No Cable		0	0.0000	0.000
11					No Cable		0	0.0000	0.000
10					No Cable		0	0.0000	0.000
9					No Cable		0	0.0000	0.000
8					No Cable		0	0.0000	0.000
7					No Cable		0	0.0000	0.000
6					No Cable		0	0.0000	0.000
5					No Cable		0	0.0000	0.000
4					No Cable		0	0.0000	0.000
3					No Cable		0	0.0000	0.000
2	30.0	300.00	1		3/8" Dia EHS 1x7 - (Orange)	10	7	0.3750	0.080
1	30.0	150.00	1	Yes	1/4" Dia EHS 1X7 - (Yellow)	10	7	0.2500	0.028

Example Tower

The screen to the left shows what the "**Tower Setup Form**" will look like after our example tower has been "Built" into the program.

Now click on the "Back to Dashboard" button

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TPT Contractor©

Twist, Plumb and Tension

Software by GTS

Field Calibration Verification Section

Back to Table of Contents

Griswold Tower Software

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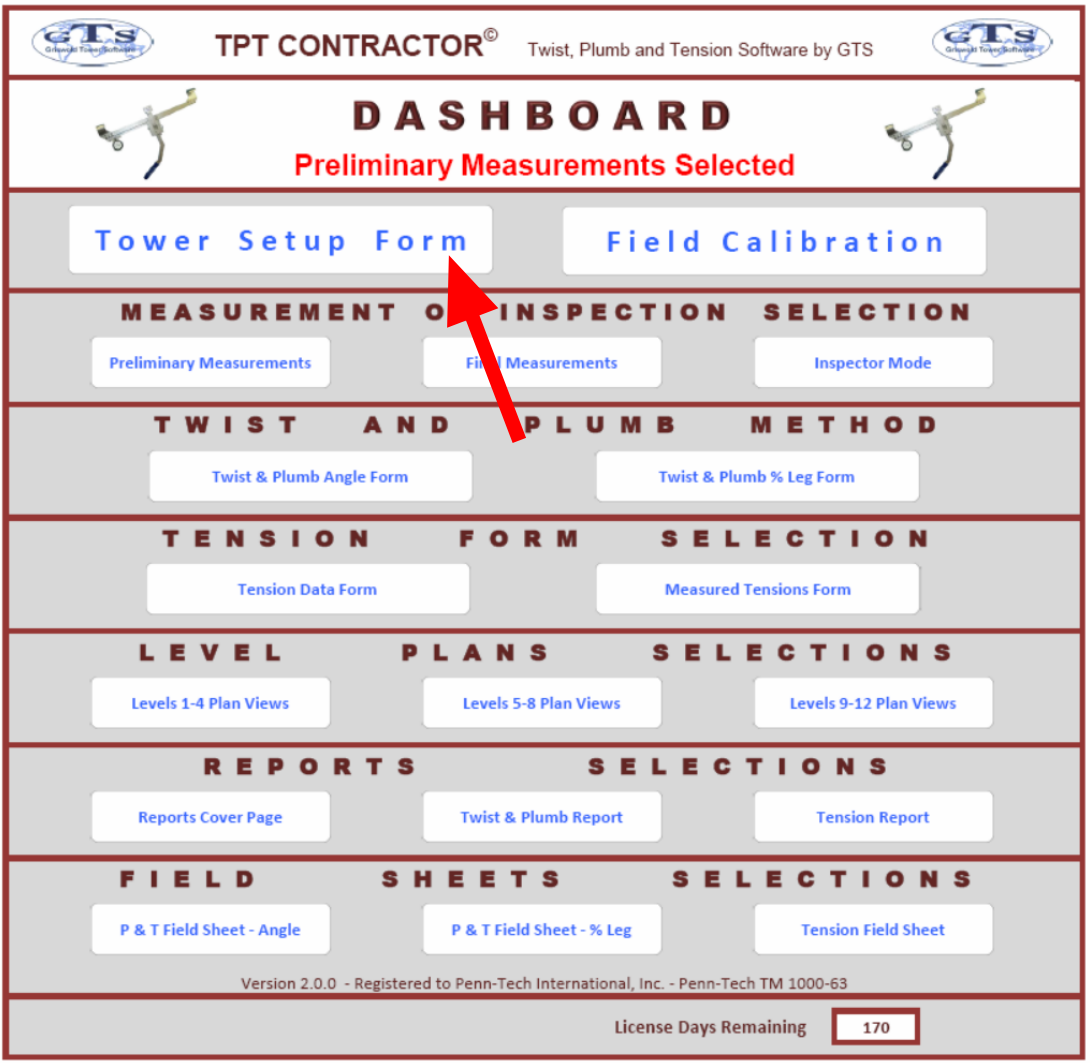
Twist, Plumb and Tension

Software by GTS



Field Calibration

First, perform the Field Calibration Verification Testing in accordance with the Penn-Tech Tension Meter User Manual.

Next, press the “Tower Setup Form” button.

Griswold Tower Software

TPT Contractor©

Twist, Plumb and Tension

Software by GTS

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Version 2.0.0

Project Setup Data	
PTII Job No.	2017-70123
Client Company	Joe's Towers
Client Name	Tim Smith
Address	123 Rock Lane
City, State, Zip	Nowhere, NV 56567
Site Name	Midland
Site No.	334-GT
PTII Employee	Daniel Boone
Date	2/17/2017
PO Number	JT-334-GT-2017

Back to Dashboard

Preliminary Measurements

Contractor Information	
Contractor	PTII
Contact Name	Thomas Hedberg
Phone Number	(484) 395-0145
Address	3 s. Bacton Hill Road, Unit 2
City, State, Zip	Frazer, PA 19355

Field Calibration Testing Data	
Tool Position 1	76
Tool Position 2	66

The Values in this program are set for	Penn-Tech TM 1000-63

Guy Foundation Locations

		Distance to Anchor - Feet			Elevation of Anchor			Structure Height (Feet)	300
Leg	Azimuth	Ring 1	Ring 2	Ring 3	Ring 1	Ring 2	Ring 3	Base Elevation	850
A	15	150.0			890.0				
B	135	204.0			820.0				
C	255	174.0			860.0				

Tower Face Data and Cable Information

Guy Elevations

Level Number	Face Width (Inches)	Attachment Elev. (Ft)	Guy Ring 1, 2 or 3	Torque Arm Y or N	Cable Size	Specified % Tension	No. of Wires	Dia (Inches)	Area (In^2)
12					No Cable		0	0.0000	0.000
11					No Cable		0	0.0000	0.000
10					No Cable		0	0.0000	0.000
9					No Cable		0	0.0000	0.000
8					No Cable		0	0.0000	0.000
7					No Cable		0	0.0000	0.000
6					No Cable		0	0.0000	0.000
5					No Cable		0	0.0000	0.000
4					No Cable		0	0.0000	0.000
3					No Cable		0	0.0000	0.000
2	30.0	300.00	1		3/8" Dia EHS 1x7 - (Orange)	10	7	0.3750	0.080
1	30.0	150.00	1	Yes	1/4" Dia EHS 1X7 - (Yellow)	10	7	0.2500	0.028

Field Calibration

Enter the Tension Meter Dial Readings for Tool Positions 1 and 2 in the fields show.

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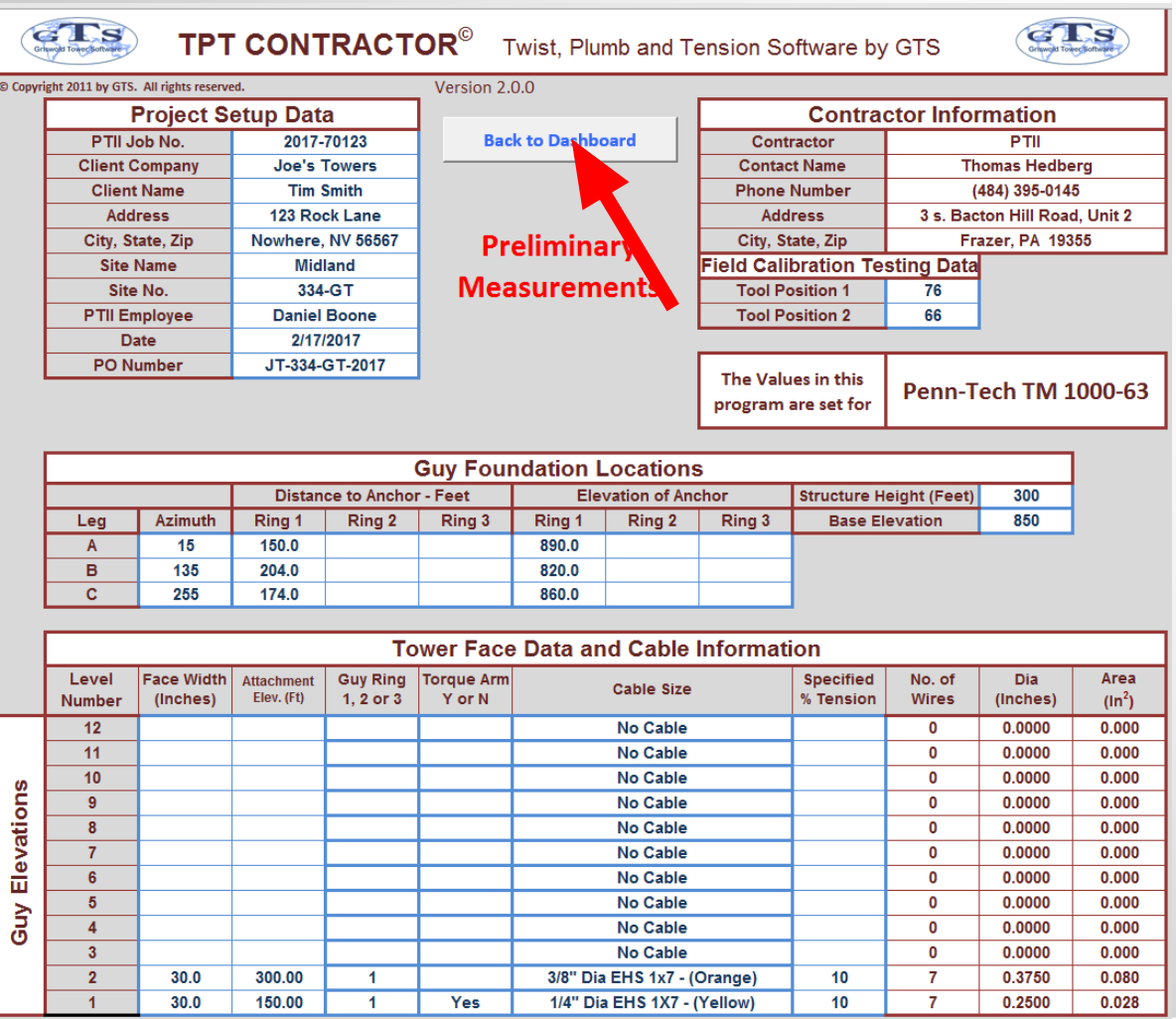
Twist, Plumb and Tension

Software by GTS



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Project Setup Data	
PTII Job No.	2017-70123
Client Company	Joe's Towers
Client Name	Tim Smith
Address	123 Rock Lane
City, State, Zip	Nowhere, NV 56567
Site Name	Midland
Site No.	334-GT
PTII Employee	Daniel Boone
Date	2/17/2017
PO Number	JT-334-GT-2017

Back to Dashboard

Preliminary Measurements

Contractor Information	
Contractor	PTII
Contact Name	Thomas Hedberg
Phone Number	(484) 395-0145
Address	3 s. Bacton Hill Road, Unit 2
City, State, Zip	Frazer, PA 19355

Field Calibration Testing Data	
Tool Position 1	76
Tool Position 2	66

The Values in this program are set for	Penn-Tech TM 1000-63

Guy Foundation Locations

		Distance to Anchor - Feet			Elevation of Anchor			Structure Height (Feet)	300
Leg	Azimuth	Ring 1	Ring 2	Ring 3	Ring 1	Ring 2	Ring 3	Base Elevation	850
A	15	150.0			890.0				
B	135	204.0			820.0				
C	255	174.0			860.0				

Tower Face Data and Cable Information

Guy Elevations

Level Number	Face Width (Inches)	Attachment Elev. (Ft)	Guy Ring 1, 2 or 3	Torque Arm Y or N	Cable Size	Specified % Tension	No. of Wires	Dia (Inches)	Area (In^2)
12					No Cable		0	0.0000	0.000
11					No Cable		0	0.0000	0.000
10					No Cable		0	0.0000	0.000
9					No Cable		0	0.0000	0.000
8					No Cable		0	0.0000	0.000
7					No Cable		0	0.0000	0.000
6					No Cable		0	0.0000	0.000
5					No Cable		0	0.0000	0.000
4					No Cable		0	0.0000	0.000
3					No Cable		0	0.0000	0.000
2	30.0	300.00	1		3/8" Dia EHS 1x7 - (Orange)	10	7	0.3750	0.080
1	30.0	150.00	1	Yes	1/4" Dia EHS 1X7 - (Yellow)	10	7	0.2500	0.028

Field Calibration

Return to the Dashboard using the "Back to Dashboard" button.

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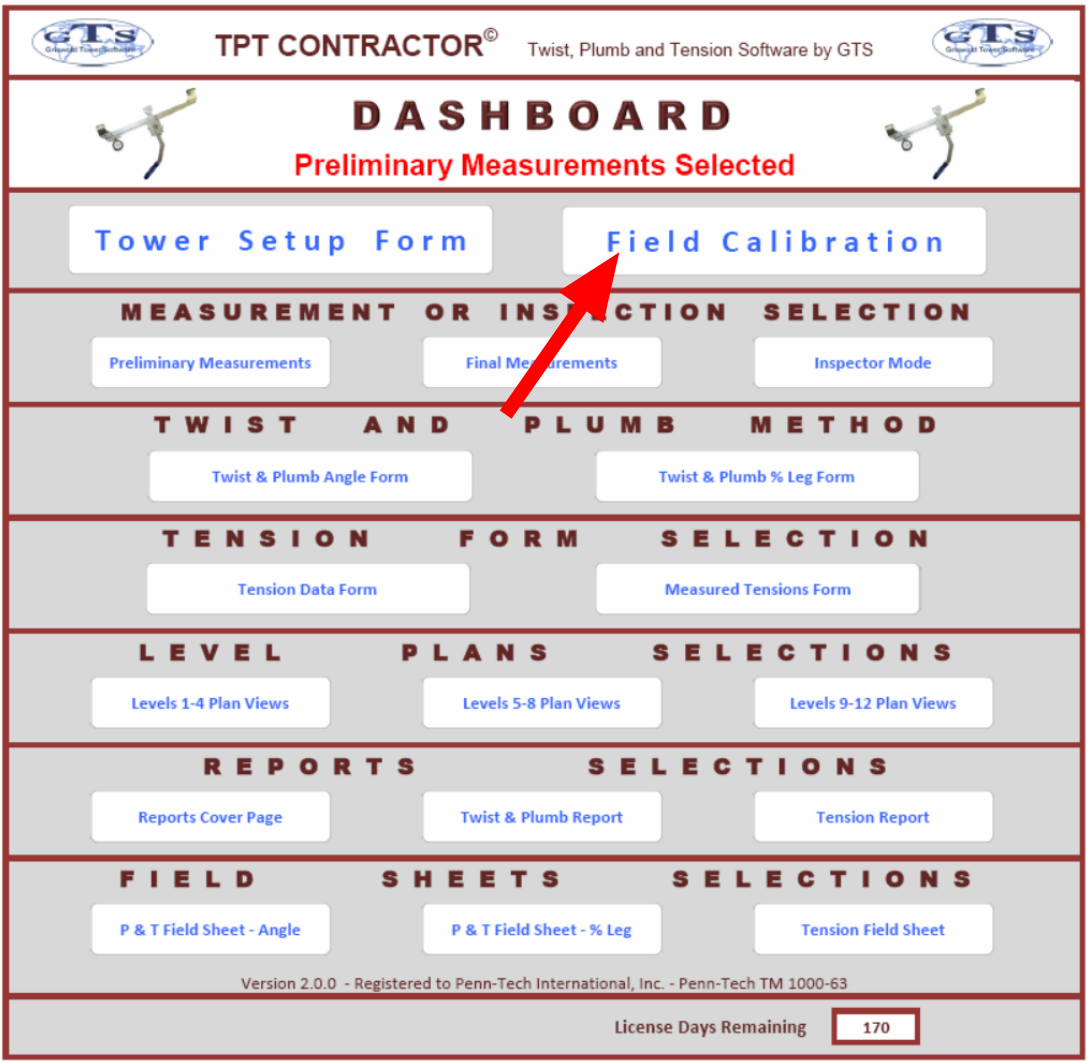
Twist, Plumb and Tension

Software by GTS



Field Calibration

Press the “Field Calibration” button to go to the “Field Calibration Test Certificate”.

