Calibration Manual

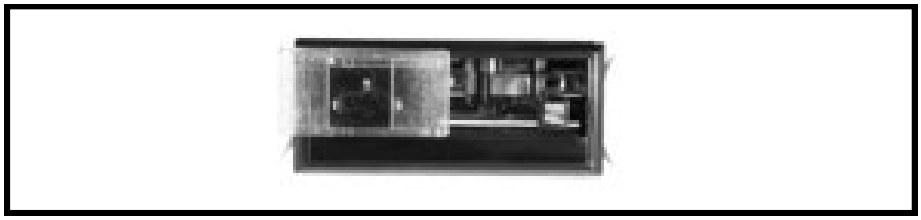
SYSTEM 1000-1

MADE IN USA

IMCO.US

www.imco.us

VOLTAGE CONNECTOR



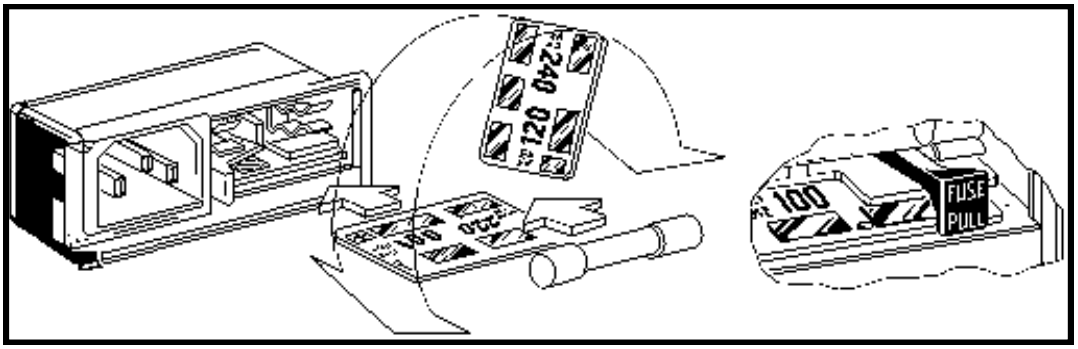
CORCOM'S VOLTAGE SELECTING AND FUSED CONNECTOR

Developed for the manufacturer who markets his products worldwide, the Voltage Connector eliminates the need for internal wiring changes, special power supplies or the need for stocking different line cords.

The Voltage Connector provides an internationally approved connector, a fuse holder and a means to change transformer primary connections with a unique voltage selector card.

With the Voltage Connector, equipment can be operated anyplace in the world without modification at time of installation.

VOLTAGE SELECTION



HOW TO SELECT OPERATING VOLTAGE

1. **Open cover door and rotate fuse pull to left.**
2. **Select operating voltage by orienting PC Board to position desired voltage on top left side. Push board firmly into module slot.**
3. **Replace fuse.**

CALIBRATION

Sequence of calibration procedure is the same for all type presses

OBI - C-FRAME - GAP - STRAIGHT SIDE - PRESS BRAKES

The following procedure applies:

1. **Pre-check Load Cells. This need only be done when new and then periodically for correct maintenance purposes.**
2. **Pre-calibration check of machine.**
3. **Pre-calibration check of Piezoelectric Transducers and Control unit.**
4. **Set up Live Load Cell with Load Cell Indicator. If more than one point to be calibrated, set up dummy load cell(s).**
5. **Determine factor number for Load Cell Indicator**
6. **Calibrate press member(s) columns or pitman(s).**
7. **Selecting and securing capacitors in control box by permanently soldering.**
8. **Check out Control unit activation.**

1. PRE-CHECK OF LOAD CELLS

1. Ensure that in the event of using more than one Load Cell, (i.e.: when calibrating two and four point presses) that all cells, live or dummy type, are of identical height or do not vary more than .0005 from each other.

2. If variation is found in dimensional height grind all cells in unison, both on top and bottom, using light passes without coolant.

2. PRE-CHECK OF MACHINE

1. Clean bolster plate and press slide with degreasing fluid. Deburr and file off any sharp projections likely to interfere with slide to bed parallelism.

