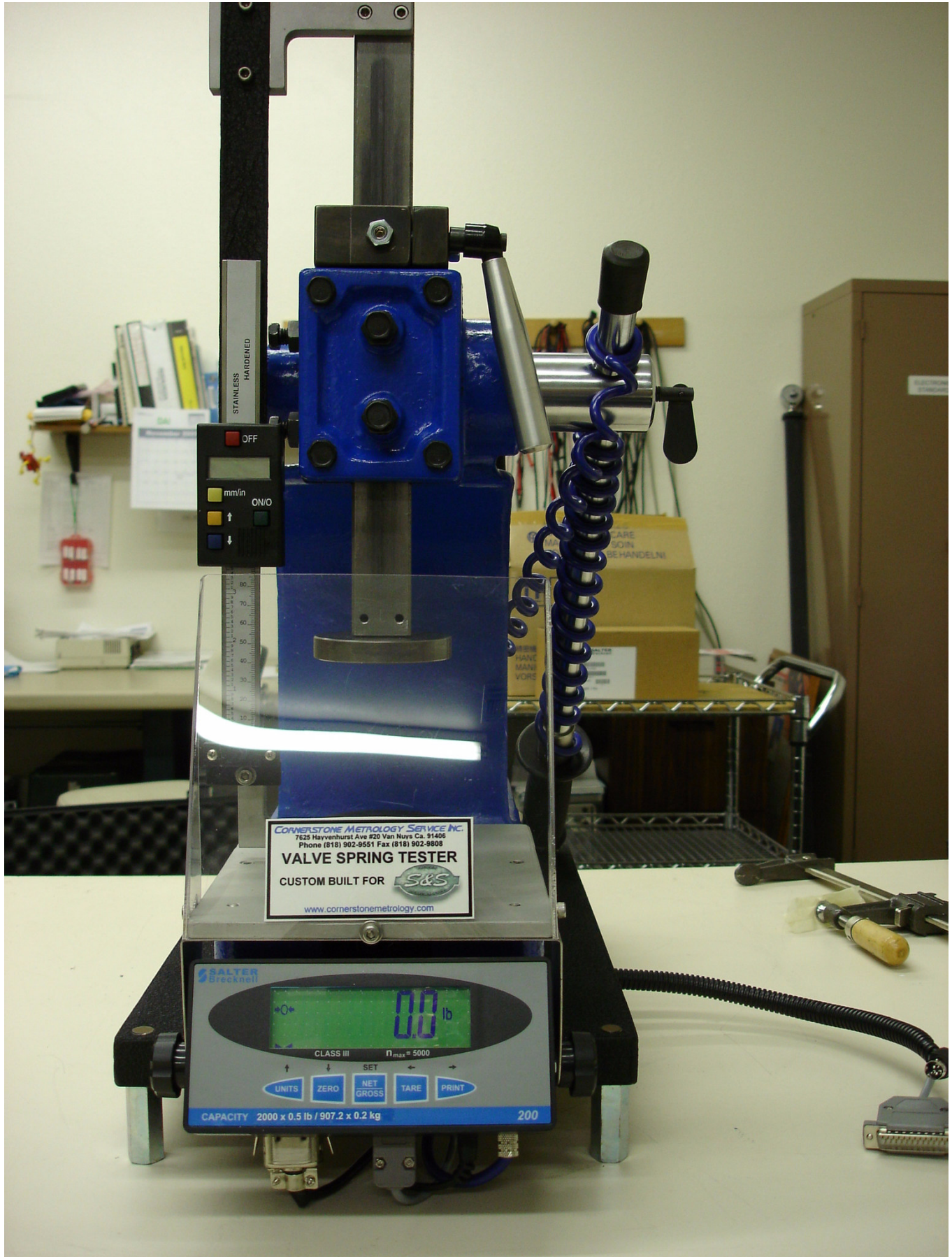


CORNERSTONE METROLOGY SERVICE INC.
OPERATION AND SERVICE MANUAL

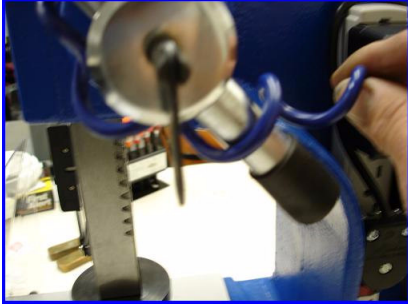


CORNERSTONE METROLOGY SERVICE INC.