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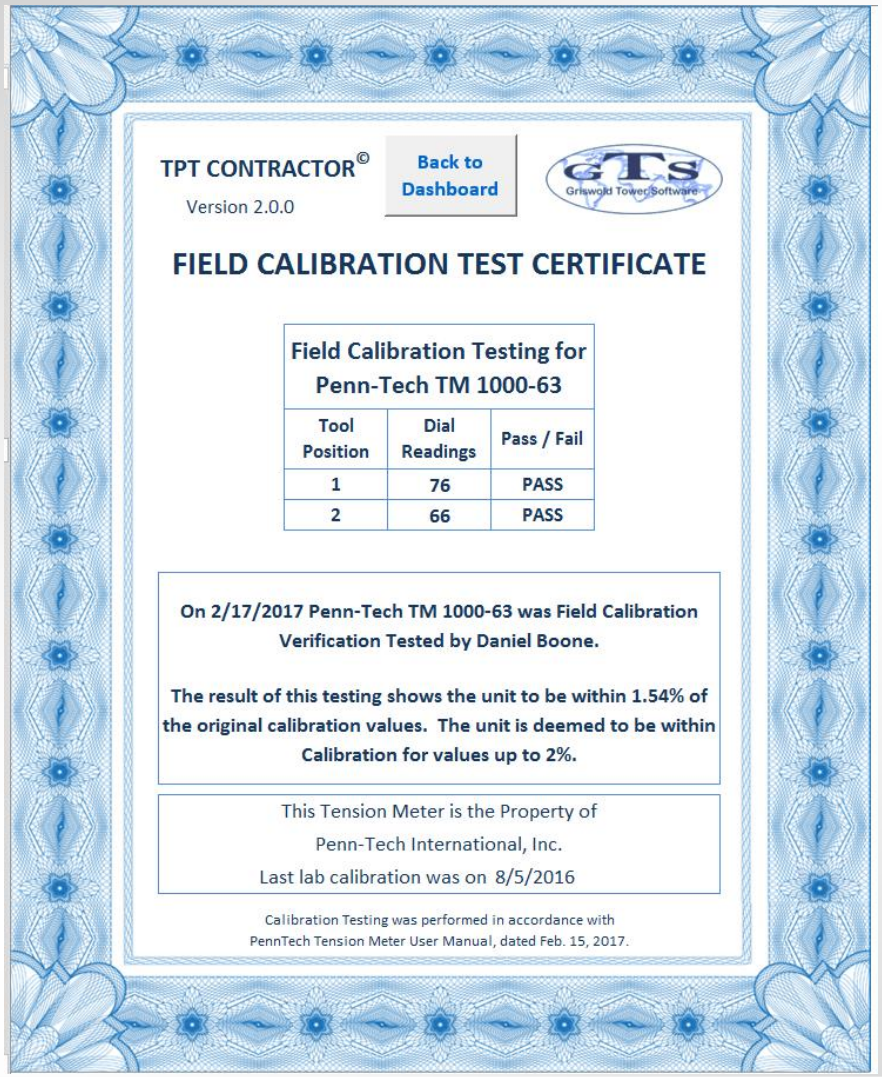
Twist, Plumb and Tension

Software by GTS



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Version 2.0.0

Back to Dashboard

GTS Griswold Tower Software

FIELD CALIBRATION TEST CERTIFICATE

Field Calibration Testing for Penn-Tech TM 1000-63		
Tool Position	Dial Readings	Pass / Fail
1	76	PASS
2	66	PASS

On 2/17/2017 Penn-Tech TM 1000-63 was Field Calibration Verification Tested by Daniel Boone.

The result of this testing shows the unit to be within 1.54% of the original calibration values. The unit is deemed to be within Calibration for values up to 2%.

This Tension Meter is the Property of
Penn-Tech International, Inc.
Last lab calibration was on 8/5/2016

Calibration Testing was performed in accordance with
PennTech Tension Meter User Manual, dated Feb. 15, 2017.

Field Calibration Test Certificate

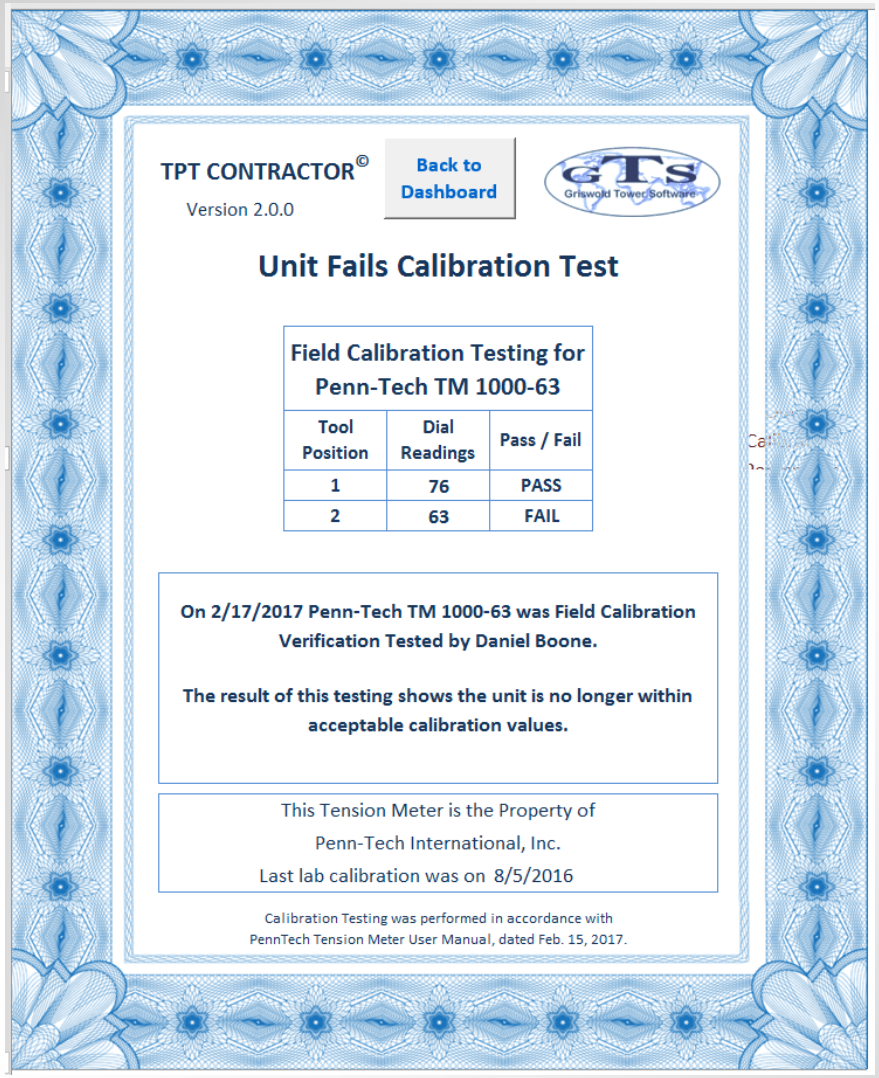
If the Dial Readings are within 2% of the Specified Maximum then the program generates a Field Test Certificate.

GTS Griswold Tower Software

TPT Contractor©

Twist, Plumb and Tension

Software by GTs



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Version 2.0.0

Back to Dashboard

GTs Griswold Tower Software

Unit Fails Calibration Test

Field Calibration Testing for Penn-Tech TM 1000-63		
Tool Position	Dial Readings	Pass / Fail
1	76	PASS
2	63	FAIL

On 2/17/2017 Penn-Tech TM 1000-63 was Field Calibration Verification Tested by Daniel Boone.

The result of this testing shows the unit is no longer within acceptable calibration values.

This Tension Meter is the Property of
Penn-Tech International, Inc.
Last lab calibration was on 8/5/2016

Calibration Testing was performed in accordance with
PennTech Tension Meter User Manual, dated Feb. 15, 2017.

Field Calibration Test Certificate

If the Dial Readings are outside of the Specified Maximum then the program generates a failing document.

GTs Griswold Tower Software

TPT Contractor©

Twist, Plumb and Tension

Software by GTS

February 17, 2017

3 s. Bacton Hill Road, Unit 2
Frazer, PA 19355
(484) 395-0145

Tim Smith
Joe's Towers
123 Rock Lane
Nowhere, NV 56567

Subject: **Preliminary Measurements Report of Twist, Plumb and Tension**
Site Name: Midland
Site Number: 334-GT

Dear Tim Smith,

At your request and in accordance with your purchase order number JT-334-GT-2017, we at Penn-Tech International, Inc. are pleased to submit this Preliminary Measurements Report of the Twist, Plumb and Tension for the 300 foot tall tower at the subject site. The Twist and Plumb information was gathered using Angular Measurements from all 3 leg azimuths. The tension values were measured using our Penn-Tech TM 1000-63 Tension Meter. This meter was last calibrated in the PennTech lab on 8/5/2016. However, this meter failed the Field Calibration Test. The test requires the meter to be within 2% of the original calibration values. This meter is now within approximately 3.1% of the original calibration values and is scheduled for recalibration at the PennTech lab.

We at Penn-Tech International, Inc. appreciate the opportunity to provide our tower services for you and Joe's Towers. If you have any questions please give us a call at the number listed at the top of this page.

Sincerely,

Penn-Tech International, Inc.

Thomas Hedberg

Attachments

This report was created using TPT Contractor®, Version 2.0.0

Field Calibration Test Certificate

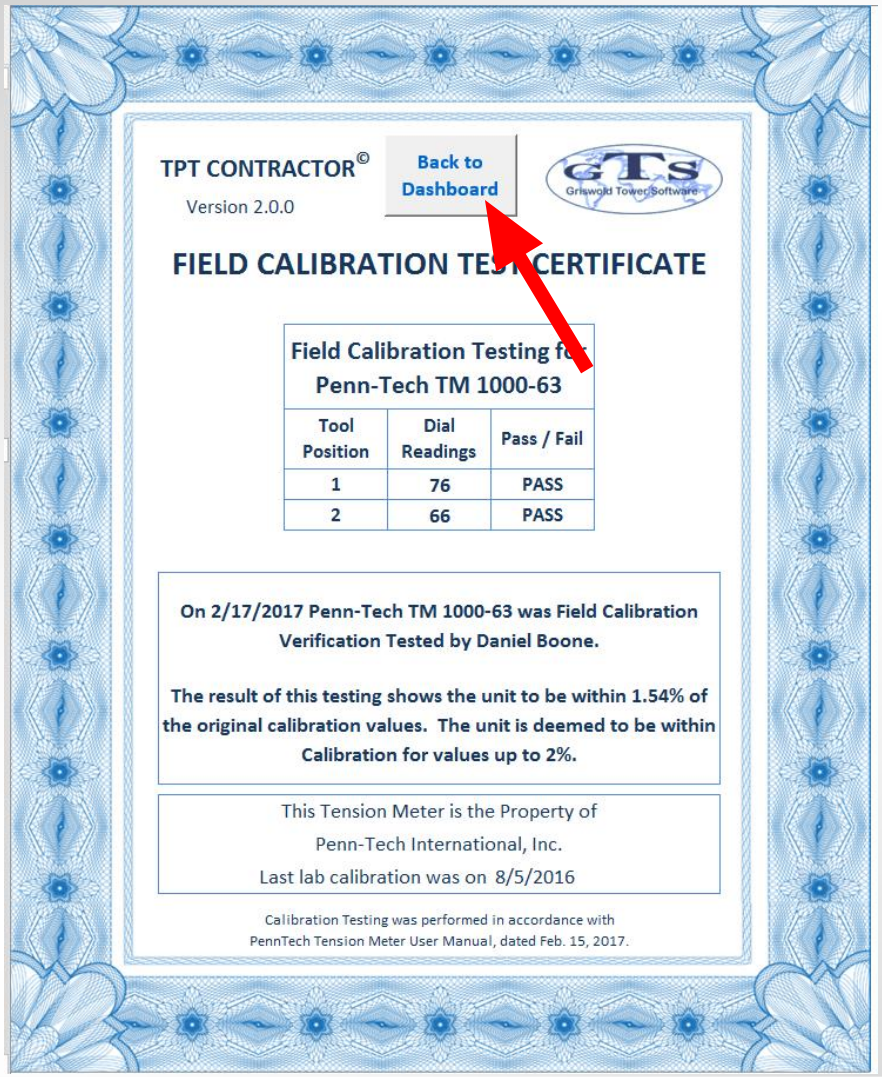
Also, if the test fails the cover page report will state the “meter failed the Field Calibration Test.”

GTS
Griswold Tower Software

TPT Contractor©

Twist, Plumb and Tension

Software by GTs



Field Calibration

Return to the Dashboard using the “Back to Dashboard” button.

GTs
Griswold Tower Software

TPT Contractor©

Twist, Plumb and Tension

Software by GTS

Measurement or Inspection Section

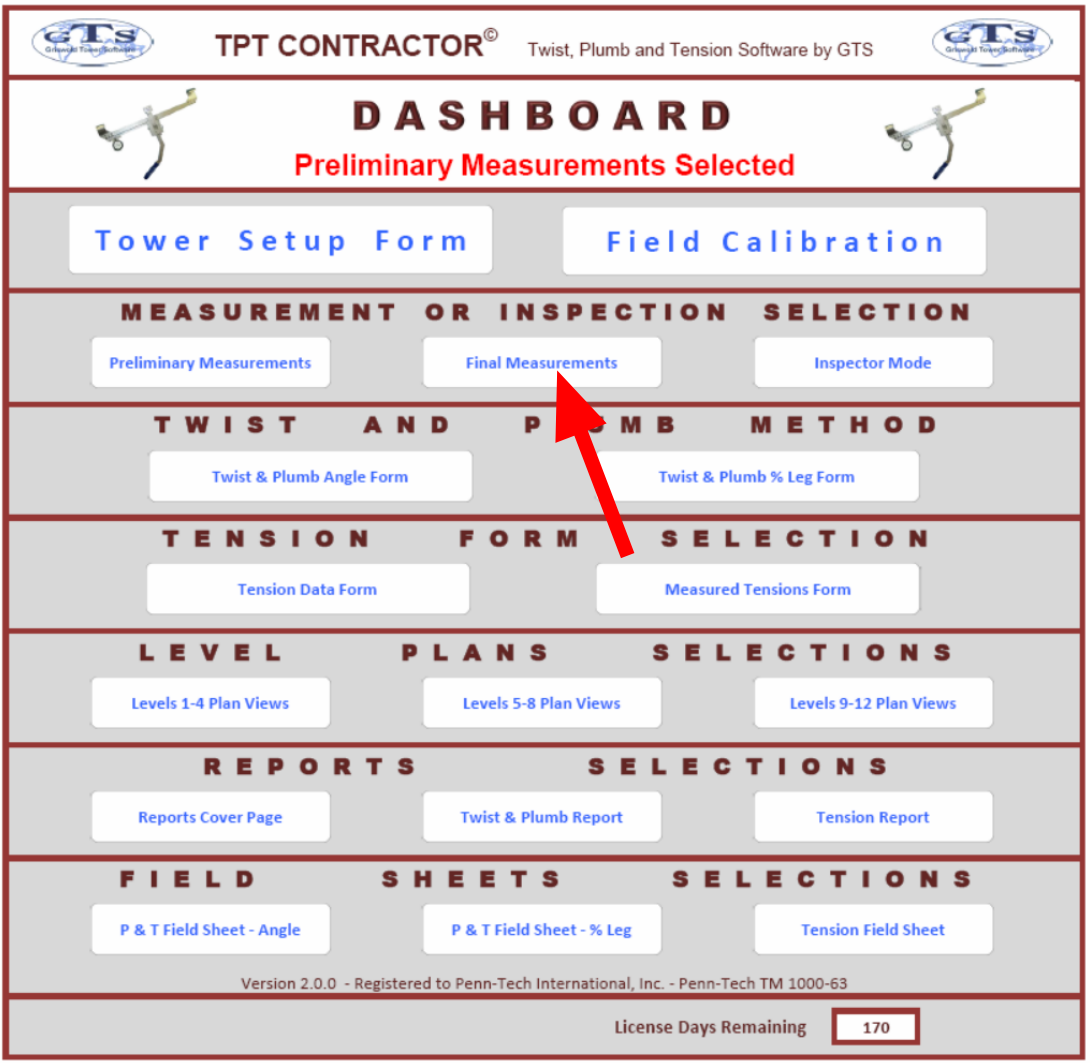
Back to Table of Contents

Griswold Tower Software

TPT Contractor©

Twist, Plumb and Tension

Software by GTS



Measurement or Inspection Section

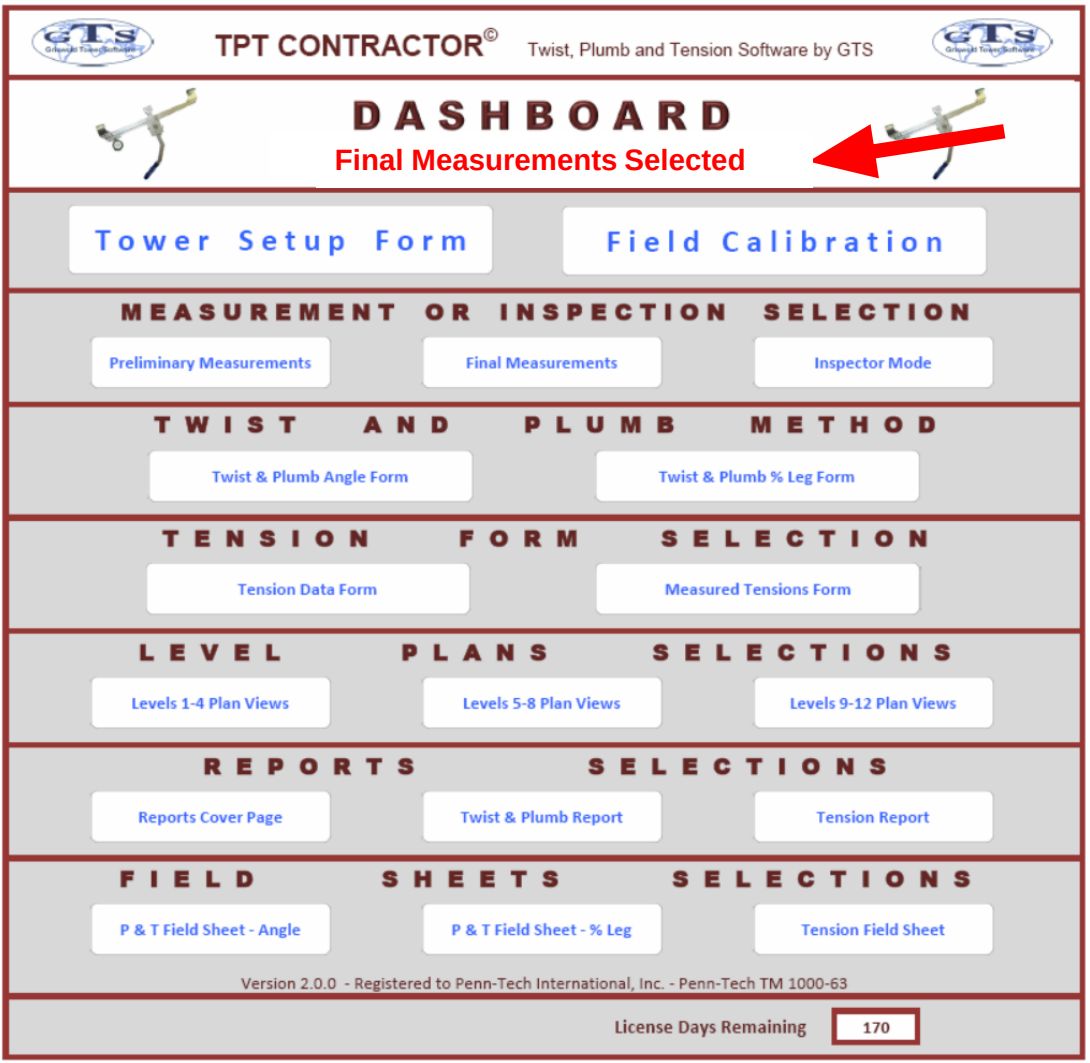
This section allows for before and after measurements with reports when adjusting a tower, or inspection reports when no adjustments are to be made. For this example we will choose the “Final Measurements Mode”.

