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COMTEN INDUSTRIES

SERIES 94 BC
SERIES 94 RC
SERIES 94 VC
SERIES 94 YC

DIGITAL VARIABLE SPEED MOTORIZED TEST SYSTEM

COMTEN INDUSTRIES
1124 19th Street North
St. Petersburg, FL USA
33713-5724

Phone 813-822-3508
Fax 813-895-2328

12/4/95

$25.00
TOM 094C

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QUALITY ASSURANCE POLICY STATEMENT

COMTEN INDUSTRIES produces quality physical testing machines oriented toward the production floor environment. Because this environment is often more severe than that of a laboratory, a high level of durability and reliability is required. It is necessary that the product be designed and built to survive the rigors of such environments, while providing the accuracy needed to meet the customer's quality standards.

The manufacturing of testing machines that monitor the quality of other manufactured products requires a strict program of quality assurance. Technical specifications alone do not guarantee that quality. It is paramount that the products' physical parameters be achieved. The ongoing monitoring of product quality results in a testing machine that meets both the customer's needs and the following standards.

COMTEN builds testing machines that conform to ASTM (American Society for Testing and Materials) standards, are calibrated according to ASTM E74, MIL-STD-45662-A and traceable to NIST (National Institute of Standards and Technology). A continual monitoring of product quality and of the customer's response to the product are essential. COMTEN conducts periodic quality audits and customer surveys to verify that the quality goals and the above standards are met.

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STATIC ELECTRICITY

ELECTROSTATIC DISCHARGE

WARNING

Electrostatic Discharge can severely damage this equipment. COMTEN INDUSTRIES does not warrant this equipment for damage caused by static electricity.

The lowest level of Electrostatic Discharge (ESD) felt by the fingertip is about 3500 Volts, with 7000 Volts being uncomfortable and over 10,000 Volts approaching painful.

Pulling Integrated Circuits from a vinyl tray in a 40% relative humidity can generate 4000 Volts. Removing a Printed Circuit Board from a bubble pack can generate over 26,000 Volts at 10% relative humidity.

The most common application that has resulted in damage has been blow molders of plastic containers. These containers have high amounts of ESD when first removed from the mold.

Relative humidity should be kept between 25 and 85% non-condensing. In severe applications such as blow molding an Anti-Static Mat should be used. All material to be tested should by touched to the mat immediately prior to placing the material in the test stand. The operator must also touch the mat prior to touching the test equipment.

Repairing damage caused by ESD can cost upward of $500.00 as well as your downtime.

WARNING - S-BLOCK LOAD CELLS

WILL BREAK

It is important that test readings do not exceed 90% of the capacity of the Load Cell. Operating the Load Cell above 90% of capacity may result in permanent damage to the Load Cell. When operating at speeds above two (2) inches per minute care should be taken not to exceed 75% of Load Cell Capacity. Should you do this the over force protection system may not react quick enough and you will break the S-Block Load Cell.

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ORDER SPECIFICATIONS

NAME : ANAMED INC. NUMBER : 9892/COL607

TESTER SPECIFICATIONS AS SHIPPED ON. : October 15, 1997

MODEL NUMBER	: 942KRC1000	SERIAL NUMBER	: 9971034
POWER REQUIREMENT	: 110 VOLTS 50/60 Hz	FUSE	: 4 AMPS
MAXIMUM FORCE	: 2000 POUNDS	CROSS HEAD SPEED	: 10 TO .2 IPM
DEFLECTION SCALE	: ENGLISH	MANUAL PART #	: TOM 094C

PRINTER MODEL	:	CONTROLLER #	: DMC 026S
PRINTER SERIAL #	:	CONTROLLER SERIAL #	: 8971035
PRINTER BAUD RATE	:		
PRINTER PARITY	:	#1 TENSILE FIXTURE	: QDR0100
		MAXIMUM FORCE	: 5000 POUNDS
#1 LOAD CELL #	: PSB0010		
SERIAL #	: 2971036	#2 TENSILE FIXTURE	: QDS0100
MAXIMUM FORCE	: 10 POUNDS	MAXIMUM FORCE	: 5000 POUNDS
#2 LOAD CELL #	: PSB0040	#3 TENSILE FIXTURE	: SCC1037
SERIAL #	: 2971037	MAXIMUM FORCE	: 500 POUNDS
MAXIMUM FORCE	: 40 POUNDS		
		#4 TENSILE FIXTURE	: WCS0525
#3 LOAD CELL #	:	MAXIMUM FORCE	: 5000 POUNDS
SERIAL #	:		
MAXIMUM FORCE	:	#1 COMPRESSION CAGE	: CCW0408
		MAXIMUM FORCE	: 400 POUNDS
#4 LOAD CELL#	:		
SERIAL #	:	#2 COMPRESSION CAGE	:
MAXIMUM FORCE	:	MAXIMUM FORCE	:

#1 PLATEN	: PMA0808	#1 MOR	:	1 INCH DIAL	:
MAX FORCE	: 1000 LBS.	MAX FORCE	:	INDICATOR	:
#2 PLATEN	:	#2 MOR	:	2 INCH DIAL	:
MAX FORCE	:	MAX FORCE	:	INDICATOR	:
OTHER	: QDS0050	OTHER	:	OTHER	:
	: FIXTURE-		:		:
	: END		:		:

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SAFETY INSTRUCTIONS

1. **Read instructions** - The entire operating manual should be read before any attempt is made to set up or operate the Machine.

2. **Retain instructions** - The safety and operating instructions should be retained for future reference.

3. **Heed warnings** - Follow all warnings on the machine and in the operating manual.

4. **Follow instructions** - All operating and other instructions should be followed.

5. **Water and moisture** - The test stand should not be used near water or in high humidity (see specifications).

6. **Liquid and object entry** - Do not let liquids or objects enter into the tester/controller cabinet or the DMC cabinet.

7. **Vibrations and dust** - Avoid locations subject to excessive dust and vibrations.

8. **Heat** - The machine should be situated away from heat sources such as radiators, appliances or machines that produce heat.

9. **Ventilation** - The machine should be situated so that its location does not interfere with its proper ventilation. The ventilation openings for the Digital Monitor Controller (DMC) and the test stand are located in the rear. These should be kept 6 inches from other objects.

10. **Placement and leveling** - The test stand and DMC should be placed on a firm, stable and level surface. Leveling legs are provided on the test stand for fine adjustment.

11. **Power sources** - The machine should be connected to a power supply only of the type indicated on the machine.

12. **Removal of power cords** - When removing power cords from the wall always pull on the plug; never pull the cord.

13. **Power cord protection** - Power supply cords should be routed so that they are not likely to be walked on or pinched by items placed on or against them.

14. **Grounding** - The tester/controller and DMC are both provided with ground connectors in their power cords. Do not attempt to defeat these ground connections. Insure that all outlets used with either the tester/controller or the DMC are properly grounded.

15. **Static electricity** - In certain situations such as plastic bottle plants, static electricity can cause severe damage to the tester/controller and/or the DMC. If this should occur it will be necessary to use either a floor or table top anti-static mat to prevent damage to the equipment.

Continued Next Page.

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SAFETY INSTRUCTIONS (Cont)

16. **Lightning protection** - To prevent lightning damage during electrical storms, unplug the power cords of the tester/controller and DMC and/or use an uninterruptable power supply and surge protector.

17. **Electrical interference** - If the DMC hangs up or resets itself, the cause could be electrical interference from transformers, motors or other high voltage electrical equipment. If such interference is suspected, relocate the unit or provide a dedicated line from the main electrical service.

18. **Servicing** - When installing new parts, repairing or servicing the tester/controller or the DMC, insure that they are not plugged in. Do not work on the unit with the power on. Replacement of some parts may require complete recalibration.

19. **Operating precautions** - When in operation wear protective eyewear and/or equip test stand with optional safety shield and keep hands away from fixtures.

20. **Maximum load capacity** - Do not exceed maximum load capacity indicated in the manual. Insure that all cables are connected between the tester/controller and the DMC. Also, set adjustable limit switch collars to limit the travel of the power screw and the fixture in both the up and down directions.

21. **Never run test stand without the DMC operating** - Damage can occur to the load cell due to force information not being provided to the DMC thus over force limits set in the DMC can not shut the unit off.

22. **Calibration** - For reliability of data, the Load Cell and DMC should be calibrated on a regular basis. Recommended frequency is twice per year when the tester is used often or if the results are critical. Once per year is the standard for normal use.

23. **Gear guard** - After servicing, insure that the gear-guard is in place to prevent possible injury to hands. Keep hands away from the gears when the unit is on.

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WARRANTY AND LIMITATION OF LIABILITY

Subject to the provisions and conditions hereof, **COMTEN INDUSTRIES** warrants to the buyer that, without charge, **COMTEN** will repair or replace, at its option, all new equipment sold to Buyer when used and maintained in the course of normal operations and conditions, if Buyer finds defects in workmanship and materials during a period of one (1) year from the date of shipment.

A. The conditions hereof are:
   1. COMTEN has been notified in writing by the Buyer of the defect prior to the termination of the warranty period.
   2. The goods are shipped to COMTEN with prior approval.

CAUTION All warranty work is done at the factory You will need to save the shipping container should your tester need to be returned to the factory. The use of an improper shipping container usually results in additional damage to the tester and additional charges.

   3. All shipping costs have been paid by the Buyer.
   4. The goods have been used and maintained under normal operating conditions.

B. Repair or replacement shall be the Buyer's sole and exclusive remedy in the event of **COMTEN**'s breach of this warranty.

C. This express warranty is in lieu of all othe warranties, express or implied, including the implied warranties of merchantability and fitness for a particular intended purpose, with the exception of the implied warranty of title.

D. The purpose of the equipment manufactured by **COMTEN** is for destructive testing, and the inherent danger associated with such testing requires the equipment to be used only by experienced operators. Due to the nature and use of the equipment, Buyer's acceptance of the **COMTEN** equipment constitutes Buyer's assumption of all risk and liability arising out of or resulting from the use of **COMTEN** equipment.

E. In no event will **COMTEN** be liable for damages, lost revenue, lost wages, lost savings or any other incidental or consequential damage arising from the purchase, use or inability to use said product, even if **COMTEN** has been advised of the possibility of such damages.

COMTEN WILL IN NO EVENT BE LIABLE FOR ANY INJURY, INDIRECT, INCIDENTAL, OR CONSEQUENTIAL DAMAGES RESULTING FROM THE USE OF ITS EQUIPMENT.

Accuracy is guaranteed at time of shipment to be as advertised or quoted.

All Load Cells are guaranteed when in normal use for a period of one (1) year from date of shipment.

If products are damaged in shipment, notify shipping company and COMTEN immediately.

Warranty void for damage due to accident, misuse or abuse.

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GENERAL INFORMATION

The 94-C Series Tester utilizes a electronic Load Cell for measuring force. A Power Nut is driven by the Motor and Gears to apply a load on the test sample by moving the Power Screw. Force is applied to the sample via the Load Cell and the data is transmitted electronically from the Load Cell to a Digital Monitor Controller.

TYPES OF TESTS

The 94-C Series Tester has been designed to perform six types of tests by changing optional equipment; Tensile, Compression, Modulus of Rupture (MOR), Fatigue, and Hardness.

TENSILE STRENGTH

The measurement of the amount of force exerted on an item by pulling on the ends of the item. A typical example would be to determine the pull strength of fishing line.

COMPRESSION STRENGTH

The measurement of the amount of force exerted on an item pressed between two plates. A typical example would be to determine the load bearing strength of concrete block.

MODULUS OF RUPTURE (MOR)

The measurement of the amount of force exerted on an item with the item supported on two ends and the force applied in the center. A typical example would be to determine the strength of a ceramic bar.

FATIGUE

The repetitive application of a load in order to determine resistance to failure in relation to varying loads. A typical example would be the low cycle Fatigue testing of metal on a MOR fixture.

HARDNESS

The determination of a material's surface hardness or resistance to penetration by other materials. A typical example would be the force required to puncture a plastic food bag.

DATA PRODUCED

YIELD STRENGTH

The amount of force that is required to stretch a material enough to cause permanent deformation.

ULTIMATE STRENGTH

The maximum amount of force measured before rupturing a material.

EXTENSION

The amount of stretching that a material undergoes with the application of a specified force.

FATIGUE LIFE

The number of fluctuating cycles that are required to cause a material to fail at a given load.

STRESS - STRAIN

This is a statement of the relationship between the load applied to a sample and the amount of change that is produced in the sample's length in the direction of the force applied.

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UNPACKING INSTRUCTIONS

REMOVING THE TESTER FROM CONTAINER

WARNING Wear Safety Glasses and gloves to prevent injury.

1. Cut and remove the nylon straps from the outside of the large container.
2. Remove the four screws from the front of the top flap and two from the left side flap. Raise the flap.
3. Remove the wood cross braces from the inside of the container. The braces are held in place by wood screws on the outside of the container.
4. Remove the four 5/16-18 X 2-1/2 inch hex head cap screws, fender washers and lock washers mounted through the bottom of the container and into the base of the Tester.
5. Raise the container and the Tester so that the Tester is in an upright position with the Base down.
6. Carefully slide the Tester from the container.
7. Place the wood cross braces back inside the container.
8. Place the retainer cap screws and washers inside the container for future use.
9. Close the lid and re-install the two flap screws.

CAUTION All warranty work is done at the factory You will need to save the shipping container should your tester need to be returned to the factory. The use of an improper shipping container usually results in additional damage to the tester.

10. Store the container in a cool dry place for future shipment of Tester. Tester should ALWAYS be shipped in the container that the Tester arrived in from the factory.
11. Open the smaller carton and remove the DIGITAL MONITOR/CONTROLLER (DMC), Load Cell and cables; place adjacent to the Tester.
12. Store container with Tester container.

CAUTION Read the manual before proceeding. Damage to the Load Cell and other parts could result if proper procedures are not followed. Damage caused through abuse or misuse is not covered by the warranty.

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SHIPPING INSTRUCTIONS

To minimize shipping damage, follow these instructions carefully.

1. Remove screws from shipping container lid flap.
2. Remove stored cross braces from inside of container.
3. Remove all clamps and fixtures from Tester.
4. Remove Load Cell from Power Screw.
5. Using the DIRECTION switch, jog between the 'OFF' and the 'DOWN' position to run the Power Screw down against Base Mounting Stud of Tester (a wood block may be needed to fill the space on some models). Do not apply excessive force.
6. Install two nylon straps around Base and Torque Bar to prevent movement during shipment. Refer to Figure A-1, page 10.

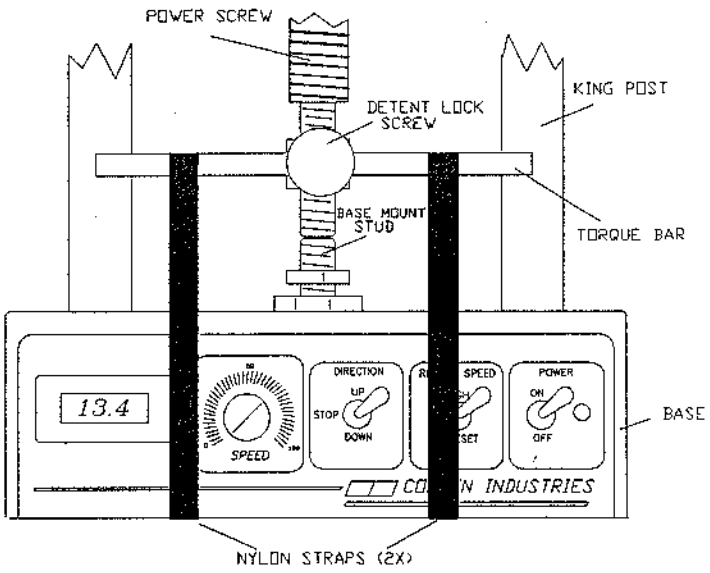


Figure A-1, INSTALLING STRAPS

7. Remove leveling feet.
8. Place container in an upright position resting on its bottom (end with holes).
9. Slide Tester inside of shipping container.
10. With Tester in container, carefully tilt container over into a horizontal position with the flap up.
11. Using the lock washers and fender washers, install the four 5/16-18 X 2-1/2 inch cap screws through the holes in the bottom of the container and into the mounting holes in the base of the Tester.