2. Remove any knock-out pins.

3. Run slide to bottom of stroke.

4. Use accurate dial indicator to check that parallelism of slide to bed is within .0005.

5. If out of alignment correct before proceeding further. This is especially important for two and four point presses.

6. Determine no holes in face of slide or in bolster are in line with position that the Load Cell will be placed.

(a) If holes are in slide or bed and 2" diameter or less, we recommend 1 1/2" thick spacer plates be placed on top and bottom of load cell.

(b) For holes of larger diameter, spacer thickness must be increased accordingly within limits of machine shut height.

3. PRE-CALIBRATION CHECK OF PIEZOELECTRIC TRANSDUCERS AND CONTROL BOX

All piezoelectric transducers supplied with any type of IMCO system must be torqued to **15 inch/lbs**. with torque wrench as supplied for any type of IMCO system. Insert hexagon end of torque wrench into top of screw socket as depicted in illustration IC500, and turn wrench clockwise as to tighten until distinct click is heard signifying suitable torque has been reached. Piezoelectric transducer is then properly torqued.

PORTABLE MEASUREMENT ONLY

Before starting to calibrate machine, plug in portable TON-INDICATOR at Signal Conditioning Box. Switch TON-INDICATOR TO "ON". Apply pressure to each piezoelectric transducer in turn by sharp jerk-type squeeze placing each piezoelectric transducer in dynamic compression (either by fingers or channel locks). Meter needle should rise, and if satisfactory response, check that piezoelectric transducer location is related to toggle switch position on signal conditioning box; i.e., switch on Signal Conditioning Box to right side, piezoelectric transducers on rear right housing (facing front of machine) gives signal on meter. Same for left hand side with switch on Signal Conditioning Box to left side. If, on squeezing piezoelectric transducer(s) it is noted that meter needle rises upon releasing pressure on sensor, wiring to sensor is reversed and incorrect. Recheck white to "A", black to "B" wiring. These checks will ensure that wiring from piezoelectric transducer to Signal Conditioning Box is correct. If incorrect, recheck wiring instructions.

PERMANENT MEASURING & MONITORING SYSTEMS

Before starting to calibrate machine with permanent unit, check that power light is "ON" at panel face, then carry out same preliminary checking procedure as for Portable Measurement, consisting of correct piezoelectric transducer(s) activation of meter(s) or digital display(s) that the piezoelectric transducer(s) location for left and right side columns or pitmans corresponds to designated left and right side meter or digital display activation. If calibration unit is set up correctly, machine alignment checked out and the piezoelectric transducers activation are satisfactory, proceed with CALIBRATION PROCEDURE.