GTS Griswold Tower Software

TPT Contractor©

Twist, Plumb and Tension

Software by GTS



Measurement or Inspection Section

The change between “Preliminary Measurements”, “Final Measurements”, and “Inspector Mode” is reflected on the Dashboard and all other forms throughout the program.

Next we will cover Twist & Plumb.

GTS Griswold Tower Software

TPT Contractor©

Twist, Plumb and Tension

Software by GTS

Twist and Plumb Section

Back to Table of Contents

Griswold Tower Software

TPT Contractor©

Twist, Plumb and Tension

Software by GTS

Twist and Plumb

The software provides 2 different methods to measure the Twist and Plumb of the tower.

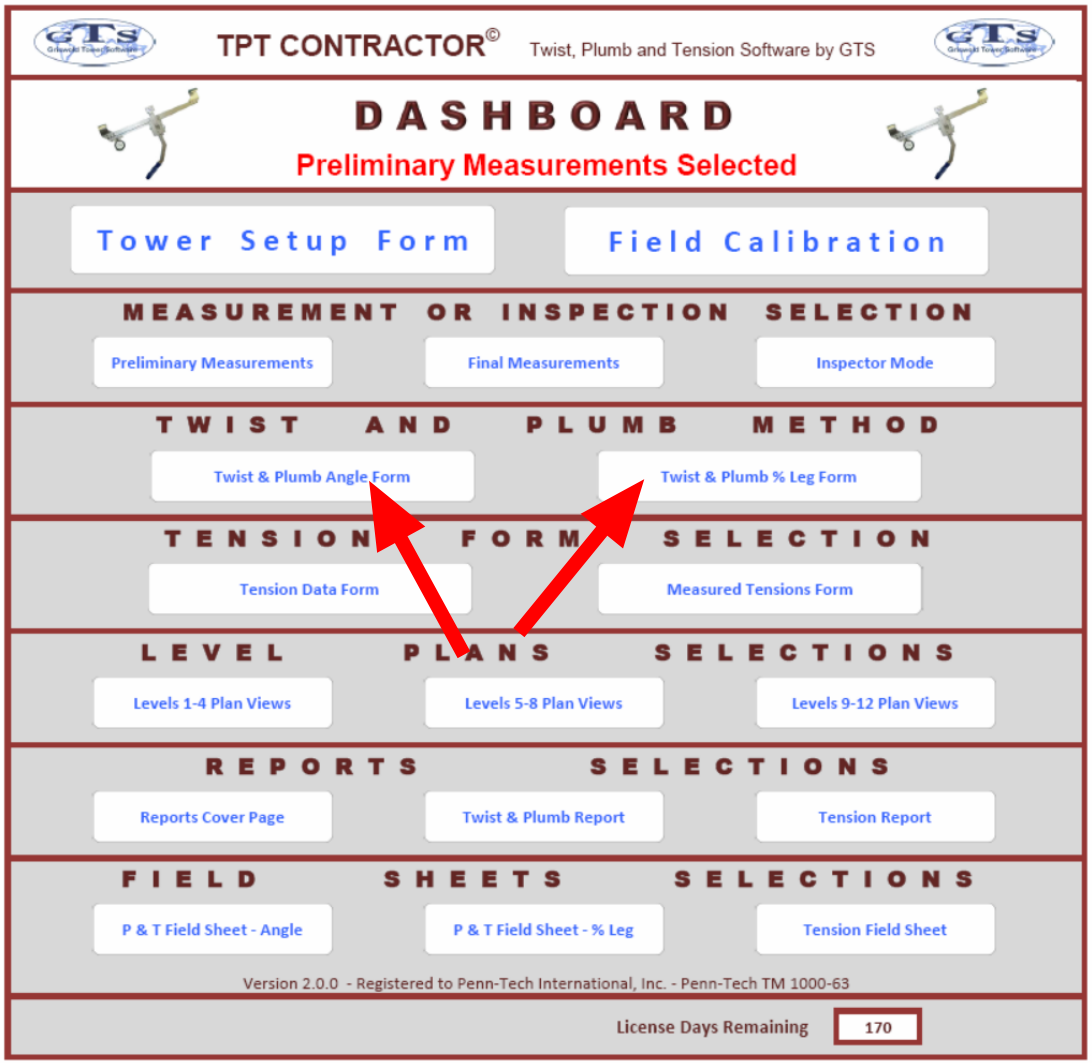
1. **Angular Method**
2. **Percent of Leg Width Method**

GTS Griswold Tower Software

TPT Contractor©

Twist, Plumb and Tension

Software by GTS



Twist and Plumb Section

The method that will be used to measure the Twist and Plumb of the tower is chosen on the Dashboard. We will first cover the Angular Measurement Method followed by the Percent of Leg Width Measurement Method.

GTS Griswold Tower Software

TPT Contractor©

Twist, Plumb and Tension

Software by GTS

Twist and Plumb – Angular Method

- The Theodolite is set up next to an anchor fan plate. It is then centered on the leg at the base of the tower and the horizontal angle in the theodolite is set to Zero.
- The distance from the Theodolite to the leg is recorded
- The scope is then tilted up to the first guy elev.
- The Theodolite is rotated to the center of the leg and the angle recorded. This is then repeated for each guy elevation. Clockwise rotation of the Theodolite is recorded as positive.

GTS Griswold Tower Software

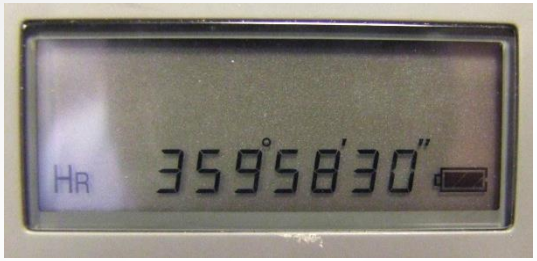
TPT Contractor©

Twist, Plumb and Tension

Software by GTS

Twist and Plumb – Angular Method

Horizontal Angle Set to Zero



Angle of 0° 01’ 30” Left

Angle of 0° 02’ 40” Right

GTS Griswold Tower Software

TPT CONTRACTOR©

Twist, Plumb and Tension Software by GTS

Final Measurements

Back to Dashboard

Angular Measurements Selected

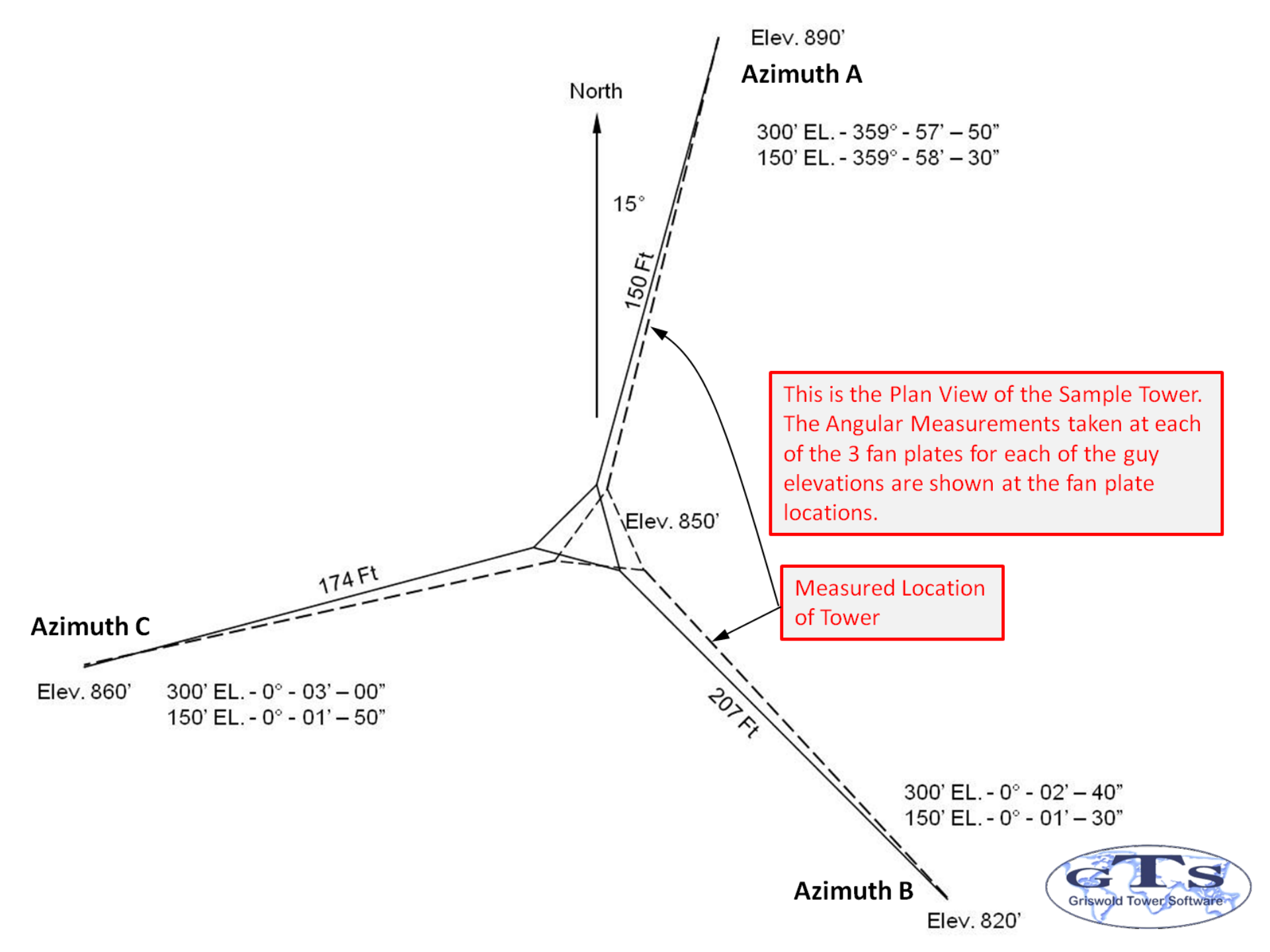
Twist and Plumb Data - Angular Measurements Method

	Level Number	Attachment Elev. (Ft)	D1 Reading - Leg A - Azimuth = 15˚				D2 Reading - Leg B - Azimuth = 135˚				D3 Reading - Leg C - Azimuth = 255˚			
			Distance - Instrument to Leg (Feet)				Distance - Instrument to Leg (Feet)				Distance - Instrument to Leg (Feet)			
			Deg	Min	Sec	Equiv.	Deg	Min	Sec	Equiv.	Deg	Min	Sec	Equiv.
Guy Elevations	12	-												
	11	-												
	10	-												
	9	-												
	8	-												
	7	-												
	6	-												
	5	-												
	4	-												
	3	-												
	2	300				0.0000				0.0000				0.0000
	1	150				0.0000				0.0000				0.0000

This is how the “Angular Measurements” form will appear after “Building” the tower is complete.

	Level Number	Attachment Elev. (Ft)	Deviation (in)			Twist Results			Plumb Results		
			D1	D2	D3	Measured Twist Btwn Elevations (degrees)	Allowable Twist Btwn Elevations (degrees)	***RESULT***	Measured Defl Btwn Elevations (inches)	Allowable Defl Btwn Elevations (inches)	***RESULT***
Guy Elevations	12	-									
	11	-									
	10	-									
	9	-									
	8	-									
	7	-									
	6	-									
	5	-									
	4	-									
	3	-									
	2	300	0.0000	0.0000	0.0000	0.00	5.00	OK	0.00	4.50	OK
	1	150	0.0000	0.0000	0.0000	0.00	5.00	OK	0.00	4.50	OK

Clear All Data on This Form


Elev. 890'
Azimuth A
North
300' EL. - 359° - 57' – 50"
150' EL. - 359° - 58' – 30"
15°
150 Ft
This is the Plan View of the Sample Tower. The Angular Measurements taken at each of the 3 fan plates for each of the guy elevations are shown at the fan plate locations.
Elev. 850'
174 Ft
Measured Location of Tower
Azimuth C
Elev. 860'
300' EL. - 0° - 03' – 00"
150' EL. - 0° - 01' – 50"
207 Ft
300' EL. - 0° - 02' – 40"
150' EL. - 0° - 01' – 30"
Azimuth B
Elev. 820'
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Final Measurements

Back to Dashboard

Angular Measurements Selected

Twist and Plumb Data - Angular Measurements Method

	Level Number	Attachment Elev. (Ft)	D1 Reading - Leg A - Azimuth = 15°				D2 Reading - Leg B - Azimuth = 135°				D3 Reading - Leg C - Azimuth = 255°			
			Distance - Instrument to Leg (Feet)			150.00	Distance - Instrument to Leg (Feet)				Distance - Instrument to Leg (Feet)			
			Deg	Min	Sec	Equiv.	Deg	Min	Sec	Equiv.	Deg	Min	Sec	Equiv.
Guy Elevations	12	-												
	11	-												
	10	-												
	9	-												
	8	-												
	7	-												
	6	-												
	5	-												
	4	-												
	3	-												
	2	300				0.0000				0.0000				0.0000
	1	150				0.0000				0.0000				0.0000

For Leg A the Distance from the Theodolite to the Leg is recorded

Use only numbers. Don't use any letters or special characters such as feet (') or inches (").

	Level Number	Attachment Elev. (Ft)	Deviation (in)			Twist Results			Plumb Results		
			D1	D2	D3	Measured Twist Btwn Elevations (degrees)	Allowable Twist Btwn Elevations (degrees)	*RESULT*	Measured Defl Btwn Elevations (inches)	Allowable Defl Btwn Elevations (inches)	*RESULT*
Guy Elevations	12	-									
	11	-									
	10	-									
	9	-									
	8	-									
	7	-									
	6	-									
	5	-									
	4	-									
	3	-									
	2	300	0.0000	0.0000	0.0000	0.00	5.00	OK	0.00	4.50	OK
	1	150	0.0000	0.0000	0.0000	0.00	5.00	OK	0.00	4.50	OK

Clear All Data on This Form

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Twist, Plumb and Tension Software by GTS

Final Measurements | Back to Dashboard | **Angular Measurements Selected**

Twist and Plumb Data - Angular Measurements Method

	Level Number	Attachment Elev. (Ft)	D1 Reading - Leg A - Azimuth = 15°				D2 Reading - Leg B - Azimuth = 135°				D3 Reading - Leg C - Azimuth = 255°			
			Distance - Instrument to Leg (Feet)			150.00	Distance - Instrument to Leg (Feet)				Distance - Instrument to Leg (Feet)			
			Deg	Min	Sec	Equiv.	Deg	Min	Sec	Equiv.	Deg	Min	Sec	Equiv.
Guy Elevations	12	-												
	11	-												
	10													
	9													
	8													
	7													
	6													
	5													
	4													
	3	-												
	2	300	359	57	50	359.9639				0.0000				0.0000
	1	150	359	58	30	359.9750				0.0000				0.0000

Next the Angular Measurements for each guy elevation are recorded. Note the leg has moved to the Left, therefore the angles are subtracted from 360° by the Theodolite.

Don't use any letters or special characters such as degrees (˚), minutes (‘) or seconds (“).

	Level Number	Attachment Elev. (Ft)	Deviation (in)			Twist Results			Plumb Results		
			D1	D2	D3	Measured Twist Btwn Elevations (degrees)	Allowable Twist Btwn Elevations (degrees)	***RESULT***	Measured Defl Btwn Elevations (inches)	Allowable Defl Btwn Elevations (inches)	***RESULT***
Guy Elevations	12	-									
	11	-									
	10	-									
	9	-									
	8	-									
	7	-									
	6	-									
	5	-									
	4	-									
	3	-									
	2	300	-1.1345	0.0000	0.0000	-0.38	5.00	OK	0.23	4.50	OK
	1	150	-0.7854	0.0000	0.0000	-0.87	5.00	OK	0.52	4.50	OK

Clear All Data on This Form

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Twist, Plumb and Tension Software by GTS

Final Measurements

Back to Dashboard

Angular Measurements Selected

Twist and Plumb Data - Angular Measurements Method

	Level Number	Attachment Elev. (Ft)	D1 Reading - Leg A - Azimuth = 15°				D2 Reading - Leg B - Azimuth = 135°				D3 Reading - Leg C - Azimuth = 255°			
			Distance - Instrument to Leg (Feet)			150.00	Distance - Instrument to Leg (Feet)			207.00	Distance - Instrument to Leg (Feet)			174.00
			Deg	Min	Sec	Equiv.	Deg	Min	Sec	Equiv	Deg	Min	Sec	Equiv
Guy Elevations	12	-												
	11	-												
	10	-												
	9	-												
	8	-												
	7	-												
	6	-												
	5	-												
	4	-												
	3	-												
	2	300	359	57	50	359.9639	0	2	40	0.0444	0	3	0	0.0500
	1	150	359	58	30	359.9750	0	1	30	0.0250	0	1	50	0.0306

The process is repeated for Legs B and C until all of the distance and Angular Measurements have been entered.

	Level Number	Attachment Elev. (Ft)	Deviation (in)			Twist Results			Plumb Results		
			D1	D2	D3	Measured Twist Btwn Elevations (degrees)	Allowable Twist Btwn Elevations (degrees)	*RESULT*	Measured Defl Btwn Elevations (inches)	Allowable Defl Btwn Elevations (inches)	*RESULT*
Guy Elevations	12	-									
	11	-									
	10	-									
	9	-									
	8	-									
	7	-									
	6	-									
	5	-									
	4	-									
	3	-									
	2	300	-1.1345	1.9268	1.8221	1.33	5.00	OK	0.75	4.50	OK
	1	150	-0.7854	1.0838	1.1135	1.56	5.00	OK	1.26	4.50	OK

The Twist Results and Plumb Results are provided immediately.

