

CT12A

Digital Cable Tensiometer

**USER INSTRUCTION MANUAL
BARFIELD M/N CT12A**

Doc. P/N: 56-101-03100

Revision E

May 29, 2009

BARFIELD, INC.



T A T G R O U P

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CONTACT INFORMATION

Users are requested to notify the manufacturer of any discrepancy, omission, or error found in this manual. Inquiries should include specific questions and reference the publication title, number, chapter, page, figure, paragraph, and effective date.

Please send comments to:

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BARFIELD, INC.
P.O. BOX 025367
MIAMI, FL 33102-5367
USA**

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ATTENTION

Although every effort has been made to provide the end user of this equipment with the most current and accurate information, it may be necessary to revise this manual in the future. Please be sure to complete and return a *Revision Request Form* to Barfield revision services and visit the company website, <http://barfieldinc.com/>, for publication updates.

Additionally, Barfield **MUST** have your name and address on file as a registered user of this equipment to ensure validation of the warranty. Please complete the **OWNER WARRANTY REGISTRATION** card promptly. This card ensures validation of the warranty.

Please send to:

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DISCLAIMER

Barfield Inc., neither a vendor nor supplier of aircraft cable tension regulator systems or an airframe manufacturer, has no control over calibration procedures or figures of aircraft cables. Users are recommended to consult their aircraft maintenance manual or the like in accordance to cable tension rigging procedures.

Pictorial representations of the CT12A are similar to but not necessarily identical to that of the physical unit. Figures and diagrams are presented for reference only.



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REVISION RECORD

REV.	ECO #	REV. DATE	DESCRIPTION OF CHANGE
-	N / A	Jul/05/06	Initial Release.
B	260-00681	Oct/11/06	Revisions made to reflect disclaimer, additional cautionary notes for CT12A use and options in calibration services.
C	260-00697	May/17/07	Revisions made to reflect new CT12A lever design and Averaging Mode feature and operation.
D	260-00730	Jul/24/08	Incorporation of Verification Bar. Company Logo was updated.
E	260-00750	May/29/09	Cable applicability (Ch. 2, section 4) was clarified. Table 3 (page 17) was updated. Note on Battery recharging (Ch. 3, section 11) was updated.



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LIST OF APPROVED REPAIR FACILITIES

The manufacturer of this equipment does not recommend the user to attempt any maintenance or repair. In case of malfunction, contact the manufacturer, to obtain the list of approved repair facilities worldwide, ensuring that this equipment will be serviced using proper procedures and certified instruments. A Return Maintenance Authorization (RMA) number will be assigned during this call, to keep track of the shipment and the service.

BARFIELD PRODUCT SUPPORT DIVISION

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INTRODUCTION

1. PUBLICATION BREAKDOWN

This user instruction manual establishes the standards of operation for Barfield's CT12A Digital Cable Tensiometer.

2. INFORMATION PROVIDED WITH THE UNIT

Besides this User Instruction Manual, the Tensiometer is provided with the four items described below.

- A. The identification label, similar to Figure 1, is located on the back of the tensiometer and provides the following information:

Manufacturer Name	
Equipment Designation	
Equipment Model Number	
Equipment Modification (if applicable)	Equipment Part Number
Equipment Options (if applicable)	Equipment Serial Number

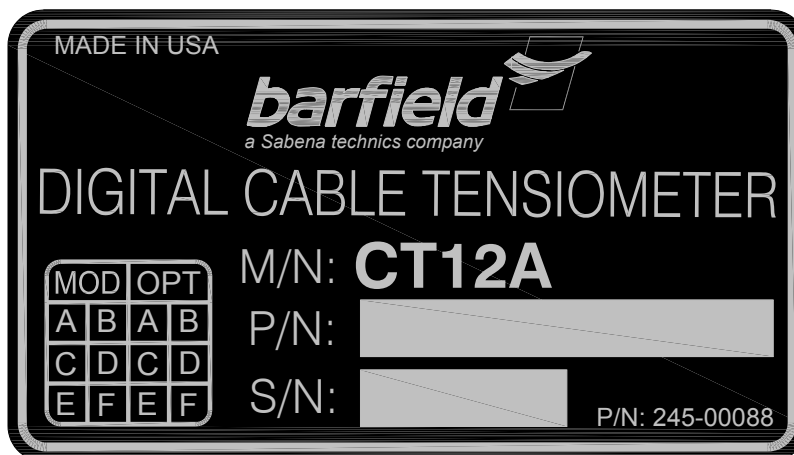


Figure 1 IDENTIFICATION LABEL

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- B. The Owner's Warranty Registration card (Figure 2) is to be completed by the owner and returned to Barfield, Inc. within **ten (10) days** of purchase to ensure automatic update of printed matter and validation of warranty.