OPERATION AND SERVICE MANUAL

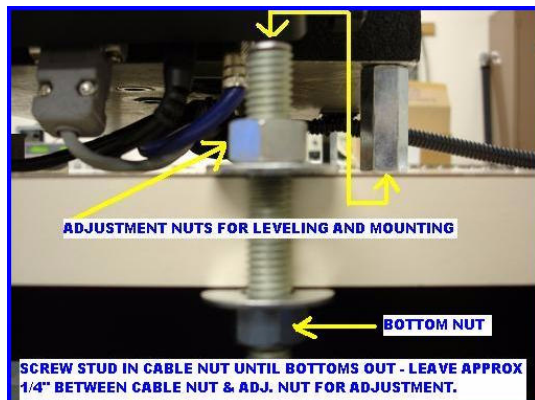
SETUP

REMOVE THE NUTS AND WASHERS FROM THE BOTTOM OF THE CRATE. REMOVE THE SCREWS THAT SECURE THE HANDLE IN THE CRATE. NOW CAREFULLY LIFT THE UNIT AND THE HANDLE OUT AND PLACE ON TABLE RESTING ON THE THREADED STUDS IN THE DESIRED POSITION. REMOVE THE SMALL RUBBER END CAP FROM THE HANDLE. ASSEMBLE THE HANDLE IN THE ARBOR PRESS SO THAT THE REAR END OF SHAFT PROTRUDES ABOUT 2" AND REINSTALL END CAP. SECURE HANDLE WITH THE PROVIDED LOCK SCREW SO THAT THE SET SCREW AT THE BASE OF THE HAND GRIP IS FACING DOWN. COIL BLUE CORD AROUND PROTRUDING END 2 TIMES (see picture below).

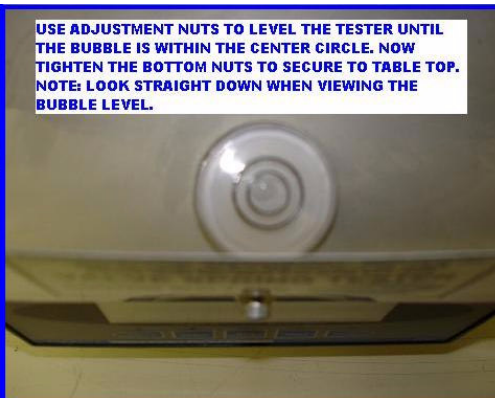


LOWER THE ADJUSTMENT NUTS DOWN ABOUT 1/4" FOR LEVEL ADJUSTMENT. MARK THE STUD LOCATION ON THE TABLE TOP. REMOVE UNIT AND DRILL 5/8" HOLES. RETRIEVE THE WASHERS FROM THE BOTTOM OF THE CRATE AND ALIGN OVER THE DRILLED HOLES. CAREFULLY LOWER STUDS THROUGH THE WASHERS AND DRILLED HOLES TO REST ON ADJUSTMENT NUTS. DO NOT

REMOVE THE CABLE NUTS. THE THREADED STUDS CAN BE REMOVED FROM THE CABLE NUTS WITHOUT DISTURBING THE CABLE NUTS. (see picture below).



USE ADJUSTMENT NUTS TO LEVEL THE TESTER UNTIL THE BUBBLE IS WITHIN THE CENTER CIRCLE. NOW TIGHTEN THE BOTTOM NUTS TO SECURE TO TABLE TOP. NOTE: LOOK STRAIGHT DOWN WHEN VIEWING THE BUBBLE LEVEL.



LOOKING STRAIGHT DOWN - THROUGH THE LEXAN SHIELD - ADJUST THE ADJUSTMENT NUTS UNTIL THE BUBBLE IN WITHIN IN INNER CIRCLE.

MAKE SURE THAT ALL 4 ADJUSTMENT NUTS ARE IN CONTACT WITH THE TABLE TOP TO ELIMINATE ANY ROCKING OF THE UNIT. NOW INSTALL THE NUTS AND WASHERS REMOVED FROM THE BOTTOM OF THE CRATE AND TIGHTEN THEM TO SECURE THE UNIT TO THE TABLE AND RECHECK THE BUBBLE LEVEL. ANY TIME THE TABLE IS MOVED OR UPON OCCASIONAL INSPECTION - IF FOUND OUT OF LEVEL - REPEAT THIS PROCEDURE. AN OUT OF LEVEL CONDITION MAY AFFECT THE ACCURACY OF THE FORCE MEASUREMENT. THIS UNIT WAS CALIBRATED AT A LEVEL CONDITION AND WAS ADJUSTED TO BE WITHIN + 0.0/-2.0 LBS OVER FULL RANGE OF 2000.0 LBS. TO MAINTAIN THIS ACCURACY, THE UNIT MUST BE LEVEL EVEN WHEN UNDER LOAD. IF THE UNIT DRIFTS OUT OF LEVEL WHEN IN USE, ADJUST THE BUBBLE TO THE FRONT SO THAT WHEN FORCE IS APPLIED, THE BUBBLE WILL DRIFT BACK BUT NOT OUT OF THE INNER CIRCLE. IF THIS CONDITION CAN NOT BE MAINTAINED, WE RECOMMEND A STIFFER TABLE OR STAND.

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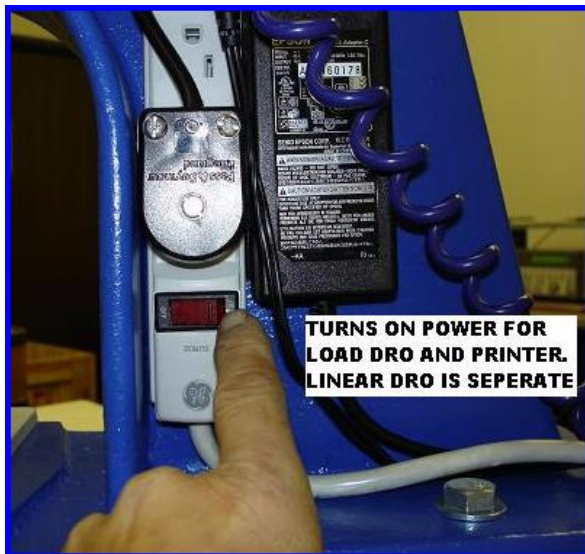
OPERATION AND SERVICE MANUAL

SETUP cont.