Clear All Data on This Form

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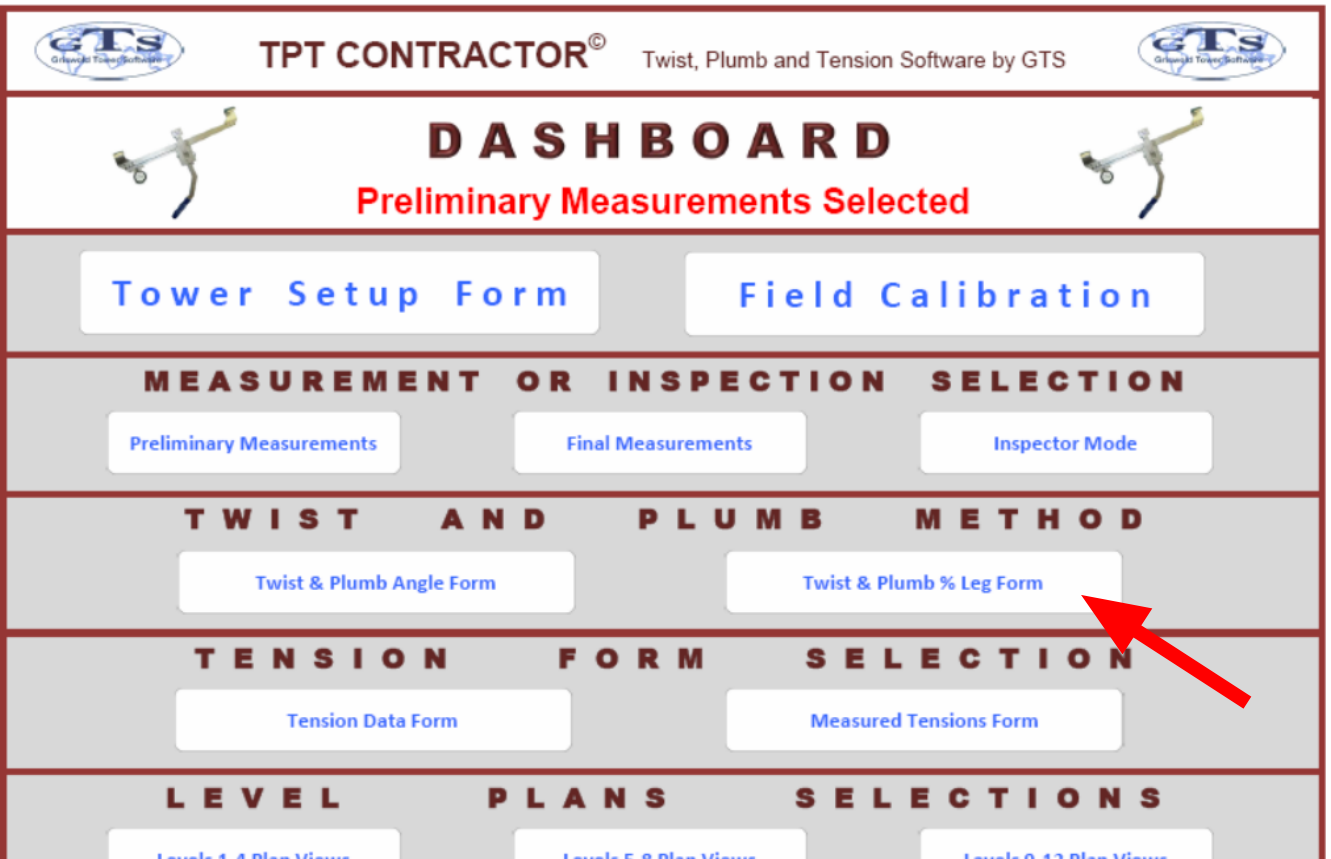
Twist, Plumb and Tension

Software by GTS

Twist and Plumb – Percent of Leg Width Method

When Percent of Leg Width method is used the “Twist and Plumb %



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Final Measurements

Back to Dashboard

% of Leg Width Measurements Selected

Twist and Plumb Data - Percent of Leg Width Measurements Method

	Level Number	Attachment Elev. (Ft)	D1 Reading - Leg A - Azimuth = 15˚				D2 Reading - Leg B - Azimuth = 135˚				D3 Reading - Leg C - Azimuth = 255˚			
			Distance - Instrument to Leg (Feet)				Distance - Instrument to Leg (Feet)				Distance - Instrument to Leg (Feet)			
			Leg Width	% of Width	Left or Right	Equiv.	Leg Width	% of Width	Left or Right	Equiv.	Leg Width	% of Width	Left or Right	Equiv.
Guy Elevations	12	-			Right				Right				Right	
	11	-			Right				Right				Right	
	10	-			Right				Right				Right	
	9	-			Right				Right				Right	
	8	-			Right				Right				Right	
	7	-			Right				Right				Right	
	6	-			Right				Right				Right	
	5	-			Right				Right				Right	
	4	-			Right				Right				Right	
	3	-			Right				Right				Right	
	2	300			Right				Right				Right	
	1	150			Right				Right				Right	

This is the Percent of Leg Width Method Form

	Level Number	Attachment Elev. (Ft)	Deviation (in)		
			D1	D2	D3
Guy Elevations	12	-			
	11	-			
	10	-			
	9	-			
	8	-			
	7	-			
	6	-			
	5	-			
	4	-			
	3	-			
	2	300			
	1	150			

Twist Results		
Measured Twist Btwn Elevations (degrees)	Allowable Twist Btwn Elevations (degrees)	***RESULT***
	5.00	
	5.00	

Plumb Results		
Measured Defl Btwn Elevations (inches)	Allowable Defl Btwn Elevations (inches)	***RESULT***
	4.50	RE-PLUMB
		RE-PLUMB

Clear All Data on This Form

Version 1.2.0

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Twist, Plumb and Tension

Software by GTS

Twist and Plumb – Percent of Leg Width Method

- Similar to the Angular Method, the instrument, usually a Transit, is setup at the fan plate and centered on the tower leg.
- Next the instrument is turned up to the guy elevation and the percent of leg width left or right is estimated as shown on the next 2 slides.

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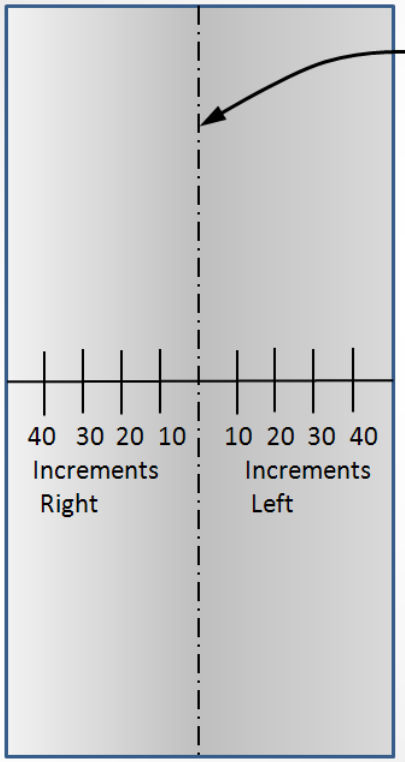
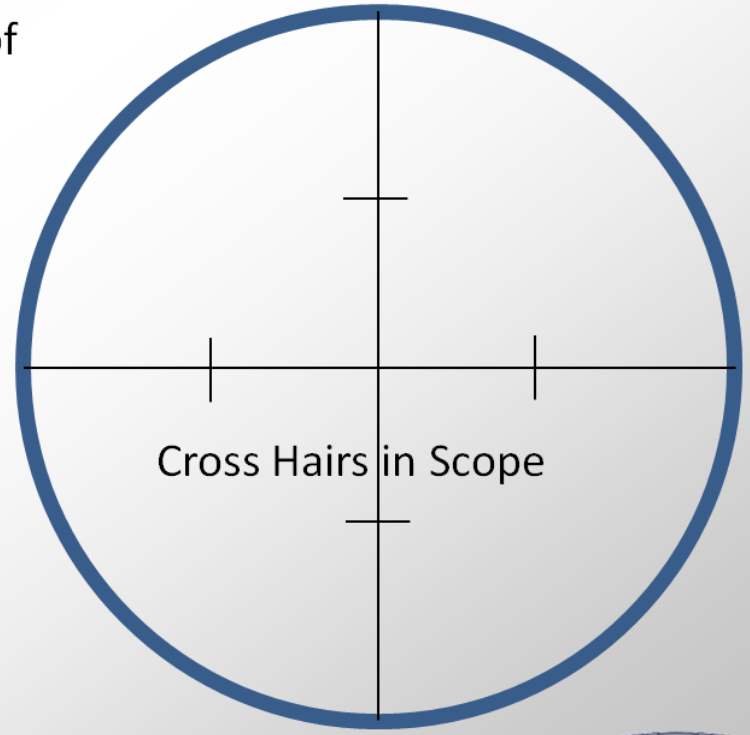
Software by GTS





Leg broken into 10% increments

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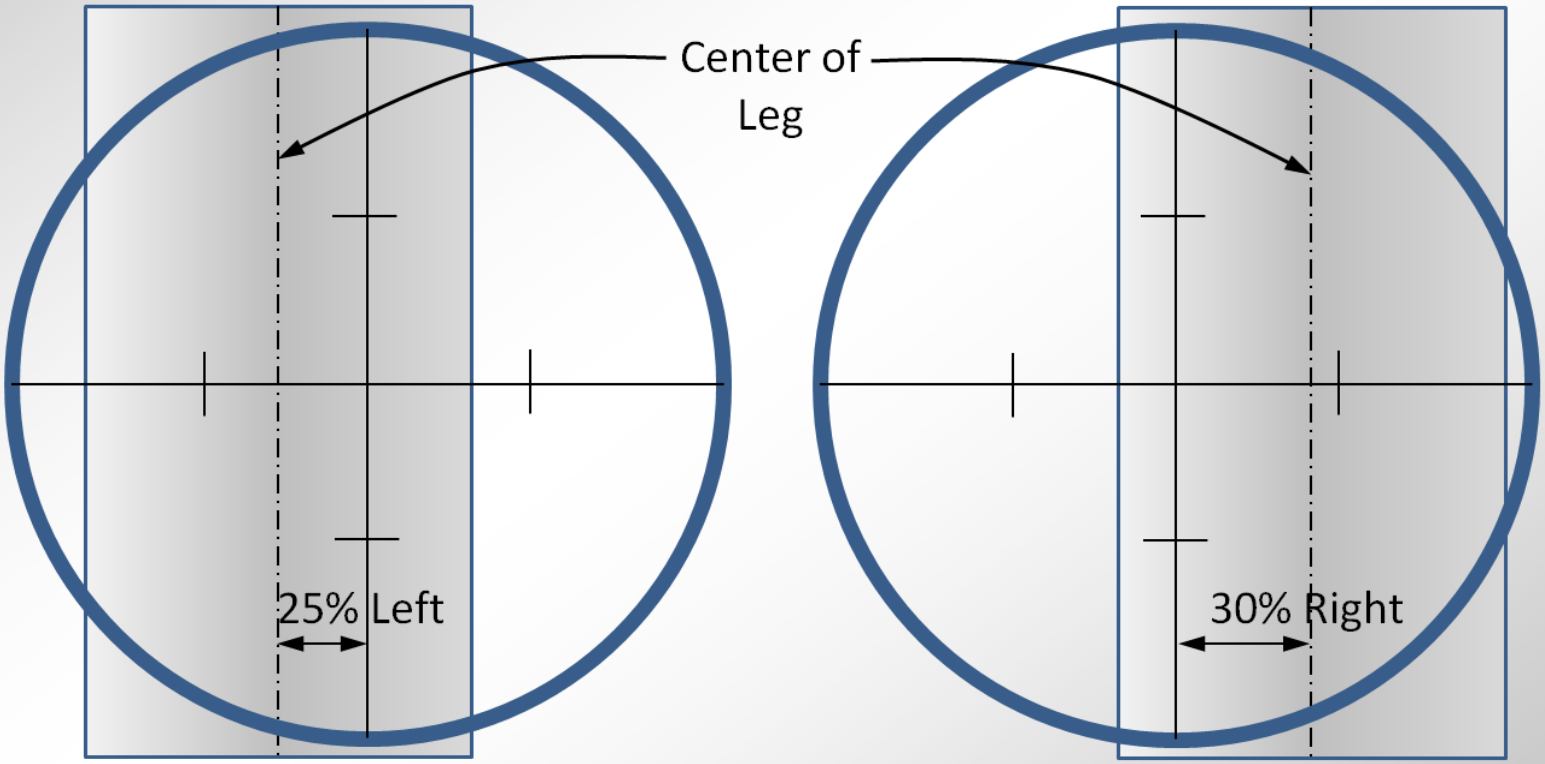
Examples of % Left and Right



Tower Leg Left of Cross Hairs 25%

Tower Leg Right of Cross Hairs 30%

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Final Measurements

Back to Dashboard

% of Leg Width Measurements Selected

Twist and Plumb Data - Percent of Leg Width Measurements Method

	Level Number	Attachment Elev. (Ft)	D1 Reading - Leg A - Azimuth = 15˚				D2 Reading - Leg B - Azimuth = 135˚				D3 Reading - Leg C - Azimuth = 255˚			
			Distance - Instrument to Leg (Feet)			150.00	Distance - Instrument to Leg (Feet)			207.00	Distance - Instrument to Leg (Feet)			174.00
			Leg Width	% of Width	Left or Right	Equiv.	Leg Width	% of Width	Left or Right	Equiv.	Leg Width	% of Width	Left or Right	Equiv.
Guy Elevations	12	-			Right				Right				Right	
	11	-			Right				Right				Right	
	10	-			Right				Right				Right	
	9	-			Right				Right				Right	
	8	-			Right				Right				Right	
	7	-			Right				Right				Right	
	6	-			Right				Right				Right	
	5	-			Right				Right				Right	
	4	-			Right				Right				Right	
	3	-			Right				Right				Right	
	2	300	3.5		Right				Right	.0000	3.5		Right	0.0000
	1	150	4		Right				Right	.0000	4		Right	0.0000

Similar to the Angular Measurements method the distances from the instrument to each of the legs are recorded.

Next the width of the legs at the guy elevations are entered.

	Level Number	Attachment Elev. (Ft)	Deviation (in)			Twist Results			Plumb Results		
			D1	D2	D3	Measured Twist Btwn Elevations (degrees)	Allowable Twist Btwn Elevations (degrees)	***RESULT***	Measured Defl Btwn Elevations (inches)	Allowable Defl Btwn Elevations (inches)	***RESULT***
Guy Elevations	12	-									
	11	-									
	10	-									
	9	-									
	8	-									
	7	-									
	6	-									
	5	-									
	4	-									
	3	-									
	2	300	0.0000	0.0000	0.0000	0.00	5.00	OK	0.00	4.50	OK
	1	150	0.0000	0.0000	0.0000	0.00	5.00	OK	0.00	4.50	OK

Clear All Data on This Form

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Final Measurements

Back to Dashboard

% of Leg Width Measurements Selected

Twist and Plumb Data - Percent of Leg Width Measurements Method

	Level Number	Attachment Elev. (Ft)	D1 Reading - Leg A - Azimuth = 15˚				D2 Reading - Leg B - Azimuth = 135˚				D3 Reading - Leg C - Azimuth = 255˚			
			Distance - Instrument to Leg (Feet)			150.00	Distance - Instrument to Leg (Feet)			207.00	Distance - Instrument to Leg (Feet)			174.00
			Leg Width	% of Width	Left or Right	Equiv.	Leg Width	% of Width	Left or Right	Equiv.	Leg Width	% of Width	Left or Right	Equiv.
Guy Elevations	12	-			Right				Right				Right	
	11	-			Right				Right				Right	
	10	-			Right				Right				Right	
	9	-			Right				Right				Right	
	8	-			Right				Right				Right	
	7	-			Right				Right				Right	
	6	-			Right				Right				Right	
	5	-			Right				Right				Right	
	4	-			Right				Right				Right	
	3	-			Right				Right				Right	
	2	300	3.5	25%	Left	359.9722	3.5	50%	Right	0.0404	3.5	50%	Right	0.0480
	1	150	4	25%	Left	359.9682	4	30%	Right	0.0277	4	30%	Right	0.0329

The percent of leg width is entered and using the Dropdown Buttons the direction (Left or Right) is input

	Level Number	Attachment Elev. (Ft)	Deviation (in)			Twist Results			Plumb Results		
			D1	D2	D3				Allowable Defl Btwn Elevations (inches)	RESULT	
Guy Elevations	12	-									
	11	-									
	10	-									
	9	-									
	8	-									
	7	-									
	6	-									
	5	-									
	4	-									
	3	-									
	2	300	-0.8748	1.7500	1.7500	1.35	5.00	OK	0.28	4.50	OK
	1	150	-0.9997	1.2000	1.2000	1.54	5.00	OK	1.47	4.50	OK

Again, the Twist Results and Plumb Results are provided immediately.