OWNER WARRANTY REGISTRATION

RETURNING THIS CARD COMPLETED ENABLES US TO KEEP YOU
AUTOMATICALLY INFORMED OF TECHNICAL UPDATES and VALIDATES YOUR WARRANTY.

NAME _____ TITLE _____

DEPARTMENT _____

COMPANY _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

P/N _____ S/N _____ MODEL # _____

PURCHASED FROM _____ DATE _____

AIRLINE ☐ REPAIR STATION ☐ OEM ☐

OTHER _____

INFORMATION GIVEN ON THIS BARFIELD, INC. WARRANTY CARD IS AND WILL REMAIN
STRICTLY CONFIDENTIAL AND WILL NOT BE SHARED.

OW-28 REV / 04.00

Figure 2 OWNER WARRANTY REGISTRATION CARD

- C. The Limited Warranty Statement Card (Figure 3) lists the manufacturer's obligation to the original purchaser.

**LIMITED
ONE YEAR
WARRANTY**

BARFIELD INSTRUMENT CORPORATION warrants to the original purchaser of this unit sold by us and/or our agent, and all the parts thereof, to be free from defects in material or workmanship under normal use and service within the specified ratings and operating conditions.

Its obligation under this warranty is hereby limited to the repair or replacement of this unit, or part thereof, which is returned to us within one year after date of invoice, suitably packaged in the original container or equivalent and which shall prove, after our examination, to be defective under terms of above paragraph.

No other warranty is expressed or implied. We are not liable for consequential damages.

Some states do not allow the exclusion or limitation of incidental or consequential damages so that the preceding limitations or exclusions may not apply to you. This warranty gives you specific legal rights and you may have other rights which vary from state to state.

This warranty does not include the cost of transportation charges to and from the factory.

The repair or replacement of this unit, or any part thereof, does not void or extend the original warranty.

BARFIELD INSTRUMENT CORPORATION reserves the right to discontinue this unit without notice, or to make modifications in design at any time, without incurring any obligation to make these modifications in units previously sold.

BARFIELD INSTRUMENT CORPORATION
4101 N.W. 29 Street
Miami, Florida 33142 U.S.A.

FORM 991-00001

Figure 3 LIMITED WARRANTY STATEMENT CARD



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- D. The Certificate of Calibration: Each new unit and re-certified unit, together with its Verification Bar, is delivered with a Certificate of Calibration that shows the date of the last calibration and when the next calibration is due. It certifies the accuracy of the unit and lists the part number and serial number to which it applies.

3. **RECERTIFICATION**

The Barfield CT12A Digital Cable Tensiometer and its Verification Bar have a one-year recertification requirement. Qualified technicians in a shop equipped with the necessary tooling and facilities must perform the maintenance required by this unit. As the manufacturer, Barfield recommends a dead weight test and calibration facility setup.

4. **APPLICABILITY**

The Barfield CT12A Digital Cable Tensiometer part numbers applicable to this Instruction Manual are:

102-03101
102-03102
102-03103
102-03104
102-03105
102-03106
102-03107
102-03108
102-03120
102-03102-BAC
102-03103-BAC
102-03105-BAC



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CHAPTER 1: PRODUCT DESCRIPTION

1. PRODUCT SCOPE

The Barfield CT12A Digital Cable Tensiometer was designed to meet the industry's requirements for testing and measuring the tension of aircraft cables.

The CT12A measures the existing tension in cables, in diameters from 1/16" to 1/4". Two different unit types are available within the product line: multi-cable and single-cable. Multi-cable units can measure up to seven different cable sizes, while single-cable units are customized for one specific cable size. Each configuration has its own advantages, so the user has both alternatives to select the most adequate for each particular situation.

The CT12A displays the battery life, last measured cable size, ambient temperature and cable tension. Apart from different labels and risers, the multi-cable and single-cable units are otherwise identical (Figure 4).

The Barfield instrument allows users to perform an entire testing operation with one hand and without the use of conversion tables. Measurements are taken once the proper cable size is selected and when the tool is clamped onto the cable. The instrument's display then shows the resulting measurement.



Figure 4: CT12A multi-cable unit

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2. CT12A FEATURES

- 10-year useful life span
- 4-character digital display
- Rugged ergonomic design
- No conversion table required
- One year calibration cycle
- Higher tension measurements
- 25 to 1000 pound range (US Standard)
- Single cable fixed riser or multi-cable riser
- Ten (10) minute automatic shutoff feature
- Standard Mode and Averaging Mode options
- Cable readings adjusted to pounds or Newtons during calibration stage*

3. PHYSICAL DESCRIPTION

Table 1: CT12A Components Description, referred to Figs. 5 and 6.