THE NEXT STEP IS TO CONNECT THE PRINTER AND LOAD DRO. CUT THE ZIP TIE THAT IS SECURING THE POWER CABLE AND THE PRINTER CABLE. THE PRINTER CABLE IS ATTACHED TO THE BASE OF THE UNIT ON THE RIGHT HAND SIDE. REMOVE THE PRINTER FROM THE BOX AND REMOVE THE TAPE FROM THE TOP COVER. OPEN THE COVER AND INSTALL THE ROLL OF PAPER AS SHOWN IN THE DIAGRAM INSIDE THE COVER. CLOSE AND SECURE THE COVER. TURN THE PRINTER OVER AND PLUG IN THE SERIAL AND POWER CABLE. THE PRINT RIBBON HAS BEEN INSTALLED. TURN THE PRINTER OVER AND POSITION AS DESIRED.

NEXT REMOVE THE LOAD DRO FROM THE BOX AND LAY ON ITS FACE IN FRONT OF THE UNIT. INSTALL ALL 4 CABLES LOCATED UNDER THE FRONT OF THE UNIT. ALL 4 CABLES HAVE UNIQUE CONNECTORS SO YOU CANNOT MIX THEM UP. REMOVE THE THUMB NUTS FROM THE DRO. NEXT SPREAD THE STAINLESS STEEL BRACKET SO THAT YOU MAY INSERT ONE OF THE 1/4-20 STUDS ON THE SIDES OF THE DRO, INTO THE BRACKET. NEXT SPREAD THE BRACKET TO ALLOW INSTALLATION OF THE OPPOSITE STUD. REPLACE THE THUMB NUTS AND ADJUST THE FACE OF THE DRO PARALLEL TO THE LEXAN SHIELD AND TIGHTEN THUMB NUTS.

NEXT PLUG IN THE POWER CABLE AND TURN ON THE POWER AS SHOWN BELOW.



THE SWITCH SHOULD LIGHT UP - IF DOES NOT CHECK POWER SOURCE. THE POWER BUTTONS FOR THE DRO AND THE PRINTER MAY BE LEFT ON SO THAT THIS SINGLE SWITCH ON THE POWER STRIP WILL TURN ON THE LOAD DRO AND PRINTER TOGETHER. THE LINEAR DRO HAS A SEPARATE ON BUTTON AND MUST BE TURNED ON SEPARATELY. DUE TO THE LINEAR DRO LOW POWER CONSUMPTION - IT CAN BE LEFT ON ALL OF THE TIME WITHOUT EFFECTING THE BATTERY LIFE. THE BATTERY WILL LAST ABOUT 1 YEAR, ON OR OFF. AN EXTRA BATTERY IS INSIDE THE BOX FOR THE LINEAR SCALE.

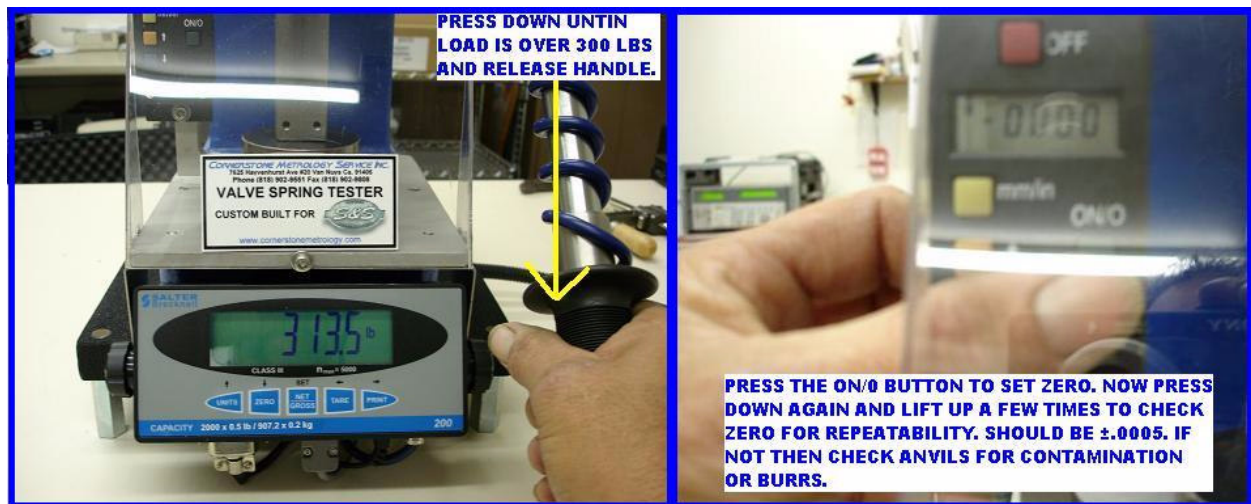
NOW THAT THE UNIT IS TURNED ON IT CAN BE USED WITHOUT WARM UP. THE NEXT STEP WILL EXPLAIN HOW TO ACCURATELY SET YOUR ZERO POINTS FOR BOTH LINEAR AND LOAD DRO. DUE TO THE DESIGN OF THIS UNIT, THE ABSOLUTE VALUE IS $\pm .004$ FOR THE LINEAR MEASUREMENT AND ± 2.0 LBS FOR FORCE MEASUREMENT IF THE ZERO SETTING PROCEDURE IS FOLLOWED CORRECTLY. THIS WILL ELIMINATE THE NEED FOR SETTING STANDARDS REGARDLESS OF SPRING SIZES FROM 0-6" TALL OR FORCE FROM 4.0-2000.0 LBS.