Clear All Data on This Form

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Final Measurements

Back to Dashboard

% of Leg Width Measurements Selected

Twist and Plumb Data - Percent of Leg Width Measurements Method

	Level Number	Attachment Elev. (Ft)	D1 Reading - Leg A - Azimuth = 15˚				D2 Reading - Leg B - Azimuth = 135˚				D3 Reading - Leg C - Azimuth = 255˚			
			Distance - Instrument to Leg (Feet)			150.00	Distance - Instrument to Leg (Feet)			207.00	Distance - Instrument to Leg (Feet)			174.00
			Leg Width	% of Width	Left or Right	Equiv.						% of Width	Left or Right	Equiv.
Guy Elevations	12	-			Right								Right	
	11	-			Right				Right				Right	
	10	-			Right				Right				Right	
	9	-			Right				Right				Right	
	8	-			Right				Right				Right	
	7	-			Right				Right				Right	
	6	-			Right				Right				Right	
	5	-			Right				Right				Right	
	4	-			Right				Right				Right	
	3	-			Right				Right				Right	
	2	300	3.5	25%	Left	359.9722	3.5	50%	Right	0.0404	3.5	50%	Right	0.0480
	1	150	4	25%	Left	359.9682	4	30%	Right	0.0277	4	30%	Right	0.0329

Press the "Back to Dashboard" Button

	Level Number	Attachment Elev. (Ft)	Deviation (in)		
			D1	D2	D3
Guy Elevations	12	-			
	11	-			
	10	-			
	9	-			
	8	-			
	7	-			
	6	-			
	5	-			
	4	-			
	3	-			
	2	300	-0.8748	1.7500	1.7500
	1	150	-0.9997	1.2000	1.2000

Twist Results		
Measured Twist Btwn Elevations (degrees)	Allowable Twist Btwn Elevations (degrees)	***RESULT***
1.35	5.00	OK
1.54	5.00	OK

Plumb Results		
Measured Defl Btwn Elevations (inches)	Allowable Defl Btwn Elevations (inches)	***RESULT***
0.28	4.50	OK
1.47	4.50	OK

Clear All Data on This Form

Version 1.2.0

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Twist, Plumb and Tension

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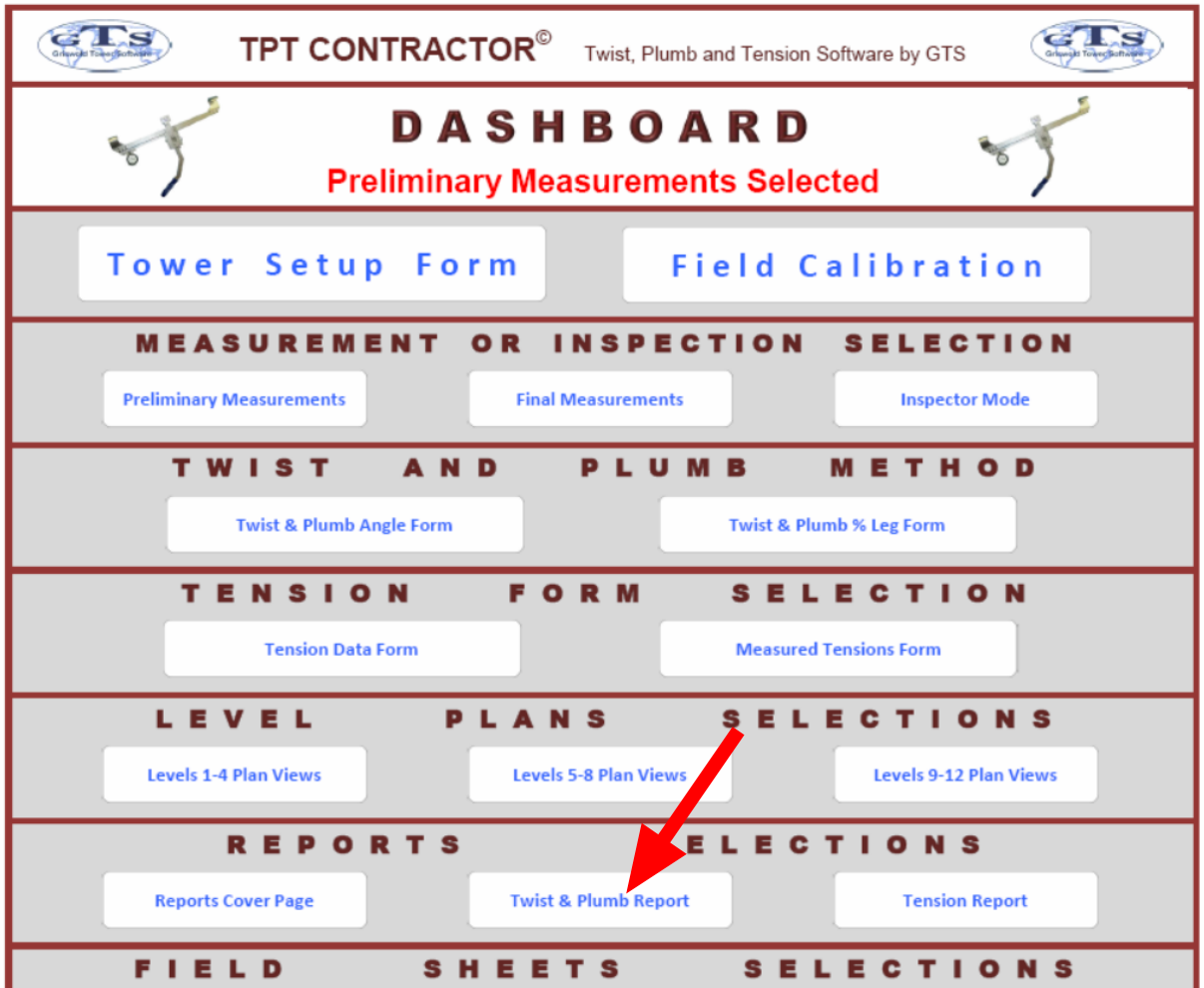

Twist and Plumb Report

Now that the Twist and Plumb Measurements are complete we can get the report. The report will contain the data of the measurement method last chosen. In this example both are available as the data for both methods have been entered.

Griswold Tower Software

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IETS Engineering Services
129 Greenwich Road / Charlotte, NC 28211
Phone: (704) 522-1131 / Fax: (704) 522-1280

Tower Twist & Plumb Report - Final Measurer

Back to Dashboard

IETS Job No.	2011-70123	**IETS Employee**	Daniel Boone
Client Name	Joe's Towers	**Date**	March 30, 2011
Site Name	Midland	**PO Number**	JT-334-GT-2011
Site No.	334-GT		

Guy Azimuth (°)		Guy Radius (ft)				Percent of Leg Width Method Used for Twist & Plumb Determination
			A	B	C	
A	15	1	150	207	174	
B	135	2				
C	255	3				

Observed Mast Data

Guy Elev (feet)	Tower Face Width A (inches)	15° leg D1 (inches)	135° leg D2 (inches)	255° leg D3 (inches)
300.0	30	-0.87	1.75	1.75
150.0	30	-1.00	1.20	1.20

from EIA/TIA 222-G

$$d = \frac{(D1+D2+D3)}{3}$$

$$e = \frac{(d*\sqrt{3})}{A}$$

$$a = \arcsin(e)$$

$$x = \frac{(D2-D3)}{\sqrt{3}}$$

$$y = \frac{(2*D1-D2-D3)}{3}$$

$$r = \sqrt{(x^2+y^2)}$$

Guy Elev (feet)	Calculated Twist			Allowable with respect to Base (degrees)	Measured Twist Btwn Elevations (degrees)	Allowable Twist Btwn Elevations (degrees)	RESULT
	d (inches)	e	α (degree)				
300.0	0.88	0.05	2.90	5.00	1.35	5.00	OK
150.0	0.47	0.03	1.54	5.00	1.54	5.00	OK

Mast Elev (feet)	Calculated Plumb Resultant			Total Allowable Deflection (inches)	Measured Defl Btwn Elevations (inches)	Allowable Defl Btwn Elevations (inches)	RESULT
	x (inches)	y (inches)	Resultant Deflection r (inches)				
300.0	0.00	-1.75	1.75	9.00	0.28	4.50	OK
150.0	0.00	-1.47	1.47	4.50	1.47	4.50	OK

Your Logo will appear on the reports.

The "Back to Dashboard" Button will not appear in the printed report.

Twist and Plumb Report

The report shown on the left of this slide is automatically generated by the software.

This page can be printed to a pdf and sent to your client. This report is prepared in accordance with TIA-222 requirements.

Griswold Tower Software

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Twist, Plumb and Tension

Software by GTS

Tension Section

Back to Table of Contents

Griswold Tower Software

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Twist, Plumb and Tension

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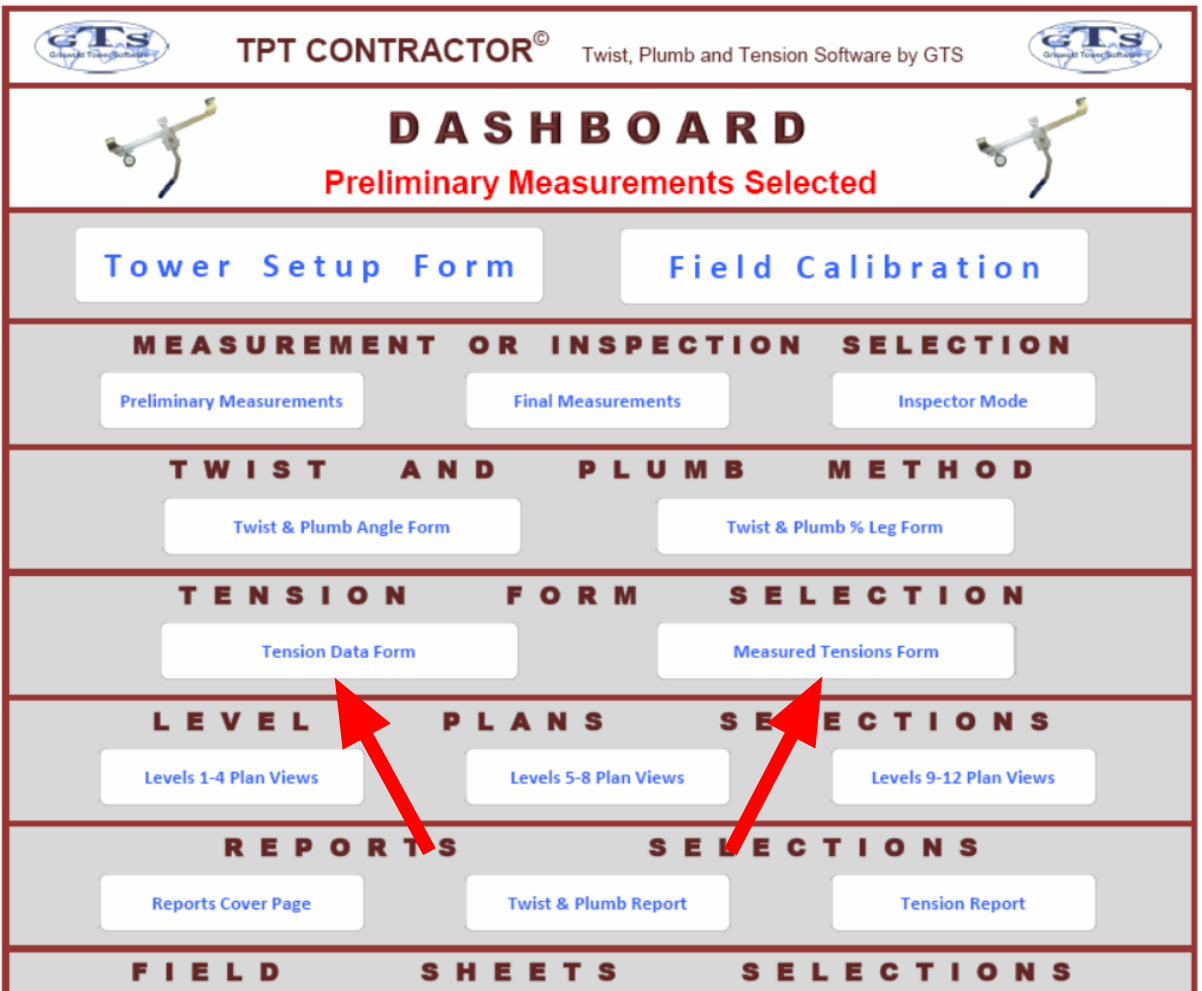

Tension Section

The Tension Forms Section of the Dashboard contains buttons for access to the “Tension Data Form” and a “Measured Tensions Form” that is used for making tension measurements without first building a tower into the “Tower Setup Form”.

GTS Griswold Tower Software

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Twist, Plumb and Tension

Software by GTs

Tension Data Form

- This form is used to record the measured tensions.
- The program contains the calibration data specific to the Penn-Tech Tensionmeter being used.
- When the current temperature is input the software provides a dial reading. This dial reading can be used to adjust the tension so that the cable tension will be correct when normalized to 60˚.
- The next slide shows the Tension Data Form for the Cables along Azimuth A. Scroll down to access the portions of the Tension Data Form for Azimuths B & C.

GTs Griswold Tower Software

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Final Measurements

Version 1.2.0

Back to Dashboard

Tension Values for Cables along Azimuth A - The 15° Leg

Level Number for Azimuth A - the 15° Leg

Level Number	Attachment Elev. (Ft)	Left, Right or Center	Cable Temp.	Req'd Dial / Handle*Block	Penn-Tech TM 1000-90				Screen Shots	Measured Tensions	Tension @ 60 Deg. F.	Specified Tensions	Percent Difference
					1	2	3	Average					
12	-	-		-				-	Screen Shot	-	-	-	-
-	-	-		-				-	Screen Shot	-	-	-	-
11	-	-		-				-	Screen Shot	-	-	-	-
-	-	-		-				-	Screen Shot	-	-	-	-
10	-	-		-				-	Screen Shot	-	-	-	-
-	-	-		-				-	Screen Shot	-	-	-	-
9	-	-		-				-	Screen Shot	-	-	-	-
-	-	-		-				-	Screen Shot	-	-	-	-
8	-	-		-				-	Screen Shot	-	-	-	-
-	-	-		-				-	Screen Shot	-	-	-	-
7	-	-		-				-	Screen Shot	-	-	-	-
-	-	-		-				-	Screen Shot	-	-	-	-
6	-	-		-				-	Screen Shot	-	-	-	-
-	-	-		-				-	Screen Shot	-	-	-	-
5	-	-		-				-	Screen Shot	-	-	-	-
-	-	-		-				-	Screen Shot	-	-	-	-
4	-	-		-				-	Screen Shot	-	-	-	-
-	-	-		-				-	Screen Shot	-	-	-	-
3	-	-		-				-	Screen Shot	-	-	-	-
-	-	-		-				-	Screen Shot	-	-	-	-
2	300	Center		23.6 / 3*X				0.00	Screen Shot	0	-129	1,540	-108.4%
-	-	-		-				-	Screen Shot	-	-	-	-
1	150	Left		11.1 / 4*X				0.00	Screen Shot	0	-132	665	-119.9%
1	150	Right		11.1 / 4*X				0.00	Screen Shot	0	-132	665	-119.9%

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Twist, Plumb and Tension Software by GTS

Final Measurements

Version 1.2.0

Back to Dashboard

Tension Values for Cables along Azimuth A - The 15° Leg

Level Number for Azimuth A - the 15° Leg

Level Number	Attachment Elev. (Ft)	Left, Right or Center	Cable Temp.	Req'd Dial / Handle*Block	Penn-Tech TM 1000-90				Screen Shots	Measured Tensions	Tension @ 60 Deg. F.	Specified Tensions	Percent Difference
					1	2	3	Average					
12	-	-		-				-	Screen Shot	-	-	-	-
-	-	-		-				-	Screen Shot	-	-	-	-
11	-	-		-				-	Screen Shot	-	-	-	-
-	-	-		-				-	Screen Shot	-	-	-	-
10	-	-		-				-	Screen Shot	-	-	-	-
-	-	-		-				-	Screen Shot	-	-	-	-
9	-	-		-				-	Screen Shot	-	-	-	-
-	-	-		-				-	Screen Shot	-	-	-	-
8	-	-		-				-	Screen Shot	-	-	-	-
-	-	-		-				-	Screen Shot	-	-	-	-
7	-	-		-				-	Screen Shot	-	-	-	-
-	-	-		-					Screen Shot	-	-	-	-
				-					Screen Shot	-	-	-	-
				-					Screen Shot	-	-	-	-
				-					Screen Shot	-	-	-	-
				-					Screen Shot	-	-	-	-
				-					Screen Shot	-	-	-	-
				-					Screen Shot	-	-	-	-
3	-	-		-				-	Screen Shot	-	-	-	-
-	-	-		-				-	Screen Shot	-	-	-	-
2	300	Center	34	22.7 / 3*X				0.00	Screen Shot	0	-56	1,540	-103.6%
-	-	-						-	Screen Shot	-	-	-	-
1	150	Left		11.1 / 4*X				0.00	Screen Shot	0	-132	665	-119.9%
1	150	Right		11.1 / 4*X				0.00	Screen Shot	0	-132	665	-119.9%

The temperature at the time the tension measurement is made is recorded here. Use only numbers.

The software recommends the dial reading "22.7" to get the right tension. It also gives the required handle position and block size for the cable being tested.

TPT CONTRACTOR© Twist, Plumb and Tension Software by GTS

Final Measurements

Version 1.2.0

Back to Dashboard

Tension Values for Cables along Azimuth A - The 15° Leg

Level Number for Azimuth A - the 15° Leg

Level Number	Attachment Elev. (Ft)	Left, Right or Center	Cable Temp.	Req'd Dial / Handle*Block	Penn-Tech TM 1000-90				Screen Shots	Measured Tensions	Tension @ 60 Deg. F.	Specified Tensions	Percent Difference
					1	2	3	Average					
12	-	-		-				-	Screen Shot	-	-	-	-
-	-	-		-				-	Screen Shot	-	-	-	-
11	-	-		-				-	Screen Shot	-	-	-	-
-	-	-		-				-	Screen Shot	-	-	-	-
10	-	-		-				-	Screen Shot	-	-	-	-
-	-	-		-				-	Screen Shot	-	-	-	-
9	-	-		-				-	Screen Shot	-	-	-	-
-	-	-		-				-	Screen Shot	-	-	-	-
8	-	-		-				-	Screen Shot	-	-	-	-
-	-	-		-				-	Screen Shot	-	-	-	-
7	-	-		-				-	Screen Shot	-	-	-	-
-	-	-		-				-	Screen Shot	-	-	-	-
6	-	-		-				-	Screen Shot				
-	-	-		-				-	Screen Shot				
5	-	-		-				-	Screen Shot				
-	-	-		-				-	Screen Shot				
4	-	-		-				-	Screen Shot				
-	-	-		-				-	Screen Shot				
3	-	-		-				-	Screen Shot	-	-	-	-
-	-	-		-				-	Screen Shot	-	-	-	-
2	300	Center	34	22.7 / 3*X	22.5	23	23.5	23.00	Screen Shot	1,622	1,566	1,540	1.7%
-	-	-		-				-	Screen Shot	-	-	-	-
1	150	Left		11.1 / 4*X				0.00	Screen Shot	0	-132	665	-119.9%
1	150	Right		11.1 / 4*X				0.00	Screen Shot	0	-132	665	-119.9%

Next the dial readings are recorded from 3 measurements.