ID	Name	Description and Function
1	Riser	Grips cable under test.
2	Plunger	Conducts pressure to load cell from cable.
3	Lever	Applies and releases pressure to cable under test.
4	Display window	Four-character screen displays results of calculated cable measurements, temperature, function selections, and battery power availability. User views cable size and riser setting for selection.
5	On/off button	Press to turn instrument ON. With instrument ON, press and hold in (3 seconds) to turn instrument OFF.
6	LED	Illuminates to indicate the standard selected with its tension measurement unit: LED 1: LBS or US Standard; LED 2: N (Newtons) or CWT (European Standard)*.
7	Backlight/cable selector	Backlight activation. For multi-cable units: press and hold to change to Menu Mode or change cable size.
8	Measure/hold	Changes Operating mode if not currently measuring. If measuring, press to hold current value (temp. or tension).
9	Battery charger port	Female DC power jack used to connect battery charger cable to instrument.
10	PC port	Located on back of CT12A. A 4-pin connector to connect PC cable to instrument's 2x5 COMM port during calibration mode.
11	Skids	Prevents instrument from sliding off aircraft surface.
12	Cable gauge	Determines cable size to be tested.
13	Label/quick reference guide	Abbreviated instruction reference guide.

* Note: Pounds to Newtons automatic conversions available in future CT12A models.

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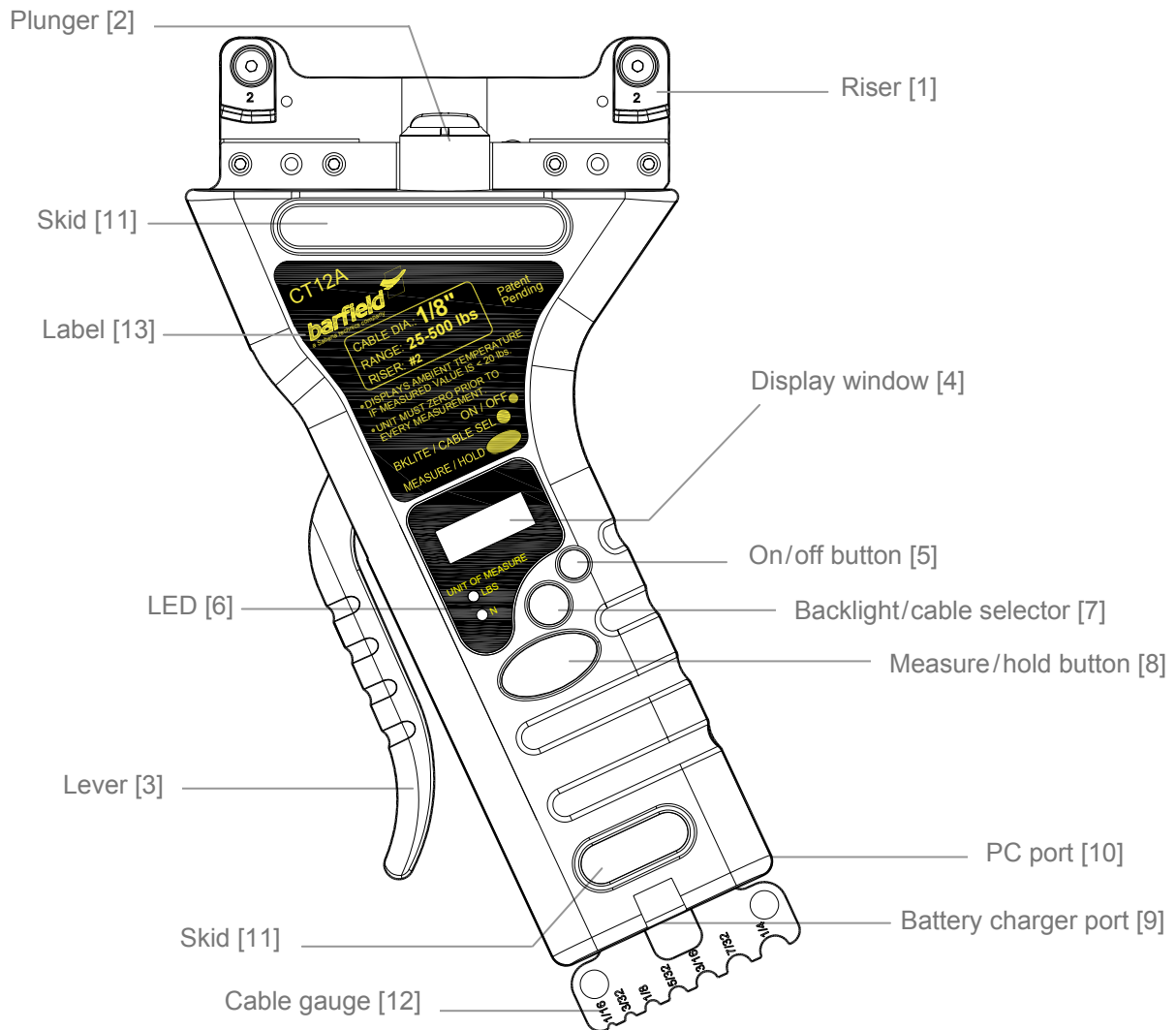


Figure 5: Front view of single-cable CT12A unit (component numbers indicated in Table 1).