CORNERSTONE METROLOGY SERVICE INC.

OPERATION AND SERVICE MANUAL

SETTING ZERO'S

LINEAR SCALE ZERO IS SIMPLE TO SET BUT MUST BE PERFORMED DAILY TO MAINTAIN ACCURACY. IT ALSO MAY BE PERFORMED A FEW TIMES DAILY IF THE TEMPERATURE IS NOT CONTROLLED. THERMAL EXPANSION CAN CAUSE ERROR IN THIS FIXTURE DUE TO ITS SIZE AND MASS SO IT SHOULD BE VERIFIED FREQUENTLY. THIS IS THE RECOMMENDED PROCEDURE. CLEAN AND OR DEBURR THE UPPER AND LOWER ANVILS WITH A COTTON CLOTH OR A FINE STONE IF ANY BURRS ARE PRESENT. PULL THE HANDLE DOWN UNTIL THE ANVILS MAKE CONTACT AND PULL UNTIL 300 LBS OR MORE ARE SHOWN ON THE LOAD DRO. NOW RELEASE THE HANDLE AND LET IT REST IN THIS POSITION. THIS WILL EXERCISE THE LOAD CEL AND ELIMINATE AND DEFLECTION ERRORS. NOW WITHOUT DISTURBING THE HANDLE PRESS THE ON/O BUTTON ON THE LINEAR SCALE. BE CAREFUL NOT TO PRESS TOO HARD TO DEFLECT THE SCALE. NOW CHECK REPEATABILITY BY RAISING AND COMpressing THE ANVILS A FEW TIMES AND MAKE SURE THAT THE LINEAR SCALE REPEATS WITHIN ± 0.0005 . NOW THE LINEAR SCALE IS READY FOR USE.