The software provides the measured tension, the measured tension converted to 60˚F, the specified tension at 60˚F, and the percent difference.

TPT CONTRACTOR© Twist, Plumb and Tension Software by GTS

Final Measurements

Version 1.2.0

Back to Dashboard

Tension Values for Cables along Azimuth A - The 15° Leg

Level Number for Azimuth A - the 15° Leg

Level Number	Attachment Elev. (Ft)	Left, Right or Center	Cable Temp.	Req'd Dial / Handle*Block	Penn-Tech TM 1000-90				Screen Shots	Measured Tensions	Tension @ 60 Deg. F.	Specified Tensions	Percent Difference
					1	2	3	Average					
12	-	-		-				-	Screen Shot	-	-	-	-
-	-	-		-				-	Screen Shot	-	-	-	-
11	-	-		-				-	Screen Shot	-	-	-	-
-	-	-		-				-	Screen Shot	-	-	-	-
10	-	-		-				-	Screen Shot	-	-	-	-
-	-	-		-				-	Screen Shot	-	-	-	-
9	-	-		-				-	Screen Shot	-	-	-	-
-	-	-		-				-	Screen Shot	-	-	-	-
8	-	-		-				-	Screen Shot	-	-	-	-
-	-	-		-				-	Screen Shot	-	-	-	-
7	-	-		-				-	Screen Shot	-	-	-	-
-	-	-		-				-	Screen Shot	-	-	-	-
6	-	-		-				-	Screen Shot	-	-	-	-
-	-	-		-							-	-	-
5	-	-		-							-	-	-
-	-	-		-							-	-	-
4	-	-		-							-	-	-
-	-	-		-							-	-	-
3	-	-		-				-	Screen Shot	-	-	-	-
-	-	-		-				-	Screen Shot	-	-	-	-
2	300	Center	34	22.7 / 3*X	22.5	23	23.5	23.00	Screen Shot	1,622	1,566	1,540	1.7%
-	-	-		-				-	Screen Shot	-	-	-	-
1	150	Left		11.1 / 4*X				0.00	Screen Shot	0	-132	665	-119.9%
1	150	Right		11.1 / 4*X				0.00	Screen Shot	0	-132	665	-119.9%

When the "Screen Shot" button is pressed the software provides the next screen.

Azimuth A Cable Information

Date and Time	**3/30/2011 9:36 AM**
Level No.	**2**
Cable Size	**3/8" Dia EHS 1x7 - (Orange)**
Attachment Elev.	**300**
Left, Right or Center	**Center**
Temperature	**34**
Req'd Dial / Handle & Block	**22.7 / 3*X**
Average Dial Reading	**23.0**
Measured Tension	**1,622**
Measured Converted to 60^0 F.	**1,566**
Specified Tension at 60^0 F.	**1,540**
Percent Difference	**1.69%**

Return to Tension Data Form

TPT Contractor©

Twist, Plumb and Tension

Software by GTS

Azimuth A Cable Information

Date and Time	**3/30/2011 9:36 AM**
Level No.	**2**
Cable Size	**3/8" Dia EHS 1x7 - (Orange)**
Attachment Elev.	**300**
Left, Right or Center	**Center**
Temperature	**34**
Req'd Dial / Handle & Block	**22.7 / 3*X**
Average Dial Reading	**23.0**
Measured Tension	**1,622**
Measured Converted to 60^0 F.	**1,566**
Specified Tension at 60^0 F.	**1,540**
Percent Difference	**1.69%**

Return to Tension Data Form

With this on the screen the laptop computer can be held next to the Tensionmeter and both photographed for inclusion in the report to the client or tower owner.

The Button in the lower right is pressed to return.

GTS Griswold Tower Software

TPT CONTRACTOR©

Twist, Plumb and Tension Software by GTS

Final Measurements

Version 1.2.0

Back to Dashboard

Tension Values for Cables along Azimuth A - The 15° Leg

Level Number for Azimuth A - the 15° Leg

Level Number	Attachment Elev. (Ft)	Left, Right or Center	Cable Temp.	Req'd Dial / Handle*Block	Penn-Tech TM 1000-90				Screen Shots	Measured Tensions	Tension @ 60 Deg. F.	Specified Tensions	Percent Difference
					1	2	3	Average					
12	-	-		-				-	Screen Shot	-	-	-	-
-	-	-		-				-	Screen Shot	-	-	-	-
11	-	-		-				-	Screen Shot	-	-	-	-
-	-	-		-				-	Screen Shot	-	-	-	-
10	-	-		-				-	Screen Shot	-	-	-	-
-	-	-		-				-	Screen Shot	-	-	-	-
9	-	-		-				-	Screen Shot	-	-	-	-
-	-	-		-				-	Screen Shot	-	-	-	-
8	-	-		-					Screen Shot	-	-	-	-
-	-	-		-					Screen Shot	-	-	-	-
7	-	-		-					Screen Shot	-	-	-	-
-	-	-		-					Screen Shot	-	-	-	-
6	-	-		-				-	Screen Shot	-	-	-	-
-	-	-		-				-	Screen Shot	-	-	-	-
5	-	-		-				-	Screen Shot	-	-	-	-
-	-	-		-				-	Screen Shot	-	-	-	-
4	-	-		-				-	Screen Shot	-	-	-	-
-	-	-		-				-	Screen Shot	-	-	-	-
3	-	-		-				-	Screen Shot	-	-	-	-
-	-	-		-				-	Screen Shot	-	-	-	-
2	300	Center	34	22.7 / 3*X	22.5	23	23.5	23.00	Screen Shot	1,622	1,566	1,540	1.7%
-	-	-		-				-	Screen Shot	-	-	-	-
1	150	Left	34	10.1 / 4*X	10	10	11	10.33	Screen Shot	740	683	665	2.7%
1	150	Right	34	10.1 / 4*X	10.5	11	10.5	10.67	Screen Shot	764	707	665	6.3%

The remaining dial readings will be filled in for the remaining cables

Tension Values for Cables along Azimuth B - The 135° Leg

Level Number	Attachment Elev. (Ft)	Left, Right or Center	Cable Temp.	Req'd Dial / Handle*Block	Penn-Tech TM 1000-90				Screen Shots	Measured Tensions	Tension @ 60 Deg. F.	Specified Tensions	Percent Difference
					1	2	3	Average					
Level 135° Leg													
12	-	-		-				-	Screen Shot	-	-	-	-
-	-	-		-				-	Screen Shot	-	-	-	-
11	-	-		-				-	Screen Shot	-	-	-	-
-	-	-		-				-	Screen Shot	-	-	-	-
10	-	-		-				-	Screen Shot	-	-	-	-
-	-	-		-				-	Screen Shot	-	-	-	-
[illegible]	-	-		-				-	Screen Shot	-	-	-	-
2	300	Center	34	23.4 / 3*X	24	25	24	24.33	Screen Shot	1,728	1,612	1,540	4.7%
-	-	-		-				-	Screen Shot	-	-	-	-
1	150	Left	34	10.2 / 4*X	10	10.5	10	10.17	Screen Shot	728	660	665	-0.8%
1	150	Right	34	10.2 / 4*X	10.5	11	10.5	10.67	Screen Shot	764	695	665	4.5%

The values for Azimuth B are given above.

The values for Azimuth C are given below.

Press the "Back to Dashboard" Button

Final Measurements

Clear All Data on This Form

Back to Dashboard

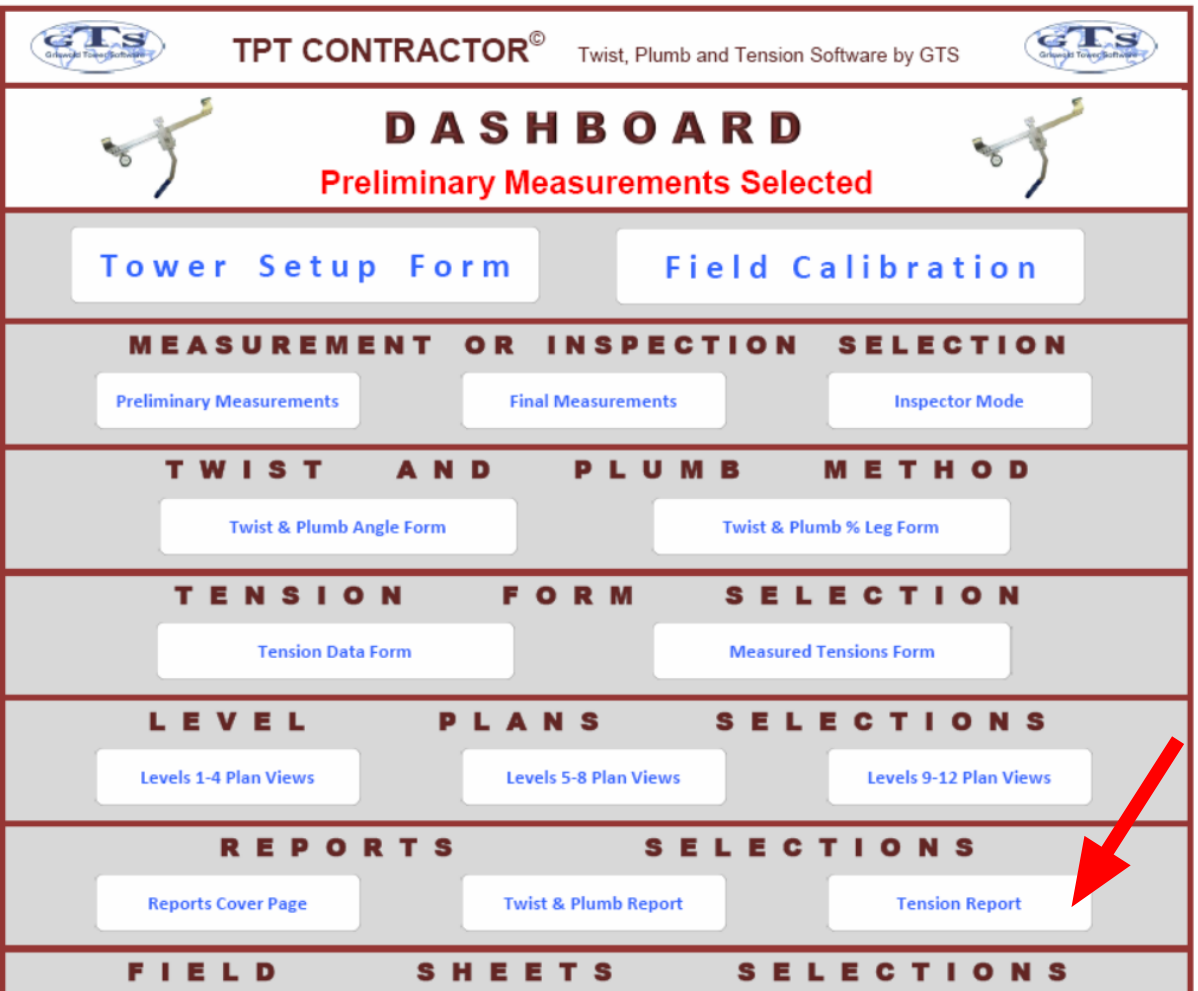
Tension Values for Cables along Azimuth C - The 255° Leg

Level Number	Attachment Elev. (Ft)	Left, Right or Center	Cable Temp.	Req'd Dial / Handle*Block	Penn-Tech TM 1000-90				Screen Shots	Measured Tensions	Tension @ 60 Deg. F.	Specified Tensions	Percent Difference
					1	2	3	Average					
Level N255° Leg													
12	-	-		-				-	Screen Shot	-	-	-	-
-	-	-		-				-	Screen Shot	-	-	-	-
11	-	-		-				-	Screen Shot	-	-	-	-
-	-	-		-				-	Screen Shot	-	-	-	-
10	-	-		-				-	Screen Shot	-	-	-	-
-	-	-		-				-	Screen Shot	-	-	-	-
3	-	-		-				-	Screen Shot	-	-	-	-
-	-	-		-				-	Screen Shot	-	-	-	-
2	300	Center	34	23.0 / 3*X	25	24.5	24	24.50	Screen Shot	1,742	1,656	1,540	7.5%
-	-	-		-				-	Screen Shot	-	-	-	-
1	150	Left	34	10.2 / 4*X	10	10.5	10	10.17	Screen Shot	728	666	665	0.1%
1	150	Right	34	10.2 / 4*X	9	10.5	10.5	10.00	Screen Shot	717	654	665	-1.7%

TPT Contractor©

Twist, Plumb and Tension

Software by GTS



Tension Report

Press the “Tension Report” button to go to that report.

GTS Griswold Tower Software

TPT CONTRACTOR© by GTS

IETS Engineering Services
129 Greenwich Road / Charlotte, NC 28211
Phone: (704) 522-1131 / Fax: (704) 522-1280

www.iets.com

GUY TENSION DATA - Final Measurements

IETS Job No.	2011-70123	**IETS Employee**	Daniel Boone
Client Name	Joe's Towers	**Date**	March 30, 2011
Site Name	Midland	**PO Number**	JT-334-GT-2011
Site No.	334-GT	**Temp (F˚)**	Input for each cable
		Measurement Device	Penn-Tech TM 1000-90

				Tension at Anchor (Pounds)			Specified Tensions (Pounds)	% Difference with Specified			
Cable Number	**Wire Size**	**Anchor Number**	**Guy Elevation**	**15° Leg**	**135° Leg**	**255° Leg**		**15° Leg**	**135° Leg**	**255° Leg**	***RESULT***
12	No Cable		-	-	-	-	-	-	-	-	
-	-	-	-	-	-	-	-	-	-	-	
11	No Cable		-	-	-	-	-	-	-	-	
-	-	-	-	-	-	-	-	-	-	-	
10	No Cable		-	-	-	-	-	-	-	-	
-	-	-	-	-	-	-	-	-	-	-	
9	No Cable		-	-	-	-	-	-	-	-	
-	-	-	-	-	-	-	-	-	-	-	
8	No Cable		-	-	-	-	-	-	-	-	
-	-	-	-	-	-	-	-	-	-	-	
7	No Cable		-	-	-	-	-	-	-	-	
-	-	-	-	-	-	-	-	-	-	-	
6	No Cable		-	-	-	-	-	-	-	-	
-	-	-	-	-	-	-	-	-	-	-	
5	No Cable		-	-	-	-	-	-	-	-	
-	-	-	-	-	-	-	-	-	-	-	
4	No Cable		-	-	-	-	-	-	-	-	
-	-	-	-	-	-	-	-	-	-	-	
3	No Cable		-	-	-	-	-	-	-	-	
-	-	-	-	-	-	-	-	-	-	-	
2	3/8" Dia EHS 1x7 -	1	300	1566	1612	1656	1540	1.7%	4.7%	7.5%	*OK*
-	-	-	-	-	-	-	-	-	-	-	
1	1/4" Dia EHS 1X7 -	1	150	683	660	666	665	2.7%	-0.8%	0.1%	*OK*
1	1/4" Dia EHS 1X7 -	1	150	707	695	654	665	6.3%	4.5%	-1.7%	*OK*

**** Tension adjusted to equivalent 60˚F temperature.***

Guy Tension Report

This report is automatically generated by the software.

This page can be printed to a pdf and sent to your client. This report is prepared in accordance with TIA-222 requirements.

Version 1.2.0

TPT Contractor©

Twist, Plumb and Tension

Software by GTS

Level Plans Section

Back to Table of Contents

Griswold Tower Software

TPT Contractor©

Twist, Plumb and Tension

Software by GTs

Measured Tensions, Twist, and Deflections for each Guy Level

The software provides additional information to assist in the field in the form of “Plan” views at each guy level. On each plan view the elevation, cable size, orientation of the guys relative to North, the “Measured Twist” and “Measured Deflections” of the tower are provided.

The tension of each of the cables at the Fan Plate, normalized to 60° F, are provided.

GTs Griswold Tower Software

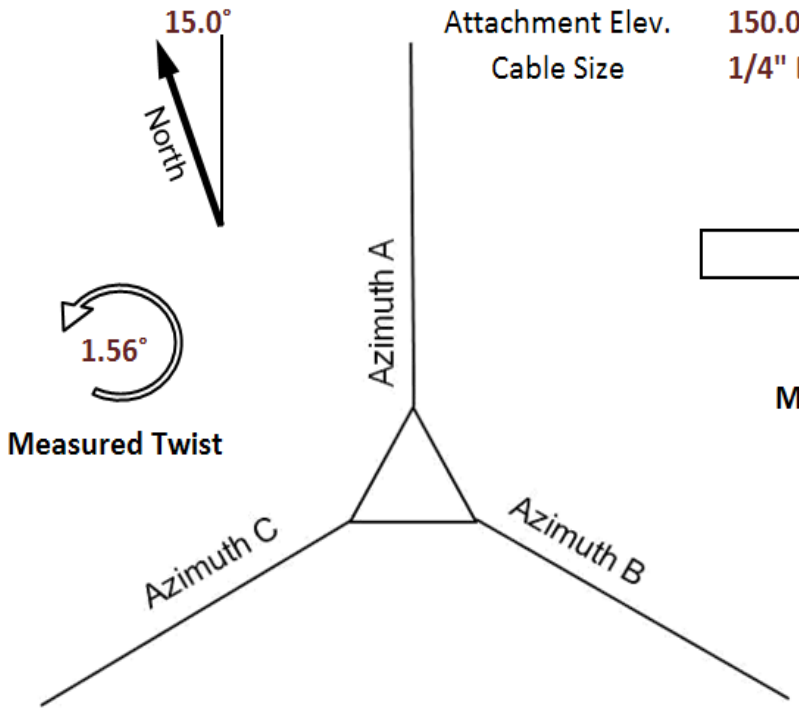
Guy Level 1 - Measured Tensions, Twist, and Deflections

Final Measurements

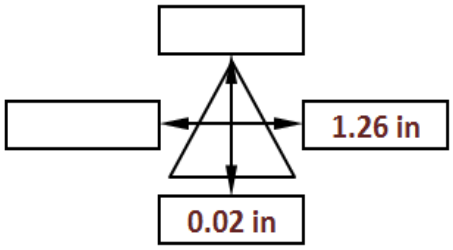
Attachment Elev. 150.0 Feet above Base of Tower

Cable Size 1/4" Dia EHS 1X7 - (Yellow)

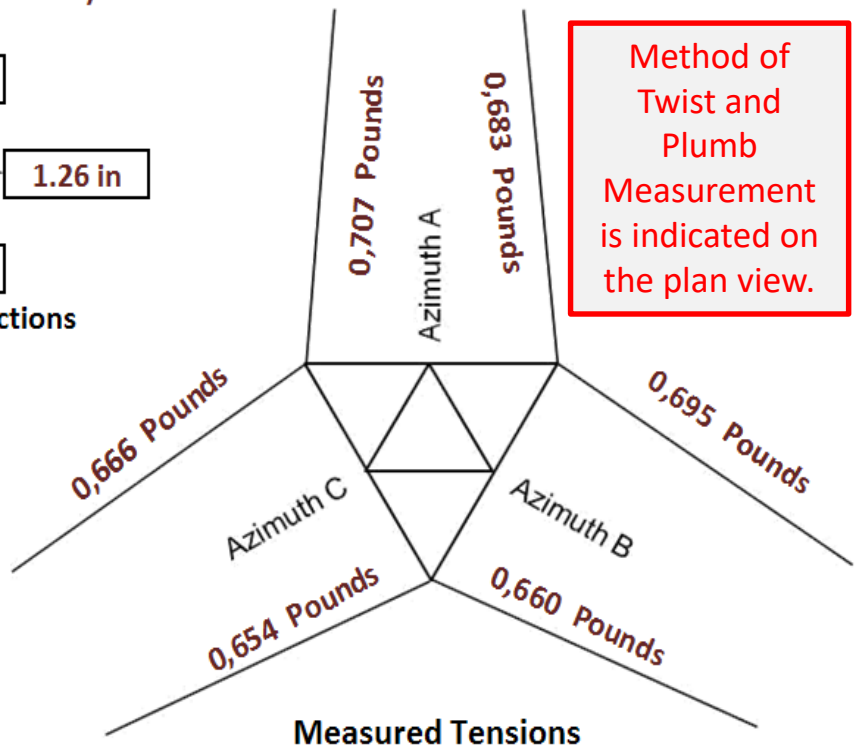
Angular Measurements Selected



Measured Twist



Measured Deflections



Measured Tensions with Torque Arms

Method of Twist and Plumb Measurement is indicated on the plan view.