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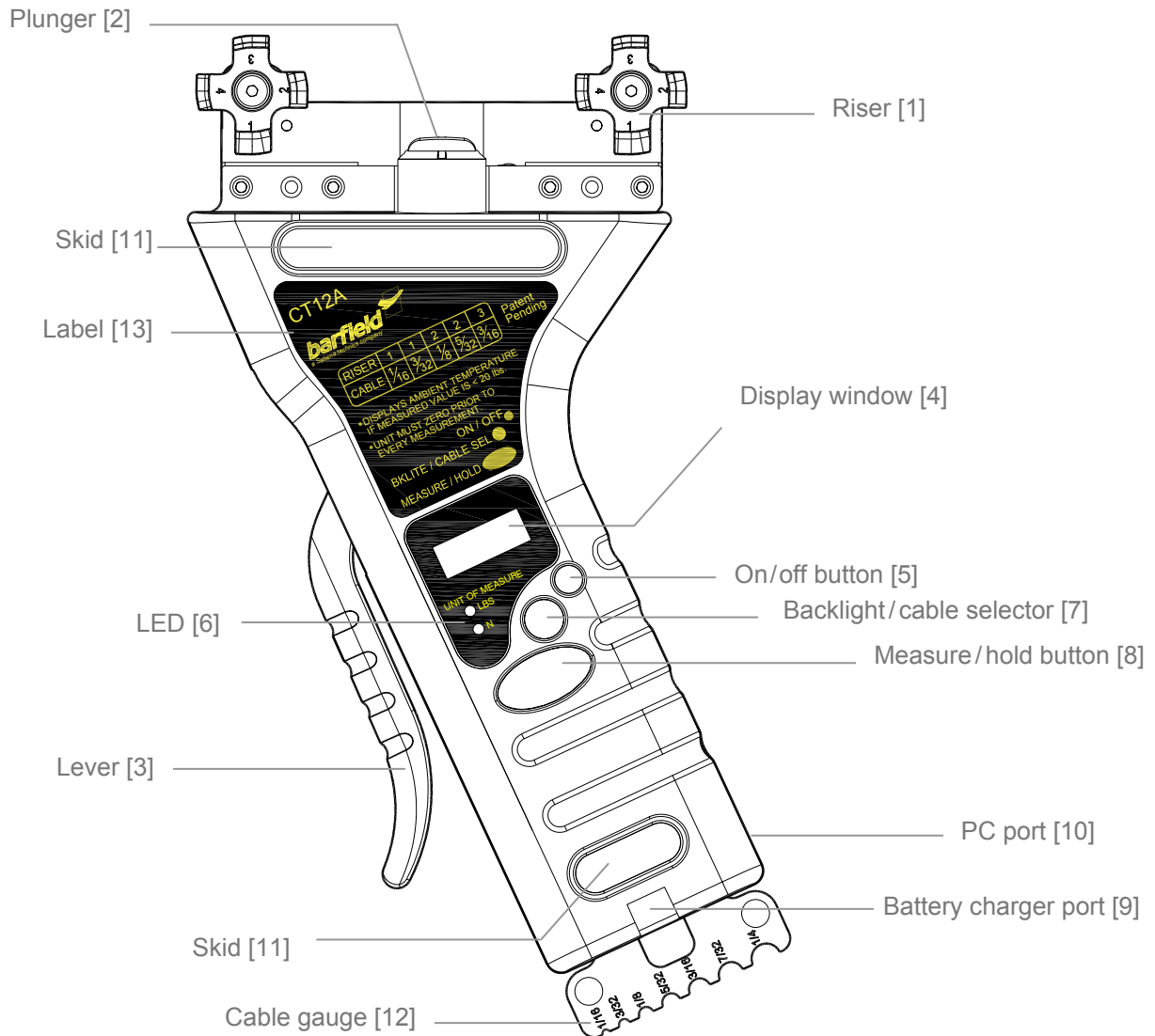


Figure 6: Front view of multi-cable CT12A unit (component numbers indicated in Table 1).