Continued Next Page.

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SHIPPING INSTRUCTIONS (Cont.)

12. Install the wood cross braces and install screws.

13. Place a note inside the container stating the problem, the name and phone number of the contact person and a return shipping address.

14. Re-install the flap screws.

15. Place two banding straps around the length of the container.

16. Place banding straps around the width of the container.

    A. Model VC - Two Straps.
    B. Model RC - Three Straps.
    C. Model YC - Four Straps.
    D. Model BC - Four Straps.

17. Your Tester is now ready for shipment.

18. If shipping DMC MONITOR/CONTROLLER and/or a Load Cell, use foam or bubble pack to protect the equipment during shipment.

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GETTING STARTED

INITIAL SET-UP OF THE TESTER

LEVEL ADJUSTMENT

Properly mount your Tester for maximum accuracy and safety.

CAUTION Failing to level your Tester may affect accuracy of tests.

1. Determine desired location on work bench for Tester.

WARNING Allow enough overhead clearance for the Power Screw to extend through the top of the Tester an amount equal to the travel distance of the Tester. Refer to **PERFORMANCE DATA AND SPECIFICATIONS**, page 54, for the travel distance of your Tester.

2. Place Tester in a horizontal position on selected location.

WARNING Wear Safety Glasses and gloves to prevent injury.

3. Cut and remove the two nylon straps located around the base and Torque Bar. Refer to Figure A-1, page 10.

4. Screw the four leveling screws into the base of the Tester. Refer to Figure B-1, page 12.

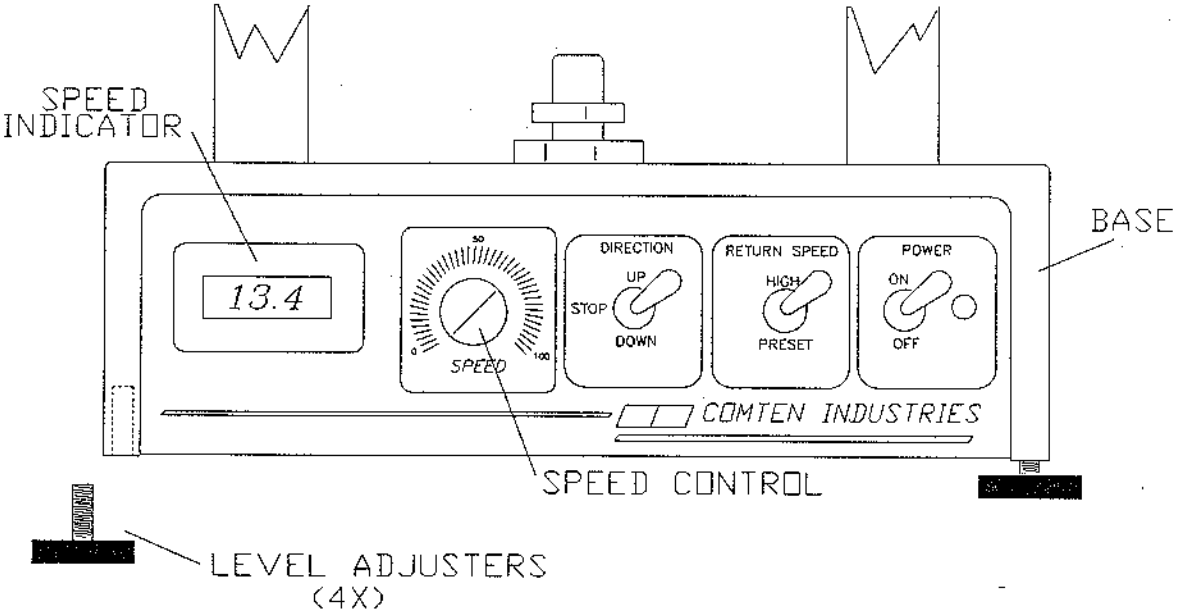


Figure B-1, INSTALLING LEVEL ADJUSTERS

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GETTING STARTED (Cont.)

LEVEL ADJUSTMENT (Cont.)

5. Place the Tester in a vertical position on the site selected for the Tester.

6. Observe the bubble in the Level located at right rear of the Tester Base. Refer to Figure B-2, page 13.

7. Adjust the leveling legs to position the bubble in the center of the Level.

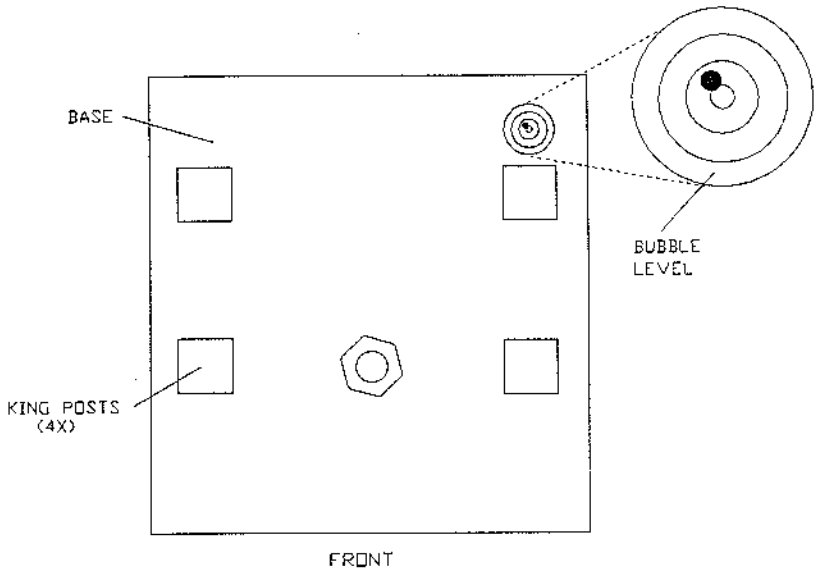


Figure B-2, LEVEL ADJUSTMENTS

INSTALLING THE LOAD CELL

CAUTION The Load Cell is a precision piece of equipment. To avoid damaging during installation, follow these instructions carefully.

1. Check to make sure unit is switched off. Refer to Figure B-5, page 13.

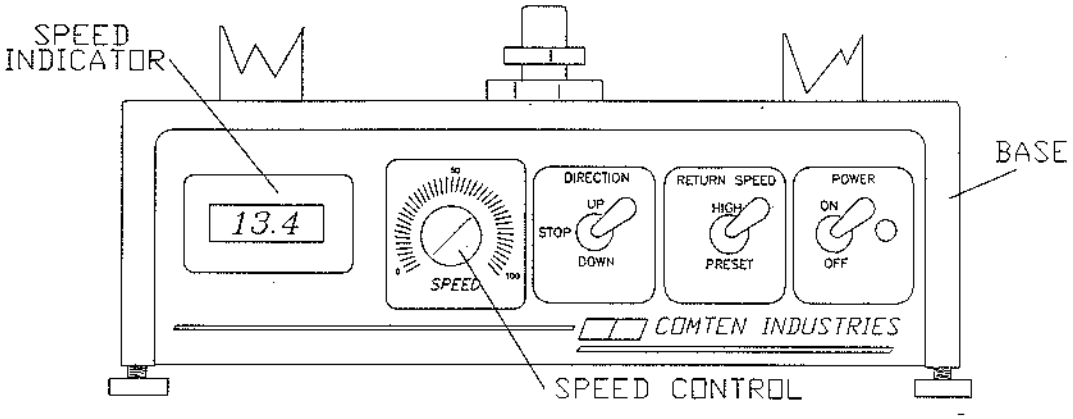


Figure B-5, FRONT CONTROL PANEL

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GETTING STARTED (Cont.)

INSTALLING THE LOAD CELL (Cont.)

2. Connect power cord to appropriate (See ORDER SPECIFICATIONS, page 4) power source. Refer to Figure B-3, page 14.

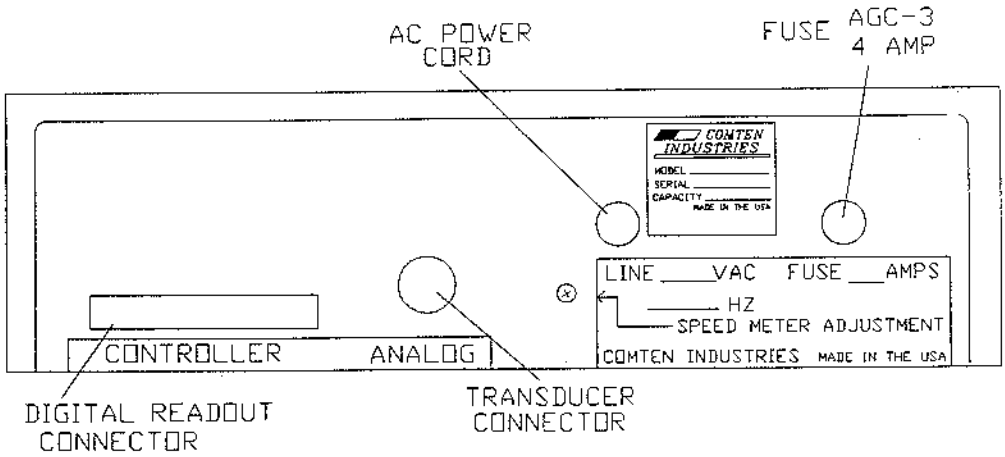


Figure B-3, REAR CONTROL PANEL

3. Refer to Figure B-5, page 13. Set the Direction Switch to the 'STOP' position. Place Power ON/OFF Switch to the 'ON' position. The red indicator light next to the switch should be illuminated, indicating that the machine is on.

4. Your Tester was shipped from the factory with the Limit Set Collars firmly tightened against the Torque Bar. Refer to Figure B-6, page 14. Loosen the Upper Limit Set Collar Thumb Screw and re-position towards the top of the Tester about 2 inches below the Red Stationary Collar; re-tighten the Thumb Screw.

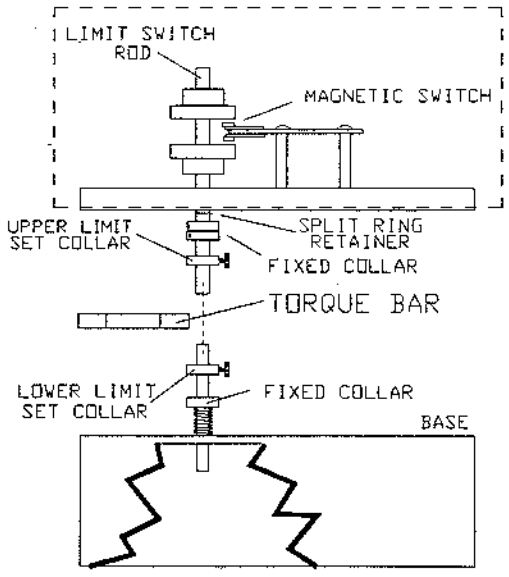


Figure B-6, LIMIT SWITCH ADJUSTMENT

Continued Next Page.

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GETTING STARTED (Cont.)

INSTALLING THE LOAD CELL (Cont.)

5. Turn the Speed Control Knob to an indicated '10'.

WARNING Watch for over head clearance of wiring, lights and other objects.

6. Place DIRECTION switch to UP position. While observing the Digital Speed Meter on the extreme left hand side of Control Panel, slowly turn SPEED knob to the speed required by your test specifications. This reading indicates the Tester operating speed in inches per minute. Set direction switch to STOP when speed is adjusted to your specifications and there is at least 8 inches between the Power Screw and the Base Mount Stud. Refer to Figure B-5, page 13.

7. The Upper Limit Switch Set Collar may be re-adjusted after you run your first test sample. See OPERATING YOUR TESTER, page 43. Loosen the Thumb Screw on the Upper Limit Set Collar on the Limit Switch Rod and lower until it is close to the Torque Bar; re-tighten the Thumb Screw.

8. Refer to Figure B-5, page 13. Located between the DIRECTION and POWER ON/OFF switch is the RETURN Switch. This is a two position switch with the positions identified as HIGH and PRESET. This switch setting is user defined to meet your needs. The HIGH setting will return the POWER SCREW at the maximum speed of the machine. Placing the switch in the PRESET position will return the POWER SCREW at the same speed as set for the UP travel rate determined above.

9. Make sure that the POWER ON/OFF Switch on the Tester is in the OFF position and the DMC Power is OFF (if connected).

CAUTION Permanent damage can be caused to the Load Cell if the Load Cell is installed with power applied to the Tester or the DMC.

10. As Load Cells are available in different sizes and the Power Screw has one standard size (1/2-20 threaded stud), an adaptor is sometimes used to make these parts mechanically compatible. Refer to Figure B-4, page 16. If your Load Cell DOES NOT have an Adaptor, go to STEP A, page 16. If your Load Cell DOES have an Adaptor, go to STEP B, page 16.

Continued Next Page.

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GETTING STARTED (Cont.)

INSTALLING THE LOAD CELL (Cont)

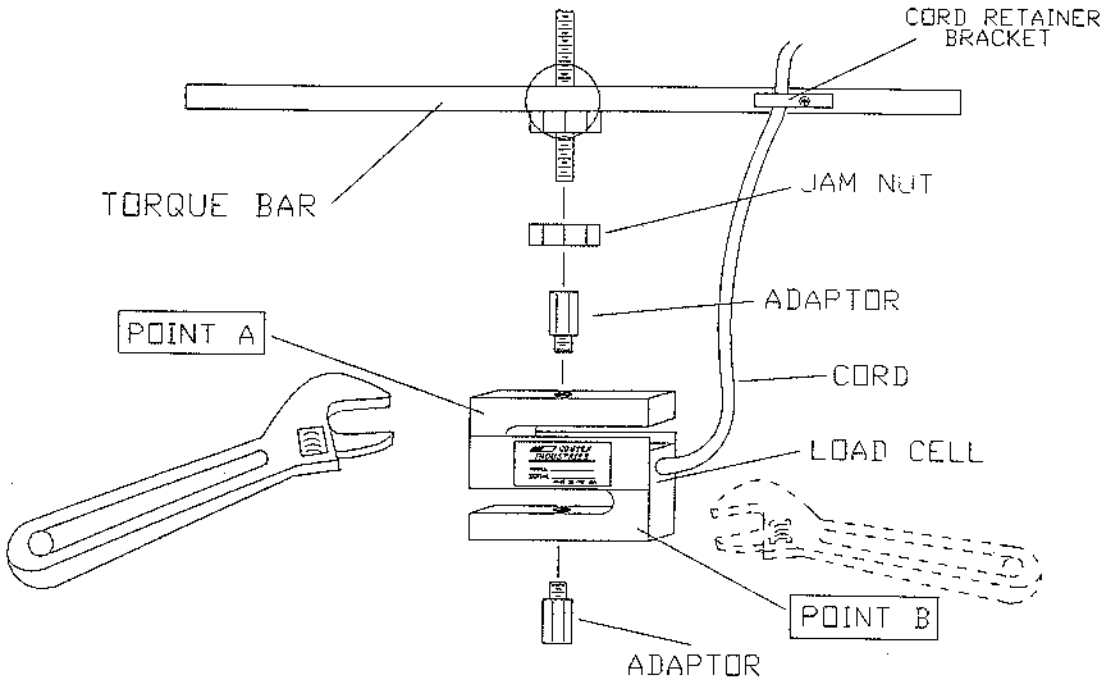


Figure B-4, LOAD CELL

STEP A

1A. Manually screw Load Cell onto the Power Screw until one to two threads appear under the top of the S-Block Load Cell. Threading the S-Block Load Cell on too far can damage it. Hand tighten the jam nut against the top of the Load Cell.

