

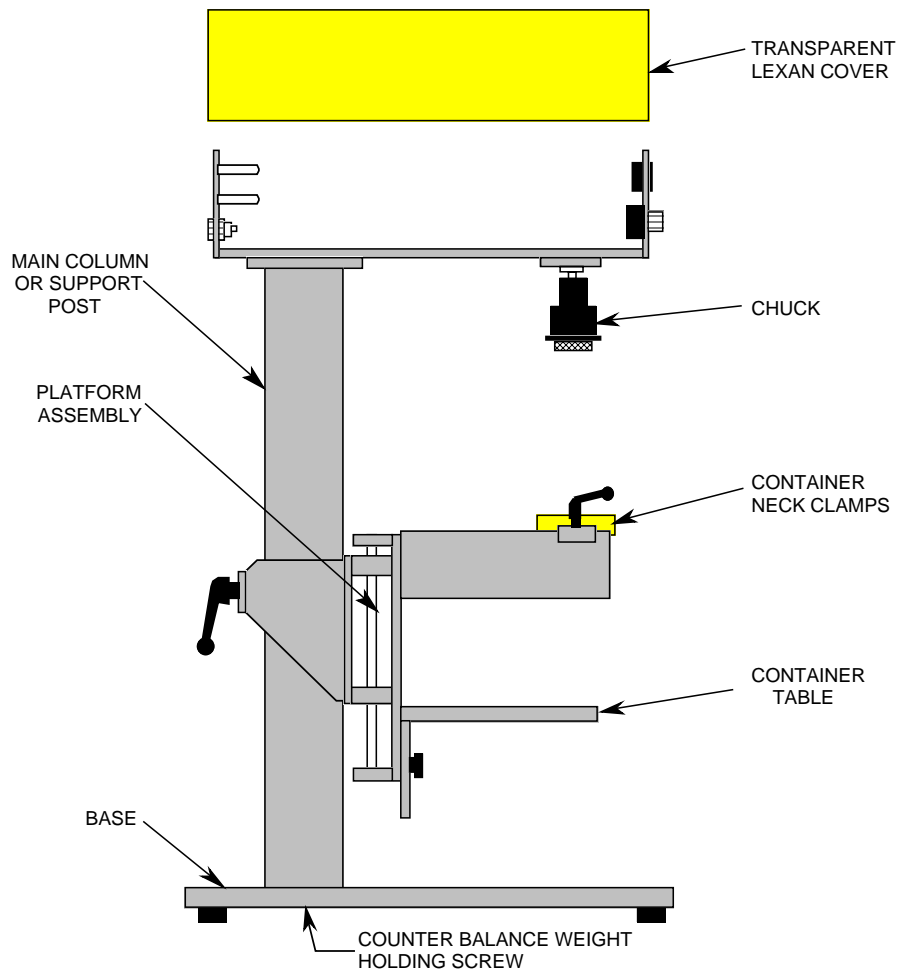


IMPORTANT! READ THIS FIRST!

TO UNPACK AND SET UP YOUR *SURE TORQUE* BENCHTOP TORQUE TESTER, PLEASE PERFORM THE FOLLOWING STEPS:

Tools needed: Screwdriver, Allen wrench set.

1. Carefully remove the crating box cover to expose the machine, which is mounted on the crate's base. Then using an Allen wrench set, unscrew four screws in the machine's base.
2. Next, unscrew the one screw under the base plate holding the counter balance weight and thread into open hole behind the column, then identify the other components and assembly hardware.
3. Connect the main air supply to the rear of the ST-100 head (refer to section 2.5.1 in the manual for specifications).
4. Attach 115 V, 60 Hz power cord (provided) to the rear of the ST-100 head.
5. Run unit in manual cycle *first* to check component operation and alignment *before* running automatic cycle.







USA • France • Hungary

Preface

Thank you for the confidence you have shown in Sure Torque, Incorporated (STI) as demonstrated by your purchase of our equipment.

Although many machine concepts and subsystem operations may be common to several different Sure Torque machine models, this Operation and Maintenance Manual (O&M) applies to your specific packaging system.

This manual is intended to provide a comprehensive description of your system's machine concepts, safety precautions, operation, basic maintenance, and adjustments necessary to assure optimum performance. A troubleshooting and replaceable parts section are included to aid in prolonging maximum machine productivity and packaging line "up-time." We at STI take great pride in you, our customer, and dedicate this manual to support your goal of prolonged system productivity throughout the years.

STI machines normally require little special attention other than routine lubrication and cleaning. Routine preventative maintenance procedures, however, should always be followed, especially those recommended in this manual. In particular, component contact areas should be inspected regularly for proper alignments and for possible wear or damage. The handy "Replaceable and Spare Parts List" will aid in rapid replacement of worn, or damaged parts, and will help return your machine to on-line productivity in the shortest possible time.

It is also extremely important to observe good shop safety practices in all aspects of installation, lubrication, operation, maintenance, and adjustments of all STI packaging equipment. Safety instructions given in this manual should be followed **strictly**, without exception under all circumstances.

If this manual does not answer a particular question, or leaves doubts in the proper operation of your machine, do not hesitate to contact our Customer Service department in Bradenton, Florida (941) 753-1095.

Your STI representative is eager to help you get the most production possible out of your packaging machines. Our reps can ensure that you receive additional information you may need. We will work with you in solving interfacing or mechanical problems, and will guide you in ordering the proper equipment, or replacement parts.

Again, thank you for becoming another loyal STI customer.

Sincerely,

Ilona R. Bankuty
President

SURE TORQUE, INC.

The Finest In Quality Closure Testing Equipment!

Safety Comes First With STI

Throughout this manual, STI will emphasize safety precautions that should be adhered to by all personnel setting up, operating, maintaining and repairing all STI equipment. Machine and personal safety depends on adherence to **ALL CAUTIONS** and **WARNINGS**. Since actual working environments vary greatly, it is impossible to mention **ALL** precautions that should be taken in any particular situation. It is your responsibility to **be alert** while working with any machinery. Failure to do so will cause **personal injury** or equipment damage.

All precautions and warnings should be discussed with **ALL** personnel operating, working on, or near any packaging equipment or production lines.

Follow All Safety Precautions In This Manual

NOTE:

Generally, CAUTION conditions refer to equipment damage, whereas WARNING conditions alert personnel to the possibility of **bodily injury**. One hazardous condition, however, could easily cause the other.

WARNING

Personal Injury Or Equipment Damage May Result If The Following 10 Safety Precautions Are Not Observed At All Times.

1. **DO NOT** operate any machine until you have completely read the manual.
2. **DO NOT** operate machine without safety guards in place. Stop the machine if guards are opened.
3. **STAY CLEAR** of all moving parts, **AND NEVER** wear baggy clothes around machines. Protect long hair with a hair net.
4. **STOP** the machine before clearing container jams.
5. **STOP** the machine before cleaning.
6. **STOP** the machine before performing maintenance or lubrication procedures.
7. Disconnect power **BEFORE changeovers** or adjustments.
8. **ENSURE** machine is properly grounded.
9. Permit **ONLY** qualified personnel to open the electrical enclosure.
10. Ensure that All personnel **are clear** of the machine **BEFORE** starting.

REMEMBER!

**ADHERE TO ALL SAFETY PRECAUTIONS LISTED ABOVE
AND THROUGHOUT THIS MANUAL**

SURE TORQUE, INC. World-Wide Torque Testing Equipment Specialists!

Corporate Overview

Sure Torque, Incorporated (STI) began development of the first electronic closure torque testing device in 1985 as the need for precision torque instrumentation, capable of accurate measurement and offering more rigorous testing of closure integrity, became a necessary requirement to meet today's manufacturers' specifications.

Sure Torque is the product line's trade name for the closure torque measurement system offered to Quality Control Laboratories and On-Line Production Facilities throughout the world.

STI can also provide torque testing seminars to packaging schools and industries which package automotive products, beverages, chemicals, cosmetics, detergents, diagnostics, foods, healthcare products, household products, liquor, pharmaceuticals, toiletries and component molding companies in support of our client base such as Abbott Laboratories, Coca Cola, Eli Lilly, General Foods, Gerber Products, Hershey, Johnson & Johnson, Olin, Procter & Gamble, Schering, S.C. Johnson, Seagrams, Pharmacia & Upjohn and Warner Lambert, to name a few.

The STI models ST-94, ST-100, OL94-2, and other custom designed Electronic Torque Testers use a combination micro-processor based control system and a precise strain gage technology which are NIST (National Institute of Standards & Technology) traceable to within $\pm 1\%$ overall, assuring repeatable release and applied torque measurements of 0.1 in-lb and 0.2 in-lb, respectively.

These models are designed to provide accurate torque measurements by eliminating the human factor imposed with manual type torque testing measurements. The manual types require process intervention that repeatedly lead to operator errors. The model ST-94 provides additional features that test component capability and torque decay; whereas, manual methods lead to problems associated with ergonomic conditions like Carpel Tunnel Syndrome, Tendonitis, etc.

Our Torque Testers offer a one step control function which initiates a gentle, but firm automatic cycle, positively clamping the container and securely gripping the closure with a very positive chucking mechanism, simulating the human hand, and automatically actuating the prescribed mechanical moment and directly translating the torque values into digital display.

The RS232 serial port can be used to transmit this data to a printer or down load it to a computer and further analyze the data with a Statistical Process Control Program (SPC). The SPC software automatically collects and analyzes torque testing data providing a menu automatically computing mean, range and standard deviation while graphing the results illustrated by line graphs, bar charts, scatter grams, or histograms, identifying the time and date of each test, eliminating the task of manual data collection and the possibility of human error in reading or recording the results.

STI also manufactures fully automatic and operator free equipment for random or controlled sampling. The model OL94-2 On-Line Torque Tester can be programmed to divert the exact number of samples from the production line flow to match your company's present protocol. It will conduct release torque tests on each container and report the results in Newton-meters or in-lb. This fully automatic model can be furnished complete with programmable controller, bottle handling equipment, shift register gates and the Sure Torque electronic package. It can retighten the product to a preset targeted torque and divert the container back onto the line or reject and redirect the product to an off-line arrangement, if preferred. It can also be supplied with a servo control loop with the capper, allowing a combination component and capper head tracking system report.

STI Torque Testers have been utilized on production filling lines immediately following a Capper as a secondary step to assure precise application torque when it is critical. In these applications, the Capper is targeted to tighten to approximately 80% of the required torque, depending on the inaccuracies of the Capper. The STI unit, instead of it being applied as a Torque Tester, is used to complete the remaining 20% of the capping application with precise repeatable and certifiable results.