CHAPTER 2: PRODUCT SPECIFICATIONS

1. PHYSICAL DATA

Height: 8 3/4" (22.2 cm)
Width: 4 3/8" (11.1 cm)
Depth: 1 1/2" (3.8 cm)
Weight: 1.2 Lbs. (0.54 kg)

2. POWER CHARACTERISTICS

- A. 3.7 VDC lithium battery (accessible for replacement; access not needed for recharging)
- B. Battery life:
- 14 hours maximum if instrument constantly ON
 - 28 hours maximum for normal operation (activated approximately 30% of time)
- C. Battery Charge:
- 2 1/2 hours quick charge / 4 hours full charge

3. TEMPERATURE CHARACTERISTICS

Operating Range: -10° C to +50° C (+14° F to +122° F)
Storage Range: -20° C to +60° C (-4° F to +140° F)

4. CABLE APPLICABILITY

The cable tensiometer is calibrated for use on standard, multiple-strand, nonjacketed, aircraft cable, made of carbon steel with zinc or tin over zinc coating (MIL-DTL-83420 specification, type I, composition A) of 7 x 7 stranding in diameters of 1/16 and 3/32 inch, and 7 x 19 stranding for 1/8, 5/32, 3/16, 7/32, and 1/4 inch. Do not attempt to use the cable tensiometer on cables of a different construction unless a custom calibration has been performed. Barfield performs custom calibrations using other cables for an additional charge, on the condition that they do not have plastic jacket, this is, that they do not belong to type II.

5. TOLERANCES FOR TENSION MEASUREMENT

Tolerances are indicated in Table 2.

Variations in cable diameter will affect tension measurement accuracy. Stated accuracy is contingent upon cables being in compliance with MIL-DTL-83420 specification, where cable diameter is within 25% of specified range while centered at the nominal cable diameter. The nominal cable diameter is defined by the cable used in calibration and specified on the certification of the unit.

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6. SPECIFICATIONS FOR CT12A MODEL NUMBERS

Table 2: Descriptions and Measurement Specifications according to Model Numbers.

<i>Model Number</i>	<i>Description</i>	<i>Cable Size</i>	<i>Range (Lbs.)</i>	<i>Tolerance (Typ.) (Lbs.)</i>	<i>Riser/Pos.</i>
102-03101	Single Cable Tensiometer for 1/16" Diameter	1/16"	25-100	± 4	#1
			101-200	± 8	
102-03102	Single Cable Tensiometer for 3/32" Diameter	3/32"	25-150	± 4	#1
			151-300	± 8	
102-03103	Single Cable Tensiometer for 1/8" Diameter	1/8"	25-200	± 6	#2
			201-400	± 12	
102-03104	Single Cable Tensiometer for 5/32" Diameter	5/32"	25-200	± 6	#2
			201-400	± 12	
102-03105	Single Cable Tensiometer for 3/16" Diameter	3/16"	50-250	± 6	#3
			251-500	± 12	
102-03106	Single Cable Tensiometer for 7/32" Diameter	7/32"	50-450	± 18	#3
			451-900	± 36	
102-03107	Single Cable Tensiometer for 1/4" Diameter	1/4"	50-500	± 20	#4
			501-1000	± 40	
102-03120	High Accuracy Multi-Cable Tensiometer	1/16"	25-100	± 4	#1
			101-200	± 8	
		3/32"	25-150	± 4	#1
			151-300	± 8	
		1/8"	25-200	± 6	#2
			201-400	± 12	
		5/32"	50-200	± 6	#2
			201-400	± 12	
102-03108	Extended Range Multi-Cable Tensiometer	1/16"	25-150	± 8	#1
			151-300	± 16	
		3/32"	25-200	± 8	#1
			201-400	± 16	
		1/8"	50-300	± 12	#2
			301-600	± 24	
		5/32"	50-350	± 14	#2
			351-700	± 28	
		3/16"	50-300	± 12	#3
			301-600	± 24	
		7/32"	50-450	± 18	#3
			451-900	± 36	
		1/4"	50-500	± 20	#4
			501-1000	± 40	

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CHAPTER 3: OPERATION

The sections that are included in this chapter, are presented in the sequence that would generally be followed when using the CT12A to take a cable tension measurement. Some sections are applicable to all CT12A units and situations; others are particular to certain configurations and conditions, as will be indicated.

1. DETERMINING THE UNIT CONFIGURATION

Before using the CT12A, determine if it is a single-cable or multi-cable unit by checking the label located on the front face of the body. For single-cable units, the cable size that the unit is designed to measure is shown (Fig. 5). Multi-cable units have a table printed on the label that lists the cable sizes and corresponding riser positions (Fig. 6).

Multi-cable units have rotary risers that are shaped like a cross. Single-cable units have fixed square-like risers that are customized for one specific cable size. Riser numbers are engraved into all risers and are also noted on the labels.