2A. Refer to Figure B-4 page 16. Grasp the Load Cell with an adjustable end wrench at Reference Point 'A' as shown in the drawing. Using a second wrench, tighten the jam nut against the top of the Load Cell while holding the Load Cell firmly with the adjustable wrench.

STEP B

The adaptor is installed at the factory.

1B. Hand thread the adaptor on to the Power Screw until the Power Screw bottoms out in the adaptor. Do not over tighten. Hand tighten the jam nut against the top of the adaptor.

2B. Refer to Figure B-4, page 16. Grasp the adaptor with an adjustable end wrench. Using a second wrench, tighten the jam nut against the top of the adaptor while holding the adaptor firmly with the adjustable wrench.

Continued Next Page.

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GETTING STARTED (Cont.)

INSTALLING THE LOAD CELL (Cont)

11. Loosen the screw in the Cord Retainer Bracket on the Torque Bar. Place the Load Cell Cord in the Cord Retainer Bracket and re-tighten the screw. Refer to Figure B-4, page 16.

12. Loosen and remove two screws from along side the aluminum bar on each side of the Front Cover plate. Refer to Figure C-1, page 17

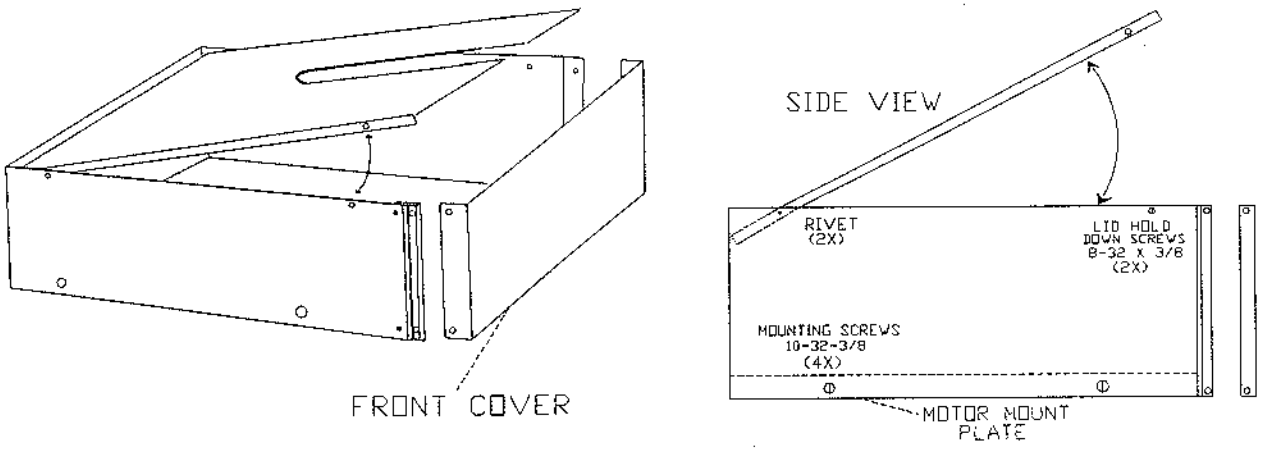


Figure C-1, GEAR GUARD

13. Connect the Load Cell Plug (DB-9) into the receptacle on the right hand side of the Motor Mount. Refer to Figure C-2, page 17. Re-install Front Cover of Gear Guard.

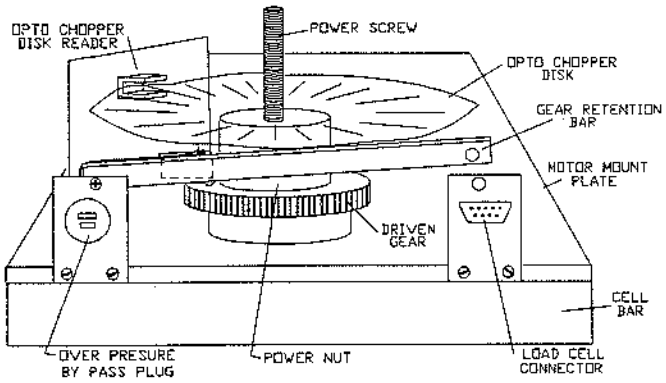


Figure C-2, LOAD CELL RECEPTACLE

14. Install clamps or cage as required. Refer to **CAGE INSTALLATION**, page 30 and/or **CLAMP, FIXTURE and PLATEN INSTALLATION**, page 32. Set DIRECTION switch to the DOWN position, bringing the upper fixture close to the lower fixture so as to facilitate the installation of the test sample into the fixtures.

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SETTING UP THE DIGITAL MONITOR CONTROLLER (DMC)

1. Check positions of DIP Switches on the under side of DMC. Refer to Figure B-8, page 19. The standard arrangement of switch positions shipped from the factory is with all switches in the 'OFF' position with the exception of positions '3' and '5', which are in the 'ON' position. This arrangement is for NO auxiliary equipment. If your equipment was shipped from the factory with a printer, refer to DMC AUXILIARY EQUIPMENT, page 19.

2. Place DMC on flat, stable work surface next to the Tester.

3. Install either end of the flat ribbon cable to the mating connector on the rear of the Tester marked 'CONTROLLER'. Refer to Figure B-3, page 14. Be sure to match alignment guide pin on the socket with matching guide slot on the connector. The label on the connector should be facing up.

4. Connect other end of flat ribbon cable to rear panel of DMC. Refer to Figure B-7, page 18. Be sure to match alignment guide pin on the socket with matching guide slot on the connector. The label on the connector should be facing up.

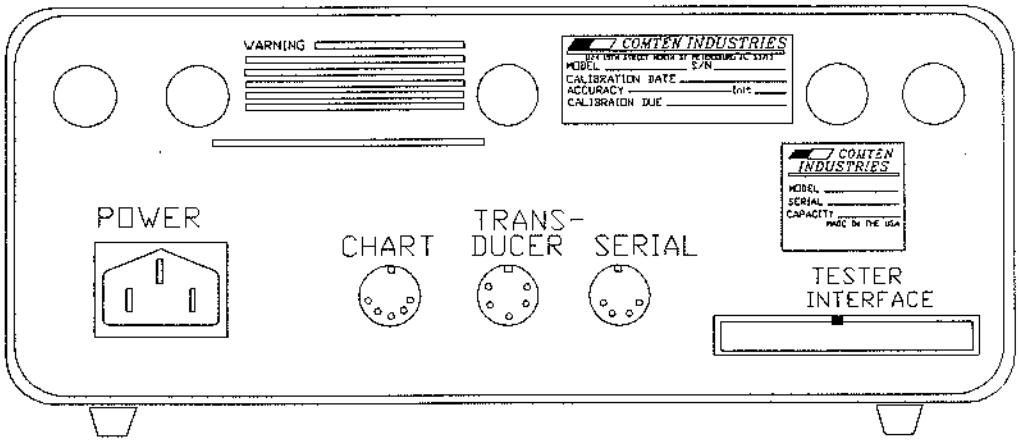


Figure B-7; DMC REAR PANEL

5. Connect either end of the round analog Transducer cable to the mating connector on the rear of the Tester marked 'ANALOG'. Refer to Figure B-3, page 14. Be sure to match the alignment guide pin on the socket with matching guide slot on the connector.

6. Connect the other end of the round analog Transducer cable to the rear panel of DMC marked 'TRANSDUCER'. Refer to Figure B-7, page 18. Be sure to match alignment guide pin on the socket with matching guide slot on the connector.

7. Connect power cord to rear panel of DMC. Refer to Figure B-7, page 18.

8. Connect Power cord to appropriate power outlet.

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DMC AUXILIARY EQUIPMENT

CAUTION To prevent damage to equipment, remove the power cord from the unit before changing DIP Switches.

PRINTER

A printer can provide the user with a historical record of the test results for future reference. If your Tester has been supplied with the optional printer, follow the installation instructions for a Serial Printer below. If you are using a Parallel printer, it must be installed through a computer. Follow the instructions under COMPUTER INSTALLATION, page 24, PRINTER, page 19, and SERIAL DATA TRANMISSION, page 22.

SERIAL PRINTER

To connect a SERIAL printer to the DMC Unit, install the optional printer cable between the printer and the DMC. Refer to Figure B-7, page 18. Install the cable end into the rear control panel of the DMC Unit port marked 'SERIAL'. Install the other cable end into the printer port identified as serial data input.

There are four separate options that must be determined and the DIP Switches set to accommodate these options. These DIP Switches are located on the underside of the DMC. Refer to Figure B-8, page 19 These options are: Type of report, Parity, Baud Rate and Operational Mode.

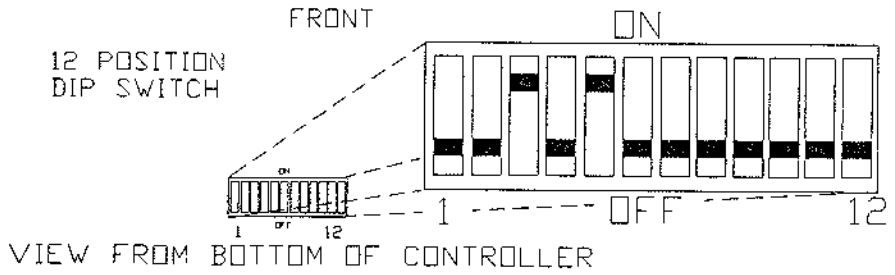


Figure B-8, DMC DIP SWITCHES

TYPES OF REPORTS

The DMC has three report modes that can be sent to the printer: No Report, Data only Report and Data Report with a Graph of the test data. These options are controlled by DIP Switches #1 and #2. Refer to Figure B-8, page 19. If either or both of these switches is/are in the ON position, the Printer must be ON and functional for the Tester to function properly. Units with Factory shipped printers are set for DATA-GRAPH reports (switches #1 and #2 in the ON position; switch #9 in the OFF position). Be sure dip switch #9 is in the "OFF" position to receive reports.

DIP SWITCHES #1 - #2

REPORT TYPE	SWITCH #1	SWITCH #2
NONE *	OFF	OFF
DATA	ON	OFF
DATA-GRAPH	ON	ON

* Factory default setting

Continued Next Page.

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DMC AUXILIARY EQUIPMENT (Cont)

TYPES OF REPORTS (Cont)

DATA ONLY REPORT

SAMPLE NUMBER #0001

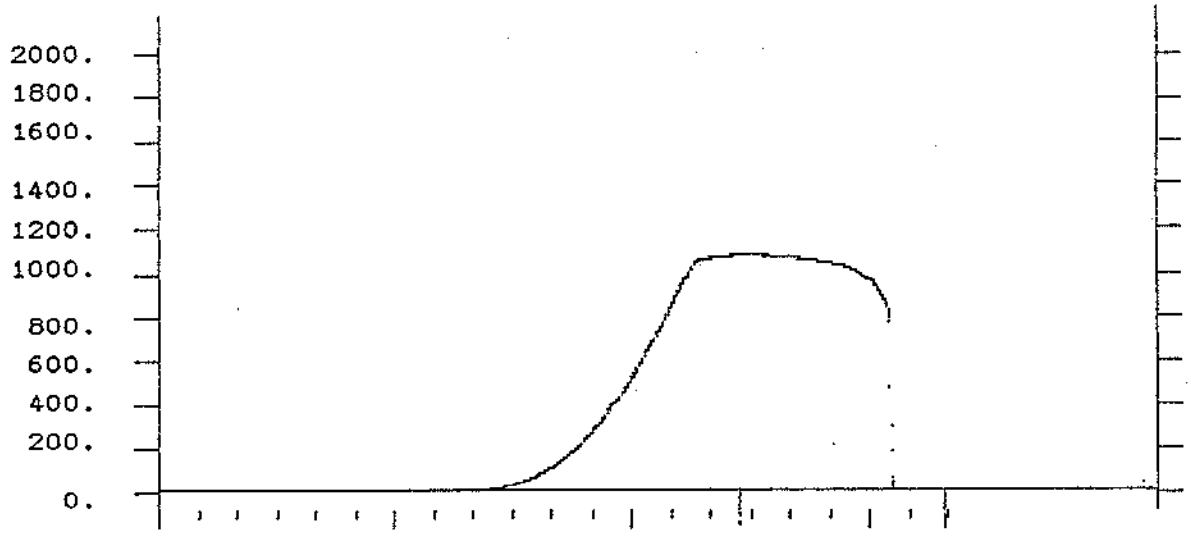
PEAK FORCE : 0017.5 KGS AT TIME :00:09:1 DEFL. : 0009.42 MM

LOAD CELL SIZE : 01818. KGS RUN TIME :00:10:5 SPEED: 0061.7 MM / MIN

TEST TERMINATED BY SAMPLE FAILURE 0010.82 MM

DATA REPORT WITH GRAPH

DATE ____/____/____ TIME ____:____:____
SAMPLE DESCRIPTION:_____
SAMPLE NUMBER :_____
OPERATOR I.D. :_____
PEAK FORCE : 04003. LBS AT TIME :01:32:4 DEFL.: 000.148 INCH
LOAD CELL SIZE : 04000 LBS RUN TIME :01:32:3 SPEED: 000.09 INCH / MIN
TEST TERMINATED BY LOAD-CELL RANGE 000.149 INCH



PARITY

'PARITY' is an electronic means of insuring that the data transferred from one piece of equipment to another is complete (no data bits missing). Parity must be matched between the two pieces of equipment for proper communications. If you are not using a factory shipped printer, the information needed should be in the paperwork shipped with the printer. Factory shipped printers and DMC's are pre-programmed to match Parity (Switch #3 ON, Switch #4 OFF) and Baud Rates (9600). Verify proper settings on receipt of equipment.

Continued Next Page.

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DMC AUXILIARY EQUIPMENT (Cont)

PARITY (Cont)

DIP SWITCHES #3 - #4

PARITY	SWITCH #3	SWITCH #4	COMMENT
NO PARITY	OFF	OFF	2 STOP BITS
EVEN PARITY	OFF	ON	1 STOP BIT
NO PARITY *	ON	OFF	1 STOP BIT
ODD PARITY	ON	ON	1 STOP BIT

* Factory default setting

BAUD RATE

'Baud' rate is the speed at which two or more pieces of electronic equipment 'talk' to each other. After determining the Baud rate of your Printer, set the DIP Switches on the under side of the DMC to match your Printer. Refer to Figure B-8, page 19. The Factory default setting is 9,600 Baud rate.

DIP SWITCHES #5 - #8

BAUD RATE	SWITCH #5	SWITCH #6	SWITCH #7	SWITCH #8
19,200	OFF	OFF	OFF	OFF
9,600 *	ON	OFF	OFF	OFF
7,200	OFF	ON	OFF	OFF
4,800	ON	ON	OFF	OFF
3,600	OFF	OFF	ON	OFF
2,400	ON	OFF	ON	OFF
2,000	OFF	ON	ON	OFF
1,800	ON	ON	ON	OFF
1,200	OFF	OFF	OFF	ON
600	ON	OFF	OFF	ON
300	OFF	ON	OFF	ON
150	ON	ON	OFF	ON
134.52	OFF	OFF	ON	ON
110	ON	OFF	ON	ON
75	OFF	ON	ON	ON
50	ON	ON	ON	ON

* factory default setting

Continued Next Page.

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DMC AUXILIARY EQUIPMENT (Cont)

SERIAL DATA TRANSMISSION

Dip Switch #9 must be in the ON position to transmit raw data to the Serial Port of the Computer or Printer. Refer to PRINTER, page 19 or COMPUTER INSTALLATION , page 24. If this switch is ON, you **MUST** have the Computer or Printer ON and functional for the Tester to work properly. It is required that Switch #9 be in the OFF position and the printer ON and functional if transmitting reports or graphs directly to a serial printer.