STI's Cappers and Cap Tighteners, BT-94, BT-100 & STSHCT, both bench top and on-line models, utilize state-of-the-art magnetic particle clutches with resolutions of $\pm 1/2$ in-lb. They are also supplied with gentle but firm, positive clamping of the container and secure gripping of the closure with a very positive chucking mechanism, while automatically actuating the prescribed applied torque for best seal integrity. STI's precision manufactured Capping Heads have been applied by our customers for installation into monoblock systems for filling and capping, and into turnkey systems for assembly of components. STI Bench top Cappers, models BT-94 and BT-100, have been successfully used on assembly lines where precise torque is critical, as in the assembly of multi-functional showerheads. STI's On-line Capper, model STSHCT, can be furnished with or without a tabletop conveyor and utilizes an indexing star wheel for positive container handling to present the container at the chucking station and returning the tightened product back to the customer's conveyor. This equipment is also used in stringent, Class 100 sterile room environments.

Container cap torque is important, not only for package appearance and product integrity, but for customer satisfaction and consumer safety. We fully support a total commitment to quality management at STI; after all, we developed this advanced torque testing technology by engineering and manufacturing the most sophisticated, up to date, electronic torque tester available in the world today.

We know that today's consumer judges product quality based on many observations, which include packaging, appearance and the overall effectiveness of efficacy of the product. Proper cap torque not only impacts the package's appearance and functionality, the product's freshness and shelf life, but more importantly, the consumer's perception of the manufacturer's level of quality and concern. In today's competitive market place, the consumer avoids buying products if there is detectable leakage, tampering, lack of air tightness, or something as a hard to remove closure, and especially when closure removal requires the use of a tool.

Today's manufacturing operations are very concerned with loose caps, which will clearly affect product freshness, product stability, shelf life and possible leakage. Stability is of particular concern, since moisture sensitive products require that the integrity of the container closure and seal be maintained. Stability considerations are critical, since liquid product loss due to evaporation or addition of moisture to a dry product can cause contamination, discoloration, significant changes in potency, and thereby, affect the efficacy of the product.

Container cap torque can significantly affect the success of a product. Closure application defects are relatively easy to prevent by assuring the closure application meets required specifications. Component integrity also shares in the success of assuring properly secured closures.

To achieve the desired level of product quality, the component manufacturer sets certain specification for acceptable torque values while testing samples based upon this and other criteria. Testing methods generally are performed off-line on collected production run samples grouped for the purpose of frequency, evaluation, and statistical analysis. Testing is also performed for a broad base of criteria pertaining to other company considerations and protocol.

At STI, we not only offer precise closure torque testing capability, we provide equipment evaluation of a closure system's compatibility to container, efficiency of tamper evident techniques, and closure or liner durability. These methods determine how a closure and container conform to performance criteria while assuring product integrity and assists in the evaluation of the Capper's capabilities.

STI's Customer Service and Parts Department is "always" available and ready to assist you with identifying and ordering any required replacement or spare components and will answer any questions you may have about the operation and maintenance of your equipment. STI's standby inventory is maintained at optimum levels to support our customer's needs. STI Customer Service personnel are always available for installations, training, classroom sessions, refresher courses, retraining, troubleshooting, routine quarterly, semi-annual, or annual calibrations, or whatever other needs you may have.

STI invites you to attend our seminars or a guided tour of our manufacturing facility to view a hands-on demonstration of these unique instruments and equipment. Please feel free to contact STI for dates and details of these events or for information, brochures and specification literature on our high quality, precision instrumentation and equipment.



USA • France • Hungary

Quality Assurance Instrumentation

ELECTRONIC TORQUE TESTER MODEL: ST-100

Operation and Maintenance Manual



PREPARED BY:
SURE TORQUE, INC.
2532-34 Trailmate Drive
Sarasota, Florida 34243
Tel: (941) 753-1095 Fax: (941) 756-8425

SURE TORQUE, INC. *World-Wide Torque Testing Equipment Specialists!*

Table of Contents

Page

Section 1, General Information	1-1
Section 2, Installation Instructions.....	2-1
Section 3, Operating Instructions	3-1
Section 4, Maintenance	4-1
Section 5, Troubleshooting Guide.....	5-1
Section 6, Warranty, Limitation of Liability and Service Information.....	6-1
Section 7, Sure Torque Options List	7-1
Section 8, Glossary.....	8-1
Appendix A	
Machine Tuning Sheet	
Certification Records	
Closure Test Records	
Sure Torque Data Acquisition (STDA - when applicable)	

List of Illustrations

Figure 1-1, ST-100 Torque Tester General Arrangement	1-2
Figure 1-2, ST-100 Torque Tester Mechanical Components (Chuck Assembly)	1-3
Figure 1-3, ST-100 Torque Tester Pneumatic Diagram	1-6
Figure 3-1, ST-100 Controls And Indicators	3-1
Figure 3-2, ST-100 Setup For Calibration	3-1
Figure 3-3, RS-232 Cable and Communication Parameters	3-10

List of Tables

Table 4-1, Cleaning Materials	4-1
Table 4-2, Maintenance Schedule	4-2
Table 5-1, Mechanical Troubleshooting Guide	5-1
Table 5-2, Electrical Troubleshooting Guide	5-2
Table 5-3, Pneumatic Troubleshooting Guide	5-2

Section 1, General Information

Sure Torque, Inc. recommends that *all* operators and service personnel scan the Table of Contents to familiarize themselves with the contents and layout of this technical manual. Since certain modifications have been made, or requested by our customers, this is a general guide and all of the technical information in this manual may not pertain to your specific machine. Changes in machine design or specifications are a result of continual machine improvement and *Sure Torque, Inc.* reserves the right to change specifications without prior notice.

The following chapter gives a brief description of the operational philosophy of your fully automated ST-100, *Sure Torque Electronic Torque Tester System*.

Major components and assemblies are called out on Figure 1-1, ST-100 Torque Tester General Arrangement, and referred to in this chapter, and throughout this manual as well. Any optional equipment included with your machine is listed on the Owners Fact Sheet. Any Changeover specifications are listed on the Machine Tuning Sheet for the particular closure and container being tested.

Your ST-100, "*Sure Torque*" *Electronic Torque Tester*, is a fully automated precision instrument designed for a wide array of container closure test functions. The ST-100 electronically measures the forces required to apply or remove threaded screw caps from containers. Your ST-100, with available options, will also apply downward forces to a *childproof* closure for the required protocol tests under the Poison Prevention and Packaging Act. The ST-100 can also be used for *any other* test that requires the measurement of an increasing rotary, or linear force to a peak point, closure container compatibility or failure analysis.

The *Sure Torque's modular* design assures minimum maintenance, ease of operation in a minimum of space, and wide-range of container acceptance capabilities.

STI offers an optional 360° degree test mechanism (refer to section **7.1.10** in this manual) for our ST-100 unit. This option measures the highest release torque sensed during a full 360° degree turn of a closure.

SURE TORQUE, INC. also offers an "On-Line" Torque Tester System that can be integrated into your existing packaging line operation. When line integrated, the "On-Line" unit can gather random containers from the conveyor at a controlled rate, and perform required closure tests, right on your production line.

1.1 SYSTEM OVERVIEW

The following paragraphs are intended to give an outline of the major components and operational sequences required to perform the ST-100, *Sure Torque functions*. Major components and assemblies are called out on Figure 1-1, ST-100 Torque Tester General Arrangement.

The basic ST-100 Torque Tester System consists of:

1. Sturdy mechanical assembly.
2. Integrated pneumatic systems.
3. Electronic components and assemblies required to perform various operational test functions.

The following four sections give a detailed description of each of these assemblies:

ST-100 MECHANICAL COMPONENTS

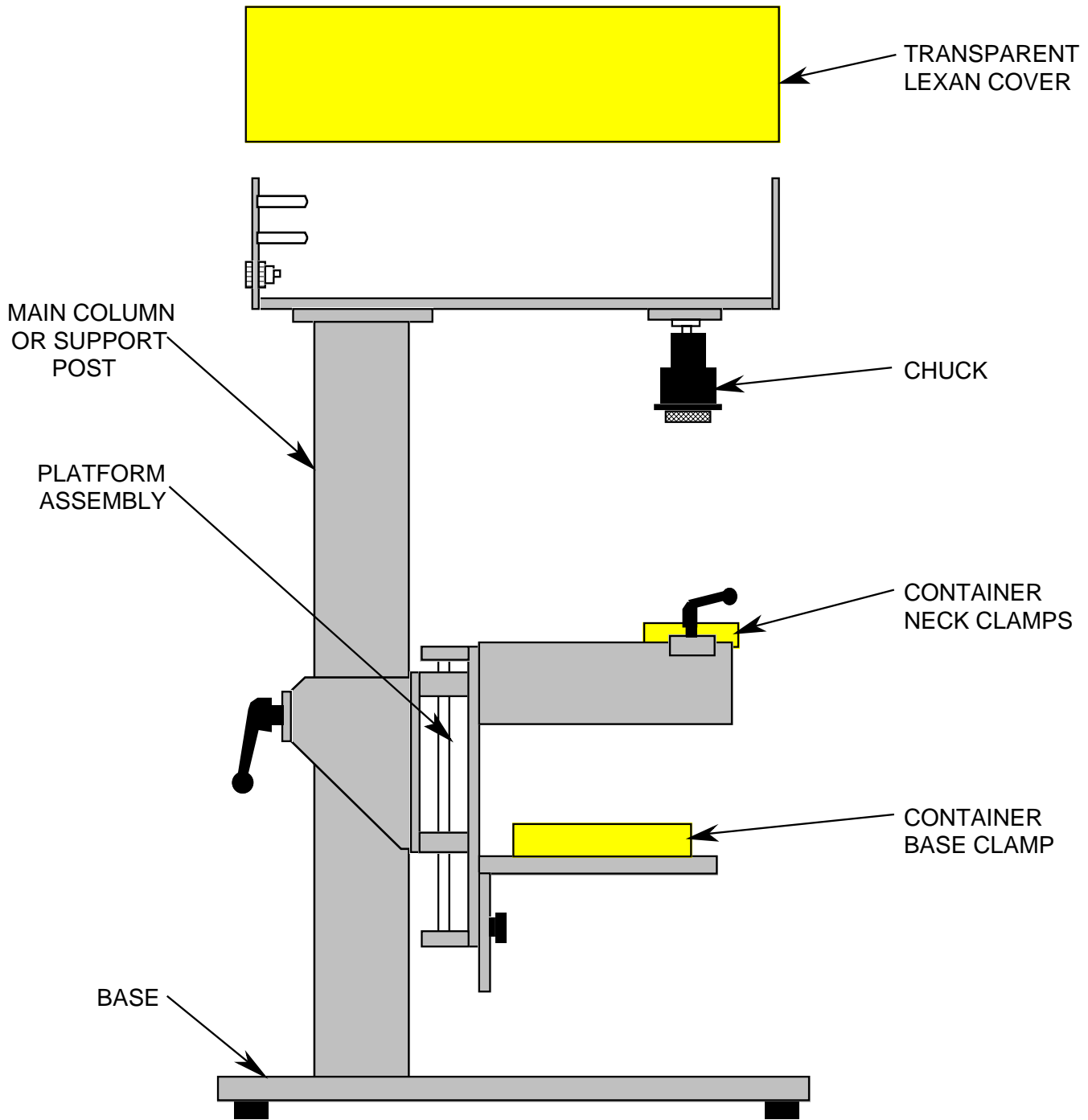


Figure 1-1, ST-100 Torque Tester General Arrangement.