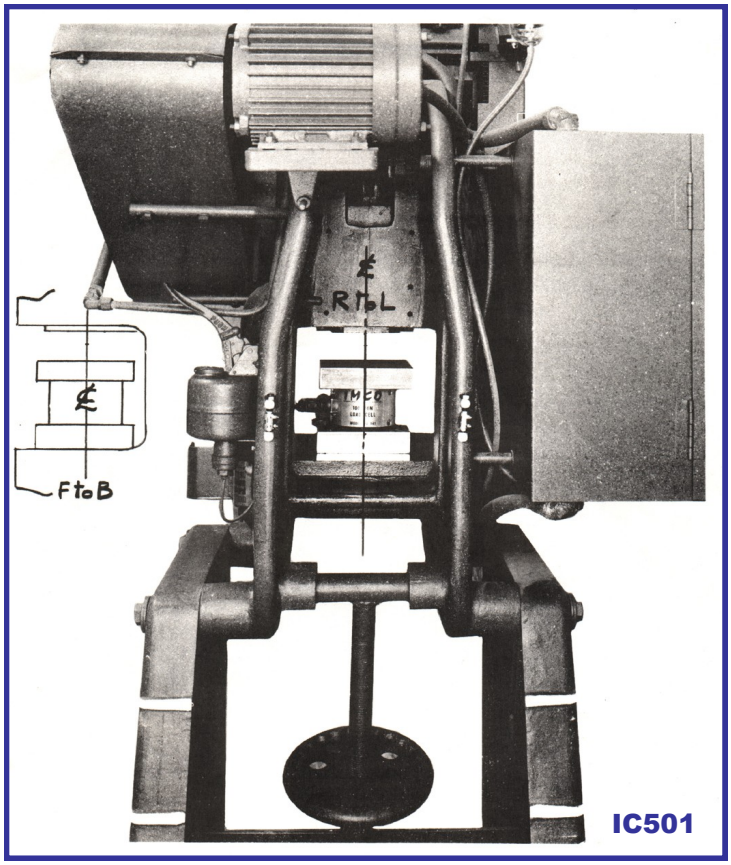
CALIBRATION PROCEDURE

The following procedure and illustrations cover setting up of a single load cell connected to Load Cell Indicator as for calibrating a single point O.B.I. (two housings) or a single point Straight Side (one pitman). The procedure for a two or four point Straight Side Press is very similar. When setting up the load cell for a machine with more than one pitman we place Load Cell under one pitman and dummy(s) (solid block) under the other(s) to balance the applied load over all pitmans. Follow procedure for first pitman with live load cell, completing calibration in its entirety, then switching live load cell with dummy and vice versa, completing calibration of second pitman, etc. until all points are completed.

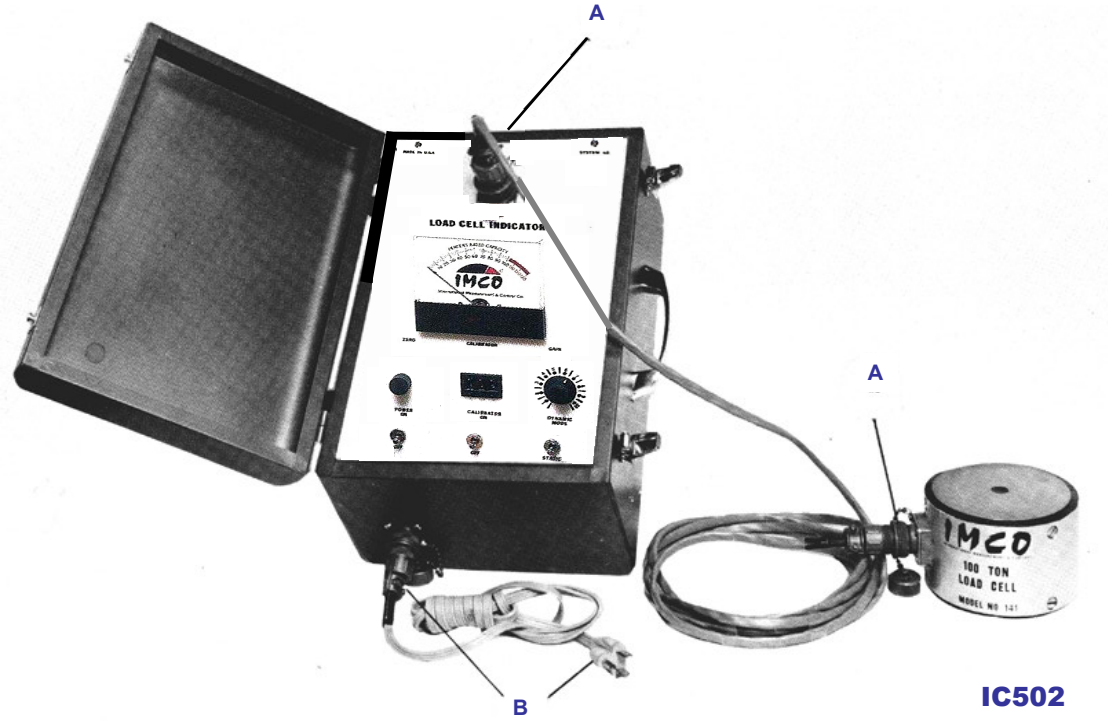
4. SETTING UP LOAD CELL INDICATOR AND LIVE LOAD CELL

1. **Ensure pre-checks of Load Cells, Machine, piezoelectric transducer and Control unit have been complete.**
2. **SET SLIDE TO BOTTOM OF STROKE > IMPORTANT<**
   If slide is at bottom of stroke the slide should always move away from load cell upon starting to rotate the drive. Extreme care should be exercised to ensure that this condition prevails to avoid possibility of striking load cell and spacers with first press stroke.
3. **Insert Live Load Cell and spacer plates Illustration IC501. Locate and center directly beneath pitman, both left to right and front to back.**

NOTE:
If more than single point machine, i.e., double crank Straight Side, etc., set a dummy load cell and spacers of identical height under other pitman to provide balanced load.