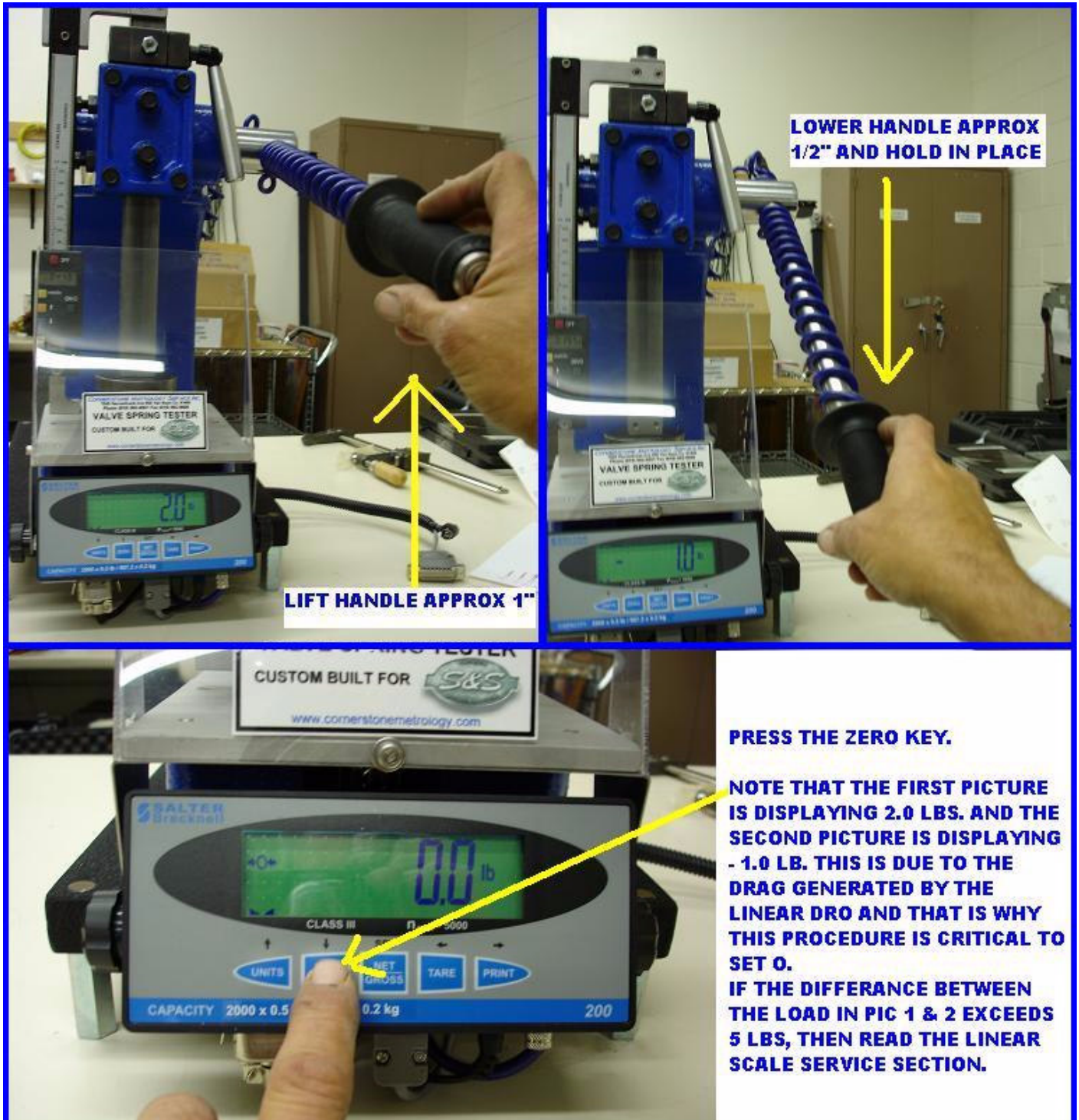


LOAD CEL DRO ZERO IS A LITTLE MORE COMPLEX AND IS ALSO IN NEED OF SOME VERIFICATION DURING THE DAY. THE FIRST STEP IS TO RAISE THE ANVIL APPROX. 1" UP AND THEN APPROX. 1/2" DOWN. HOLDING THE HANDLE TO ASSURE THAT THE UPPER ANVIL IS ABOUT 1/2" FROM THE LOWER ANVIL WITH THE FORCE IN THE COMPRESSION DIRECTION, WITH THE OTHER HAND, PRESS THE ZERO BUTTON ON THE LOAD DRO. NOW RAISE AND LOWER THE HANDLE ABOUT 1/2" AND CHECK THE REPEATABILITY ON YOUR ZERO. IT SHOULD REPEAT WITHIN 1.0 LB. YOU WILL NOTICE THAT WHEN YOU LIFT THE HANDLE, THE LOAD DRO WILL DISPLAY SOME FORCE. THIS IS CAUSED BY THE DRAG GENERATED BY THE LINEAR SCALE THAT IS MOUNTED TO THE LOWER ANVIL THAT IS ATTACHED TO THE LOAD CEL. THIS IS NORMAL BECAUSE THE LINEAR SCALE MUST HAVE SOME DRAG TO BE ACCURATE. SINCE THE SPRING TESTER IS USED IN THE COMPRESSION MODE, WE MUST ZERO IT IN THE COMPRESSION MODE. IF THIS READING IS FOUND TO EXCEED 5 LBS WHEN YOU HAVE SET YOUR ZERO AND LIFT THE ANVIL, GO TO THE LINEAR SCALE SERVICE SECTION OF THIS MANUAL FOR INSTRUCTIONS.

CORNERSTONE METROLOGY SERVICE INC.

OPERATION AND SERVICE MANUAL

SETTING ZERO'S cont.



IF THE ZERO REPEATS WITHIN +/- 1.0 LB THEN YOU ARE READY TO CHECK SPRINGS.

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OPERATION AND SERVICE MANUAL

OPERATION

OPERATION IS VERY SIMPLE, PLACE A SPRING IN THE CENTER OF THE LOWER ANVIL, PULL THE HANDLE UNTIL THE SPRING HEIGHT IS DISPLAYED ON THE LINEAR DRO, AND PRESS THE BUTTON LOCATED IN THE END OF THE HANDLE TO PRINT OUT THE MEASURED FORCE AT THAT HEIGHT (see picture below). REPEAT THIS FOR EACH DESIRED HEIGHT. IT IS IMPORTANT TO HOLD THE HANDLE AS STEADY AS POSSIBLE WHEN PRESSING THE PRINT BUTTON AND WILL TAKE SOME PRACTICE TO GET USE TO. THE BAUD RATE OF THE PRINT COMMAND IS FAST AND WILL TAKE READINGS “ON THE FLY” SO BE STEADY AND YOU WILL GET GOOD RESULTS.



OPERATION FOR SAMPLE LOTS

WHEN INSPECTING MULTIPLE SPRINGS OF THE SAME CONFIGURATION, YOU WILL WANT TO USE THE DEAD STOP. I HAVE BEEN PROVIDED WITH SOME SPECIFICATIONS OF ONE OF YOUR APPLICATIONS AND I WILL USE THESE SPECIFICATIONS FOR AN EXAMPLE OF THE DEAD STOP EMPLOYMENT.

SPECIFICATION PROVIDED

INSTALLED HEIGHT = 2.300
½ LIFT HEIGHT = 1.800
FULL LIFT HEIGHT = 1.300

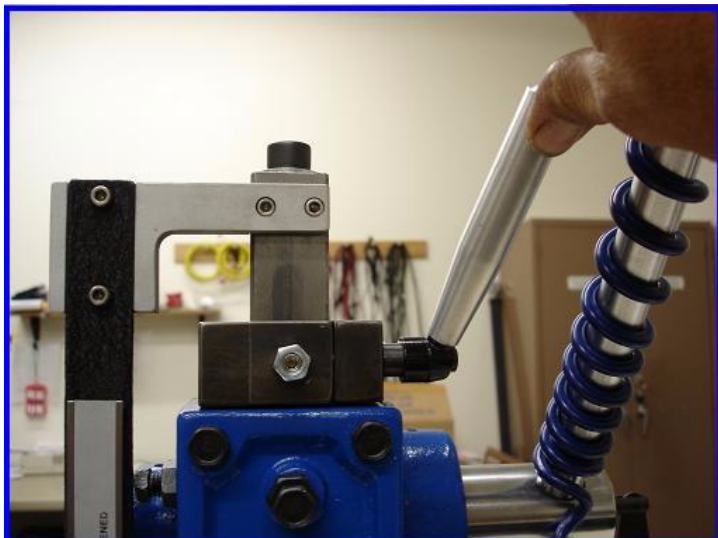
THE FORCE WAS PROVIDED AS WELL BUT IS NOT NEEDED FOR THE SETUP. WE WILL TREAT THE FORCE AS AN UN KNOWN TO SIMULATE YOUR ACTUAL INSPECTION PROCESS.