IETS Job Number 2011-70123

Joe's Towers Site Name: Tim Smith

Joe's Towers Site No.: 123 Rock Lane

3/30/2011

Back to Dashboard

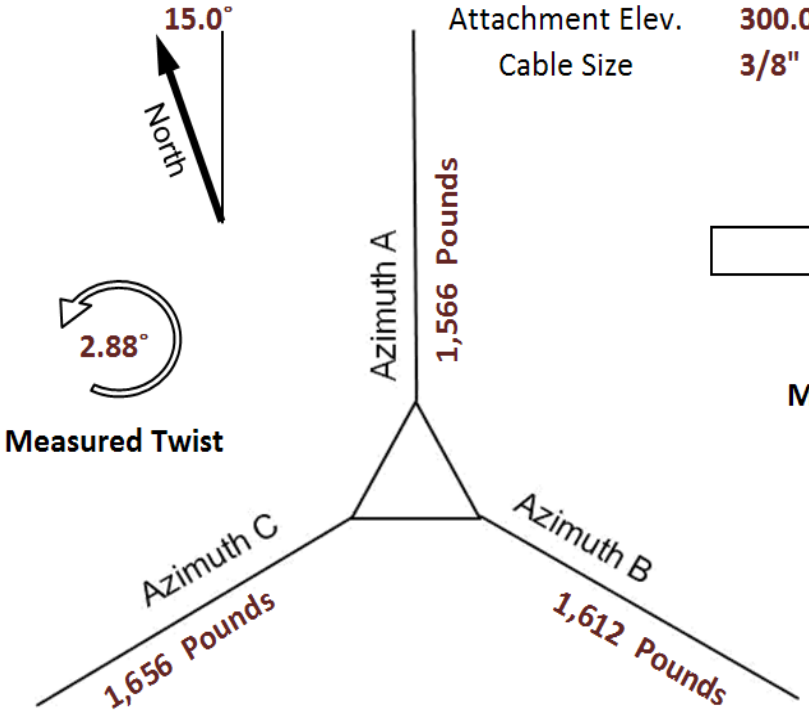
Note that the tension values for Guy Level 1 are shown on the plan with Torque Arms

Guy Level 2 - Measured Tensions, Twist, and Deflections

Final Measurements

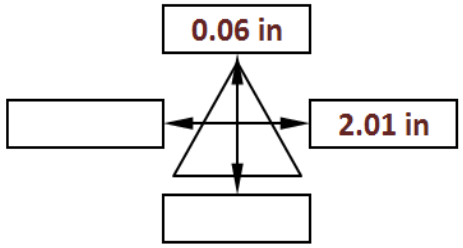
Attachment Elev. **300.0 Feet above Base of Tower**

Cable Size **3/8" Dia EHS 1x7 - (Orange)**



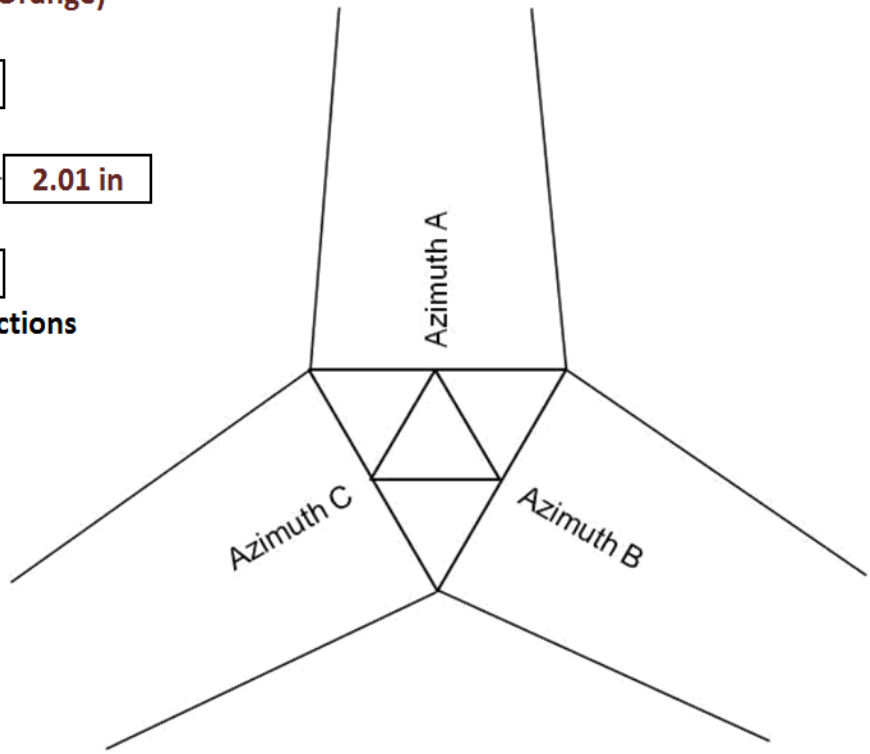
Measured Twist

Measured Tensions without Torque Arms



Measured Deflections

Angular Measurements Selected



IETS Job Number 2011-70123

Joe's Towers Site Name: Tim Smith

Joe's Towers Site No.: 123 Rock Lane

3/30/2011

Back to Dashboard

Note that the tension values for Guy Level 2 are shown on the plan without Torque Arms

TPT Contractor©

Twist, Plumb and Tension

Software by GTs

Measured Tensions, Twist, and Deflections for each Guy Level

The purpose of these individual plan views is to give information as to what the tower is doing if the twist and plumb are out of tolerance. Of course the same information is available even if the tower is within tolerance.

Levels 1 thru 4 are on a single form (tab).

Levels 5 thru 8 are on a single form (tab).

Levels 9 thru 12 are on a single form (tab).

GTs Griswold Tower Software

TPT Contractor©

Twist, Plumb and Tension

Software by GTS

Field Data Sheets

Back to Table of Contents

Griswold Tower Software

TPT Contractor©

Twist, Plumb and Tension

Software by GTS

Plumb and Twist Field Data Sheets

Once the tower has been built on the “Tower Setup Form” the software provides 2 different field data sheets. One for Angular Measurement Method, and one for Percent of Leg Width Measurement Method. Either or both may be printed for use by the field crew.

Tension Field Data Sheets

Once the tower has been built on the “Tower Setup Form” the software provides a Tension Field Data Sheet that can be printed for use by the field crew.

GTS Griswold Tower Software

Plumb and Twist Field Data - Angular Method

IETS Job No.	2011-70123
Client Name	Joe's Towers
Site Name	Midland
Site No.	334-GT

IETS Employee	Daniel Boone
Date	
Wind	
Temperature - F	

	Level Number	Attachment Elev. (Ft)	D1 Readings			D2 Readings			D3 Readings		
			Distance to Leg (Ft)			Distance to Leg (Ft)			Distance to Leg (Ft)		
			Deg	Min	Sec	Deg	Min	Sec	Deg	Min	Sec
Guy Elevations	12	-	----	----	----	----	----	----	----	----	----
	11	-	----	----	----	----	----	----	----	----	----
	10	-	----	----	----	----	----	----	----	----	----
	9	-	----	----	----	----	----	----	----	----	----
	8	-	----	----	----	----	----	----	----	----	----
	7	-	----	----	----	----	----	----	----	----	----
	6	-	----	----	----	----	----	----	----	----	----
	5	-	----	----	----	----	----	----	----	----	----
	4	-	----	----	----	----	----	----	----	----	----
	3	-	----	----	----	----	----	----	----	----	----
	2	300									
	1	150									

Plumb and Twist Field Data - % of Leg Width

IETS Job No.	2011-70123
Client Name	Joe's Towers
Site Name	Midland
Site No.	334-GT

IETS Employee	Daniel Boone
Date	
Wind	
Temperature - F	

	Level Number	Attachment Elev. (Ft)	D1 Readings			D2 Readings			D3 Readings		
			Distance to Leg (Ft)			Distance to Leg (Ft)			Distance to Leg (Ft)		
			Leg Width	% of Width	Left or Right	Leg Width	% of Width	Left or Right	Leg Width	% of Width	Left or Right
Guy Elevations	12	-	----	----	----	----	----	----	----	----	----
	11	-	----	----	----	----	----	----	----	----	----
	10	-	----	----	----	----	----	----	----	----	----
	9	-	----	----	----	----	----	----	----	----	----
	8	-	----	----	----	----	----	----	----	----	----
	7	-	----	----	----	----	----	----	----	----	----
	6	-	----	----	----	----	----	----	----	----	----
	5	-	----	----	----	----	----	----	----	----	----
	4	-	----	----	----	----	----	----	----	----	----
	3	-	----	----	----	----	----	----	----	----	----
	2	300									
	1	150									

Tension Field Data using Penn-Tech TM 1000-90

IETS Job No.	2011-70123
Client Name	Joe's Towers
Site Name	Midland
Site No.	334-GT

IETS Employee	Daniel Boone
Date	
Wind	
Temperature - F°	

Tension Equipment
Penn-Tech TM 1000-90

Guy Elevations

Level Number	Elev. (Ft)	Left, Right or Center	Cable Size	15° Penn-Tech TM 1000-90				135° Penn-Tech TM 1000-90				255° Penn-Tech TM 1000-90			
				1	2	3	Temp	1	2	3	Temp	1	2	3	Temp
12	-	-	No Cable	---	---	---	---	---	---	---	---	---	---	---	---
-	-	-	-	---	---	---	---	---	---	---	---	---	---	---	---
11	-	-	No Cable	---	---	---	---	---	---	---	---	---	---	---	---
-	-	-	-	---	---	---	---	---	---	---	---	---	---	---	---
10	-	-	No Cable	---	---	---	---	---	---	---	---	---	---	---	---
-	-	-	-	---	---	---	---	---	---	---	---	---	---	---	---
9	-	-	No Cable	---	---	---	---	---	---	---	---	---	---	---	---
-	-	-	-	---	---	---	---	---	---	---	---	---	---	---	---
8	-	-	No Cable	---	---	---	---	---	---	---	---	---	---	---	---
-	-	-	-	---	---	---	---	---	---	---	---	---	---	---	---
7	-	-	No Cable	---	---	---	---	---	---	---	---	---	---	---	---
-	-	-	-	---	---	---	---	---	---	---	---	---	---	---	---
6	-	-	No Cable	---	---	---	---	---	---	---	---	---	---	---	---
-	-	-	-	---	---	---	---	---	---	---	---	---	---	---	---
5	-	-	No Cable	---	---	---	---	---	---	---	---	---	---	---	---
-	-	-	-	---	---	---	---	---	---	---	---	---	---	---	---
4	-	-	No Cable	---	---	---	---	---	---	---	---	---	---	---	---
-	-	-	-	---	---	---	---	---	---	---	---	---	---	---	---
3	-	-	No Cable	---	---	---	---	---	---	---	---	---	---	---	---
-	-	-	-	---	---	---	---	---	---	---	---	---	---	---	---
2	300	Center	3/8" Dia EHS 1x7 - (Orange)												
-	-	-	-	---	---	---	---	---	---	---	---	---	---	---	---
1	150	Left	1/4" Dia EHS 1X7 - (Yellow)												
1	150	Right	1/4" Dia EHS 1X7 - (Yellow)												

TPT Contractor©

Twist, Plumb and Tension

Software by GTS

Tension Measurements without Tower Data

Back to Table of Contents

Griswold Tower Software

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Tension Measurements without Tower Data

Sometimes you might need to take tension measurements on cables(s) but do not want to, or don't need to build the tower.

TPT Contractor provides a form specifically for this purpose. It is shown on the next slide.

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Software by GTS

TPT CONTRACTOR© Twist, Plumb and Tension Software by GTS

Measured Tensions using Penn-Tech TM 1000-90

Cable No.	Cable Size	Handle Position & Block	Dial Readings				Tension (Pounds)	Percent of Break Strength	Notes
			1	2	3	Average			
1	No Cable								
2	No Cable								
3	No Cable								
4	No Cable								
5	No Cable								
6	No Cable								
7	No Cable								
8	No Cable								
9	No Cable								
10	No Cable								
11	No Cable								
12	No Cable								
13	No Cable								
14	No Cable								
15	No Cable								

Griswold Tower Software

TPT Contractor©

Twist, Plumb and Tension

Software by GTs

Tension Measurements without Tower Data

This form works similar to the other forms in the software. When a cable size is selected the software displays the required handle position and block size. Once 3 dial readings have been recorded the software provides the average dial reading, the tension in the cable, and the percent of break strength. The form also provides a place for short notes for each cable. The software currently allows up to 15 individual cable tension tests on this one form.

GTs Griswold Tower Software

TPT Contractor©

Twist, Plumb and Tension

Software by GTS

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Measured Tensions using Penn-Tech TM 1000-90

Cable No.	Cable Size	Handle Position & Block	Dial Readings				Tension (Pounds)	Percent of Break Strength	Notes
			1	2	3	Average			
1	5/8" Dia EHS 1x19 - (Black)	3*L	44	43	43	43.3	3,872	9.6%	This is an example of a measurement on a 5/8" 1x19 EHS Cable
2	No Cable								
3	No Cable								
4	No Cable								
5	No Cable								
6	No Cable								
7	No Cable								
8	No Cable								
9	No Cable								
10	No Cable								
11	No Cable								
12	No Cable								
13	No Cable								
14	No Cable								
15	No Cable								

Inserted Information

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Measured Tensions using Penn-Tech TM 1000-90

Cable No.	Cable Size	Handle Position & Block	Dial Readings				Tension (Pounds)	Percent of Break Strength	Notes
			1	2	3	Average			
1	5/8" Dia EHS 1x19 - (Black)	3*L	44	43	43	43.3	3,872	9.6%	This is an example of a measurement on a 5/8" 1x19 EHS Cable
2	No Cable								
3	No Cable								
4	No Cable								
5	No Cable								
6	No Cable								
7	No Cable								
8	No Cable								
9	No Cable								
10	No Cable								
11	No Cable								
12	No Cable								
13	No Cable								
14	No Cable								
15	No Cable								

Results

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Report Pages

Back to Table of Contents

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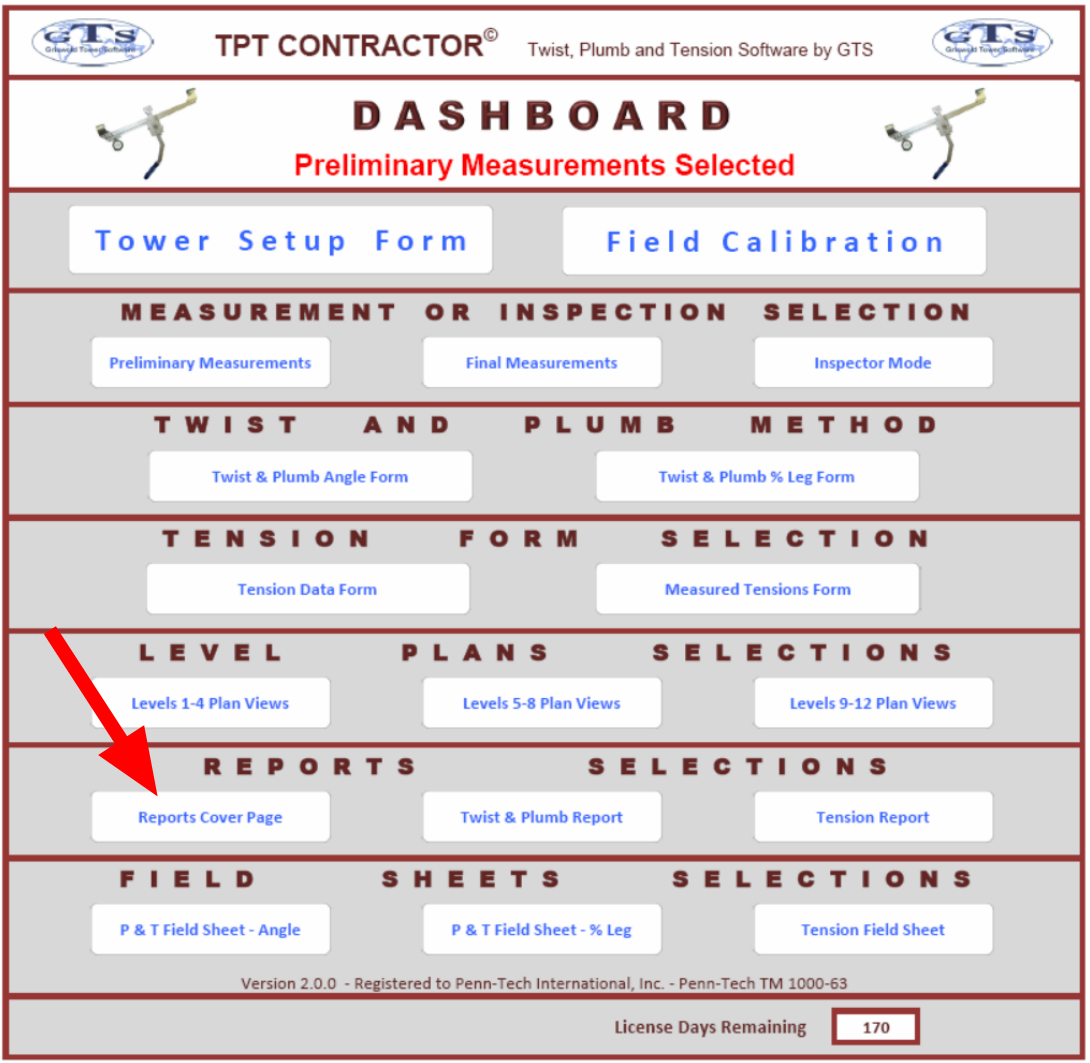

Report Pages

We previously covered the “Twist & Plumb Report” and the “Tension Report” automatically generated by TPT Contractor. The program also generates a “Reports Cover Page”. Using the information provided in the Tower Setup form the report is addressed to your client, identifies the tower and work performed.