4. Connect Live Load Cell to Load Cell Indicator via load cell connector illustration **IC502(A).**
5. Connect Load Cell Indicator via three wire plug to 110V power supply illustration **IC502(B)** .



IC502

6. Check Load Cell Indicator illustration **IC503** to ensure POWER and CALIBRATOR switch Is to "OFF" and MODE switch is to "STATIC".
7. Turn POWER switch to "ON". Meter needle will rise.
8. Rotate "ZERO" control knob until meter needle registers zero. This function balances the load cell bridge.
9. Insert the correct factor number on CALIBRATOR Three Digit Dial by rotating control. This factor number obtained from Calibration Tonnage Factor Sheet. (See explanation of number determination)
10. Switch Calibrator to "ON", meter needle will rise from zero position.
11. Adjust GAIN control until indicator needle reads 100%.
12. Switch Calibrator "OFF", needle will drop. Adjust, if necessary, to get accurate reading of zero by using zero control knob.
13. Repeat 10 to 12 once more.
14. Put MODE switch in DYNAMIC position.

IC503

5. DETERMINING YOUR FACTOR NUMBER FOR THE LOAD CELL INDICATOR

To determine your suitable "factor" number to be dialed in on your Load Cell Indicator we recommend the following procedure:

Based on type press you intend to calibrate. Select a percent-age of its maximum capacity at which you plan to work. This percentage should always be 50% or more but is not necessary to calibrate at 100% unless machine capacity is in low tonnage range. For guidance the IMCO factory engineer endeavors to work at approximately 60-80%.

Select factor number from TONNAGE/FACTOR data sheet, then compare the Tonnage listed opposite in the adjacent column as a percent ratio of the machine maximum capacity, making sure it falls within the limits specified in previous paragraph, but practical enough to be easily read on customer control meter.

If percent ratio appears within limits, this will then be the dial readout percent you will be looking for on portable or machine mounted control unit. The readout on the meter of the Load Cell Indicator will always be 100%.

DO NOT EXCEED LOAD CELL CAPACITY
This can result in damage and subsequent erroneous calibration procedure.

Care should also always be exercised when pres point tonnage is higher than the Load Cell capacity, that is protected from accidental overload.

Examples Based on using 100 ton Load Cell

125 Ton Press Single Point
Calibrate at 100 tons - Factor **(see Example Factor Sheet page 10)**
100 : 125 = 80%.
Load Cell Indicator Master Meter should read 100%, while customer control meter should read 80%.

60 Ton Press - Single Point
Calibrate at 45 tons - Factor **(see Example Factor Sheet page 10)**
45 : 60 = 75%.
Load Cell Indicator Master Meter should read 100%, while customer control meter should read 75%.

250 Ton Two Point Press
125 Ton Per Point (*Use dummy load cell under one point.)
Calibrate each point at 85 tons - Factor **(see Example Factor Sheet page 10)**
85 : 125 = 68%.
Load Cell Indicator Master Meter should read 100%, while customer control meter should read 68%.

45 Ton Single Point Press
Calibrate at between 80 and 100% when tonnage gets really low to obtain best resolution.
Calibrate - 40 tons - Factor **(see Example Factor Sheet page 10)**
Calibrate - 45 tons - Factor **(see Example Factor Sheet page 10)**
40 : 45 = 88.8% (89%)
45 : 45 = 100%
35 : 45 = 77.7% (78%)

EXAMPLES CONTINUED

From these examples covering varied types of machines it can be seen that determining the factor is a relatively simple process and that when calibrating the Load Cell Indicator (Master Meter) should read that percent of machine capacity determined by the ratio of factor tonnage as to total machine capacity.

*

When using dummy load cells as for two and four point presses, ensure that live and dummy Cells are approximately within .005 of each other. Calibrate each point in turn using same live load cell and supporting other points with dummy cell(s).