1.1.1 Electronic Control

The operator's interface with the *Sure Torque unit* is controlled through the integrated electronic control, which includes the computer that regulates the ST-100's operational cycles, processes the input/output data, and acts as the overall communications link with the line operator or test engineer. This electronic control can easily interface with an on-line or remotely operated IBM PC for data collection. Sure Torque, Inc. will gladly integrate this IBM interface controller PC in your system.

1.1.2 Mechanical Assembly

The Mechanical System consists of a Stand assembly, Chuck and Change Part Components. Please refer to Figure 1-2, ST-100 Torque Tester Mechanical Components (Chuck Assembly).

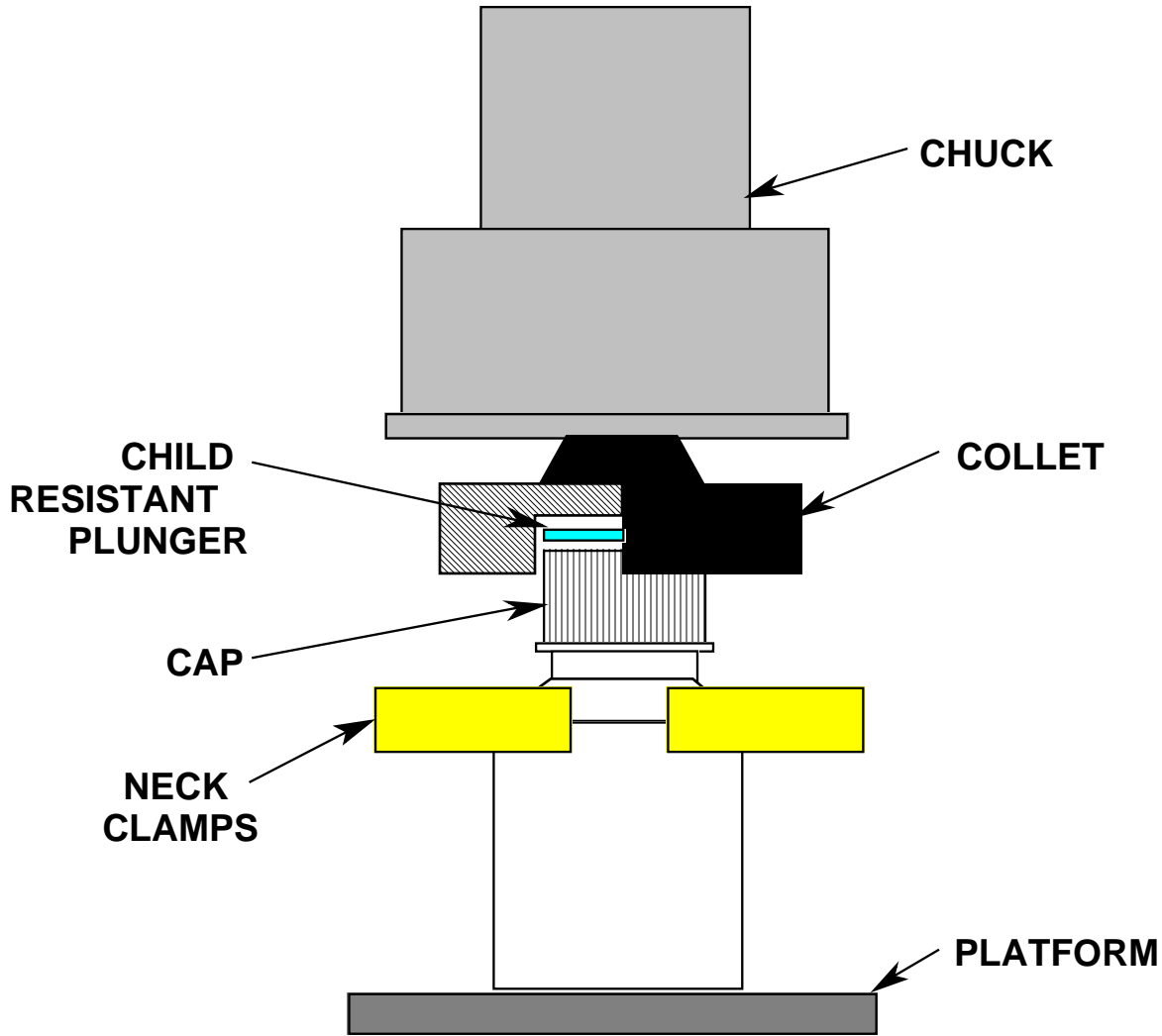


Figure 1-2, ST-100 Torque Tester Mechanical Components (Chuck Assembly).

1.1.2.1 Stand Assembly

The Stand Assembly is an aluminum fixture which supports the Container Platform, Clamp, Chuck, and ST-100 Control Head Assembly. The stand has a wide stable base to minimize motion during the test cycle, and a rugged main support post on which the container platform is attached. The container platform is manually raised or lowered to accommodate the different container / bottle heights and locked into position by a “quick-release” half-turn locking handle.

On top of the stand’s Main Column or support post is the ST-100’s Main Head Assembly, which contains all the main pneumatic, electronic, and force sensing components required for the actual torque testing function operations. The base of the control head assembly is a solid aluminum plate, which acts as a sturdy mounting surface for all these components. The cover of the control head, made of attractive and durable smoked Lexan, is removable for component cleaning, servicing and calibrating.

1.1.2.2 Chuck Assembly

The Chuck is the mechanical component, which holds the Collet that “grasps” the various closure devices, and transmits the force to actually remove the closures. Both the “grasping” and the “turning” forces of the Chuck are applied pneumatically, via electronic control. The Chuck rotates on a shaft, actuated by the pneumatic Test Cylinder located in the Main Head Assembly. This Test Cylinder applies the required force to perform all torque-test functions.

1.1.2.3 Change-Parts

Each different container and closure “combination” requires a different set of change-parts, (please refer to the Machine Tuning Sheet for the required change-parts for the particular container/closure combination being tested).

The change-parts, (or tooling package), for the basic ST-100 consists of:

- a. Container Base Clamp (when applicable) holds the container’s base.
- b. Container Neck Clamps which hold the container’s neck as close to the closure as possible.
- c. Closure Collet, which actually “grasps” the closure during the test cycle.

1.1.3 Pneumatic Assembly

Understanding the Pneumatic Assembly and its components is the key to understanding your ST-100 *Sure Torque* system and receiving optimum production and maintenance free operation from your unit. Please refer to Figure 1-3, ST-100 Pneumatic Diagram.

The pneumatic components control these 4 major *Sure Torque* functions:

1. Holding the container, (the Clamp function).
2. “Grasping” the closure, (the Chuck function).
3. Raising and lowering the Platform.
4. Activating the Test Cylinder to apply or remove the closure.

The Pneumatics Operational Philosophy is as follows:

Air pressure is applied to the ST-100 through a panel-mounted regulator. STI offers an optional filter package for those locations, which do not have a clean air supply.

The central air supply is then distributed via an inlet manifold to four regulators, which individually control the air supply to the four main operation functions listed above. The manifold air supply is also monitored by a pressure switch that will warn the *Sure Torque* operator if incoming air supply falls below a preset value. The air pressure is sent directly to the Platform, Clamp, and Chuck air valves, which control the air cylinders that activate these components.

The air pressure to the Test Cylinder, however, is first routed to a special electronic regulator, and a small cylindrical storage reservoir. The electronic regulator is an electrically operated, pneumatic control device that utilizes a variable electronic input signal to control a pneumatic output pressure. The input voltage to the electronic regulator is steadily increased, producing an increase in the output pressure to the Test Cylinder, thus increasing the Chuck torque for both the applying *and* releasing of closures. This output pressure is not affected by changes in input pressures that may occur from normal plant air variations.

The small Air Storage Reservoir, located between the electronic regulator and the Test Cylinder, provides a smooth, pulse-free and constant pressure airflow to the Test Cylinder, smoothing out the rates of change in the pressure being fed to the cylinder. This airflow of constantly increasing pressure, produces a pulse-free and smoothly increasing “force” that allows *very* accurate readings of peak torque values. Clean airflow to the Test Cylinder is critical for proper operation of this component, and that of the overall machine as well.

Adjusting the “Release Rate” in the set-up menu of the control box regulates the rate of increasing the air pressure. The Release Rate is programmable from 1 to 250 seconds. A shorter release rate minimizes cycle time. A longer release rate minimizes the effects of acceleration on the final torque reading. See Section **3.5.2** for more details.