GTS Griswold Tower Software

TPT Contractor©

Tension

IETS Engineering Services
129 Greenwich Road
Charlotte, NC 28211
(704) 522-1131

March 30, 2011

Tim Smith
Joe's Towers
123 Rock Lane
Nowhere, NV 56567

Subject: **Final Measurements Report of Twist, Plumb and Tension**
Site Name: Midland
Site Number: 334-GT

Dear Tim Smith,

At your request and in accordance with your purchase order number JT-334-GT-2011, we at IETS Engineering Services are pleased to submit this Final Measurements Report of the Twist, Plumb and Tension for the 300 foot tall tower at the subject site. The Twist and Plumb information was gathered using Angular Measurements from all 3 leg azimuths. The tension values were measured using our Penn-Tech TM 1000-90 Tension Meter. This meter was last calibrated on 6/16/2011.

We at IETS Engineering Services appreciate the opportunity to provide our tower services for you and Joe's Towers. If you have any questions please give us a call at the number listed at the top of this page.

Sincerely,

IETS Engineering Services

Bill Griswold

Attachments

Report Pages

The Report Cover Page example shown on the left covers the Final Measurements on our 300 foot sample tower. Note the client's PO is referenced, what method was used to measure the twist and plumb, and the serial number of the Penn-Tech Tension Meter used. Your company logo is also placed on this and the other 2 reports.

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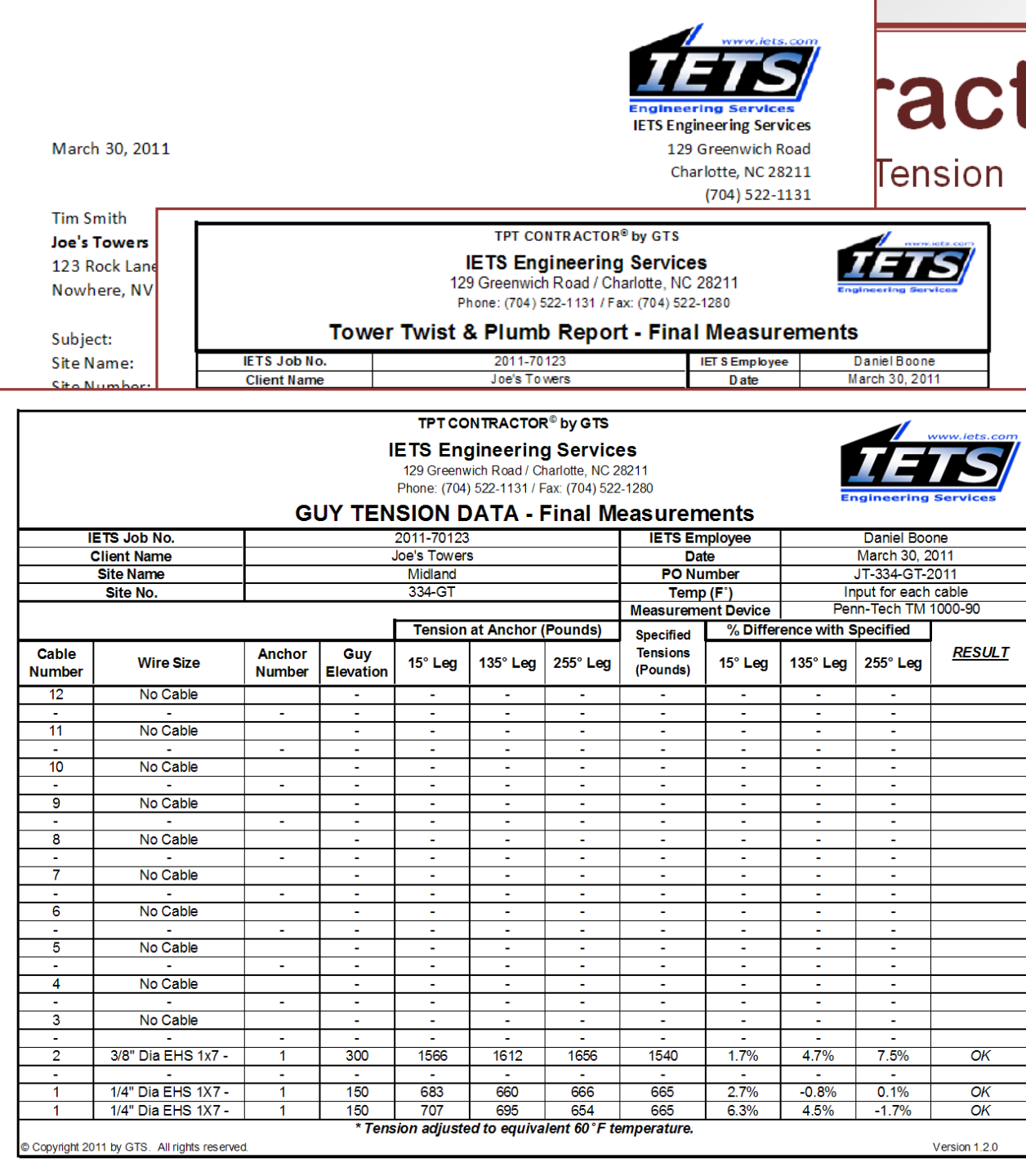


ractor©

Tension

March 30, 2011

IETS Engineering Services
129 Greenwich Road
Charlotte, NC 28211
(704) 522-1131

Tim Smith
Joe's Towers
123 Rock Lane
Nowhere, NV

Subject:
Site Name:
Site Number:

TPT CONTRACTOR® by GTS

IETS Engineering Services
129 Greenwich Road / Charlotte, NC 28211
Phone: (704) 522-1131 / Fax: (704) 522-1280

Tower Twist & Plumb Report - Final Measurements

IETS Job No.	2011-70123	IETS Employee	Daniel Boone
Client Name	Joe's Towers	Date	March 30, 2011

TPT CONTRACTOR® by GTS

IETS Engineering Services
129 Greenwich Road / Charlotte, NC 28211
Phone: (704) 522-1131 / Fax: (704) 522-1280

GUY TENSION DATA - Final Measurements

IETS Job No.	2011-70123	IETS Employee	Daniel Boone
Client Name	Joe's Towers	Date	March 30, 2011
Site Name	Midland	PO Number	JT-334-GT-2011
Site No.	334-GT	Temp (F°)	Input for each cable
		Measurement Device	Penn-Tech TM 1000-90

Cable Number	Wire Size	Anchor Number	Guy Elevation	Tension at Anchor (Pounds) 15° Leg	135° Leg	255° Leg	Specified Tensions (Pounds)	% Difference with Specified 15° Leg	135° Leg	255° Leg	RESULT
12	No Cable		-	-	-	-	-	-	-	-	
-	-	-	-	-	-	-	-	-	-	-	
11	No Cable		-	-	-	-	-	-	-	-	
-	-	-	-	-	-	-	-	-	-	-	
10	No Cable		-	-	-	-	-	-	-	-	
-	-	-	-	-	-	-	-	-	-	-	
9	No Cable		-	-	-	-	-	-	-	-	
-	-	-	-	-	-	-	-	-	-	-	
8	No Cable		-	-	-	-	-	-	-	-	
-	-	-	-	-	-	-	-	-	-	-	
7	No Cable		-	-	-	-	-	-	-	-	
-	-	-	-	-	-	-	-	-	-	-	
6	No Cable		-	-	-	-	-	-	-	-	
-	-	-	-	-	-	-	-	-	-	-	
5	No Cable		-	-	-	-	-	-	-	-	
-	-	-	-	-	-	-	-	-	-	-	
4	No Cable		-	-	-	-	-	-	-	-	
-	-	-	-	-	-	-	-	-	-	-	
3	No Cable		-	-	-	-	-	-	-	-	
-	-	-	-	-	-	-	-	-	-	-	
2	3/8" Dia EHS 1x7 -	1	300	1566	1612	1656	1540	1.7%	4.7%	7.5%	OK
-	-	-	-	-	-	-	-	-	-	-	
1	1/4" Dia EHS 1X7 -	1	150	683	660	666	665	2.7%	-0.8%	0.1%	OK
1	1/4" Dia EHS 1X7 -	1	150	707	695	654	665	6.3%	4.5%	-1.7%	OK

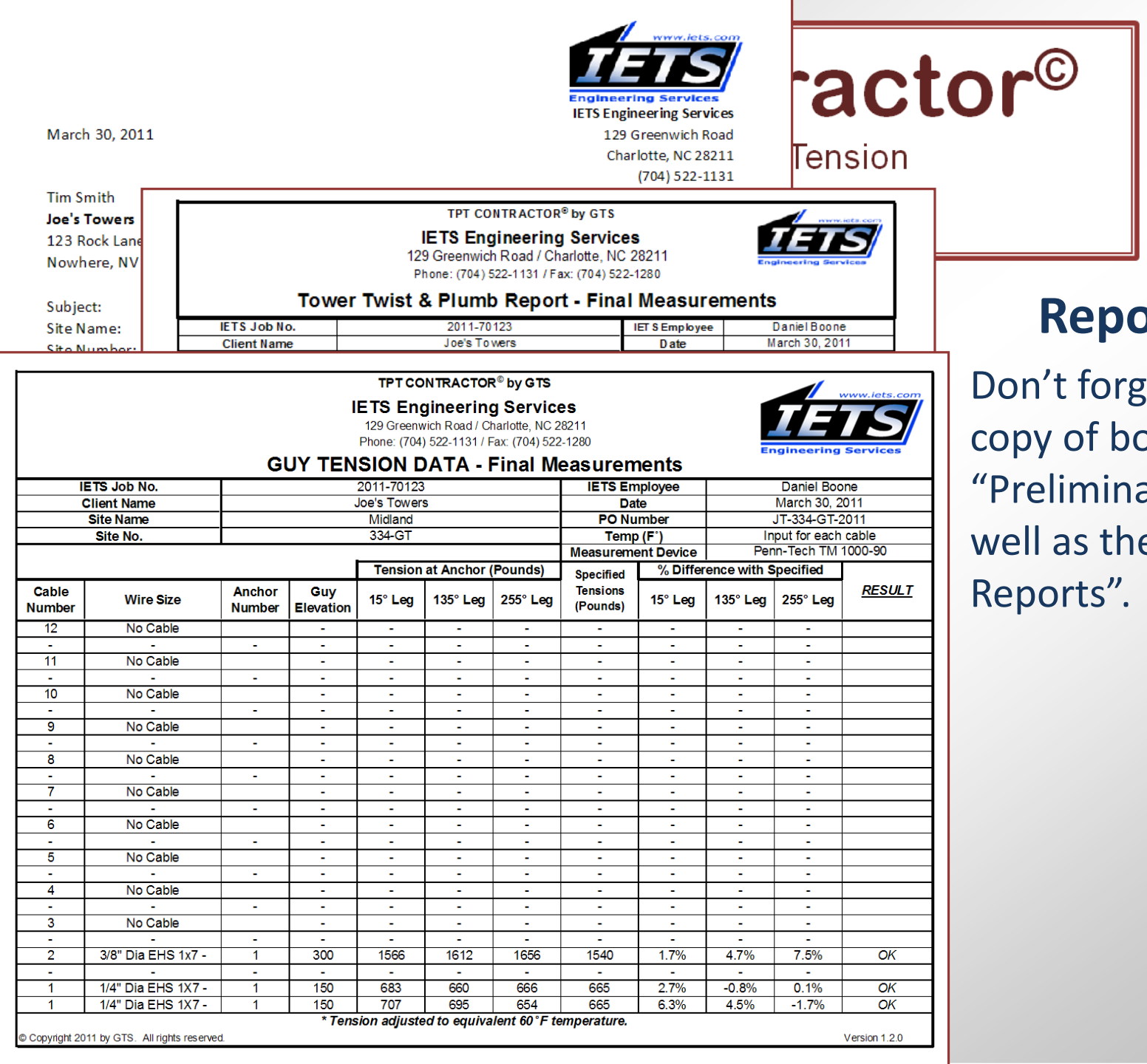
** Tension adjusted to equivalent 60°F temperature.*

Version 1.2.0

Report Pages

With the "Report Cover Page", the "Twist and Plumb Report" and the "Tension Report", along with the "Screen Shots" taken at each guy cable, you have everything you need to provide your client with a complete and professional report of your services.

GTS Griswold Tower Software



IETS Engineering Services
129 Greenwich Road
Charlotte, NC 28211
(704) 522-1131

March 30, 2011

Tim Smith
Joe's Towers
123 Rock Lane
Nowhere, NV

Subject:
Site Name:
Site Number:

TPT CONTRACTOR® by GTS

IETS Engineering Services
129 Greenwich Road / Charlotte, NC 28211
Phone: (704) 522-1131 / Fax: (704) 522-1280

Tower Twist & Plumb Report - Final Measurements

IETS Job No.	2011-70123	IETS Employee	Daniel Boone
Client Name	Joe's Towers	Date	March 30, 2011

TPT CONTRACTOR® by GTS

IETS Engineering Services
129 Greenwich Road / Charlotte, NC 28211
Phone: (704) 522-1131 / Fax: (704) 522-1280

GUY TENSION DATA - Final Measurements

IETS Job No.	2011-70123	IETS Employee	Daniel Boone
Client Name	Joe's Towers	Date	March 30, 2011
Site Name	Midland	PO Number	JT-334-GT-2011
Site No.	334-GT	Temp (F°)	Input for each cable
		Measurement Device	Penn-Tech TM 1000-90

				Tension at Anchor (Pounds)			Specified Tensions (Pounds)	% Difference with Specified			RESULT
Cable Number	Wire Size	Anchor Number	Guy Elevation	15° Leg	135° Leg	255° Leg		15° Leg	135° Leg	255° Leg	
12	No Cable		-	-	-	-	-	-	-	-	
-	-	-	-	-	-	-	-	-	-	-	
11	No Cable		-	-	-	-	-	-	-	-	
-	-	-	-	-	-	-	-	-	-	-	
10	No Cable		-	-	-	-	-	-	-	-	
-	-	-	-	-	-	-	-	-	-	-	
9	No Cable		-	-	-	-	-	-	-	-	
-	-	-	-	-	-	-	-	-	-	-	
8	No Cable		-	-	-	-	-	-	-	-	
-	-	-	-	-	-	-	-	-	-	-	
7	No Cable		-	-	-	-	-	-	-	-	
-	-	-	-	-	-	-	-	-	-	-	
6	No Cable		-	-	-	-	-	-	-	-	
-	-	-	-	-	-	-	-	-	-	-	
5	No Cable		-	-	-	-	-	-	-	-	
-	-	-	-	-	-	-	-	-	-	-	
4	No Cable		-	-	-	-	-	-	-	-	
-	-	-	-	-	-	-	-	-	-	-	
3	No Cable		-	-	-	-	-	-	-	-	
-	-	-	-	-	-	-	-	-	-	-	
2	3/8" Dia EHS 1x7 -	1	300	1566	1612	1656	1540	1.7%	4.7%	7.5%	*OK*
-	-	-	-	-	-	-	-	-	-	-	
1	1/4" Dia EHS 1X7 -	1	150	683	660	666	665	2.7%	-0.8%	0.1%	*OK*
1	1/4" Dia EHS 1X7 -	1	150	707	695	654	665	6.3%	4.5%	-1.7%	*OK*

Tension adjusted to equivalent 60°F temperature.

Version 1.2.0

Report Pages

Don't forget to save a copy of both the "Preliminary Reports" as well as the "Final Reports".

Griswold Tower Software

TPT Contractor©

Twist, Plumb and Tension

Software by GTS

Background on Author and Questions

Back to Table of Contents

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Background

TPT Contractor was developed by Bill Griswold, a professional structural engineer, registered in 40 states, with 43 years of experience. Mr. Griswold has been heavily involved in the tower industry for over 17 years, helping to develop many of the engineering standards in use today. Mr. Griswold is the President and Chief Engineer of Griswold Tower Software, PC an independent Structural Engineering Company that is available with assist contractors with their engineering needs. Mr. Griswold can be contacted at, BillGriswold@Live.com

GTs Griswold Tower Software

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Questions

- For questions regarding TPT Contractor please contact Tom Hedberg, President of Penn-Tech International, Inc.
- Email address – pti@ptii.net
- Phone - (484) 395-0145 – Office
  (484) 431-2156 – Mobile

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The End

Back to Table of Contents

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