6. CALIBRATING MACHINE MEMEBER

OBI - C-FRAME - GAP- ONE POINT (One Pitman) STRAIGHT SIDE PRESS

We can now accurately determine, visually, by readout of percent capacity meter on the Load Cell Indicator any load placed on the machine when striking the top surface of the Live Load Cell and/or spacer with the machine slide (ram), reflecting how hard the cell is struck.
At the time of load, piezoelectric transducers having been pre-torqued, each to 15 inch/lbs., will undergo a physical change causing a discharge of electrical energy proportional to how hard the cell is struck.
This energy output coming from across the piezoelectric transducer terminals is in turn transmitted to the piezoelectric transducer input terminals located within the control box or Signal Conditioning Box.
Due to the energy output from the piezoelectric transducers being different from the energy output from the Live Load Cell, we are now required to "condition" the piezoelectric transducers outputs. The control meter or control digital displays contained in either the portable TON-INDICATOR or the permanently mounted CONTROL UNIT, will be made to read in terms of percent capacity for a meter system or direct tons for a digital system the tonnage at which machine is being calibrated, while at the same time the meter of the Load Cell Indicator should be reading 100%.
This matches energy values from both the piezoelectric transducers and Load Cell at tonnage exerted on the machine. This final step in the calibration procedure is accomplished as follows:

First check that Live Load Cell, spacers, etc. have not shifted position in between the slide and bed; this should be checked periodically during calibration.

CALIBRATING MACHINE MEMBER
Portable Measurement Only

Connect Portable TON-INDICATOR to Signal Conditioning Box via Amphenol connector Illustration **IC504(A) Page 8.** Position so as to readily view meter readout of both TON-INDICATOR and LOAD CELL INDICATOR. Set toggle switch at front of Signal Conditioning Box to RIGHT side or if multiple position Signal Conditioning Box as for Four Point Press set switch to point number one.

Open Signal Conditioning Box cover and connect the Capacitance Switch Box CSB-2 via alligator clips cross piezoelectric transducer input for RIGHT side or number one point of Signal Conditioning Box Illustration **IC504(D) Page 8 .** Make sure all Capacitance Switch Box CSB-2 switches are each on zero. Transducers input location Illustration **IC504(B) Page 8.**

With screwdriver, turn clockwise the variable capacity trimmer for right side located in Signal Conditioning Box just above piezoelectric transducer input terminals (do not force screw by over tightening) Illustration **IC504(C) Page 8.**

PORTABLE MEASUREMENT ONLY Continued

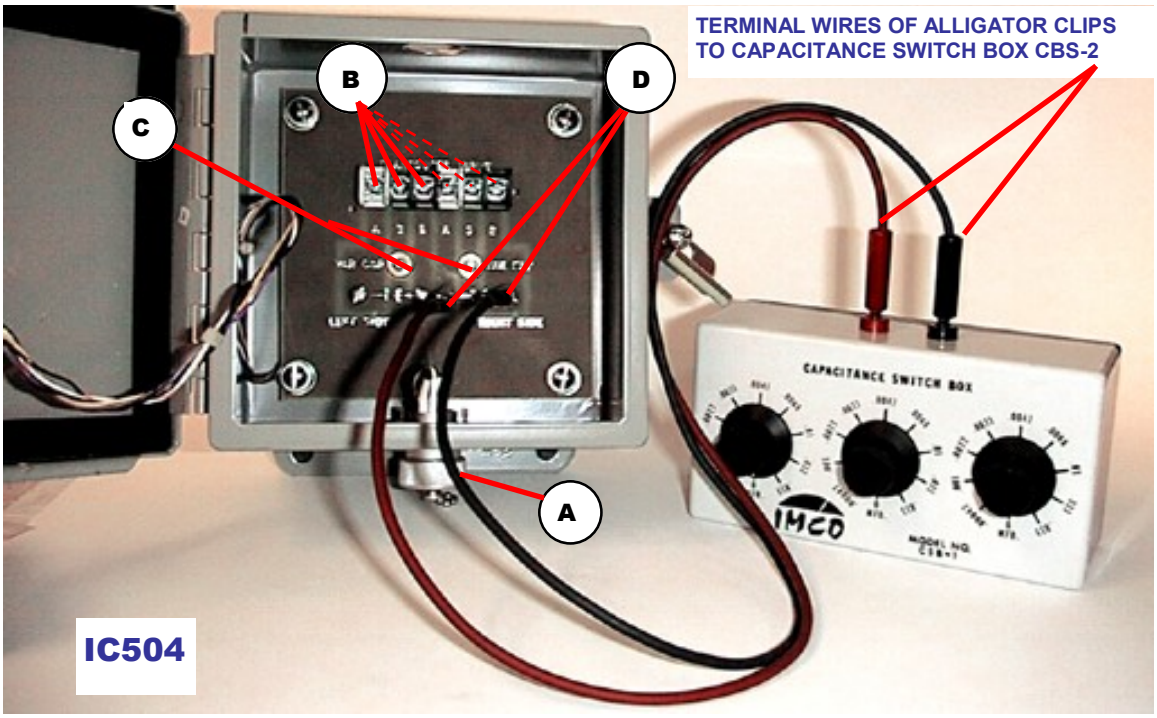
Start slide in motion, reducing shut height in approximate .005 increments so as to slowly introduce increasing tonnage on live load cell by striking with slide face (ram). Slowly bring Load Cell Indicator Meter up to 100% reading, which based on Factor input chosen from Tonnage/Factor Data Sheet will represent a specific tonnage being applied to Load Cell and therefore machine members.