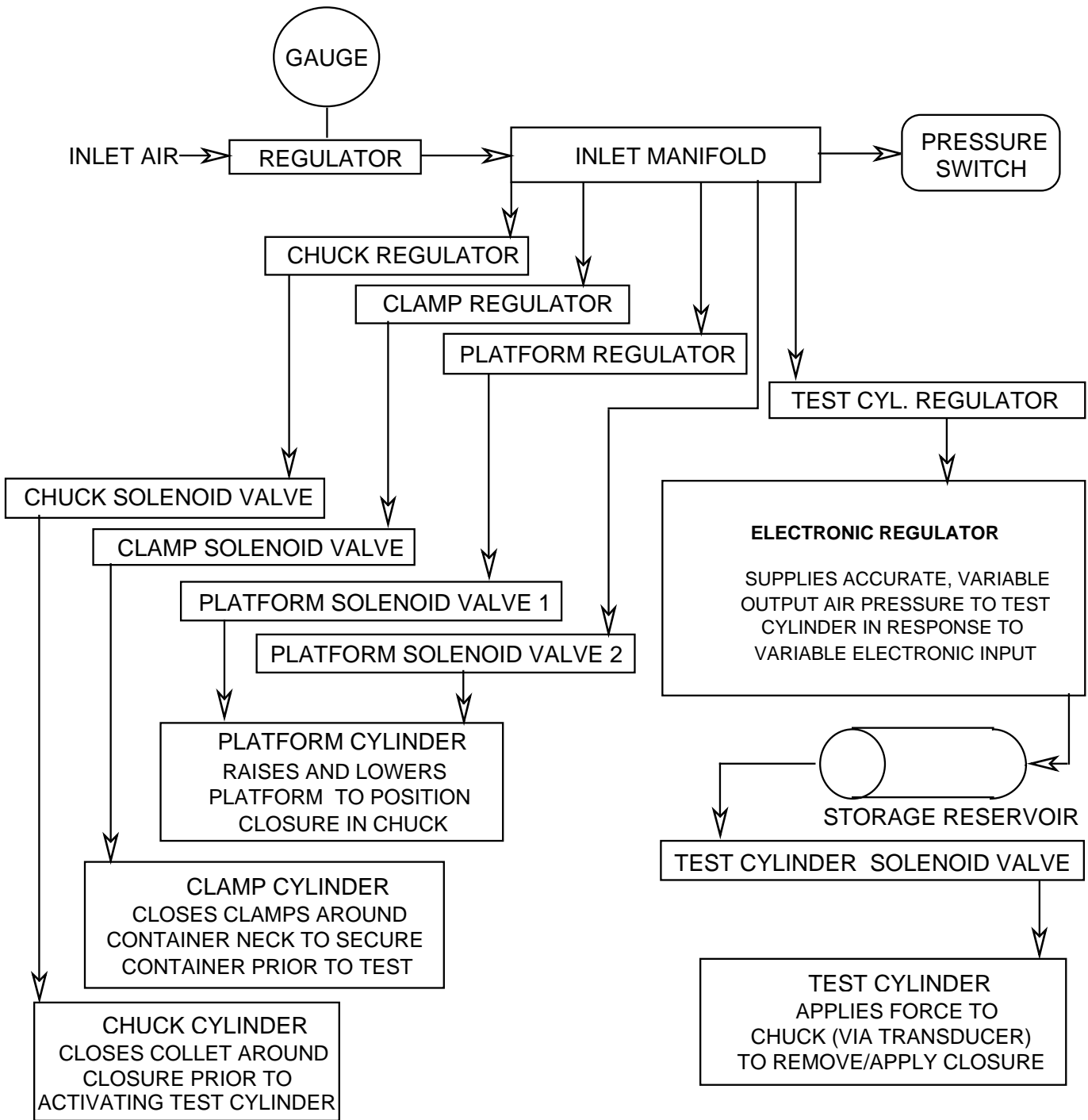


Figure 1-3, ST-100 Torque Tester Pneumatic Diagram.

1.1.4 ELECTRONIC ASSEMBLY

A basic knowledge of the Electronic Assembly and related components will aid greatly in the understanding of the function of your ST-100 Torque Tester.

The main electronic components of the ST-100 are as follows:

1. The Transducer.
2. The Microprocessor.

1.1.4.1 Transducer

The force applied to the Chuck by the Test Cylinder (the application *or* removal torque), is measured by an electronic Strain Gauge Transducer. A strain gauge operates by measuring minute changes in a solid-state electrical conductor as it is flexed or strained. The changes show up as measurable increases or decreases in electrical resistance to a current flow through the conductor caused by the variation in the cross-section of the conductor.

The Transducer in the ST-100 is designed to compensate for temperature, vibration and other possible causes of resistance variation, and to convert the change in electrical resistance into a linear electrical signal, which is proportional to the force applied to the closure device. In this way, the mechanical force (torque) applied to the closure device is converted into an electrical signal. This signal is then sent to the microprocessor, which monitors the torque, and controls the operating functions of the ST-100 *Sure Torque* system.

1.1.4.2 Microprocessor

The Microprocessor monitors the torque signal and records the *peak signal* as the actual application *or* removal torque. This signal is displayed on the digital display on the front of the Torque Tester Head, and can also be output to a variety of data collection devices.

The Microprocessor also controls the operating cycle of the *Sure Torque* system. Additionally the Microprocessor can display diagnostic and error messages and allows the operator to program various parameters of the test cycle to achieve optimum performance and accuracy.

1.2 OPERATIONAL SEQUENCE of the TEST CYCLE FUNCTIONS

The *basic* operational sequence of your ST-100 *Sure Torque* system is as follows:

1.2.1 Clamping Sequence

In the *first* step of the *Sure Torque's* operational cycle, the Clamp air cylinder is activated and closes the Clamps around the neck of the container being tested. Since each set of Clamps has been made to fit a particular container, the container is *firmly* held in place, preventing it from bending, twisting or slightly rotating, thus affecting the closure test results.

1.2.2 Platform Raising Sequence

The *second* step in the operational cycle is to pneumatically raise the Platform on which the container has been placed. The Platform raises to a height at which the container closure is securely inserted into the Chuck mechanism.

1.2.3 Chuck Actuation Sequence

In the *third* step in the operational cycle, the Collet closes around the closure being tested, and securely "grasps" the closure prior to the Chuck rotating it either on, or off the container for a "Torque-Test".

1.2.4 Torque-Test Sequence

In the *fourth* and final step of the operational cycle, The Test Cylinder is activated, and the torque applied to the closure being tested is linearly increased. The Transducer measures the peak torque applied to the closure. The measurement is displayed on the digital display of the Microprocessor and is available for other optional functions, (eg: data collection and reporting, statistical analysis, graphic printout, automated capper torque control, etc.).

The standard operational test mode of the ST-100 is the removal torque mode in which a container/closure is tested to determine the actual torque at which the closure “breaks loose” from the container, (the point at which the “seal” of the container is “breached”. Because the seal is breached in this test, it is considered a “destructive” test.

Section 2, Installation Instructions

The following paragraphs explain the required information and procedures to properly install your ST-100 *Sure Torque* Electronic Torque Tester.

CAUTION

Read this section completely before installing your new unit.

2.1 RECEIVING THE UNIT

Your ST-100 *Sure Torque* System is shipped with the mechanical component already assembled. It has to be hooked up with the electronic control unit, the air supply and the optional printer and/or computer.

2.1.1 Inspecting

Sure Torque urges you to give your machine a complete inspection as soon as it is received. Any machine damage and/or missing parts should be reported to *Sure Torque, Inc. immediately*.

CONTACT:

SURE TORQUE, INC.
2532-34 Trailmate Drive
Sarasota, Florida 34243
Phone: (941) 753-1095 Fax: (941) 756-8425

IMPORTANT

Please Follow These Simple Inspection Steps:

1. Check the packing list that accompanies the equipment to ensure that ALL loose parts have been included.
2. Check the unit completely for possible shipping damage.
3. Check the unit completely for any screws, bolts, belts, wheels, or other parts that may have loosened during shipment. These parts should be tightened and/or properly adjusted **before** operating the equipment.
4. Assemble the unit according to the following Unpacking instructions.

2.1.2 Unpacking

Remove all packing, shipping wire, and/or other materials that might interfere with machine operation or safety and proceed with the following unpacking and set-up procedures.

IMPORTANT

To unpack and set up your new *Sure Torque* Electronic Torque Tester, follow the steps below:

NOTE:

Tools needed: Screwdriver, Allen wrench set.

1. Carefully remove the crating box cover to expose the machine, which is mounted on the crate's base. Then using a screwdriver, unscrew four screws in the machine's base.
2. Next, **unscrew the one screw under the base plate** holding the counter balance weight, then identify the other components and assembly hardware, including the four foot pads to be screwed back into the base plate holes.
3. Connect the main air supply to the rear of the head (refer to section 2.5.1 in the manual for specifications).
4. Attach 115 V, 60 Hz power cord (provided) to the rear of the Main Head Assembly.
5. Run unit in manual cycle *first* to check component operation and alignment *before* running automatic cycle.

IMPORTANT

See "Section 3, Operating Instructions" for complete instructions.

2.2 POSITIONING THE UNIT

Simply place the *Sure Torque* unit on a large table or flat platform allowing plenty of *side room* to perform proper torque testing in an uncluttered area.

WARNING

Only **qualified personnel** should move or install this equipment. Failure to comply may cause equipment damage and/or personal injury.

2.3 PRE-RUN, *Sure Torque* Check-out

Two fuses are used to protect the System's electronic components. Assure that they are installed, and in good working order.

- One fuse is located inside the power receptacle (1 A)
- One fuse is located on the main PC board (1 A)

NOTE:

The following **five** operators functions *Must* be performed prior to the running and/or operation of the ST-100 *Sure Torque* System.

1. Be sure the power on switch to the unit is off.
2. Connect the Power Cord to 120 V, AC receptacle.
3. Hook-up a clean, dry, filtered air supply of 80 psi at 4 cfm. Connect the airline to the 1/8" NPT fitting at rear panel of the Test Head. (If optional filter is installed, connect the airline to the 1/8" NPT filter inlet.)
4. Set the Regulator at the Rear Panel to 80 psi on the Pressure Gage.

2.4 ELECTRICAL INSTALLATION

CAUTION

Damage to electrical components can result if improper electrical connections are made. Be sure to check **all** connections **before** applying power.

WARNING

1. **Only** qualified personnel should perform electrical installation of this equipment.
2. To avoid electrical shock, **do not** install this machine with **any power** active.
Failure to comply with these Warnings, may cause extensive equipment damage and severe personal injury.

2.4.1 Precautions

The electrical supply requirements of your ST-100 *Sure Torque*, are designed to meet your individual specifications. Therefore, the Owners Fact Sheet in this manual should be checked **before** any electrical connections are installed, **or**, power is put to the unit.

2.4.2 Connections

All electrical connections should be made by a **qualified electrician** and in accordance with the local electrical codes.

2.5 PNEUMATIC INSTALLATION

Individual regulators have been provided by STI (refer to Figure 1-3, ST-100 Torque Tester Pneumatic Diagram).

CAUTION

Filtering systems for air supplies are the **machine owners** responsibility. Contaminated air **will** cause excessive wear, erratic operation, and eventual failure of pneumatic components.

2.5.1 Air Supply

A clean and moisture-free air supply of 80 psi should be available to mate with the existing air connection on your machine. *Sure Torque* recommends the use of 5 μ filtration.

2.5.2 Plumbing

Customers piping for the air supply can run to the rear of the machine from any convenient point.

2.5.3 Air Pressure Settings

Normal pressure setting for operation is 80 PSI. The automatic pressure switch will shut down machine if inlet pressure falls below 65 PSI.