THE HANDLE ON THE DEAD STOP WILL BE ADJUSTED SO THAT IT MAY STILL BE MOVED BUT HAVE A DRAG SUFFICIENT TO HOLD ITS POSITION. THE HANDLE ON THE DEAD STOP CAN BE INDEXED BY PULLING HANDLE OUTWARDS AND ROTATING TO A DESIRED POSITION. (see picture next page).

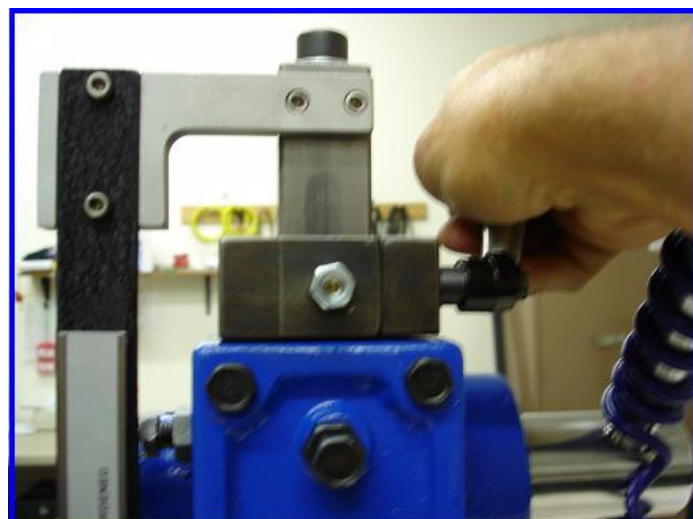
CORNERSTONE METROLOGY SERVICE INC.

OPERATION AND SERVICE MANUAL

OPERATION FOR SAMPLE LOTS cont.



THE DEAD STOP IS EQUIPPED WITH TEFLON BUSHINGS AND CAN BE PRE LOADED WITHOUT DAMAGING THE SURFACES OF THE ARBOR SHAFT. NOW YOU CAN PULL THE ANVIL DOWN TO THE LOWEST DESIRED HEIGHT AND LOCK IT IN PLACE.



NOW PLACE A GAGE BLOCK UNDER THE LEFT HAND SIDE OF THE DEAD STOP THAT IS EQUAL TO THE FULL LIST TO GET YOUR "INSTALLED HEIGHT"



NOTE THE DRO READING



CORNERSTONE METROLOGY SERVICE INC.

OPERATION AND SERVICE MANUAL

OPERATION FOR SAMPLE LOTS cont.

NEXT REPLACE THE 1" GAGE BLOCK WITH ONE EQUAL TO ½ LIFT



NOTE THE DRO READING



NOW YOU CAN INSPECT MULTIPLE SPRINGS USING THE 1" BLOCK FOR INSTALLED HEIGHT, THE .500 BLOCK FOR ½ LIFT HEIGHT AND NO BLOCK FOR FULL LIFT HEIGHT. YOU MUST BE CAREFUL NOT TO OVER PULL THE DEAD STOP AS IT IS NOT PINNED BUT A FRICTION STOP. THIS WILL TAKE SOME TIME TO GET USE TO. IF THE DEAD STOP BECOMES SLOPPY IN THE UNLOCKED MODE. THE SET SCREWS ON THE FRONT AND SIDE CAN BE READJUSTED TO A PERCEPTIBLE DRAG AND ELIMINATE THE SLOP.

SPECIAL APPLICATIONS

THE ARBOR HANDLE HAS BEEN POSITIONED TO MEASURE UP TO 3.5" BUT IF YOU HAVE A TALLER SPRING, YOU CAN RE INDEX THE ARBOR SPLINE BY REMOVING THE LOCK COLLAR, SLIDING OUT THE HANDLE AND RE INDEXING IT. THERE IS NO NEED TO RESET THE LINEAR SCALE DRO IF THIS IS DONE. (see picture below)