2. POWERING ON THE UNIT AND INTRODUCTORY DISPLAY

Securely hold the CT12A unit in the palm of your hand. Turn the instrument on by pressing and holding down the ON /OFF button until the display activates.

After power on, the display window will briefly show a software code that is relevant only to the manufacturer, and then:

- If the CT12A is in Standard Mode, the battery life percentage will be shortly displayed.
- If the CT12A is in Averaging Mode, the battery life percentage will be shown, followed, for a short period, by the letters **AVE**.

Note: The standard and averaging modes will be explained in the next section.

After these brief displays, the current setting for the cable size will be shown. Multi-cable units will toggle between this diameter and the corresponding riser number. Single-cable units will only display its assigned cable size. These displays will remain until a measurement (tension or temperature) is started.

3. SELECTION OF THE OPERATING MODE

Both the multi-cable and single-cable units feature two modes of cable tension measurement: Standard Mode and Averaging Mode. Standard Mode gives individual cable tension measurements. Averaging Mode automatically averages three measurements, up to a maximum of 999 lbs. For greater tensions, the standard mode is to be used.

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Due to inherent variations in cable diameter, there can be differences between the actual cable tension and that displayed by the tensiometer. In order to minimize the effect of cable variances, it is recommended that multiple measurements be taken on the cable using the Averaging Mode to ensure the reliability of the measurement.

When the CT12A is powered On, the unit defaults to the Mode in which it was during its last use. The unit is shipped after being set by the manufacturer to Standard Mode.

The only way to change the operating mode is immediately after powering the unit on so, every time that the current mode has to be changed, turn off the CT12A, turn it on again and immediately hold the MEASURE / HOLD button down. The display window will toggle slowly between **AVE** and **OFF**. Release the MEASURE / HOLD button when **AVE** appears on the display window to set the CT12A to Averaging Mode. To set the Standard Mode, release the MEASURE / HOLD button when the display window shows **OFF**.

4. TAKING A TEMPERATURE READING

The ambient temperature reading may be taken when the CT12A is in measurement mode, either in free position, or placed on the cable in an unlocked position (handle is open), or even with the handle closed if the measured tension is less than 20 Lbs.

To view the ambient temperature in the display window, activate the Measurement Mode by pressing the MEASURE / HOLD button and moving the lever (it is not necessary to bring it against the body). To exit from the Measurement Mode, press and hold the BKLITE / CABLE SEL until the current cable size and riser are shown.

Note: If unit displays **n:C** instead of temperature, then the unit is not calibrated and should be returned to the manufacturer for calibration.

Celsius and Fahrenheit Conversion

The display window will indicate the ambient temperature in either degrees Celsius or Fahrenheit. To change from one to the other, turn off the CT12A, turn it on again and immediately hold the BKLITE / CABLE SEL button down. The display will toggle slowly between **C** and **F**. Release the BKLITE / CABLE SEL when the desired unit is shown. Re-press the MEASURE / HOLD button for the converted temperature reading.

5. SETTING THE DISPLAY BACKLIGHT

When the CT12A is turned on, the backlight of the display will automatically illuminate. If this light is not required to make the readings visible, to save battery this light can be turned off. The BKLITE / CABLE SEL button, works as a toggle switch to turn off and on this backlight, if it is pressed down just for an instant and then released.

If a unit has its backlight on, and no activity is detected on either its buttons or its lever, the backlight automatically turns off after approximately 20 seconds. Ten minutes later without activity, the whole unit will turn off.

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Only for multi-cable units, by keeping BKLITE / CABLE SEL button pressed down for more time than it is required to turn backlight on and off, the user can select the cable size, as it is explained in section 6.

6. SETUP OF CT12A FOR TAKING TENSION MEASUREMENTS

The preparation for taking tension measurements depends on the CT12A configuration.

If the CT12A to be used is of the single-cable type (as described in Section 1):

- Determine the cable size. If needed, use cable gauge provided at one end of the CT12A.
- Check the CT12A label and make sure the listed cable diameter matches the cable size.
- Verify that the number engraved in the risers match the number listed on the CT12A label.
- Press the ON/OFF button to turn CT12A on. The introductory display described in Section 2 will be shown.
- If current settings are not appropriate, select desired Operation (standard or averaging) and temperature (°F or °C) modes, following the steps indicated in sections 3 and 4, respectively, immediately after power on.
- After these settings are completed, press and release the MEASURE / HOLD button and move the lever. CT12A will show the ambient temperature, indicating that the set up is complete, so the unit is ready to start taking measurements.

If the CT12A to be used is of the multi-cable type (as described in Section 1):

- Determine the cable size. If needed, use cable gauge provided at one end of the CT12A.
- From the CT12A label, determine the riser number corresponding to the cable size.
- Verify that the number engraved in the risers located at the lowest or southernmost positions, both are the same as the number selected in the previous step. If they are not, rotate both multi-risers as required. CT12A multi-cable unit 102-03120 does not use riser position #4.