2.6 MACHINE TUNING SHEET

(Refer to the Machine Tuning Sheet in the Appendix-A, accompanying this manual). The Machine Tuning Sheet shows the recommended mechanical adjustments for the different change parts ordered with your machine. The Tuning Sheet is a valuable tool for all those operating the ST-100 *Sure Torque* Unit. It is recommended that this tuning sheet be reviewed by **All** personnel involved in machine operation and changeover procedures, before initiating machine start-up. *Sure Torque, Inc.* should be contacted immediately if there are any questions or problems pertaining to any specific Tuning Sheet data, its understanding, or application. The final run and fine tune settings for your machine, may be slightly different from the ones on the Tuning Sheet, thus, the customer's set-up and change-over personnel should note these changes, for future reference, on the Tuning Sheet.

Section 3, Operating Instructions

3.1 CONTROLS AND INDICATORS

The ST-100 Torque Tester Control Unit has operator controls and indicators necessary for torque testing functions. Refer to Figure 3-1, ST-100 Controls and Indicators, for a drawing of all operator's controls and indicators, listing their types and functions.

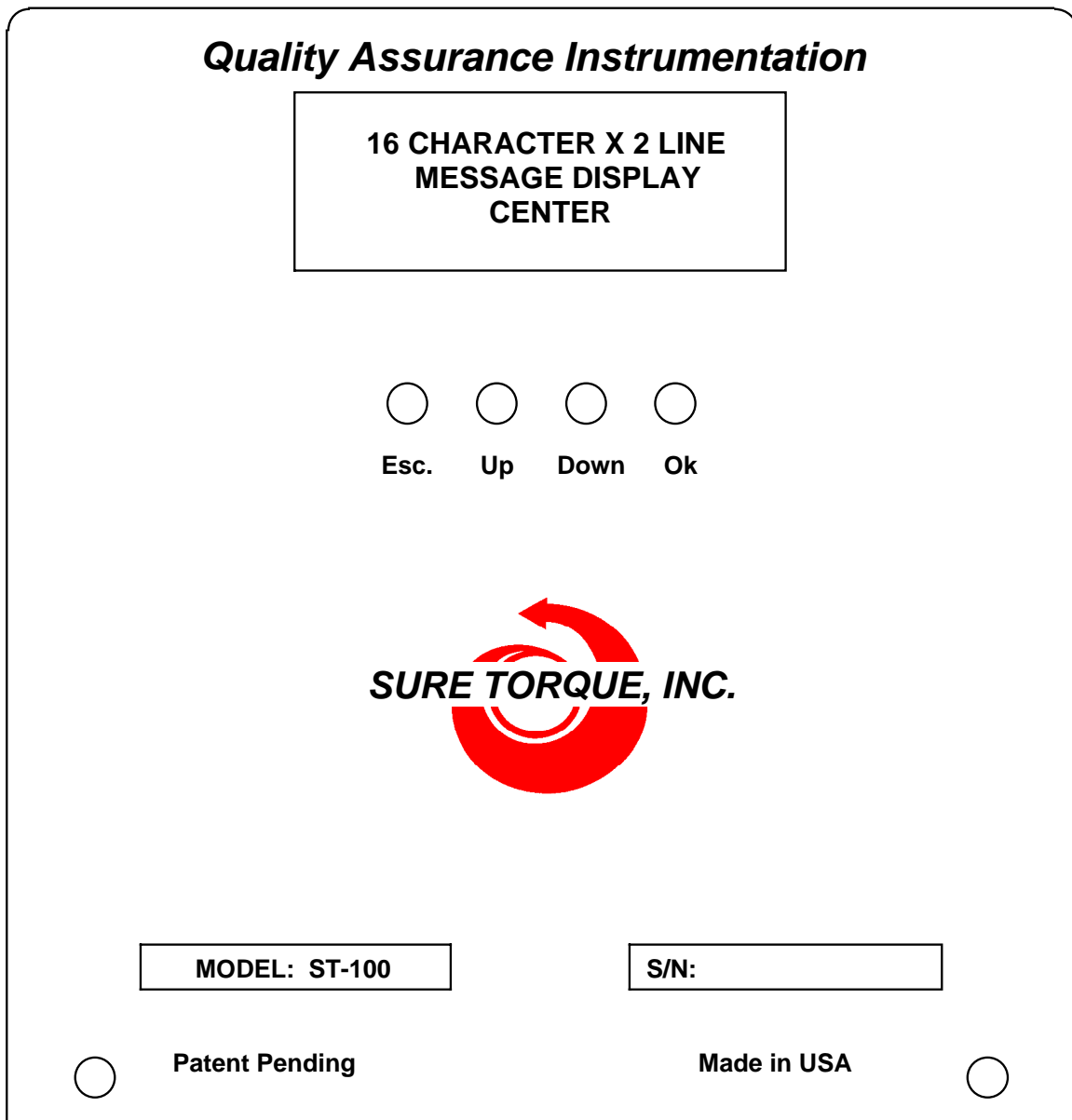


Figure 3-1, ST-100 Controls and Indicators.

3.2 OPERATOR CONTROL FUNCTIONS

There are 4 push-button switches available to the user to operate the ST-100 *Sure Torque Control* Unit. They are used as “Soft Keys”, that is to say, their functions depend on the operational test mode in use.

3.2.1 Escape Button

This button is used to escape to the next higher-level item in the menu.

3.2.2 Down Button

This button is used to *Reduce* a numerical value. *EXAMPLE:* Set applied torque value. By pressing this button, the value Displayed is *Reduced*.

3.2.3 Up Button

This button is used to *Increase* a numerical Value, by pressing this button, the value displayed is *Increased* (used just the opposite as the “Down” button).

3.2.4 Ok Button

This button functions as an “acknowledgment of operation”, or to “go forward” with the operational cycles of the testing process. It is also the main button to “Start” an actual test.

3.2.5 Manual Mode

Pressing the "Esc." and "Up" buttons *simultaneously* gains access to the Sure Torque's manual mode of operation. In this mode the Clamp, Container Platform, and Chuck assemblies have individual on/off push-button switches that either activate or deactivate their respective operational test functions. This mode is the mode that is most frequently used for machine set-up or trouble shooting.

3.2.6 Set-up Mode

Pressing the "Down" and "Ok" buttons simultaneously places the system into the set-up mode, in which different set-up parameters can be programmed.

3.3 MACHINE SET UP

Prior to initial and/or routine machine startup, it is essential to perform a detailed and accurate inspection to the overall system. As well, a proper “Set-up” procedure is necessary to assure the accuracy, and optimum trouble-free operation of your ST-100 Torque Tester.

IMPORTANT

Refer to Section 2, Installation Instructions, Section 2-3, Pre-run, *Sure Torque* Check-out **Before** attempting to start **or** operate your ST-100 *Sure Torque* System.

3.3.1 Pre-run Inspection

Prior to any initial **and/or** routine set-up, the following inspections **must** be performed:

1. Check to see that **all** electrical connections are installed as per the wiring diagram and that no loose or unfastened wires are evident.
2. Check to see that **all** pneumatic connections are installed properly, and that no loose or unfastened hoses or lines are evident. With air pressure on, listen for any air leaks throughout the system, and correct.
3. Visually inspect the **entire** unit for any loose brackets, bolts, etc.
4. Check to see that there are no loose items on or around any of the moving parts.
5. Check to see that the Tuning Sheet adjustments are appropriate for the container size to be run. (Please refer to the Machine Tuning Sheet in Appendix-A).

3.4 MECHANICAL SET-UP

Follow these procedures to assure proper ST-100 *Sure Torque* set-up, and operation.

IMPORTANT

These steps must be performed whenever the size of the closure and/or container to be tested, is changed.

To set-up your Sure Torque Unit, proceed as follows:

1. Install the proper Collet, for the “closure” being tested, into the Chuck Housing utilizing the Lock Pin (Press Lock Pin handle button during installation and removal).
2. Push the “POWER” button **On** (located on the back panel of the Main Head Assembly).
3. Go to Manual Mode (Refer to section 3.2.5)

Container Platform Adjustment:

4. Obtain a container to be tested, with its closure **on**.
5. Press the “TABLE” push button, energizing the Table to full “Up” position.
6. Set the height of the Container platform with the container/closure to be tested, in position. Manually set the height of the Container Platform, via the locking handle on rear of Platform. Adjust the Container Platform so that there is 1/8” clearance between the *Top* of the closure, and the base of the Collet relief, and lock Container Platform securely. On a “CT” type closure feel the downward travel allowed on the pneumatic table by pushing down on the platform table. Adjusting the table’s regulator valve compensates for the additional vertical force created by the closure’s thread travel and any unnecessary pressure is reduced accordingly. On the “CR” type closure, while setting up to engage the closure’s ratchets prior to obtaining thread engagement, the proper table height is first set (static) conforming to the perimeters described in your Sure Torque ST-100 tuning sheet. Next, feel the downward travel allowed on the pneumatic table by pushing down on the platform table. By adjusting the table’s regulator valve to obtain a constant vertical load on the component and closure, this assures a dynamic engagement of the closure’s ratchet feature.

Clamp Adjustment:

7. Set the Left Hand, Stationary Clamp in a position that will ensure a centralized position of the container on the Platform.
8. Press the "CLAMP" push button, energizing the Air Clamp.
9. Adjust the Air Clamp in or out until both stationary, and moveable Clamp sections, perfectly align the container, (and closure), in the Collet.
10. Press the "TABLE" push button, lowering the Container platform.
11. Press the "CLAMP" push button, opening the Clamp.
12. Press "Esc" push button to return to main menu. Confirm your settings by running an automatic cycle:
13. Select either "Applied" or "Release" by using the "Esc" to choose the desired mode and then the "Ok" push button to select that mode. If "Applied" is selected, set the desired torque setting using the "Up" and "Down" push buttons while viewing the Display Meter.
14. Place the container/closure to be tested, onto the Container Platform *snugly* against the Stationary Clamp.
15. Press the "Ok" push button.
16. Read the "Applied", or "Release" Torque finding for this particular test, on the display, at the end of the test cycle.

3.5 ELECTRONIC SET-UP

The Sure-Torque set-up Mode provides several options to set-up and alter electronic or pre-programmed software settings. Select the set-up Mode from the Main Menu with the "Up" and "Down" buttons. Press "Ok". There are four sub-menus in the set-up menu: Calibration, Setup Delay and Setup Features.