The capacitance Switch Box CSB-2 represents the 9 standard values of calibrating capacitors repeated (3) three times on (3) three rotary switches. Use the rotary switches in any combination to select the exact capacitance required.
With the LOAD CELL INDICATOR METER reading 100%, continue to strike the Load Cell intermittently, at the same time introducing capacitance values into the piezoelectric transducer circuitry by using the Capacitance Switch Box CSB-2. Dial in capacitance to just above the reading you require. Then using the two other rotary switches add additional capacitance to bring readings down using smaller capacitance values. It is possible to use only (1) one rotary switch to achieve required values. Stop the press and select one or more combination of capacitors **(do not mix other types or manufactures of capacitors)** to achieve the total value needed. Remove alligator clips from across terminal in control box, insert capacitors by attaching across A & B terminal screws of appropriate piezoelectric transducer input. **Illustration IC 506(D).**

Start press once again and check readout on control meter, and if it remains as close as previous when connected to Capacitance Box, insert screwdriver into variable capacity trimmer Illustration **IC504(C)** turning counterclockwise to reduce 5-6% overage to obtain corrected percent capacity meter readout representing desired calibration tonnage.

If accurate readout cannot be obtained by variable trimmer, recheck capacitance total of Capacitance Switch Box or values selected. If readout is accurate, make sure capacitance is securely connected in position.

Repeat procedure for left-hand side sensor or other points. Remember to check frequently positioning of Live Load Cell, spacers, etc. beneath the pitman to avoid any “walking” action. When percent capacity readout from the portable meter correctly represents calibration tonnage for each individual member and the Load Cell Indicator meter also continues to read 100% for each, the calibration is complete.