OPERATION MODES

Selection of switch positions 10 through 12 of the DIP Switch will determine how your Tester will respond to certain conditions. The areas of operation affected by these switch positions are: Taring of the digital read out of the last test data, starting of the next test, when the test is to be terminated and if the Tester will re-position itself (return) at the completion of the test. The factory default settings are Mode 0 for standard models; Mode 3 for Auto Set Platens.

MODE	TARE	TEST START	TEST TERMINATION	RETURN
0 *	MANUAL	MANUAL	2.34% OF LOAD CELL RANGE	AUTO
1	MANUAL	AUTO	87.50% OF PEAK	AUTO
2	** A/P, MANUAL	AUTO	75.00% OF PEAK	AUTO
3	** A/P, MANUAL	AUTO	87.50% OF PEAK	AUTO
4	AUTOMATIC	AUTO	87.50% OF PEAK	AUTO
5	MANUAL	AUTO	75.00% OF PEAK	MANUAL
6	** A/P, MANUAL	AUTO	2.34% OF LOAD CELL RANGE	AUTO
7	AUTOMATIC	AUTO	87.50% OF PEAK	AUTO

* Factory default setting.
** A/P = AUTO PLATEN, an optional piece of equipment specifically designed for bottle testing. Modes 2,3 and 6 are recommended for Auto Set Platens.
*** Mode 7 is a continuous cycle test for Fatigue or Hysteresis.

LOAD CELL RATINGS	TEST TERMINATION @2.34% of PEAK
0 - 4 LBS	.0936 LBS after PEAK
10 - 40 LBS	.0936 LBS
100 - 400 LBS	.9360 LBS
1000 - 5000 LBS	9.3600 LBS

FAILURE DETECTION/TEST TERMINATION

In order for the system to detect the failure of a sample, certain parameters must be met. Load Cell sizes 10 pounds and above have a 10 X amplification factor. Once the minimum value has been passed, the system looks for the force to drop below the cutoff value that has been selected by the mode setting.

Continued Next Page.

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DMC AUXILIARY EQUIPMENT (Cont)

MODE 0 AND 6

The force applied must reach a certain minimum value to start the test which is calculated at 9.38% of Load Cell range. Example: 4000 pound Load Cell starts with a 10X range of 400 pounds. The test would not be considered valid or started until the force reaches 9.38% of 400 pounds or 37.5 pounds. After passing the minimum value, the test will be terminated when force drops to 2.34% of Load Cell range. Example: 4000 pound Load Cell starts with a 10X range of 400 pounds. The test would terminate when the force drops below 2.34% of 400 pound or 9.36 pounds.

MODES 1, 3, 4 AND 7

The cutoff value for these modes is 87.5% of the maximum force reading obtained during the test. For example, if a sample showed a maximum force of 80 lbs during a test, the test would be terminated when the Force reading dropped below the shut off point; .875 x 80 lbs or 70 lbs.

MODES 2 AND 5

In modes 2 and 5, the cutoff value would be 75% of the maximum force reading obtained during the test. For example, if a sample showed a maximum force of 80 lbs during a test, the test would be terminated when the Force reading dropped below the shut off point; .75 x 80 lbs or 60 lbs.

MODE SELECTION CHART

DIP SWITCHES #10 - #12

MODE	SWITCH #10	SWITCH #11	SWITCH #12	MODE	SWITCH #10	SWITCH #11	SWITCH #12
0 *	OFF	OFF	OFF	4	OFF	OFF	ON
1	ON	OFF	OFF	5	ON	OFF	ON
2	OFF	ON	OFF	6	OFF	ON	ON
3	ON	ON	OFF	7	ON	ON	ON

* Factory default setting

AUTO PLATEN

To use, switch the Auto Platen switch box to ON before starting the Tare mode. Refer to Figure B-10, page 24. The Auto Platen plate is installed in the same manner as standard platen plates. Refer to Figure G-2, page 33. When the sample contacts the platen disk, the Tester will pause, read and store the tare information. After storing data, the Auto Platen switch is bypassed by the DMC and the test will resume.

The Auto Platen mode is normally used for the testing of bottles, cans or any other object that might be crushed between the platens. A maximum speed of two inches per minute is recommended unless the sample is very incompressible, i.e. polyurethane foam pillows or blocks. Incompressible items should be run at a much slower speed. The auto platens should stop the Tester before the application of force.

Continued Next Page.

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DMC AUXILIARY EQUIPMENT (Cont)

AUTO PLATEN (Cont.)

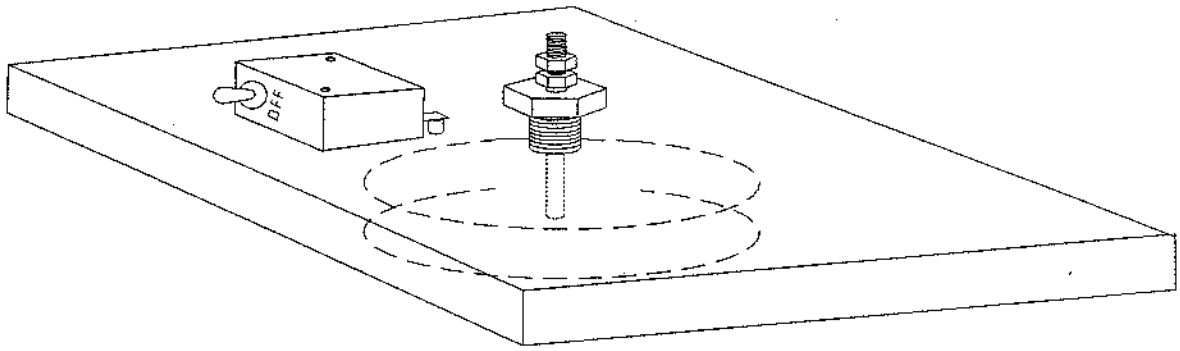


Figure B-10, AUTO PLATEN

AUTO RETURN

If this function is selected, then at the end of the test, the tester will return the Torque Bar to its starting position. This location is determined by the location of the lower stop collar on the Limit switch rod. Refer to Figure B-6, page 14.

COMPUTER INSTALLATION

Some companies have a need to collect and track the data produced from their tests. To satisfy these requirements, COMTEN offers the option of connecting your Tester to a computer. To allow the DMC to transfer this information to the Computer, DIP Switches #1, #2 and #9 should be in the following positions:

#1 - ON **#2 - OFF** **#9 - ON**

Dip Switch #9 must be in the ON position to transmit raw data to the Serial Port of the Computer or Printer. Refer to PRINTER, page 19 or COMPUTER INSTALLATION , page 24. If this switch is ON, you **MUST** have the Computer or Printer ON and functional for the Tester to work properly. It is required that Switch #9 be in the OFF position and the printer ON and functional if transmitting reports or graphs directly to a serial printer.

Refer to COMPUTERIZED OPERATIONS, page 25, for instructions on operating the Tester from a computer.

EQUIPMENT REQUIREMENTS

The DMC can communicate with any computer that has a Serial Port (RS-232).

COMPUTER CONNECTIONS

1. Connect the cable to the 'SERIAL' connector on the rear of the DMC MONITOR/CONTROLLER. Refer to Figure B-7, page 18.

2. Connect other end of cable to the Serial Port on your computer.

3. Connect your printer to the computer as described in the computer and printer paper work.

4. Follow the instructions for your data communications software. **COMTEN INDUSTRIES** can supply you with Data Acquisition, Telecommunications and custom software to meet your needs.

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COMPUTERIZED OPERATIONS

The DMC Unit is capable of accepting commands from a computer keyboard if the DMC has been connected to the computer and a communications software program has been installed in the computer. There are several communications software packages available that are capable of performing this task including **COMTEN INDUSTRIES C-TAP - T**est **A**cquisition **P**ackage; the only requirement is that it is capable of handling Serial Data.

The advantages of using a computer to control and observe system data are:

1. Data captured can be recorded and saved as a permanent record.
2. Raw data can be manipulated by your database or spreadsheet software to provide added information and provide a historical record.
3. Custom formatted printed reports can be generated by your software.
4. Mechanical actions of the Tester can be programmed to occur on an automatic basis. The ability of the Tester to Step and Hold Deflection; Step and Hold Force or perform these functions in repetition.

After installing your communications program, activate it by using the command supplied with the Software.

The programming options are:

1) Stop and hold deflection	4) Transmit ON	7) Time
2) Stop and hold force	5) Reset	8) Data on return
3) Bell	6) Transmit OFF	9) Clear/restart

Each of the commands is initiated by pressing and holding the CONTROL key, press the command letter. **DO NOT USE THE BACK SPACE KEY!** If you make a mistake, press ENTER and reenter the command.

COMMANDS

1) STEP AND HOLD DEFLECTION FUNCTION

CONTROL D
RESPONSE: DEFL?
INPUT: (First step) (delay) (step size) (number of steps)

EXAMPLE:
INPUT: 1000 20 500 5

First step is (1000) X .001" = 1000 counts = 1 inch.
Delay is (20) X .25 seconds = 10 seconds. 4 counts = 1 second.
Step size is (500) X .001 = .5".
Number of steps (5) = number of times to repeat the above steps.

Resulting action from this step will be that the Test machine will move up 1 inch and hold for 5 seconds; then move 1/2 inch for five steps.

Continued Next Page.

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COMPUTERIZED OPERATIONS (Cont)

2) STEP AND HOLD FORCE FUNCTION
CONTROL F
RESPONSE: DEFL?
INPUT: (Force) (delay) (force increment) (number of increments).

EXAMPLE:
INPUT: 100 40 50 3

First step is (100). Specifies initial force to monitor.
Delay between steps is (40) X .25 seconds = 10 seconds. 4 counts = 1 second.
Step size is (50). Tester will operate until initial setting plus 50 lbs has been reached (150).
Number of delays (3) = 100 (Delay) + 50 (Delay) + 50 (Delay) = 200 lbs.

Resulting action from this step will be that the Test machine will move up until the amount of force = 100; wait 10 seconds then move up until the force count has increased by 50; hold for 10 seconds; repeat the second step for a final force count of 200.

3) BELL
CONTROL G
RESPONSE: DMC bell will sound.
INPUT: None

Resulting action: Bell will ring to verify communications link between DMC and computer.

4) Test Stand STOP
CONTROL N
RESPONSE: Stops Test Stand upward movement without terminating the test.
INPUT: None

Resulting action: Test Stand stops and holds position until the test is terminated or the UP command is received. Force and Deflection continued to be acquired, displayed and sent out the serial port if enabled. Tare must be completed and Test Stand started before this command is obeyed.

5) Test Stand UP
CONTROL O
RESPONSE: Starts Test Stand upward movement if previously stopped.
INPUT: None

Resulting action: Test Stand starts to move up if previously stopped. Force and deflection will continue to be acquired, displayed and sent out the serial port if enabled.

6) Transmit ON
CONTROL Q
RESPONSE: None
INPUT: None

Resulting action: Enables the serial data if it was disabled, any pending data will be transmitted. Standard serial data software flow control is **X-ON**

Continued Next Page.

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COMPUTERIZED OPERATIONS (Cont)

7) RESET
CONTROL R
RESPONSE: None
INPUT: None

Resulting action: DMC will act as if it were just turned on (cold boot).

8) TRANSMIT - OFF
CONTROL S
RESPONSE: None
INPUT: None

Resulting action: Halts serial data until reset by X-ON.
Standard serial data software flow control is **X-OFF**

9) TIME
CONTROL T
RESPONSE: None
INPUT: None

Resulting action: Will transmit the time if the clock option is installed.

10) DATA ON RETURN
CONTROL W
RESPONSE: None
INPUT: None

Resulting action: Will transmit serial data when Tester is returning. The function is a ON/OFF switch used with data stream enabled (DIP switch 9 ON).

11) CLEAR/RESET
CONTROL Y
RESPONSE: None
INPUT: None

Resulting action: Is the equivalent to pressing CLEAR/START switch on the DMC; resets software to initial settings.

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SELECTING THE PROPER LOAD CELL

Series **94 -C** Testers have a rated capacity of up to 5000 pounds, depending on the model.

To prevent damage to the Load Cell, the anticipated force reading should be within 50 - 60% of Load Cell capacity.

EXAMPLE: If anticipated forces are 200 pounds, select a 400-pound Load Cell.

Select the Load Cell(s) for your application(s), from **TABLE 1, LOAD CELL SELECTION CHART** below.

CAUTION

It is important that test readings do not exceed 90% of the CAPACITY of the Load Cell. Operating the Load Cell above 90% of capacity may result in permanent damage to the Load Cell. When operating at speeds above two (2) inches per minute care should be taken not to exceed 75% of Load Cell Capacity. Should you do this the over force protection system may not react quick enough and you will break the S-Block Load Cell.

If you are using our Tester in a Compression mode, refer to **TABLE 2, CAGE SELECTION CHART** on Page 29. Cages have specific minimum Load Cell requirements. If you frequently use more than one type of clamp, you can save time by using Quick Disconnects with your clamps. The use of Quick Disconnect Swivels (#QDS 0100) will provide for better Fixture alignment. Refer to your catalog, call your Dealer or the factory for more information.

TABLE 1 - LOAD CELL SELECTION CHART

CAPACITY LBS. / KG.	PART NUMBER	CAPACITY LBS. / KG.	PART NUMBER	CAPACITY LBS. / KG.	PART NUMBER
4 / 1.8	PSB 0004	200 / 90	PSB 0200	2000 / 900	PSB 2000
10 / 4	PSB 0010	400 / 180	PSB 0400	4000 / 1800	* PSB 4000
20 / 9	PSB 0020	600 / 270	PSB 0600	5000 / 2250	**PSB 5000
40 / 18	PSB 0040	800 / 360	PSB 0800	-----	N/A
100 / 45	PSB 0100	1000 / 450	PSB 1000	-----	N/A

CAPACITY is the maximum force reading in pounds/kilograms.

PART NUMBER is a **COMTEN INDUSTRIES** part number and can be ordered from your Dealer of from the factory.

Do not exceed your test stand rating when ordering Load Cells.

These Load Cells fit all **94 -C SERIES** Testers.

* Requires 944K -C or 945 KVC Series Tester.
** Requires 945K -C Series Tester.

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COMPRESSION CAGE SELECTION

A cage is an optional piece of equipment that allows a Tester to perform Compression Strength tests.

CAGE SELECTION

Select proper cage for your application. Cage should be rated higher than the highest rated compression load anticipated. Refer to Tables 2 and 3, **CAGE SELECTION CHART.**

EXAMPLE: Maximum anticipated compression load is 1300 pounds. Tester must be rated at 2000 or 4000 pounds. Select Cage CCS 2006, rated at 2000 pounds.

TABLE 2 - COMPRESSION CAGE SELECTION CHART

Accommodates test samples 7" high X 6" wide.

PART NUMBER	MINIMUM CAGE LOAD CELL LBS. / KG'S	MAXIMUM CAGE CAPACITY LBS. / KG'S	TARE WEIGHT ADDED LB'S. / KG'S.
CCS 0406	40 / 18	400 / 180	3.7 / 1.7
CCS 1006	100 / 45	1000 / 450	8.1 / 3.7
CCS 2006	200 / 90	2000 / 900	10.5 / 4.8
CCS 5006	200 / 90	5000 / 2250	12.9 / 5.9

TABLE 3 - WIDE TYPE CAGE SELECTION CHART

Accommodates test samples 7" high X 8" wide.

PART NUMBER	MINIMUM LOAD CELL LBS. / KG'S	MAXIMUM CAGE CAPACITY LBS. / KG'S	TARE WEIGHT ADDED LBS. / KG'S
CCW 0408	100 / 45	400 / 180	5.8 / 2.7
CCW 1008	200 / 90	1000 / 450	13.8 / 6.3
CCW 2008	200 / 90	2000 / 900	16.9 / 7.7
CCW 5008	400 / 180	5000 / 2250	20.1 / 9.2

The maximum capacity of 94 -C Series Testers is 5000 pounds, depending on model.