Selecting one of the sub-menus is accomplished by pressing the "YES" or "NO" as each option appears on the display. Pressing the "Esc" button leads back to the previous menu mode. Details on the set-up menus are as follows:

3.5.1 Calibration (sub-menu)

Enter the Calibration sub-menu by pressing "YES" when the display reads: "CALIBRATION" . The display then will read:

```
"TORQUE: + 0.0 "  
" EXIT    RECAL"
```

In this mode the transducer is directly connected to the display for continuous observation and calibration of the ST-100 instrument. The actual certified system calibration with accurate weights is done in this mode. If you have purchased the optional verification kit (strongly recommended), follow these steps to verify the unit's calibration:

- 1 . Remove the platform
- 2 . Using 5/16-18 hand knobs, install the weight roller assembly (roller side up).
- 3 . Remove the existing collet
- 4 . Remove the left clamp assembly
- 5 . Slide back the right clamp assembly all the way to the right
- 6 . Install the desired test pulley into the chuck
- 7 . Raise the roller assembly to align the test pulley with the roller assembly. The top of the rollers should be in level with the middle of the pulley
- 8 . Attach the wire to the test pulley with the loop at the end of the wire set over the head of the socket screw in the middle of the pulley. Wrap the wire around pulley at least 180 degrees and hang it over the appropriate roller. If you hang the wire over the right hand side roller, you test the machine for release; if over the left hand side roller, you test for applied.
- 9 . Hang the desired weight on the end of the wire. Be sure not to drop the weight and shock the testing head.
- 10 . If the reading on the display is within the $\pm 1\%$ range of the torque (the radius of the pulley multiplied by the weight), the torque tester meets the calibration requirements.

Pressing the "Esc" button will terminate the calibration mode and return to the previous sub-menu.

If your machine does not meet the above criteria, press the "Ok" button to recalibrate the machine. The display then will read:

" REMOVE WEIGHT "
"THEN PRESS A KEY"

Remove the weight from the wire, then press any key. The display will read:

" HANG THE WEIGHT "
"THEN PRESS A KEY"

Hang the weight on the wire, then press any key. The display will read:

" RADIUS x WEIGHT "
" Set: XX.X in-lbs "

Calculate the torque by multiplying the radius of the pulley by the weight being used. Enter this value using the "Up" or "Down" keys. Press "Ok". The ST-100 will display the correct torque value.

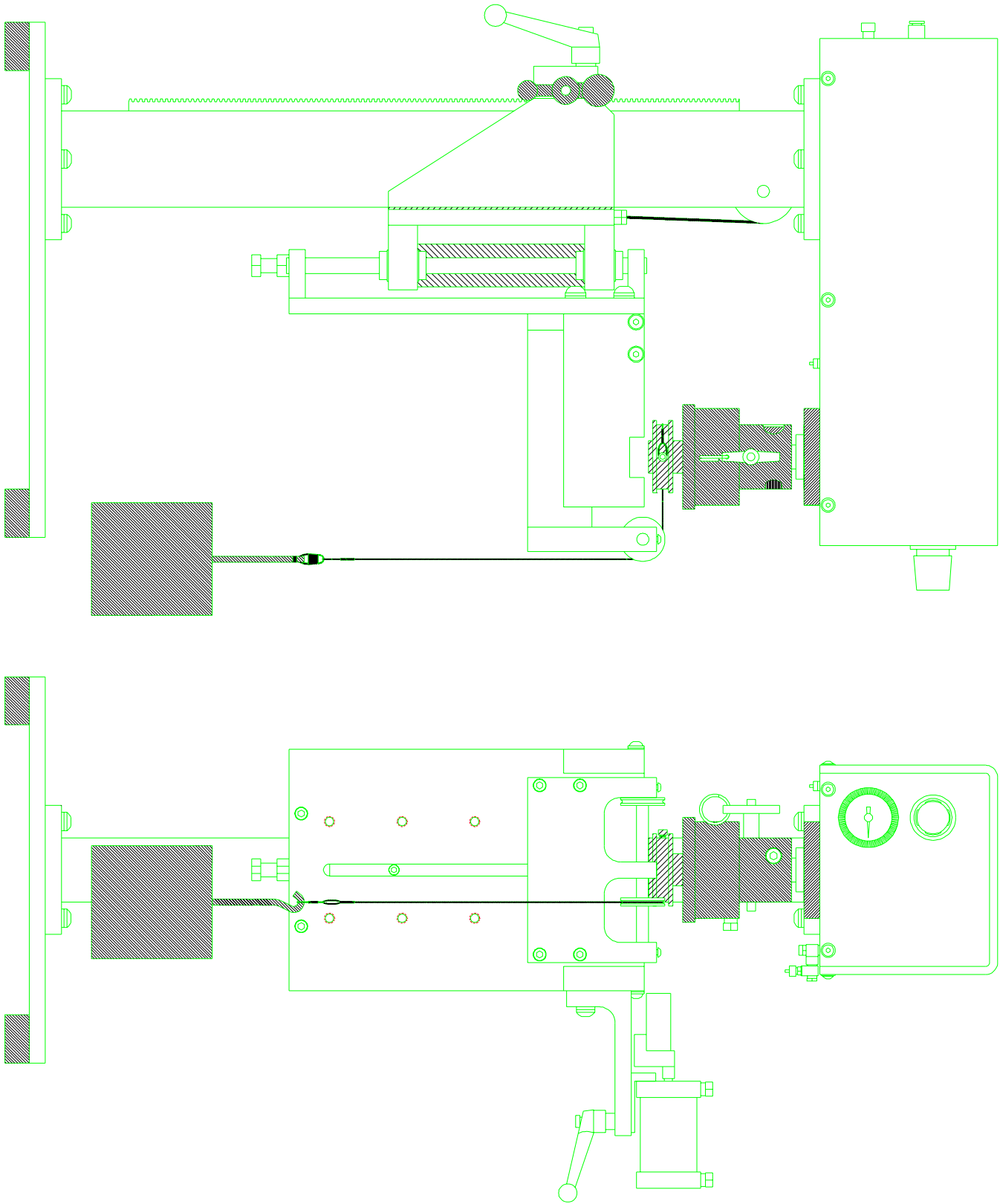


Figure 3-2, ST-100 Setup For Calibration

3.5.2 Set-up Delay (Sub-Menu)

Enter the Setup Delay sub-menu by pressing “YES” when the display reads: “SETUP DELAY” in the Setup Menu.

Timing of the measurement cycle is altered in this sub-menu. The order of cycle steps is pre-programmed. The items in this menu are arranged in the same order as they occur within the cycle: Clamp on, Table up, Chuck on, Chuck off, Table down, Clamp off.

The timing delays are measured as the time between the start of the displayed cycle step to the start of the next operating step. Example: “Table Up=1.5 s” means that the time from the beginning of the Table Up motion until the start of the Chuck On action is 1.5 seconds. All timing values are adjustable from 0.0 - 250.0 seconds in 0.1 second increments, except as noted. Select the timing constant you wish to change with the “Up” and “Down” keys, then press “Ok”. Values are set by the “Up” and “Down” buttons. “Ok” enters the value displayed, “Esc” returns to the previous sub-menu. Timing values are normally not changed unless a major size change is made to the test containers and closures. The delay value is increased if more time is required between cycle steps.

The rate at which *release* and *applied* torque is applied is also adjustable in the set-up delay sub-menu. The rate of release torque is adjusted by altering the relative rate value in the set-up delay sub-menu. The rate is adjusted from 1 to 250 seconds in 1 second increments. The value entered, is the time from start of the torque application to the time at which the system reaches full (100%=100 Inch-Lbs) torque in a linear fashion. As the time value increases, the cycle time is lengthened. As the value is decreased, the cycle time is shortened. A release rate set too short can adversely affect the accuracy of torque readings.

The application rate is set in a similar manner and the settings and functions operate in the same fashion.

3.5.3 Set-up Features (Sub-Menu)

Enter the Calibration sub-menu by pressing “YES” when the display reads “FEATURES” in the Setup Menu. The “FEATURES” sub-menu contains standard and optional items, including time and date setting and the Release and Applied Fallback values. Each Feature is reached by scrolling through the menu items.

3.5.3.1 Date, Time settings

For certified and validated measurement the Torque data reported from the RS-232 port is tagged with actual time and date stamp. Time adjustment is required once a year. To set the time and date, use the “Ok” button to advance to the next digit, “UP” and “DOWN” to select the right value. Press "Esc" when you are finished.

3.5.3.4 Release and Applied Fallback

Select a value by pressing “UP” or “DOWN”. Release fallback torque value means the torque amount drop after peak value that terminates the cycle and validates the peak value to be the true release torque. Select low value for low expected torque and higher for higher expected torque. Particularly useful for speedier cycle and child resistant cap applications. You can set different values for Release and Applied mode in 0.1 in-lb increments up to 100 in-lb.

3.6 DISPLAYED MESSAGES, OPTIONS AND INSTRUCTIONS

3.6.1 Display

All operator controls and messages are conducted via the 2 X 16 Character message center and the four (4) program keys under the display.

The modes and messages are programmed into a computer cartridge. Depending on the options the customer selected at the time of purchase, these modes may or may not be installed in the equipment.

3.6.2 Power On

At Power On the

```
“ MODEL: ST-100 “  
“   VER: 2.2   “
```

message appears. By pressing the “Ok” key, the unit enters the main menu.

3.6.3 The Main Menu

The Main Menu contains the two modes of operation the ST-100 is programmed for. Selection of a mode is done by pressing the "Ok" key at the appropriate mode. Selecting the other main menu item is done by pressing the "ESC" key. From the main menu the user may select the **manual mode** by simultaneously pressing the left two buttons ("ESC and "UP") or the **setup mode** by simultaneously pressing the right two buttons ("DOWN" and "ENTER").

3.6.4 Release Mode

(Selected from the Main Menu by pressing "Ok"). "RELEASE" message appears on the screen. Pressing the two green push buttons on the head simultaneously initiates the test cycle. "TORQUE:" and the actual release peak torque is displayed. At the end of the test cycle the display will hold the measured peak torque until you press “Ok” or “ESC”, which takes you back to the previous screen.

3.6.5 Applied

(Selected from the Measurement Menu). "APPLIED...SET: XX.X in-lb." message appears on the screen. The second row displays the torque that the torque tester will apply. Set the desired applied torque value by pressing the “Up” or “Down” button, then press “Ok”. Pressing the two green push buttons on the head simultaneously initiates the test cycle. "TORQUE:" and the actual applied peak torque is displayed. At the end of the test cycle the display will hold the measured peak torque until you press “Ok” or “ESC”, which takes you back to the previous screen.

3.6.6 Manual Mode

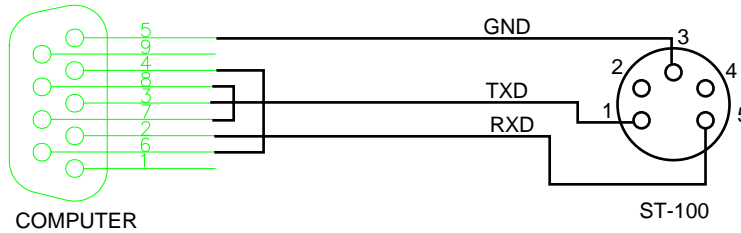
(Selected from the Main Menu by pressing the "Esc" and "Down" buttons simultaneously) Useful for adjustment in the mechanisms, this mode allows you to independently operate the clamp, table and chuck movements. Press the appropriate button (one push turns the device on, another turns it off). By pressing the “ESC” button you may return to the main menu.