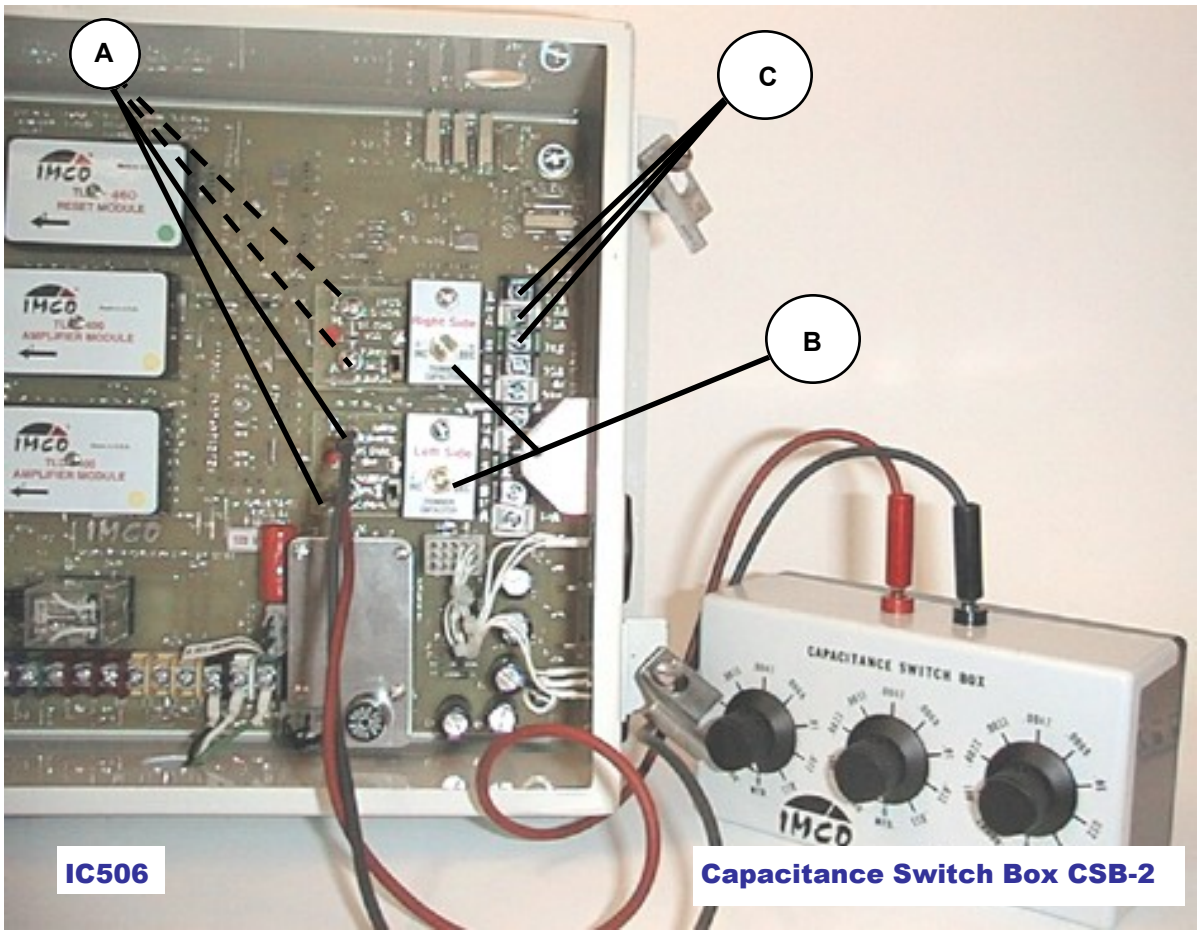
7. SELECTING AND SECURING CAPACITORS IN CONROL BOX

Set LOAD CELL INDICATOR in position so as to enable convenient readout of its meter and those meter(s)or digital display(s) on the permanently mounted unit on machine. (A/C Powered TON-INDICATOR or TON-LIMIT DETECTOR).

If unit is of single meter and toggle switch type set switch to RIGHT SIDE, check power light is on. Two meter or digital type requires no checking other than to assure power light is "ON".

Open inner door of control by removing single screw on right-hand side. Connect Capacitance Switch Box CSB-2 with alligator clips to piezoelectric transducers input capacitance terminals for Right Side. Illustration IC506(A). Make sure Capacitance Switch Box CSB-2 switches are each on zero.

Start slide in motion, reducing shut height in approximate .005 increments so as to slowly introduce increasing tonnage on live load cell by striking with slide face (ram). Slowly bring Load Cell Indicator Meter up to 100% which, based on Factor input chosen from Tonnage/Factor date sheet, will represent a specific tonnage being applied to Load Cell and therefore machine members.



IC506 Capacitance Switch Box CSB-2

EXAMPLE:
This is not your factor sheet .

LOAD CELL INDICATOR

TONNAGE FACTOR DATA SHEET

EXAMPLE:
This is not your factor sheet .