Verify the rating of your Tester before ordering equipment. Do NOT exceed rating of your Tester. Cages MUST be used with Platens, 'F' Blocks or MOR fixtures. Be sure to order with your cage.

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COMPRESSION CAGE INSTALLATION

Cages allow the use of your Tester in a Compression mode. Saddle Type cages allow for testing items larger than the Standard cage. Cages **MUST** be used with Platens, 'F' Blocks or MOR fixtures.

1. Place DIRECTION Switch to the 'UP' position to raise Power Screw high enough for Cage to be placed between base and Load Cell Stud plus about three inches. Refer to Figure B-4, page 16. Turn Power Switch to 'OFF' position.

2. For Test Stands under 2000 lbs. install Spacer Nut (SAE 1/2 - 20 x 5/16" thick) on Base Mounting Stud and tighten against Base Lock Nut. Tighten lightly (10 ft lbs.). Refer to Figure F-1, page 30. No spacer nut is required on 5000 LB cages.

3. Install a Face Nut (SAE 1/2 - 20 X 7/16" thick) on the Load Cell Stud. Run nut on threads as far as possible; do not tighten.

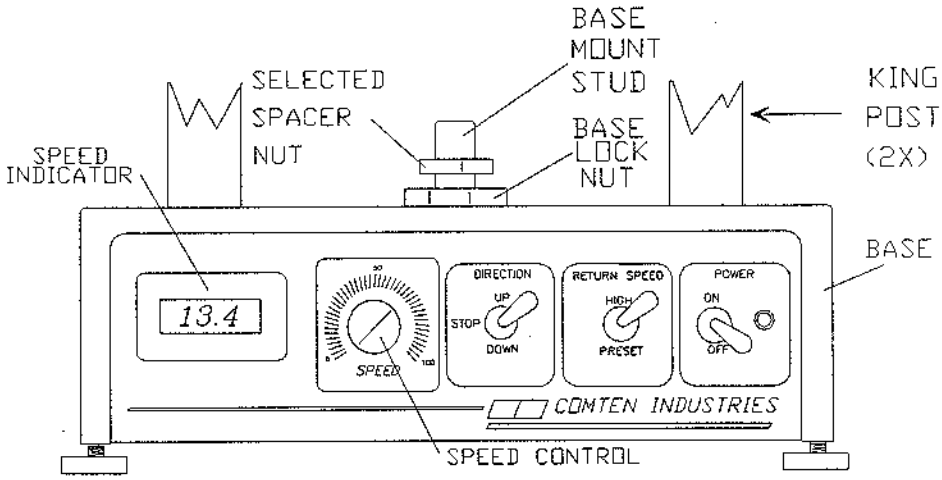


Figure F-1, INSTALLING CAGE SPACERS.

4. Set Cage beside Tester in a vertical position with Cage weight rating facing operator. The letters "RF" should appear on the right side of the Compression Bar and Tie Down Bar. Refer to Figure F-2, page 31.

5. Locate the clearance hole in the Cage Tie Down Bar.

6. Lift Cage and place on Tester with Cage Tie Down Bar resting on the Tester Base. Base Fixture Mounting Stud should pass through the clearance hole in the Cage Tie Down Bar. For cage orientation, refer to Figure F-3, page 31.

Continued next page.

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COMPRESSION CAGE INSTALLATION (Cont.)

7. On a Standard Cage, install Torque Clamps around King Posts and onto Cage upright. On Wide Type cages, install the Cage one Torque Clamp. Refer to Figure F-3, page 31.

8. Raise Draw Bar over Load Cell Stud through clearance hole in Cage Draw Bar.

9. While holding Draw Bar in place, install second Face Nut on the Load Cell Stud. Adjust Nut so that end of Power Screw is flush with exposed end of Nut.

10. While holding second Face Nut with a wrench, tighten first (Top) Face Nut against Cage Draw Bar using a wrench. Tighten securely.

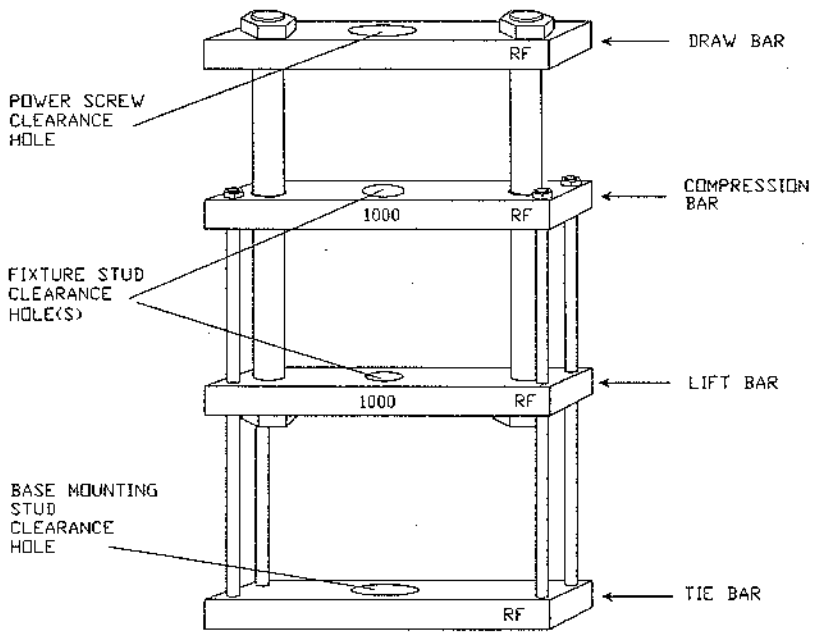


Figure F-2, CAGE REFERENCE.

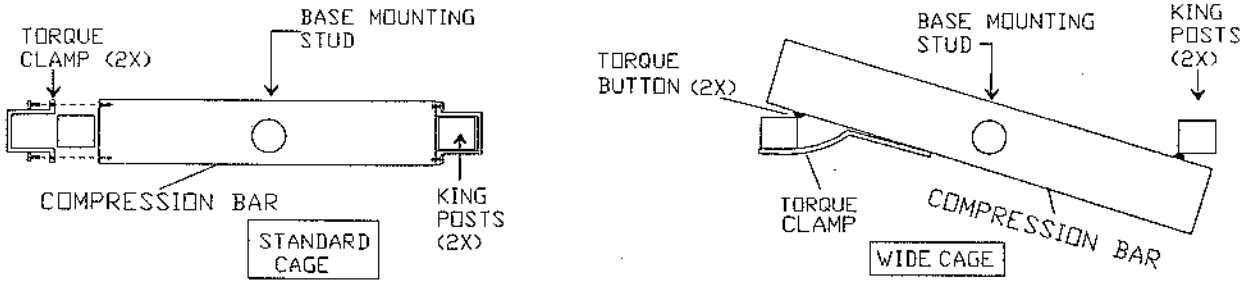


Figure F-3, CAGE ORIENTATION.

11. On the top of the Tie Bar install a Face Nut on the Base Mounting Stud.
    A. 2000 lbs. and under Compression Cages.
    Thread down until flush with the top of the Base Mounting Stud. Using an end wrench, tighten the lower Spacer Nut up to and against Compression Cage Tie Down Bar.
    B. 5000 lbs. Compression Cages.
    Using an end wrench, tighten the Face Nut against Compression Cage Tie Down Bar. The top of the stud should be close to flush with the top of the nut. If stud is not close to flush (either too low or too high), call the factory.

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CLAMP, FIXTURE AND PLATEN INSTALLATION

There are many standard models of Clamps, Fixtures and Platens available from **COMTEN INDUSTRIES** that will fit most applications. If your needs are not covered by the selections listed in your catalog, please call your Dealer or the factory. **COMTEN INDUSTRIES** can custom build clamps and fixtures to your needs and specifications.

CLAMPS

Clamps are designed for Tensile strength testing and are generally installed in matched pairs; however, using dissimilar clamps is an acceptable practice. If you frequently use more than one type of clamp, you can save time by using Quick Disconnects with your clamps. The use of Quick Disconnect Swivels (#QDS 0100) will provide for better Fixture alignment. Refer to your catalog, call your Dealer or the factory for more information.

1. Refer to Figure G-1, page 32. Turn Power Switch 'ON'. Set Direction Switch to 'UP'.

2. Raise Power Screw high enough to allow clearance while installing clamps. Return Direction Switch to 'STOP'. Turn Power switch to the 'OFF' position.

3. Thread Face Nut (1/2"-20 by 7/16" thick) on Load Cell Stud far enough to allow clamp to be threaded on to the Power Screw.

4. Thread top clamp on to Load Cell Stud far enough that at least one thread is showing. Orient Clamp for operator convenience.

5. Tighten Face Nut against clamp. Using an adjustable wrench to hold the clamp (Refer to Figure G-1, page 32) tighten the nut with an end wrench.

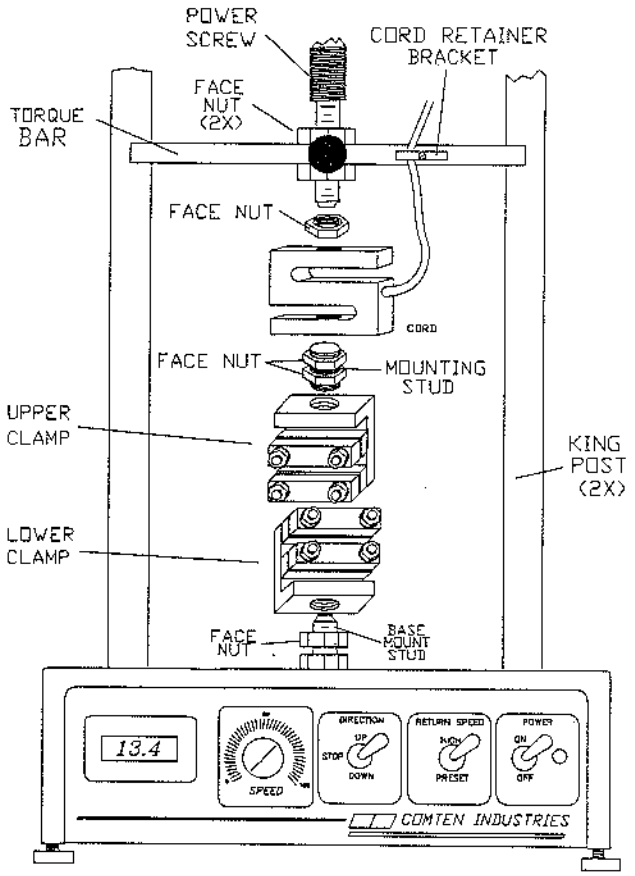


Figure G-1, CLAMP INSTALLATION.

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CLAMP AND FIXTURE INSTALLATION (Cont.)

CLAMPS (Cont.)

6. Thread Face Nut on Base Mounting Stud against the Base Lock Nut.

7. Thread clamp on to Base Mounting Stud far enough that at least one thread is showing. Align with upper clamp. Refer to Figure G-1, page 32.

8. Tighten Face Nut against clamp, using an adjustable wrench to hold clamp and an end wrench to tighten nut.

PLATENS AND 'F' BLOCKS

Platens are used for compression testing of large items; 'F' blocks are for smaller items. These items are installed on compression cages and are designed to prevent damage to your cage. Installation is similar for either item.

1. With Cage mounted on Tester, raise Draw Bar to allow working room for your hands. Turn Power Switch to the 'OFF' position.

2. Starting with the lower platen/block, place the plate on top of the Lift Bar. Align Fixture Mounting Stud with the Lift Bar clearance hole. Place Platen/block clearance hole over the Stud. Refer to Figure G-2, page 33.

3. Install a Fixture Mounting Nut from the under side of the Lift Bar and on to the Fixture Mounting Stud. Refer to Figure G-2, page 33. Tighten securely.

4. Hold the top plate against the bottom of the Compression Bar with the Mounting Stud passing through the clearance hole. Install a Fixture Mounting Nut from the top side of the Compression Bar and on to the Fixture Mounting Stud. Refer to Figure G-2, page 33. Tighten securely.

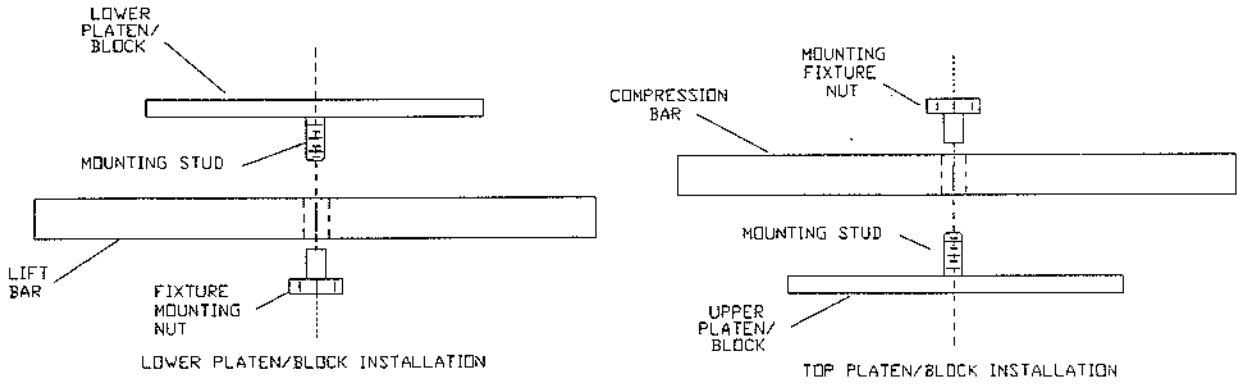


Figure G-2, MOUNTING PLATENS & 'F' BLOCKS

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CLAMP AND FIXTURE INSTALLATION (Cont.)

MOR FIXTURES

MOR (Modulus Of Rupture) fixtures are designed to determine the Flexural strength of an item and are designed to be mounted to a Compression Cage.

1. With Cage mounted on Tester, Raise Draw Bar to allow working room for your hands. Turn Power Switch to the 'OFF' position.

2. Starting with the lower MOR fixture, place on top of the Lift Bar, aligning the center mounting stud on the fixture with the mounting hole in the Lift Bar.

3. Install the Fixture Mounting Nut on to the mounting stud from the under side of the Lift Bar. Refer to Figure G-3, page 34. Tighten securely.

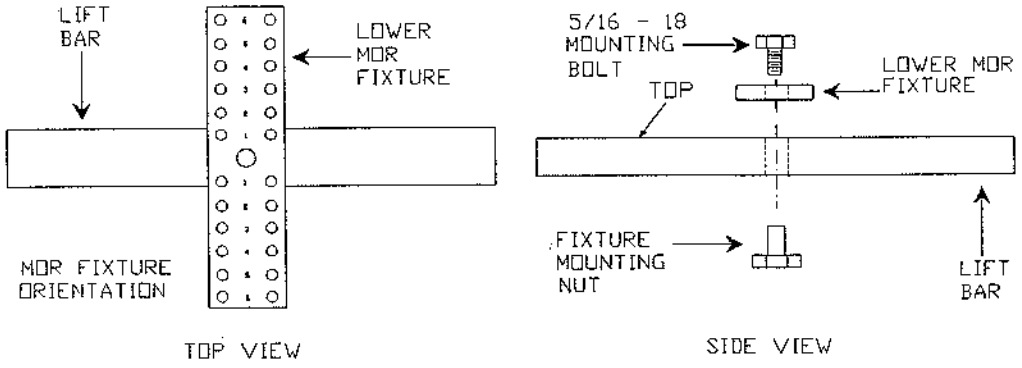


Figure G-3, MOUNTING LOWER MOR FIXTURE

4. Hold the upper MOR fixture against the bottom of the Compression Bar with the mounting stud passing through the center hole. Install the Fixture Mounting Nut from the top side of the Compression Bar and onto the fixture stud. Refer to Figure G-4, page 34. Tighten securely.