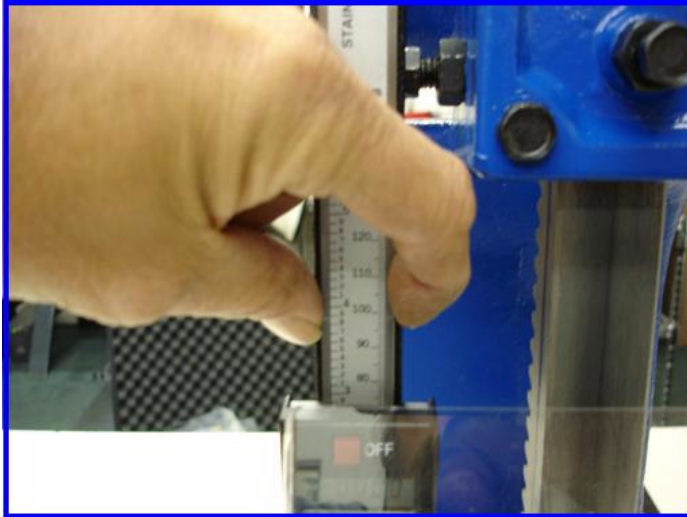
BOTH THE LINEAR AND LOAD DRO CAN BE SWITCHED INTO METRIC UNITS OF MEASURE WITHOUT THE NEED TO RE ZERO OR RE CALIBRATE. ANY COMBINATION IS ALSO POSSIBLE. KG FORCE WITH INCH HEIGHT OR LBS FORCE WITH MM HEIGHT.

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OPERATION AND SERVICE MANUAL

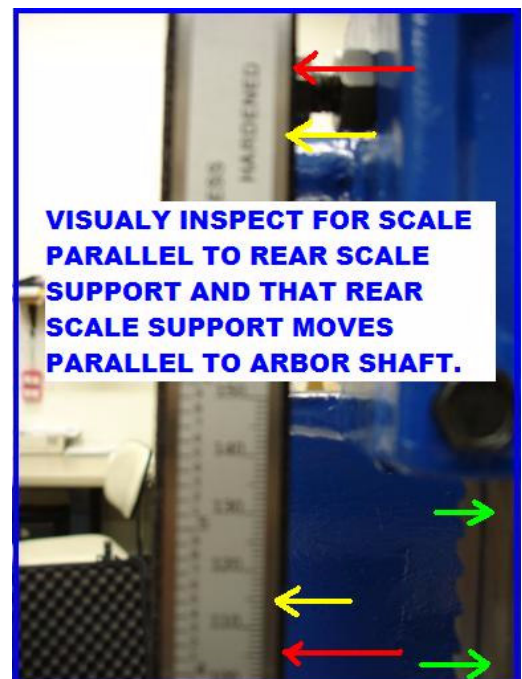
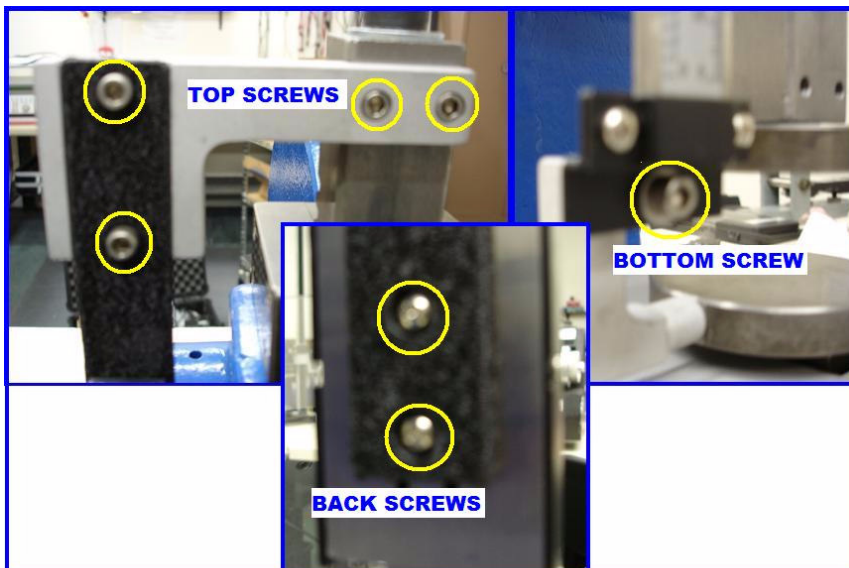
LINEAR SCALE SERVICE SECTION

IN THE EVENT THAT YOU ARE HAVING PROBLEMS WITH THE LINEAR SCALE, HERE ARE SOME SIMPLE FIX'S. THE MOST COMMON PROBLEM IS CONTAMINATION CAUSING TO MUCH DRAG ON THE SCALE. LIGHTLY TAKE YOUR FINGERS AND CLEAN THE GIB AREA'S OF THE SCALE. DO NOT OIL THIS SURFACE. (see picture below)



IF THIS DOES NOT CORRECT THE PROBLEM THEN CHECK THE ALIGNMENT OF THE SCALE. THE BLACK REAR BRACKET MUST MOVE PARALLEL TO THE ARBOR SHAFT. THIS CAN BE VERIFIED VISUALLY BY MOVING THE HANDLE UP AND DOWN WHILE OBSERVING THE REAR BRACKET IN RELATION TO ONE OF THE FREE PLAY BOLTS IN THE LEFT HAND SIDE OF THE ARBOR HEAD. IF IT DOES NOT MOVE PARALLEL, THEN LOOSEN AND ADJUST THE UPPER BRACKET SCREWS. (see picture below)

NOTE THAT THE HEIGHT OF THE REAR BRACKET IS SET SO THAT THE LINEAR READER HEAD DOES NOT CONTACT THE LOWER BRACKET OF THE LINEAR SCALE WHEN IN THE ZERO POSITION. IF YOU SIMPLY KEEP THE TOP OF THE REAR BRACKET FLUSH WITH THE TOP ARBOR SHAFT MOUNT, IT WILL CLEAR. THE REAR BRACKET SHOULD ALSO TRAVEL PARALLEL TO THE ARBOR SHAFT FRONT TO BACK. THIS IS NOT ADJUSTABLE.