Caution: If the riser position requires change, use the 3/32" "L" hex key (the Allen Wrench provided with CT12A) to loosen the socket head cap screw in order to rotate the multi-risers to the required position. Care should be taken when positioning the multi-riser so as not to move the spring pin and polyurethane spring out of position. After the multi-riser has been repositioned, retighten the screw.

- Press the On/Off button to turn CT12A on. The introductory display described in Section 2 will be shown.

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- If current settings are not appropriate, select desired Operation (standard or averaging) and the temperature (°F or °C) modes, following the steps indicated in sections 3 and 4, respectively, immediately after power on.
- Verify that the cable size and riser number indicated in the display, match with the risers that have been selected. If they do not match, the following sequence will allow setting internally the correct cable size. Press and hold the BKLITE / CABLE SEL button only when the display toggles between the current internal setting of cable size and riser number. Release the button when the display changes to the next (in the order of the Label Table) cable size. The display will now toggle between this new cable size and riser number. Repeat by pressing, holding and releasing this button until the desired cable size is displayed.

Note: Just holding the BKLITE / CABLE SEL button down will simply stop the sequence; it has to be alternatively pressed and released, according to the changes of the display, in order to access the different sizes to make the selection.
- After these settings are completed, press and release the MEASURE / HOLD button and move the lever. CT12A will show the ambient temperature, indicating that the set up is complete, so the unit is ready to start taking measurements.

7. TAKING TENSION MEASUREMENTS

General Notes:

- The measuring procedure is common for single-riser and multi-riser units. However, there is a difference at the moment of taking the reading, between the two measuring modes (standard or averaging).
- As an option, the reading being taken can be held in display, as explained in section 8.
- **Caution:** When performing low tension measurements, where the handle does not lock in position, make sure that the handle is *fully* closed. Failure to do so will result in inaccurate measurements.
- **Caution:** For cable tension adjustment, carefully adjust the control cable tension in accordance with the airframe manufacturer's recommendations.

On a large aircraft, take the temperature of the immediate area into consideration when using the CT12A as with any standard cable tensiometer. For long cable sections, use the average of two or three temperature readings to obtain accurate tension values.

- **Caution:** The CT12A should not be used on cables that are connected to tension regulators, since the actual tension in such cables will vary depending on the errors in the regulator, its spring rate, and the condition of the control cable.



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Measurement Procedure:

- Zero the CT12A by pushing the lever against the body, then pulling it up completely. The CT12A is ready to measure when the LED stops blinking.
- Clamp the CT12A to the cable to be tested, making sure the risers are seated on the cable, by pushing the lever completely against the body. A blinking LED means that the CT12A is measuring the cable's tension. Take the value when the LED stops blinking. Pull lever up completely and wait until the LED stops blinking before starting the next reading.
- After taking the first tension reading, the displays from the CT12A and the required steps depend on the mode that is set, as described below.

If the CT12A is set for Standard Mode (as described in Section 3):

- ♦ A minimum of three consecutive readings must be taken for a single cable tension measurement. It may be necessary to skip the first reading in order to obtain a proper zeroing of the load-cell of the CT12A. The display will indicate the tension values as described before. Obtain the tension value by calculating the average of at least three readings.
- ♦ The unit will be ready to start the measurement procedure at a new location of the cable, or on a new cable, as soon as the lever is opened and the LED stops blinking.

If the CT12A is set for Averaging Mode (as described in Section 3):

- ♦ The first reading, described before, is the trial reading, ensuring a proper zero of the CT12A load-cell. A **-0-** value will show in the display window, indicating that the trial reading has been completed.
- ♦ Three consecutive cable tension measurements must be performed after the trial reading and are automatically averaged by the CT12A. The display window will indicate that the first and second readings were completed by showing **-1-** and then **-2-**. After the third reading, the CT12A will automatically calculate the average of the first, second and third readings (the trial reading is discarded), and only this average will be displayed, prefixed, as a guide to the user, by an **A** and separated from the value with a dot. A summary of the display sequence presented at the CT12A window, corresponding to the readings, is as follows:

-0-	Trial reading
-1-	First reading
-2-	Second reading
A.XXX	Third reading (displays average of 1st, 2nd and 3rd readings)

Note: The maximum average tension that can be measured is 999 lbs. For greater values, the standard mode must be used.

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- ♦ The unit will be ready to start the measurement procedure at a new location of the cable, or at a new cable, as soon as the lever is opened from the third reading and the LED stops blinking.