3.6.7 RS-232 Interface

Serial Port for data transmission to a remote computer or to a printer. Data is output after every measurement cycle. Data is in ASCII format with CR, LF Delimiter. Protocol: 1200 Baud, 8 Data bits, 2 stops, no parity (see Figure 3-2, RS-232 Cable and Communication Parameters). Cable to PC Serial Port is optional.

3.7 STDA (Sure Torque Data Acquisition - Optional)

MS-DOS compatible software package for data collection from ST-100 RS-232 Port. If you have purchased this option refer to the Appendix A in this manual for details.



CABLE LENGTH: 6'

COMMUNICATION PARAMETERS

1. BAUD RATE: 1200
2. PARITY: NO
3. DATA LENGTH: 8 BITS
4. STOP BITS: 2

Figure 3-3, RS-232 Cable and Communication Parameters.

IMPORTANT

If your *Sure Torque* ST-100 Electronic Torque Tester is not running smoothly, or there is **any** doubt as to its operational proficiency, or proper production cycle, contact STI Customer Service at once:

Phone: (941) 753-1095

FAX: (941) 756-8425

Section 4, Maintenance

Proper and regular, routine maintenance schedules should be followed at all times with the SURE TORQUE, INC. instrument. This instrument is designed to give many years of trouble-free operation, so long as machine cleaning and maintenance are performed regularly. SURE TORQUE suggests you train all machine operators and maintenance personnel with a comprehensive program and maintenance schedule. The posting of this schedule in machines' electrical cabinet, or near machine, will aid personnel in conforming to the overall maintenance program, and not miss scheduled maintenance objectives.

WARNING

Do not attempt to clean **any** part of this machine with the power on. Turn off the power with the **power** button before performing **any** cleaning or maintenance functions.

Be sure to follow **all** safety precautions in the Safety Instructions.

Failure to comply to the aforementioned Warnings **may** cause personal injury.

4.1 CLEANING

Frequent regular cleaning is one of the most important functions of any machinery maintenance program. Surrounding shop conditions such as dust, type of product, etc., will dictate the frequency of cleaning required. Simply... Inspect machine daily, and thoroughly clean as necessary.

Wipe or wash all rails, chains, guides, wheels, belts, gears, and any other “slip”, “drive”, or “container contact” surfaces, to remove contaminants as frequently as needed, which may be weekly, or even daily.

Various materials used for specific machine applications and the recommended cleaning solutions are listed below:

TABLE 4-1, Cleaning Materials.

MATERIAL (APPLICATION):	CLEANING SOLUTIONS:
a. High Density Polyethylene (Change Parts):	All purpose cleaner.
c. Anodized Aluminum (Structure):	All purpose cleaner.
d. Transparent Polycarbonate/acrylic* (Guarding):	Glass cleaner.
e. Mechanical Parts:	All purpose cleaner/degreaser.

- **Do not** use alcohol and chlorothene based cleaning products on these materials.

•
• **4.2 PREVENTIVE MAINTENANCE**

A comprehensive Preventive Maintenance Program is recommended to keep your SURE TORQUE ST-100 Instrument in optimum operating condition, eliminating any unnecessary machine “down-time”. The following schedule is an outline as to achieving this goal. Any additions or changes to suite your own specific production operation should implement into the overall Maintenance Program.

WARNING

Do not attempt to clean **any** part of this machine with the power on.
Turn off the power with the **power** button before performing **any** cleaning or maintenance functions.
STI recommends unplugging the machine before **any** cleaning or maintenance functions.
Be sure to follow **all** safety precautions in the Safety Instructions.
Failure to comply to the fore mentioned Warnings **may** cause personal injury.

CAUTION

As a **Minimum Maintenance Program**,
follow the procedures scheduled below, **regularly**.
Failure to comply with these minimum maintenance
functions **may** cause machine damage.

TABLE 4-2, Maintenance Schedule.

INTERVAL	MAINTENANCE FUNCTION
Weekly:	a. Check overall machine for any leaks and required cleaning. b. Apply light machine oil to shafts of Air Cylinder shafts. c. Check all pneumatic hose connections for any leaks. d. Check all Air Cylinders for full stroke. e. Completely clean all machine parts and inspect operational functions, cycles, and adjustments.

NOTE:

Keep an adequate supply of SURE TORQUE spare parts on hand.
Contact SURE TORQUE, INC. for a recommended low-cost “Spare” package for your particular machine.

4.3 PNEUMATIC SYSTEMS MAINTENANCE

The Pneumatic System actuates all the mechanical systems and components, and their relative test functions. A clean, steady supply of compressed air is essential for proper *Sure Torque* operation. As well, the proper adjustment of these pneumatic components is also essential to accurate torque testing data.

- *Regulator:*

Overall ST-100 System pressure is controlled by a master regulator located on the unit, assuring that no more than 80 psi. of air enters the *Sure Torque* unit.

- *Mini Regulators, (Cylinder Regulators).*

Proper air pressure settings for the Clamp, Container Platform, Chuck, and Test Cylinders, are individually adjustable. These Cylinder Regulators are factory set for optimum performance. Cylinder Regulator adjustment should be limited to one (1) turn, in either direction, for fine adjustments of the various cylinder actuated functions.

NOTE:

Clockwise turning of Cylinder Regulator, *Raises* actuation pressure.
Counter-clockwise turning of Cylinder Regulator, *Lowers* actuation pressure.

4.3.1 Air Leaks

It is important to keep the Pneumatic System *Airtight*, and to correct small leaks, should they occur, before they become major problems. With pressure on the system, some leaks may be difficult to locate because the *Lost Air* is continuously being replaced. Small leaks may be located quickly by brushing the suspected part with a soap and water solution, and watching for bubbles, which will form and become “active”, at the point where the air escapes. Pneumatic system circuits equipped with air pressure regulators can be isolated for air-leak troubleshooting.

NOTE:

Air leaks beyond the regulator will be indicated if the air gauge *does not* maintain constant pressure for a considerable period.

IMPORTANT

By providing periodic inspection and maintenance of the Pneumatic System, the operational proficiency your ST-100 *Sure Torque* is greatly enhanced.

4.3.2 Air Filter

IMPORTANT

If you did not purchase the optional SURE TORQUE Air Filter, then you *must* install your own Air Filter.

There is a drain cock located at the bottom of each filter bowl. This drain cock should be opened at least once a week to drain accumulated water and unused oil from the pneumatic system.

WARNING

Shutdown your *Sure Torque* unit, **and** the system air pressure, **before** opening Drain Cocks. Failure to comply may cause damage to equipment and/or personal injury.

4.3.3 Solenoid Valves

The Solenoid valves are air direction components that open *or* close in response to electrical impulse, and emit their air flow to air operated components. The Solenoid Air Valves are an *extremely* important part of the ST-100 Electronic Torque Tester System. These valves should *Always* be included in the regular, preventative maintenance program of the overall unit. Make sure that valve responses are immediate and snappy. Air supply to the valves should be clean and free from moisture.

Section 5, Troubleshooting Guide

This troubleshooting guide is presented to assist in the recognition of any possible malfunctions, identification of their probable causes, and correcting the problem. Refer to the Machine Tuning Sheet in the Appendix-A, when making any adjustments to the machine. This is a general troubleshooting guide, therefore, some malfunction conditions and/or corrective applications may not apply to your particular ST-100 Electronic Torque Tester.

WARNING

1. **Only** qualified personnel should troubleshoot this machine
2. **All** Personnel should stay clear of moving parts
3. **All** guards and safety features must be replaced **before** the machine is returned to service.

Failure to comply to these warnings **may** cause personal injury !

TABLE 5-1, Mechanical Troubleshooting Guide.

MALFUNCTION	PROBABLE CAUSE
1. Unusually High Torque Reading:	Check clearance between the top, inside surface of the Collet's relief cut counter bore; and the top of the top of the container/closure. Assure that this clearance is <i>from .06" to .012"</i>
2. Unusually Low Torque Reading:	Check for rigidity of container clamps. Container MUST NOT Rotate!

TABLE 5-2, Electrical Troubleshooting Guide.

MALFUNCTION	PROBABLE CAUSE	CORRECTIVE ACTION
1. Sure Torque will not Power-up:	<ol style="list-style-type: none"> a. No AC power to main panel b. Main AC fuse missing/blown c. Main disconnect not in "on" position d. "Power On" push-button faulty 	<ol style="list-style-type: none"> a. Check power connections b. Replace fuses c. Turn disconnect to "on" position. d. Replace push-button

TABLE 5-2, Electrical Troubleshooting Guide (Continued).

MALFUNCTION	PROBABLE CAUSE	CORRECTIVE ACTION
2. Sure Torque will not Start:	<ul style="list-style-type: none"> a. No AC power b. Control or main fuse blown/missing c. Line voltage not within $\pm 10\%$ 	<ul style="list-style-type: none"> a. Check connections and disconnect. b. Replace fuses c. Install isolation X-former

TABLE 5-3, Pneumatic Troubleshooting Guide.

MALFUNCTION	PROBABLE CAUSE	CORRECTIVE ACTION
1. Cannot Get Proper Air Pressure:	<ul style="list-style-type: none"> a. Air regulator defective b. Air gauge defective c. Leak in air system d. Insufficient air supply 	<ul style="list-style-type: none"> a. Replace air regulator b. Replace air gauge c. Locate leak and correct d. Check for restrictive kinks, or leaks in air hoses or connections.
2. Discrete Air Components not Responding:	<ul style="list-style-type: none"> a. Excessive moisture in system b. Component defective c. Defective rear panel fuse d. Low air pressure 	<ul style="list-style-type: none"> a. Check filtering system b. Replace component <ul style="list-style-type: none"> c. Replace fuse d. Check air supply and that air pressure at the main regulator is 80 psi
3. Water in Air Supply:	<ul style="list-style-type: none"> a. Filter defective b. Filter dirty 	<ul style="list-style-type: none"> a. Replace filter b. Clean or replace filter
4. Discrete Air Components Malfunctioning:	<ul style="list-style-type: none"> a. Excessive moisture in system b. Air supply dirty. c. Leak in component or hose connections 	<ul style="list-style-type: none"> a. Check filtering system b. Check filtering system c. Locate leak and correct.