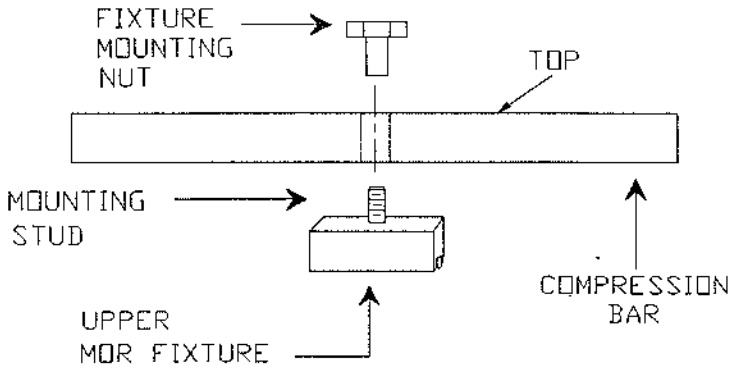


Figure G-4, MOUNTING UPPER MOR FIXTURE

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DEFLECTION SCALE

The Deflection Scale is a standard piece of equipment on the 94 Series Testers used to determine the amount of deflection (stretch) achieved during a test.

1. Place test sample in the Tester.
2. Carefully apply a light pressure to the test sample by jogging the DIRECTION switch between the 'UP' and 'OFF' position. Apply no more force than is necessary to take slack out of the test sample.
3. Loosen Thumb Screw on Deflection Scale; move Scale to align the Zero reference pointer on the Torque Bar. Refer to Figure H-1, page 35. Re-tighten Thumb Screws.
4. Complete test. Refer to Page 43, OPERATING YOUR TESTER.
5. When test sample breaks or reaches desired force, stop test. Record amount of movement.

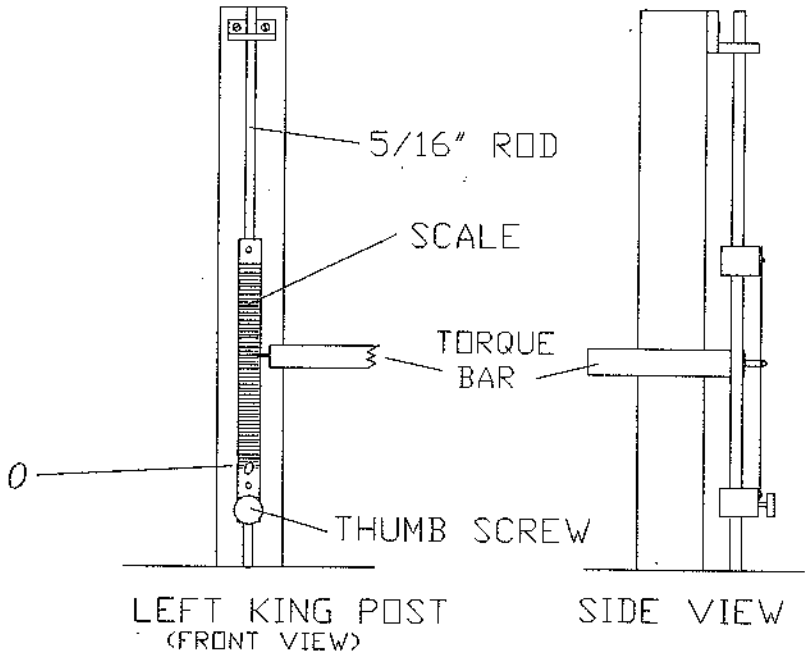


Figure H-1, DEFLECTION SCALE

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DMC FRONT PANEL SWITCH FUNCTIONS

WARNING READ THE FOLLOWING SECTION "OPERATING YOUR TESTER" AND "MODES OF OPERATION" BEFORE ATTEMPTING TO USE YOUR TESTER.

CAUTION The DMC MUST be turned ON at least twenty minutes prior to performing tests to assure accuracy of tests. This warm up period is necessary to allow the electronics to stabilize.

WARNING **ALWAYS** wear Safety Glasses when operating Tester.

Factory settings for this equipment is set for Operation MODE 0. For variations on operating modes and to set your DMC to a different operating mode, refer to OPERATION MODES, page 22.

DEFLECTION DISPLAY (Set A)
In all modes of operation, the unit of measure on initial power up is SPEED in INCHES per MINUTE. After the first run, the unit defaults to a deflection setting of 40 inches. Refer to Set A on Figure J-1, page 36.

FORCE DISPLAY (Set B)
In all modes of operation, the unit of measure on initial power up is in Pounds and the capacity of the installed Load Cell. Refer to Set B on Figure J-1, page 36.

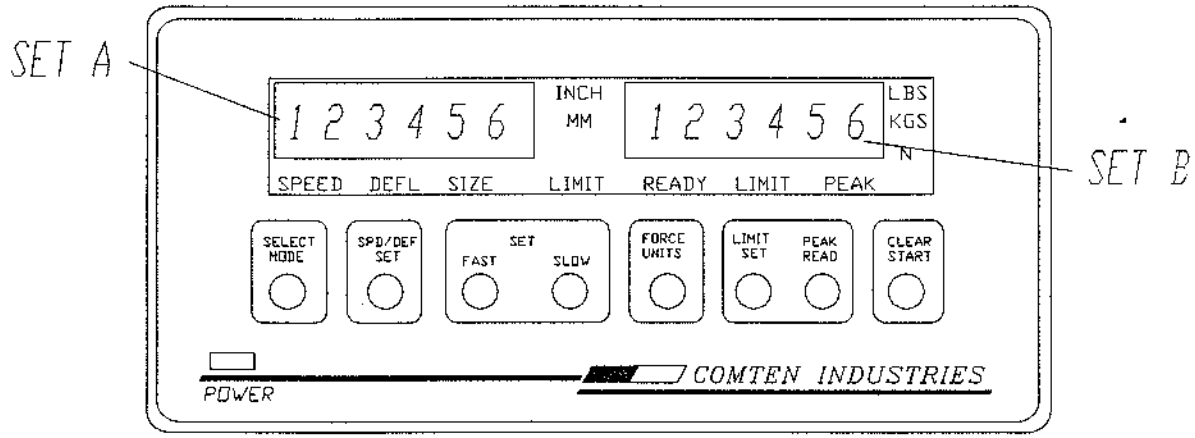


Figure J-1; DMC FRONT PANEL

The switches on the front panel of the **DMC** allow you to use the various force, deflection or speed displays and limit control settings that are built into the **DMC**.

Continued Next Page.

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DMC FRONT PANEL SWITCH FUNCTIONS (Cont.)

Refer to Figure J-1, page 36 for all of the following switches.

POWER

Turns the DMC main power ON or OFF. PUSH ON. PUSH OFF.

SELECT MODE

Selects the type of information displayed in the deflection display (SET A) during the test. Pressing button rotates the display between:

DEFLECTION in INCHES
SPEED in INCHES per MINUTE
DEFLECTION in MILLIMETERS
SPEED in MILLIMETERS per MINUTE

SPD/DEF SET

Pressing before the test tare is started, shows the preset deflection limit to be displayed and altered. Use the SET switches, FAST or SLOW to change limit value. Pressing again stores deflection limit and returns deflection display to normal.

SET - FAST & SLOW

Used to set the FORCE or DEFLECTION limit. FORCE LIMIT is selected by pressing the LIMIT SET switch. DEFLECTION LIMIT is selected by pressing the SPD/DEF SET switch. Pressing the FAST and SLOW together re-sets the selected displayed limit to the allowed minimum. ZERO for deflection and FIVE for force. Pressing either individually allows the display value to count up FAST or SLOW until the desired value or the maximum allowed is displayed.

FORCE UNITS

Rotates FORCE display (Set B) from POUNDS to KILOGRAMS to NEWTONS. Power on default is POUNDS.

LIMIT SET

Allows the preset force limit to be displayed or set. Pushing LIMIT SET before the test tare is started displays the present preset force limit. This defaults at power up to the maximum force allowed by the load cell. Use the SET switches, FAST or SLOW to change limit value. Press LIMIT SET again to store new value and return force display to normal.

PEAK READ

MOMENTARILY causes the FORCE DISPLAY to show the PEAK FORCE read during the test. The PEAK FORCE is automatically displayed at the end of the test.

CLEAR / START

Steps the DMC through all normal test steps. Used to start all automated test stand functions. The number of times the CLEAR / START switch must be pushed is dependent on the DIP SWITCH MODE SELECTED.

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MODES OF OPERATION

Modes of operation are set with Dip Switches 10 through 12 on the bottom of the **DMC**. Refer to Figure B-8, page 19 for DMC DIP SWITCHES, to OPERATION MODES, page 22 and to MODE SELECTION CHART on page 23, 38 for Mode setup. The **DMC** is shipped from the factory set to Mode 0.

ALL MODES

1. Turn the Tester, DMC Monitor/Controller (and Printer or computer if used) to the ON position. Allow adequate warm up time (15 to 20 minutes) before proceeding.

2. On initial power up, the DMC will flash the Load Cell rated value in the right (FORCE) display. Refer to Figure J-1, page 36. The left display will read the speed of the Tester; as the Tester is not moving at this point, the indication is '0'.

3. Place the Tester DIRECTION Switch in the 'STOP' position. Refer to Figure B-5, page 13.

4. Adjust the Tester Limit Switch stops. Refer to Figure B-6, page 14.

MODE 0

1. Press the CLEAR/START button. The right hand side of the DMC display will show an '=' sign and a numeric value which is the TARE value.

2. Press the CLEAR/START button again. This will remove the TARE value and display the Ready Light on the DMC.

3. Press the CLEAR/START button a third time and the Tester will begin to run in the UP direction. Adjust the Tester speed using the Vernier Dial on the Tester. Read the SPEED from the left display of the DMC. Adjust the Tester speed to your requirements.

4. Press the CLEAR/START again. The Tester will stop momentarily and then return to its start position.

5. Insert the sample to be tested.

6. Press the CLEAR/START button on the DMC again. The DMC will again display the '=' sign and a numeric (TARE) value in the right hand display.

WARNING This is a destructive test and the inherent danger associated with such testing may require extreme forces. **ALWAYS** wear Safety Glasses while performing tests.

7. Press the CLEAR/START button on the DMC again. The DMC will display a numeric reading of less than ten counts and the Ready Light will illuminate.

8. Press the CLEAR/START button again on the DMC. The Tester will run in the UP direction until the test has been completed. Completion of the test is determined by the DMC. The DMC looks for one of the following:
   A. Activation of the Upper Limit Switch.
   B. Sensing of a Peak Value reading.
   C. Reaching of preset force or deflection limit.
   D. Reaching the limit of the Load Cell.

Continued Next Page.

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MODES OF OPERATION (Cont)

MODES 0 (Cont.)

CAUTION Do NOT exceed the maximum value of the Load Cell. Exceeding maximum Load Cell value will damage Load Cell.

9. Press the CLEAR/START button at any time to stop test if required.

   NOTE: If an audible BEEP is heard during the test, slow the Tester speed.

   After completion of the test, the DMC will read and display the amount of DEFLECTION at peak force in the left hand display and the PEAK FORCE in the right hand display. The Tester will return to the start position for the next test.

10. Remove debris from completed test; perform steps 5 - 10 for next test.

MODES 1, 4

1. Press the CLEAR/START button and the Tester will begin to run in the UP direction. Adjust the Tester speed using the Vernier Dial on the Tester. Read the SPEED from the left display of the DMC. Adjust the Tester speed to your requirements.

2. Press the CLEAR/START button at any time to stop Tester. The Tester will return to the start position for the test.

3. Insert the sample to be tested.

WARNING This is a destructive test and the inherent danger associated with such testing may require extreme forces. **ALWAYS** wear Safety Glasses while performing tests.

4. Press the CLEAR/START button on the DMC. This action will start the test after a short delay.

5. The Tester will run in the UP direction until the test has been completed. Completion of the test is determined by the DMC. The DMC looks for one of the following:
   A. Activation of the Upper Limit Switch.
   B. Sensing of a Peak Value reading.
   C. Reaching of preset force or deflection limit.
   D. Reaching the limit of the Load Cell.

CAUTION Do NOT exceed the maximum value of the Load Cell. Exceeding maximum Load Cell value will damage Load Cell.

6. Press the CLEAR/START button at any time to stop test if required.

   NOTE: If an audible BEEP is heard during the test, slow the Tester speed.

   After completion of the test, the DMC will read and display the amount of DEFLECTION at peak force in the left hand display and the PEAK FORCE in the right hand display. The Tester will return to the start position for the next test.

7. Remove debris from completed test; perform steps 3 - 7 for next test.

Continued Next Page.

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MODES OF OPERATION (Cont)

MODES 2, 3 AND 6

1. Turn Platen Switch to ON position. Refer to Figure B-10, page 24.

2. Press the CLEAR/START button and the Tester will begin to run in the UP direction. Adjust the Tester speed using the Vernier Dial on the Tester. Read the SPEED from the left display of the DMC. Adjust the Tester speed to your requirements.

3. Press the CLEAR/START button at any time to stop Tester. The Tester will return to the start position for the test.

4. Insert the sample to be tested.

5. Press the CLEAR/START button on the DMC.

CAUTION Do NOT run test without sample in the Tester to activate the Auto Platen Switch.

WARNING This is a destructive test and the inherent danger associated with such testing may require extreme forces. **ALWAYS** wear Safety Glasses while performing tests.

6. The Tester will run in the UP direction. When the sample contacts the Platen Disk, the Tester will pause, read and store the TARE information.

7. The Tester will restart and continue running in the UP direction until the test has been completed. Completion of the test is determined by the DMC. The DMC looks for one of the following:
   A. Activation of the Upper Limit Switch.
   B. Sensing of a Peak Value reading.
   C. Reaching of preset force or deflection limit.
   D. Reaching the limit of the Load Cell.

CAUTION Do NOT exceed the maximum value of the Load Cell. Exceeding maximum Load Cell value will damage Load Cell.

8. Press the CLEAR/START button at any time to stop test if required.

   NOTE: If an audible BEEP is heard during the test, slow the Tester speed.

   After completion of the test, the DMC will read and display the amount of DEFLECTION at peak force in the left hand display and the PEAK FORCE in the right hand display. The Tester will return to the start position for the next test.

9. Remove debris from completed test; perform steps 4 - 8 for next test.

Continued Next Page.

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MODES OF OPERATION (Cont)

MODE 5

In this mode the Tester will not return to its start position at the end of the test.

1. Press the CLEAR/START button on the DMC. The right hand side of the DMC display will show an '=' sign and a numeric value which is the TARE value.

2. Press the CLEAR/START button again and the Tester will begin to run in the UP direction. Adjust the Tester speed using the Vernier Dial on the Tester. Read the SPEED from the left display of the DMC. Adjust the Tester speed to your requirements.

3. Press the CLEAR/START button at any time to stop Tester.

4. Return Test Stand to Lower Limit by placing DIRECTION Switch on Tester to the 'DOWN' Position. Return switch to the 'STOP' position.

5. Insert the sample to be tested.

6. Press the CLEAR/START button on the DMC. The right hand side of the DMC display will show an '=' sign and a numeric value which is the TARE value.

WARNING This is a destructive test and the inherent danger associated with such testing may require extreme forces. **ALWAYS** wear Safety Glasses while performing tests.

7. Press the CLEAR/START button on the DMC again to begin test.

8. The Tester will run in the UP direction until the test has been completed. Completion of the test is determined by the DMC. The DMC looks for one of the following:
   A. Activation of the Upper Limit Switch.
   B. Sensing of a Peak Value reading.
   C. Reaching of preset force or deflection limit.
   D. Reaching the limit of the Load Cell.

CAUTION Do NOT exceed the maximum value of the Load Cell. Exceeding maximum Load Cell value will damage Load Cell.

9. Press the CLEAR/START button at any time to stop test if required.

   NOTE: If an audible BEEP is heard during the test, slow the Tester speed.

   After completion of the test, the DMC will read and display the amount of DEFLECTION at peak force in the left hand display and the PEAK FORCE in the right hand display.