8. HOLDING A TENSION MEASUREMENT

While the CT12A is clamped onto the cable, pressing the MEASURE / HOLD button will hold the value in the display window. The Hold feature is especially helpful when the display is not in the line of sight, such that the user will need to remove the CT12A from the cable to take the reading. The value in the display window will remain frozen *until* the MEASURE / HOLD button is pressed again to release the Hold Mode. The LED will blink, indicating that the Hold Mode has been deactivated. If this action does not occur, move the lever towards and away from the body of the unit and observe if the LED blinks.

9. USE OF THE VERIFICATION BAR

The purpose of the Verification Bar is to give the user of the CT12A assurance that the unit is performing within specifications. The Verification Bar can be used at any time and as often as needed.

Note: If the CT12A is dropped, *verify* the unit before using it again.

The CT12A and the Verification Bar are a *matched* set: a particular CT12A must be verified only with its own Verification Bar, and a Bar must not be used with a CT12A other than its match. Make sure that the bar is always identified by keeping its tag attached. The CT12A and the Verification Bar that belongs to it should always be calibrated together.

The Verification Bar should be treated with care. If the Bar is stressed mechanically so it is permanently deformed, as would occur if used with a pair of risers that are different from the one specified here, or if any other load is applied outside of what is intended, the bar will no longer be useful and a new bar will need to be calibrated to the unit. Check the Bar periodically and discontinue use if damage is found.

To use the Verification Bar:

Make sure the Verification Bar you are using has the same serial number as the CT12A model you are verifying.

If you have a multi-riser CT12A model, set the risers to the position number and configure the CT12A to the cable diameter indicated on the Bar tag or as per the Table 3, following the procedures indicated in Section 6.

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Table 3: Specifications of Verification Bars

UUT P/N	VERIF. BAR ASSY. P/N	CABLE OD	RISER #	TOL. (LBS)
102-03101	115 - 00520	1/16"	1	± 4
102-03102	115 - 00520	3/32"	1	± 4
102-03102 BAC	115 - 00520	3/32"	1	± 4
102-03103	115 - 00521	1/8"	2	± 6
102-03103 BAC	115 - 00521	1/8"	2	± 6
102-03104	115 - 00521	5/32"	2	± 6
102-03105	115 - 00522	3/16"	3	± 6
102-03105 BAC	115 - 00522	3/16"	3	± 6
102-03106	115 - 00522	7/32"	3	± 18
102-03107	Not Available	1/4"	4	± 20
102-03120	115 - 00521	1/8"	2	± 6
102-03108	115 - 00521	1/8"	2	± 12

Configure CT12A to average mode, as was indicated in Section 3.

Note: The Verification Bar can be used in standard mode for a quick check but reading will not be guaranteed to be within the tolerance specified. Hint: If quick check is not within tolerance, then perform verification in average mode.

Place the Verification Bar on risers as shown in Fig. 7.



Figure 7: Two views of the correct placement of the Verification Bar in the CT12A

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Note: The Verification Bar must be used in the same way, orientation and position every time. Use care when performing the verification test in order to get the most accurate reading possible. If in doubt whether the Verification Bar was loaded properly or if a reading was properly taken, stop and begin verification process again.

Take the reading(s) using the Mode selected, as was described in Section 7.

After the readings are taken, the value displayed should be inside the range calculated with the Bar's own tension and tolerance, both indicated on its ID tag. The tolerance is also shown in Table 3. If value displayed is not within this range, discontinue use of the CT12A. This indicates the unit either is out of calibration or in need repair/overhaul.

10. POWERING OFF THE CT12A

Hold the ON/OFF button down until the LEDs are illuminated and the display shows **BYE**.

11. RECHARGING THE CT12A BATTERY

Connect the battery charger to a 115 VAC 50/60 Hz power source.

Lift the rubber cover of the charger port, located at the bottom edge of the CT12A (Fig. 8), and insert there the battery charger cable connector as shown.

The CT12A is fully charged when the green light is no longer illuminated. It takes approximately 2 ½ hours for a quick charge, and 4 hours for a full charge.

Note: Do not use the CT12A while the battery is being charged.



Figure 8 CT12A with Battery Charger Accessory

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CHAPTER 4: RECEIVING, SHIPPING, AND STORAGE

1. RECEIVING

No special unpacking procedures are necessary. It is recommended that the factory shipping container and packing materials be retained should it become necessary for any reason to reship the CT12A.

Also recommended is that the CT12A be carefully inspected for damage. Check for any binding of moving parts, improper mountings, broken parts and any other condition that may affect operation. If damaged, do not use it and immediately notify the carrier and the manufacturer.

2. SHIPPING

Use standard delicate electronic equipment packaging procedures when packing the battery charger for reshipment.

3. STORAGE

Place a four-ounce bag of desiccant inside the CT12A case (optional).

Close and latch the cover.

Store in a cool, dry place with a temperature range of -20° C to +60° C.