Section 6, Sure Torque, Inc. Warranty, Limitation of Liability and Service Information

All Sure Torque, Incorporated (STI) equipment carries a warranty against defective parts, material and workmanship for one (1) year from the date of shipment. We guarantee the equipment to perform only the functions outlined in the purchase order when supplied with the correct electrical and compressed air supply. Purchased components carry the warranty of the original equipment manufacturers. Normal wear, abuse, misapplication or misuse, incorrect adjustments by the customer, failure that is not machine related and failure due to operating with samples that are different from those supplied and used during construction of the equipment is excluded from this warranty. We will not accept any charges for work performed by purchaser unless the work was authorized in writing by Sure Torque. Satisfaction of this warranty will be limited to the repair, replacement, modification or issuance of a credit for defective material or workmanship only after the return of the parts for evaluation in our plant. Any warranty service (consisting of time, travel and expenses) performed other than at our factory shall be at buyer's expense. In no event will Sure Torque, Incorporated be responsible for consequential, incidental or exemplary damages.

Sure Torque instruments whether patented, patentable or non-patentable represents a reduction to practice of Sure Torque's know-how and expertise. This know-how and expertise is the result of our considerable experience, research and development. To protect and to retain control over our know-how and expertise, the know-how and expertise executed in the machinery covered by an order to purchase shall be considered a one-time license. The purchaser by accepting delivery of the equipment agrees not to build or have built equipment, which substantially duplicates equipment in whole or in part.

This warranty does not apply to:

1. Damage resulting from abuse, negligence, accident, or loss or damage in transit.
2. Damage caused by neglecting explicit Cautions and Warnings, contained within Seller's (STI's) Operations and Maintenance Manual, depicting specific safeguards and procedures that must be adhered to, and the related risks of equipment damage (and/or personal injury) by not doing so.
3. Damage caused by attempting repairs and/or alterations without prior written consent of Seller (STI).
4. Damage caused by improper connections to the equipment of other manufacturers, or improper connections of equipment of other manufacturers, to that of the Seller.
5. Damage caused by improper electrical connections.
6. Damage caused by improper mechanical installation or set-up.
7. Damage caused by failure to perform required maintenance as outlined in Seller's (STI's) Operations and Maintenance Manual.
8. Incidental items, such as miscellaneous consumables, hardware, fuses, light bulbs, springs, glass, acrylic, polycarbonate, or plastic components.

The Seller makes no other warranty, expressed or implied, and **disclaims any implied warranty of merchantability or fitness for a particular purpose.**

The Buyer and Sure Torque, Inc., agree that the sole and exclusive remedies for breach of any warranty concerning the goods shall be repair or replacement of defective parts upon the terms above described or, at Seller's option, refund of purchase price. The Seller **Shall not** be liable for contingent or consequential damages to **persons, property, or loss of productivity** and its sole liability as above set forth in this document.

Any action by Buyer for any alleged breach of the warranty set forth herein shall be brought to the attention of Sure Torque, Inc., by Buyer within the warranty period, but not later than thirty (30) days after the alleged breach.

This statement of warranty and limitation of liability is a complete and exclusive statement of all warranty and liability representations of Sure Torque, Inc. It may not be varied, supplemented, qualified or interpreted by any prior dealings between the parties or by any usage of the trade or upon the face or reverse of any form to which this is attached or part of, nor may it be modified by any agent, employee, or representative of the Seller unless such modification or representation is made in writing and signed by a duly authorized officer of the Seller.

Repairs and/or replacements under the terms of this warranty **Shall not extend the warranty life of the original equipment supplied.**

Equipment, parts, or components returned to the factory (STI) should be accompanied by the following information: A Return of Materials Authorization (RMA) number, the reason for the return with a comprehensive description of the malfunction, shipping instructions, and the name and telephone number of a contact in the event of any problems.

In some cases, prior to Warranty repair and/or replacement authorization, Seller (STI) may require an on-site inspection of the Buyer's equipment. This inspection, if deemed necessary by Seller, is intended to verify malfunction and identify what repairs or expendable parts, if any, are required to bring the unit(s) up to a satisfactory operating condition as determined by Seller (STI). The cost of the necessary parts and labor to bring the machine to a satisfactory operating condition will be billed at retail prices and standard service rates, and shall be paid by the customer. Thank You, STI.

Section 7, Sure Torque Options List

7.1 OPTIONS LIST

7.1.1 Release Mode

This mode tests the release torque of a previously applied closure. In this way the Sure Torque ST-100 acts to insure all containers tested reach the proper release value as it relates to the cappers applied torque. A digital display indicates the release torque at which the closure loosens. The model ST-100 applies increasing removal torque consistently to a closure until it reaches the release torque value or shows a lesser torque measurement during operation on a loose closure.

7.1.2 Applied Torque Mode

This mode applies closures accurately and consistently to a sample of containers, often in preparation for further testing or evaluation. In the Applied torque mode, the model Sure Torque ST-100 accurately applies closures to individual containers without operator intervention or influence.

7.1.3 Metric Measurement

This arrangement provides the option of displaying all torque measurements in metric Newton-Meters, in place of inch-pound units. If chosen, this option will be a selection in the set-up menu as a Metric or U.S. (avoirdupois) toggles function.

7.1.4 RS-232 Interface

This option provides a cable and RS232 serial port, on the back of the Sure Torque ST-100 main head, to interface to a serial port on a customer's IBM compatible computer or printer. All test data generated on the Sure Torque ST-100 are available for output to a customer's printer or PC. This feature available with the Sure Torque STDA data acquisition package, which feeds all collected torque values into the customer's PC for storage, later analysis or printout.

7.1.5 Real Time Clock (RS-232 serial port required)

A data collection aid to provide time and date readout on any torque test data downloaded to a customer's computer or printer. With this option installed, the Sure Torque ST-100 automatically feeds time and date signals to the customer's PC or printer, identifying the time and date of each test. With the possibility of a house computer shut down, this optional back up feature allows actual time and date transmitted with the generated test data.

7.1.6 Verification Kits

This feature allows an on-site verification of the Electronic Torque Tester's calibration by your technicians. The specially designed set of calibration weights and brackets, enclosed in self-contained storage boxes, are available in two sizes, portable and lab use with optional capacity for 50 Inch-Lb calibration requirement. We strongly advise the addition of this option to your torque testing operation for purposes of continued validation of equipment and quality conforming to performance.

7.1.7 STDA Software

The Sure Torque STDA software package, downloaded to customer's hard drive or floppy disk, automatically collects and displays torque test data from the ST-100 Electronic Torque Tester in both release and applied torque modes, eliminating the task of manual data collection and the possibility of human error in reading or recording results. IBM compatible computer and RS-232 serial port option required. If you have purchased this option refer to the Appendix A in this manual for details.

7.1.8 Set-up Lock Out Feature

This feature allows you to prevent any unauthorized person to make any changes in the set-up setting. You have to enter a four-letter password to have access to the set-up mode.

Section 8, Glossary

This list of terms and machine nomenclature is used throughout this publication. Understanding meanings and applications will be helpful in using the publication.

applied torque: The torque required to apply closures accurately and consistently to a sample of containers, including multiple and repetitive extensions of applied torque requirements, measured in units of inch-pounds (avoirdupois) or Newton-Meters.

“A” diameter: Diameter of bottle around which pilfer proof or tamper evident band is applied.

bottle control: Equipment parts used for supporting and indexing bottles through a machine.

bottle finish: Sealing surface, threads, neck, neck ring or support ring of bottle.

bottle neck: The throat area below and including the thread finish of the bottle.

bridge torque: Same as secondary Torque.

calibration: The test performed to verify that actual test measurements coincide with certifiable standards or conforms to specifications.

cap feed: Parts or units which relate to closure transfer or orientation.

cap release: Capper component which allows bottle pick up of closure.

CR (closure): Child Resistant

CT (closure): Continuous Thread.

“E” diameter: Diameter of vertical outside wall of bottle Finish.

headset: Parts making up the chuck and collet assembly.

head space: The unfilled volume between the top of the liquid and the top of the bottle.

heel: Bottle base or container foot.

histogram: The graphic presentation of a frequency distribution.

horizontal score: The score near the bottom of a metal closure forming the pilfer proof band.

ID: Measurement of inside diameter.

initial torque: The twisting force required to start closure movement on bottle finish.

liner: The sealing component of a closure system.

Mil Standard 105-D: Quality control information issued by Military Procurement for statistical sampling.

minimum: Low limit of dimensional tolerance.

neck ring: The formed ring (transfer bead) around the neck to secure Pilfer proof or tamper evident band.

Newton Meters: A metric unit (Nm) measurement comparable to converted US Inch-pound units.

NIST: National Institute of Standards and Testing.

non-destructive: The act of maintaining the integrity of the product unharmed and unspoiled.

OD: Measurement of outside diameter.

perpendicularity: Bottle specification around the vertical axis of base and neck.

pneumatic head assembly: Parts making up the Electronic and pneumatic components of the torque tester equipment.

PP: Pilfer proof.

PSI: Pounds per square inch (measure of pressure).

QC: Quality Control.

R: Range of values.

range: The difference between the highest and lowest measured value.

real time: Logging actual time and date of occurring data.

release torque: The torque required to disengage the threads of a previously applied closure, including extensions of non-destructive release, measured in units of inch-pounds (avoirdupois) or Newton-Meters (Nm).

removal torque: The rotational forces necessary to remove closure from the bottle.

RO (roll-on): The action of copying the threads of the bottle into the metal closure as the two are joined.

RS-232 Interface: A serial port connection from controller to interface a computer or printer.

“S” diameter: Vertical dimension from top of sealing surface to start of thread.

sealing surface: The uppermost portion of the bottle finish where the interface with the lining material of the closure creates a barrier to transmission.

shoulder: The area between the neck and container body.

spotting lug: The notch formed into the bottle to aid in bottle indexing purpose.

standard deviation: A measure of the variation of data from the average.

SPC: Statistical Process Control.

STDA: Proprietary data acquisition and process.

short thread: Closure threads of less than one full 360 degree turn of thread.

“T” diameter: Outside diameter of threads.

TE (closure): Tamper Evident.

thread start: The point at the top of bottle where the thread begins.

topload: The pressure (PSIG) applied by vertical force during closure application to achieve thread engagement of child proof (CR) closures or sealing bottle finish (surface) prior to roll on application.

traceable: A copy of a previously certified component.

twist off: Closure thread with lug design.

vent: Openings in side wall of closure to aid in rapid evacuation of headspace gases.

vent slots: The vertical interruptions of bottle threads.

ware: Glass bottle containers.



USA · France · Hungary

Quality Assurance Instrumentation

ELECTRONIC TORQUE TESTER MODEL: ST-100

Operation and Maintenance Manual

Appendix A

- ❑ Machine Tuning Sheet
- ❑ Certification Records
- ❑ Closure Records
- ❑ Sure Torque Data Acquisition (STDA - when applicable)
- ❑ Strip Test Mode (when applicable)