10. Return Test Stand to Lower Limit by placing DIRECTION Switch on Tester to the 'DOWN' Position. Return switch to the 'STOP' position.

11. Remove debris from completed test; perform steps 5 - 11 for next test.

Continued Next Page.

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MODES OF OPERATION (Cont)

MODE 7

This is a continuous cycle operation for fatigue testing. It is recommended that you set Force Limit and/or Deflection Limit on the DMC.

1. Press the CLEAR/START button and the Tester will begin to run in the UP direction. Adjust the Tester speed using the Vernier Dial on the Tester. Read the SPEED from the left display of the DMC. Adjust the Tester speed to your requirements.

2. To stop test, press SPD/DEF SET button when tester is returning or turn the DMC off.

3. Insert the sample to be tested.

WARNING This is a destructive test and the inherent danger associated with such testing may require extreme forces. **ALWAYS** wear Safety Glasses while performing tests.

4. Press the CLEAR/START button on the DMC to begin test.

5. The Tester will run in the UP direction until the test has been completed. Completion of the test is determined by the DMC. The DMC looks for one of the following:
   A. Activation of the Upper Limit Switch.
   B. Sensing of a Peak Value reading.
   C. Reaching of preset force or deflection limit.
   D. Reaching the limit of the Load Cell.

CAUTION Do NOT exceed the maximum value of the Load Cell. Exceeding maximum Load Cell value will damage Load Cell.

6. Turn the DMC off at any time to stop test if required.

   NOTE: If an audible BEEP is heard during the test, slow the Tester speed.

   After completion of the test, the DMC will read and display the amount of DEFLECTION at peak force in the left hand display and the PEAK FORCE in the right hand display. The Tester will return to the start position for the next test.

7. After completion of the test, the Tester will return to the START position and cycle again.

8. To stop test, press SPD/DEF SET button when tester is returning or turn the DMC off.

9. Remove debris from completed test; perform steps 3 - 9 for next test.

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OPERATING YOUR TESTER

WARNING THIS SECTION "OPERATION YOUR TESTER" IS A GENERIC DESCRIPTION OF TESTER OPERATIONS. THE SPECIFIC NUMBER OF TIMES THE CLEAR/START BUTTON IS PUSHED TO START THE TEST IS MODE DEPENDENT. OTHER CHARACTERISTICS OF THE TEST ARE ALSO MODE DEPENDENT. READ THE "MODES OF OPERATION" SECTION BEFORE PROCEEDING.

CAUTION The DMC MUST be turned ON at least twenty minutes prior to performing tests to assure accuracy of tests. This warm up period is necessary to allow the electronics to stabilize.

WARNING **ALWAYS** wear Safety Glasses when operating Tester.

TENSILE STRENGTH TESTING

1. Install one end of test item in top clamp.
2. Install the other end in the bottom clamp.

   NOTE: If using the Deflection Scale apply light force to the test sample by jogging the DIRECTION Switch between the 'UP' and 'OFF' position. Stop when sample becomes taught. Set Zero on the Deflection Scale with pointer on Torque Bar. Refer to DEFLECTION SCALE, page 35. Proper setting of Limit Switch Collars will reduce or eliminate the need for jogging.

3. With the DIRECTION Switch to the 'STOP' position press the CLEAR/START button to start the test, applying force to the test sample.

WARNING This is a destructive test and may require extreme forces. The danger associated with such testing **REQUIRES** the use of Safety Glasses while performing tests.

4. Press the CLEAR/START (Mode dependent) button to continue to increase force until test sample separates, desired force reading or deflection is achieved.
5. Tester will automatically re-set to prepare for next sample (except Mode 5). Torque Bar will stop when it reaches Lower Limit Set Collar. (Mode 5: Press CLEAR/START button to re-set.) Adjust Lower Limit Switch Collar if necessary. Refer to Figure B-6, page 14.
6. Press the CLEAR/START button to terminate the test if necessary.

CAUTION Do NOT exceed the maximum value of the Load Cell. Exceeding maximum Load Cell value will damage Load Cell.

7. Adjust Upper Limit Set Collar, if needed. Refer to Figure B-6, page 14.
8. Read Deflection from the DMC left Digital Display. Read Force from the DMC right Digital Display.

Continued Next Page.

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OPERATING YOUR TESTER (Cont.)

TENSILE STRENGTH TESTING (Cont.)

9. If using an Deflection Scale, read dimension from scale (ruler). Log reading in accordance with your company procedures.

10. Open clamps and remove remains of test sample.

11. Perform steps 1 - 11 for next test.

COMPRESSION AND MODULUS TESTING

WARNING **ALWAYS** wear Safety Glasses when operating Tester.

1. Place the item to be tested on the lower Platen, 'F' block or MOR fixture.

2. Place DIRECTION Switch to the 'UP' position to raise the Compression Cage Lift Bar. Apply enough force so that Platen, 'F' blocks or MOR Fixture is holding the test sample; set DIRECTION switch to the 'OFF' position. Proper setting of Limit Switch Collars will reduce or eliminate the need for jogging.

   NOTE: If using the Deflection Scale or Dial Indicator, set Zero on Deflection Scale with pointer on Compression Cage Lift Bar or set Zero on Dial Indicator.

WARNING This is a destructive test and may require extreme forces. The danger associated with such testing **REQUIRES** the use of Safety Glasses while performing tests.

3. Press the CLEAR/START button to start the test.

4. Continue to increase force until test sample breaks, desired force reading or deflection is achieved.

5. Tester will automatically re-set to prepare for next sample (except Mode 5). Torque Bar will stop when it reaches Lower Limit Set Collar. (Mode 5: Press CLEAR/START button to re-set.) Adjust Lower Limit Switch Collar if necessary. Refer to Figure B-6, page 14.

6. Press the CLEAR/START button to terminate the test if necessary.

CAUTION Do NOT exceed the maximum value of the Load Cell. Exceeding maximum Load Cell value will damage Load Cell.

7. Adjust Upper Limit Set Collar, if needed. Refer to Figure B-6, page 14.

8. Read Deflection from DMC left digital display. Read Force from DMC right digital display.

9. Log reading in accordance with your company procedure.

10. Clear test sample debris from Tester.

11. Perform steps 1 - 10 for next test.

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ROUTINE MAINTENANCE

1. Clean Power Screw; apply a light coat of general purpose grease at least once a month. Clean and lubricate more often in an extremely dusty environment.

2. Once every six months, lift Power Screw and Driven Gear from the Pillow Block. Apply a small dab of light lubricating grease on the bearing over which the Gear and Power Nut rotate. Refer to Figure K-2, page 45.

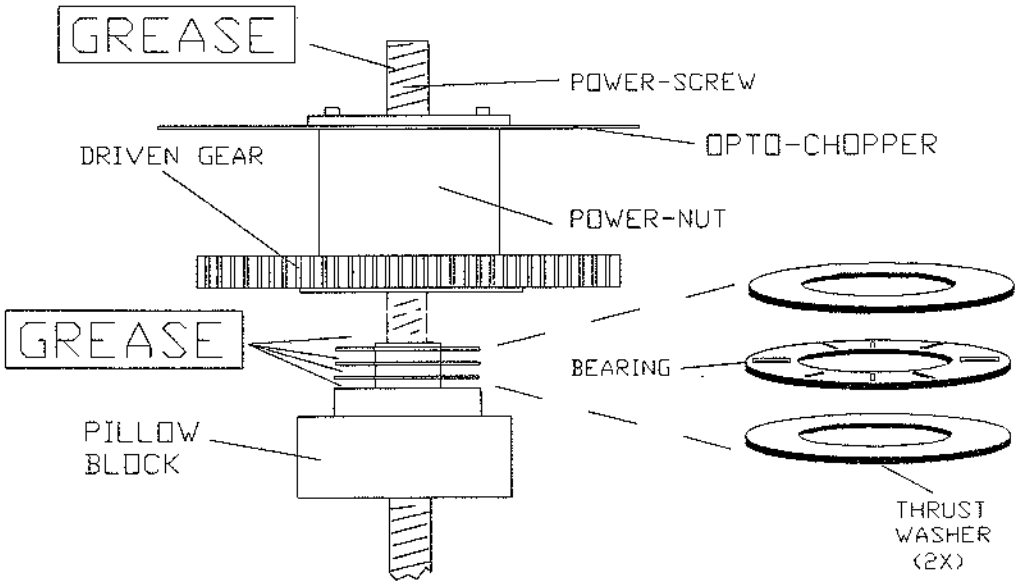


Figure K-2, PILLOW BLOCK.

3. Annual calibration/certification should be performed to ensure accurate and consistent test results. The recommended period between calibration is one year or less, depending on usage. Calibrate both the PSB Load Cell and the DMC unit at the same time to assure best accuracy.

4. Replace blown fuses with BUSS 3AG-4, 125/250 VAC (4 Amp fast-blow) fuses or equivalent in your Tester. Use of higher capacity fuses can result in damage to controller and/or motor and **VOIDS** warranty.

REPLACING THE TACH MOTOR DRIVE BELT

1. Turn off Power to Tester.

2. Raise Gear Guard cover by Removing one screw from each side near the top front of the cover. Lift cover at top front, rotating on rear hinge, toward rear of Tester. Refer to Figure C-1, page 17.

3 Loosen and remove the two screws on each side of the aluminum bar on each side of Front Cover plate. Remove the cover. Refer to Figure C-1, page 17.

Continued Next Page.

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ROUTINE MAINTENANCE (Cont)

REPLACING THE TACH MOTOR DRIVE BELT (Cont)

4. Loosen and remove the screw on the right side of the white Gear Retention Bar. Refer to Figure C-2, page 17.

5. Raise White Gear Retention bar to allow room to clear Driven Gear.

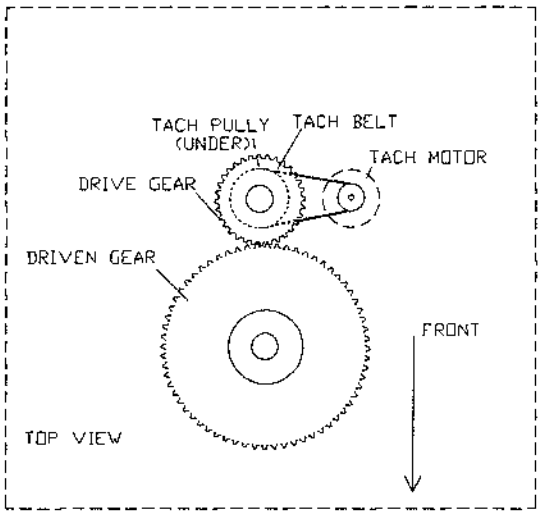


Figure K-1, TESTER TACH DRIVE BELT

6. Remove the old Belt from the Tach Pulley by rolling the O-Ring over the top of the Pulley. Refer to Figure K-1, page 46.

7. Disengage the Driven Gear from the Drive Gear by lifting up on the Torque Bar. Remove the Belt from the Drive Pulley and Gear.

8. Place the new O-Ring over the Drive Gear Pulley.

9. Lower Power Screw, Driven Gear.

10. Engage Power Nut and Driven Gear with the Pillow Block. Refer to Figure K-2, page 45.

CAUTION DO NOT OPERATE THE TESTER WITHOUT BOTH THE WASHERS AND BEARING IN PLACE.

11. Roll the Belt over the smaller Pulley using your thumbs to push the ring into place. **DO NOT** use a screwdriver or other hard object, as it may damage the new Belt.

12. Install White Gear Retention Bar. Refer to Figure C-2, page 17.

13. Install Gear Guard top and Front Cover. Refer to Figure C-1, page 17.

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FACTORY SERVICE

For your convenience, **COMTEN INDUSTRIES** can calibrate and *certify your PSB Load Cells and DMC Monitor/Controller. Calibrated Load Cells will be returned the same method as received; i.e., if sent one day air freight, Load Cell will be returned one day air freight. In house turn around times for a single DMC and Load Cell are as follows:

Two (2) working days: when shipped via One Day Air freight.
Three (3) working days: when shipped via Two Day Air freight.
Five (5) working days: when shipped via Ground Transportation.

* Test procedures conform to ASTM methods of calibration and MIL- STD-45662A and are traceable to NIST (except as noted on Calibration Statement).

Load Cells are certified to be within +/-0.05% of full-scale reading at each test point at the time of shipment.

Digital Monitor Controller (DMC) is certified to be within +/-0.05% of full-scale reading at each test point at the time of shipment.

The overall system (Controller and PSB Load Cell) is certified to be within +/-0.10% of full-scale reading at each test point at the time of shipment.

COMTEN INDUSTRIES performs complete repairs including complete overhaul on any COMTEN or RESEARCH PRODUCTS testers regardless of age. Call the factory service department at 813-822-3508 for more information.

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TROUBLE SHOOTING

The Tester and DMC are extremely reliable pieces of equipment designed to provide for many years of trouble free service. Like any piece of equipment, however, individual components can fail over time. The following procedures are presented to assist the technically competent to trouble shoot some of these potential problems.

TEST STAND TROUBLE SHOOTING GUIDE

PROBLEM	PROBABLE CAUSE	SOLUTION
A. Power light is off and unit does not run.	1. The fuse is blown. 2. Loose or disconnected power supply. 3. Defective switches, wiring, etc.	1. Replace with proper AGC fuse. 2. Check plugs and power connections. 3. Have a qualified electrician service or return to factory or dealer.
B. Power light is on but unit does not run up or down.	1. Check speed control setting. 2. Over Travel Limit Switch.	1. Turn control clockwise. 2. Check for relays to activate by moving the Limit Switch Rod up and down with the Direction Switch first set to the 'Down' position then repeating with it in the 'Up' position.
B-1. When checking machine under Solution B-2 above, the machine operates.	3. Over Travel Limit Switch is out of adjustment.	3. For adjustment procedure refer to OVER TRAVEL LIMIT SWITCH, Page 53.
B-2. When checking machine under Solution B-2 above, the relays can be heard activating but the machine does not run.	4. SCR board or motor may be bad.	4. Have a qualified electrician service or return to factory or dealer.
B-3. When checking machine under Solution B-2 above, nothing is heard and the machine does not run.	5. The cause can be a bad Limit Switch, Up/Down Switch, relay, transistor or a broken or loose wire or connection.	5. Have a qualified electrician service or return to factory or dealer.
C. The stand runs down but not up.	1. Over-pressure bypass plug loose or missing if so equipped. 2. DMC to Test Stand ribbon cable or other connection or wiring is loose, broken, or incorrectly installed. 3. The Platen Switch circuit is open (if so equipped).	1. Reinstall plug see Figure C-2, Page 17. 2. Check all connections then have a qualified electrician service or return to factory or dealer. 3. Turn switch off then try to run machine up. If it runs up there is a open in the circuit.

DMC TROUBLE SHOOTING

PROBLEM	PROBABLE CAUSE	SOLUTION
A. DMC does not display speed or deflection.	1. Opto Chopper Disk is out of reader.	1. Replace Opto Chopper Disk in Reader. See Figure C-2, Page 17
B. DMC force display constantly reads 3.51, 35.1 or 351 as test results.	1. Firmware 10X range switching problem.	1. Call Factory for manual override switch.

Continued Next Page.

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TROUBLE SHOOTING (Cont)

DMC MONITOR/CONTROLLER CHECK OUT

As the DMC MONITOR/CONTROLLER and Tester work as a unit, the Digital Display on the DMC is designed to provide information about both pieces of equipment.

1. Remove the electrical power from the Tester by toggling the POWER ON/OFF Switch to the OFF position. Refer to Figure B-5, page 13.

2. Remove the Front cover of the Gear Guard. Refer to Figure C-1, page 17.

WARNING Permanent damage can be caused if the Load Cell is installed or removed with the power applied to the DMC.

3. Turn POWER OFF position on the DMC by pressing the POWER switch. Disconnect the Load Cell from the receptacle at the top of the Tester. Refer to Figure C-2, page 17.