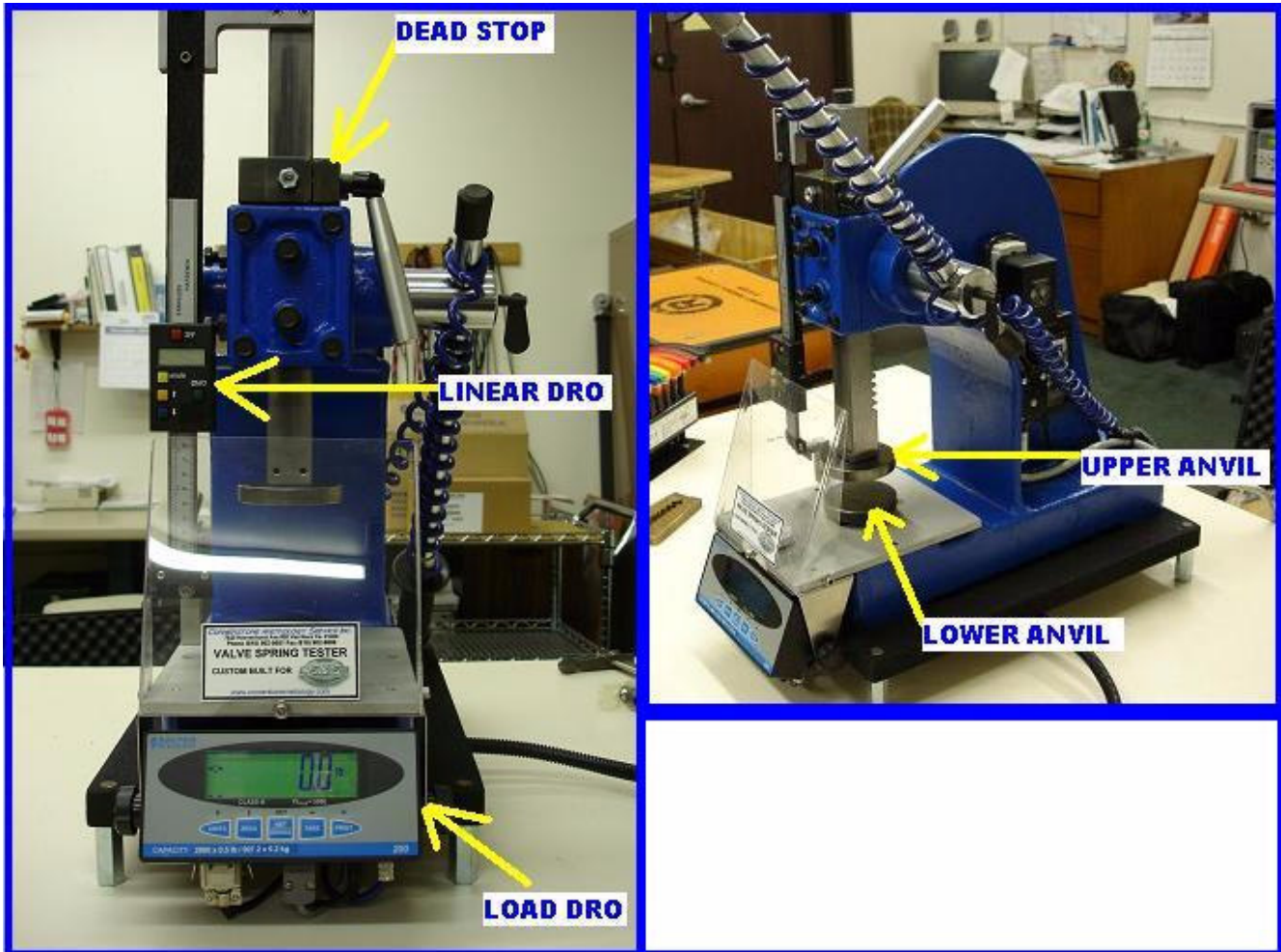
CORNERSTONE METROLOGY SERVICE INC.

OPERATION AND SERVICE MANUAL

LINEAR SCALE SERVICE SECTION cont.

IF THE TOP SCREWS ARE ADJUSTED, THEN THE BOTTOM SCREW MUST BE LOOSENED AND RE TIGHTENED TO ELIMINATE ANY BIND CAUSED BY THE ADJUSTMENT. A VISUAL INSPECTION NOW CAN BE PERFORMED TO ASSURE THAT THE LINEAR SCALE READING SCALE IS CENTERED AND PARALLEL WITH THE REAR BRACKET. THIS ADJUSTMENT IS DONE BY LOOSENING THE BOTTOM SCREW AND THE BACK SCREWS. IF THE PROBLEMS STILL EXISTS, THEN THE PROBLEM IS LOAD CEL ALIGNMENT AND MUST BE PERFORMED BY CORNERSTONE METROLOGY.

DESCRIPTIONS



QUESTIONS OR PROBLEMS CALL KEITH AT
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