4. Press the POWER switch on the DMC to turn power ON. The digital displays on the DMC present coded information during certain conditions. Follow these instructions carefully to determine this information. Refer to Figure J-2, page 49.

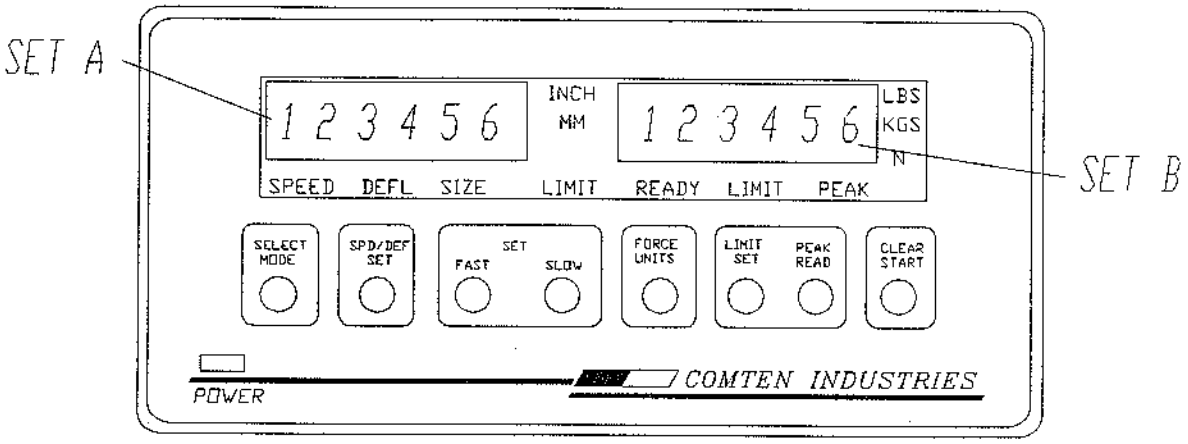


Figure J-2, DMC DISPLAY POSITIONS

5. With the DMC connected to the Tester:
   A. Set Tester DIRECTION switch to STOP.
   B. Toggle Tester POWER ON/OFF switch the ON position.

Continued Next Page.

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TROUBLE SHOOTING (Cont)

DMC MONITOR/CONTROLLER CHECK OUT (Cont)

6. Refer to Figure J-2, page 49. Position 1 of the digital display marked as SET B represents the status of the DMC DIP Switches 1 - 4 (refer to figure B-8, page 19). Compare this reading to the chart below. Verify that the indicated switch positions matches the actual positions and are consistent with your needs.

DISPLAY SET B, POSITION 1

DISPLAY READING	SWITCH # 1	2	3	4	DISPLAY READING	SWITCH # 1	2	3	4
0	OFF	OFF	OFF	OFF	8	OFF	OFF	OFF	ON
1	ON	OFF	OFF	OFF	9	ON	OFF	OFF	ON
2	OFF	ON	OFF	OFF	A	OFF	ON	OFF	ON
3	ON	ON	OFF	OFF	b	ON	ON	OFF	ON
4	OFF	OFF	ON	OFF	C	OFF	OFF	ON	ON
5	ON	OFF	ON	OFF	d	ON	OFF	ON	ON
6	OFF	ON	ON	OFF	E	OFF	ON	ON	ON
7	ON	ON	ON	OFF	F	ON	ON	ON	ON

7. Refer to Figure J-2, page 49. Position 5 of the digital display marked as SET A represents the status of the DMC DIP Switches 5 - 8 (refer to figure B-8, page 19). Compare this reading to the chart below. Verify that the indicated switch positions matches the actual positions and are consistent with your needs.

DISPLAY SET A, POSITION 5

DISPLAY READING	SWITCH # 5	6	7	8	DISPLAY READING	SWITCH # 5	6	7	8
0	ON	ON	ON	ON	8	ON	ON	ON	OFF
1	OFF	ON	ON	ON	9	OFF	ON	ON	OFF
2	ON	OFF	ON	ON	A	ON	OFF	ON	OFF
3	OFF	OFF	ON	ON	b	OFF	OFF	ON	OFF
4	ON	ON	OFF	ON	C	ON	ON	OFF	OFF
5	OFF	ON	OFF	ON	d	OFF	ON	OFF	OFF
6	ON	OFF	OFF	ON	E	ON	OFF	OFF	OFF
7	OFF	OFF	OFF	ON	F	OFF	OFF	OFF	OFF

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TROUBLE SHOOTING (Cont)

DMC MONITOR/CONTROLLER CHECK OUT (Cont)

8. Refer to Figure J-2, page 49. Position 3 of the digital display marked as SET B represents the status of the DMC DIP Switches 1 - 4 (refer to figure B-8, page 19). Compare this reading to the chart below. Verify that the indicated switch positions matches the actual positions.

DISPLAY SET B, POSITION 3

DISPLAY READING	SWITCH # 9	10	11	12	DISPLAY READING	SWITCH # 9	10	11	12
0	OFF	OFF	OFF	OFF	8	OFF	OFF	OFF	ON
1	ON	OFF	OFF	OFF	9	ON	OFF	OFF	ON
2	OFF	ON	OFF	OFF	A	OFF	ON	OFF	ON
3	ON	ON	OFF	OFF	b	ON	ON	OFF	ON
4	OFF	OFF	ON	OFF	C	OFF	OFF	ON	ON
5	ON	OFF	ON	OFF	d	ON	OFF	ON	ON
6	OFF	ON	ON	OFF	E	OFF	ON	ON	ON
7	ON	ON	ON	OFF	F	ON	ON	ON	ON

For steps 9 - 12, refer to Figure J-2, page 49. Locate position 4, SET B.

9. Press and hold the SET SLOW button. Position 4-B should read 1. Release button.

10. Press and hold the SET FAST button. Position 4-B should read 2. Release button.

11. Press and hold the SPD/DEF SET button. Position 4-B should read 4. Release button.

12. Press and hold the SELECT MODE button. Position 5-B should read 8. Release button.

For steps 13 - 16, refer to Figure J-2, page 49. Locate position 2, SET B.

13. Press and hold the CLEAR START button. Position 2-B should read 1. Release button.

14. Press and hold the PEAK READ button. Position 2-B should read 2. Release button.

15. Press and hold the LIMIT SET button. Position 2-B should read 4. Release button.

16. Press and hold the FORCE LIMIT button. Position 2-B should read 8. Release button.

17. Toggle the Tester DIRECTION switch to the UP position. The DMC should read dB in positions 4 and 5, SET A. Refer to figure J-2, page 49. A. Activate the Upper Limit Switch. The Digital read out on the DMC should change to C8 and the Tester should stop. If you are using a Platen Switch, activation of this switch should result in a DMC reading of 48.

Continued Next Page.

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TROUBLE SHOOTING (Cont)

DMC MONITOR/CONTROLLER CHECK OUT (Cont)

18. Toggle the DIRECTION switch to the DOWN position and activate the DOWN Limit Switch. Display positions 4 and 5A should read 24 or 25 and the Tester should stop.

19. Toggle the Tester DIRECTION Switch to the STOP position. Press and hold the SPEED/DEFLECTION SET and the FAST buttons at the same time. Display positions 4 and 5A should read should read d8 or d9. Release the SPEED/DEFLECTION and FAST buttons.

20. Press and hold the SPEED/DEFLECTION button only. Tester positions 4 and 5A should stop and the display should read 00 or 01. Release the SPEED/DEFLECTION button.

21. Press and hold the SPEED/DEFLECTION and the SLOW buttons simultaneously. The display should read 34 or 35; the Tester should run in the DOWN direction.
    A. Activate the DOWN Limit Switch. Display positions 4 and 5A should read 24 or 25; the Tester should stop.
    B. Release the SPEED/DEFLECTION button.

22. Turn POWER to OFF position on the Tester.

WARNING Permanent damage can be caused if the Load Cell is installed or removed with the power applied to the DMC.

23. Re-connect Load Cell Plug (DB-9) into the socket at the top of the Tester. Refer to figure C-2, page 17. Turn POWER on the Tester to the ON position. The DMC display will flash the correct Load Cell size and will send a report to the printer (if connected) and will give the current ROM version, Serial Number and date of the ROM, the Baud Rate, Check Sum and Mode of Operation (refer to OPERATION MODE, page 22.

The following is a summary of Tester status codes (positions 5 and 6, SET A, figure J-2, page 49.

FC -	Test stand OFF.
7F -	Test Stand is ON; Direction Switch in STOP position.
34 -	Test Stand is ON; Direction Switch in DOWN position. Lower Limit Switch not tripped.
24 -	Test Stand is ON; Direction Switch in DOWN position. Lower Limit Switch tripped.
d8 -	Test Stand is ON; Direction Switch in UP position. Upper Limit Switch not tripped.
c8 -	Test Stand is ON; Direction Switch in UP position. Upper Limit Switch tripped.

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OVER TRAVEL LIMIT SWITCH

The purpose of the Over Travel Switch is to prevent damage to the Tester and related equipment caused by driving the Power Screw and Torque Bar beyond available space. Damage can occur in either direction (up or down). The Limit Switch is activated by the Torque Bar pushing up or down on the operator adjustable Limit Set Collars. These Collars are on the vertical round rod located behind the right King Post.

The Over Travel Limit Switch is calibrated at the factory. The rigors of shipping and normal use can alter these adjustments. The following steps are designed to re-calibrate this switch by adjusting the position of the Magnet Assemblies relative to the Magnetic Switch.

Please read all steps in the procedure before proceeding.

1. Turn Power Switch off ... **AND** ... remove Test Stand Power Connector from outlet.

2. Refer to figure C-2, Page 14. Remove the Gear Guard.

3. Refer to Figure L-1 page 53. Move both Upper Limit Set Collar and Lower Limit Set Collar so they are at least one (1) inch from the Torque Bar.

4. The Split Ring Retainers should be equal distance (about 5/32") from the Motor Mount Plate. If they are equal within 1/16", proceed to step 5. If they differ by more than 1/16" adjust as follows: Unlock Lock Screw in the Lower Fixed Collar with 3/32 " hex wrench. Raise or lower the Collar on the Limit Switch Rod as necessary to center the Motor Mount Plate between the Split Ring Retainers. Tighten Lock Screw in Lower Fixed Collar. Check Split Ring Retainer spacing. Readjust if necessary.

5. The spacing between the Magnets on the Limit Switch Rod should be 5/8" +/- 1/32". The Magnetic Switch should be positioned an equal distance between the Upper and Lower Magnets. If the spacing is correct proceed to step 6. If incorrect, reposition the magnets by unlocking the Lock Screws on the Magnet Collars and set the 5/8" spacing with the Magnetic Switch centered. Re-tighten Lock Screws.

Do not change the position of the Red Collar.

6. Operate the Test Stand in both directions. The stand should stop when the Torque Bar contacts either the Upper or Lower Limit Switch Set Collars. If the Test Stand does not stop repeat steps 4 and 5 above.

7. Replace Gear Guard.

8. Return Upper Limit Set Collar and Lower Limit Set Collar to the desired operating position.

9. Connect Test Stand power. Test proper operation.

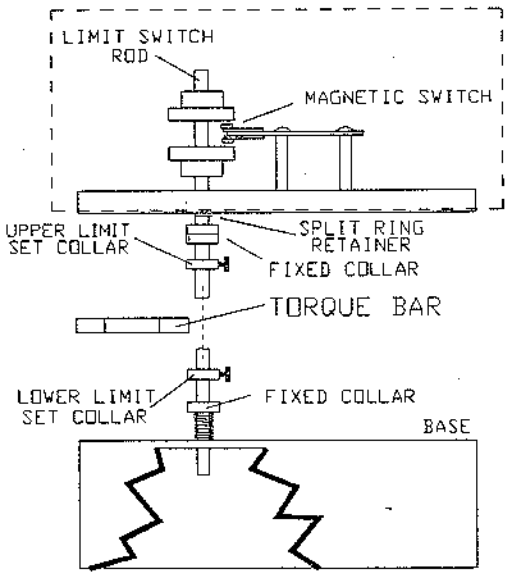


Figure L-1, LIMIT SWITCH ASSEMBLY

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PERFORMANCE DATA AND SPECIFICATIONS

TEST STANDS

FORCE MEASUREMENT

Load Cells:	Completely interchangeable to maximum capacity of the Test Stand.
Accuracy:	System accuracy to +/ - 0.10% of full scale.
Ranges:	4 to 5000 pounds.
Resolutions:	See Price Sheet.

WORKING CAPACITY

94- -RC	8 inches width with 18 inches of travel without clamps.
94- -VC	8 inches width with 28 inches of travel without clamps.
94- -YC	8 inches width with 44 inches of travel without clamps.
94- -BC	12 inches width with 44 inches of travel without clamps.

FORCE CAPACITY See ORDER SPECIFICATIONS, page 4.

OVERALL DIMENSIONS

	WIDTH	HEIGHT	DEPTH	
94- -RC	12	36	11	All dimensions in inches.
94- -VC	12	46	11	
94- -YC	12	61	11	
94- -BC	24	61	12	

SHIPPING WEIGHT

94- -RC	68	All Weights are in Pounds.
94- -VC	71	
94- -YC	83	
94- -BC	300	

TRAVEL IN INCHES PER MINUTE: See ORDER SPECIFICATIONS, page 4.

ENVIRONMENTAL REQUIREMENTS:

	OPERATING	STORAGE
AIR TEMPERATURE:	10 to 35 Degrees Celsius	-25 to 70 Degrees Celsius
RELATIVE HUMIDITY:	20 to 85% Non-condensing	5 to 90% Non-condensing

POWER REQUIREMENTS:

STANDARD:	115 VOLTS	50/60 Hertz	See back of Test Stand for AGC fuse size.
OPTIONAL:	220 VOLTS	50/60 Hertz	

All dimensions and weights are approximate and are without accessories included.

All specifications are subject to change without notice.

Continued Next Page.

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PERFORMANCE DATA AND SPECIFICATIONS (Cont)

DIGITAL MONITOR CONTROLLER (DMC)

Linearity:	+/- 0.1% of Full Scale
Display Update:	2 times per second
Sampling Rate:	20 times per second
Excitation:	Factory set Calibration, (10,000 VDC)
Analog Output:	0-1 VDC F. S. for chart recorder (0-100 mV F. S. on x10 scale)
Digital Output:	Selectable Data Stream (Serial) to computer or printer port.
Interface:	A 34 Line ribbon cable and a 5 line shielded cable connect the DMC to the Tester and allows for full control of the Tester including automatic testing.
Display:	Dual 6 Digit, 7-segment LED /display, .56" high. Left display for Speed or Deflection (Selectable). Right display for Force.
Force:	Resolution 4000 counts full scale adjusted to Pounds, Kilograms or Newtons.
Speed:	Resolution to .01" per minute (.254 mm as .02mm).
Deflection:	Resolution to .001" (.0254 mm as .02 mm).
Documentation:	Printer Output includes length of run, peak force, cross-head speed, and a graphic illustration of test results if selected. Date and Time are included with OPTION-RTC. Computer interface sends Force and Deflection data through the serial port at a rate of 2 conversions per second.
Size and Weight:	10.25"W x 5.5"H x 9.5"D; weight 8 lbs.
Calibration:	Suggested at the end of 1st six months or any time results appear distorted or questionable. The frequency of future calibration is determined by the stability found between calibrations.

ENVIRONMENTAL REQUIREMENTS:

	OPERATING	STORAGE
AIR TEMPERATURE:	10 to 35 Degrees Celsius	-25 to 70 Degrees Celsius
RELATIVE HUMIDITY:	20 to 85% Non-condensing	5 to 90% Non-condensing

POWER REQUIREMENTS:

STANDARD:	115 VOLTS	50/60 Hertz.
OPTIONAL:	220 VOLTS	50/60 Hertz
FUSE SIZE:	GMA 0.5 AMP.	Internal

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