U.S. TONS		METRIC TONNES	
CALIBRATION TONNAGE	LOAD CELL INDICATOR FACTOR NO.	CALIBRATION TONNAGE	LOAD CELL INDICATOR FACTOR NO.
100T	72D	100T	65D
95	76	95	69
90	80	90	73
85	85	85	77
80	90	80	82
75	96	75	87
70	103	70	93
65	111	65	101
60	120	60	109
55	131	55	119
50	144	50	131
45	160	45	145
40	180	40	163
35	206	35	187
30	240	30	218
25	288	25	261

NOTE:

This factor sheet is to be used with Load Cell Indicator equipped with 500K CALIBRATOR POT

Set factor number in Load Cell Indicator. Slowly build up pressure on Load Cell in press by decreasing die space and striking Cell harder until Load Cell Indicator meter reads 100%. Tonnage at this point being exerted on Load Cell will be that shown opposite factor number.

See calibrations instructions.

COMPANY NAME: EXAMPLE — THIS IS NOT YOUR FACTOR SHEET	
DESCRIPTION: 100 TON LIVE AND DUMMY LOAD CELL	
SERIAL NO.	**MODEL NO. 141**
FACTOR REF U.S.: 72D = 100T	**METRIC 65D - 100T**
CAL POT: 500K	**BRIDGE RESISTANCE: 350**
HEIGHT: 3.999 INCHES	**101.55 MILIMETERS**
DATE:	**NO. IN SET: 2**

Set factor number in Load Cell Indicator. Slowly build up pressure on Load Cell in press be decreasing die space and striking Cell harder until Load Cell Indicator meter reads 100%. Tonnage at this point being exerted on Load Cell will be that shown next to factor number. See calibration instructions.

Determine your "factor" number by selecting suitable Calibration Tonnage that represents ratio of approximately 60-80% of machine capacity you are calibrating. Always work at 50% or better of machine rated capacity in tons but it is not necessary to work at 100% unless in low tonnage range presses. DO NOT EXCEED LOAD CELL CAPACITY.

This can result in damage and subsequent erroneous calibration procedure.

See reference for determining your factor number.

The Capacitance Switch Box CSB-2 represents the 9 standard values of calibrating capacitors repeated (3) three times on (3) three rotary switches. Use the rotary switches in any combination to select the exact capacitance required.
With the LOAD CELL INDICATOR METER reading 100%, continue to strike the Load Cell intermittently, at the same time introducing capacitance values into the piezoelectric transducer circuitry by using the Capacitance Switch Box CSB-2. Dial in capacitance to just above the reading you require. Then using the two other rotary switches add additional capacitance to bring readings down using smaller capacitance values. It is possible to use only (1) one rotary switch to achieve required values. Stop the press and select one or more combination of capacitors **(do not mix other types or manufactures of capacitors)** to achieve the total value needed. Remove alligator clips from across terminal in control box, insert capacitors by attaching across A & B terminal screws of appropriate piezoelectric transducer input.
Illustration IC 506C Page 9

IC505

8. CHECK OUT CONTROL UNIT ACTIVATION

Start press once again and check readout on control meter(s) or digital display(s). If it remains as close as previous when connected to Capacitance Switch Box CSB-2, insert screwdriver into variable capacity trimmer, **Illustration 506(B**), turning counter clockwise to reduce the 5 - 6% over range to obtain correct percent capacity meter readout or correct tons for digital readout, representing desired calibration tonnage.

If accurate readout cannot be obtained by variable trimmer, recheck capacitance total of Capacitance Switch Box CSB-2 or values selected. If readout is accurate, make sure capacitance is securely connected in position.

Repeat procedure for the left-hand side piezoelectric transducer or other points. Remember to check frequently positioning of Live Load Cells, Spaces, etc. beneath pitman to avoid any “walking” action. When capacity readouts from control meter(s) or control digital display(s) correctly represent calibration tonnage for each individual member and the Load Cell Indicator meter also continues to read 100% for each, the calibration is complete.

DUMMY TEST BRIDGE INSTRUCTIONS

A Dummy Test Bridge has been supplied with your System 1000-1 Load Cell Indicator in order to check proper system operation. This is accomplished by plugging the Dummy Test Bridge into the Load Cell Indicator System 1000-1 connector and checking to see if the Load Cell Indicator System 1000-1 balances properly.

This check is done with the Load Cell Indicator System 1000-1 in the Static Mode and the Calibrator Pot on any Factor Number.

This will insure that the Load Cell Indicator System 1000-1 is operating properly and eliminates any question that might arise between possible difficulties in either a Load Cell or the Load Cell Indicator System 1000-1.

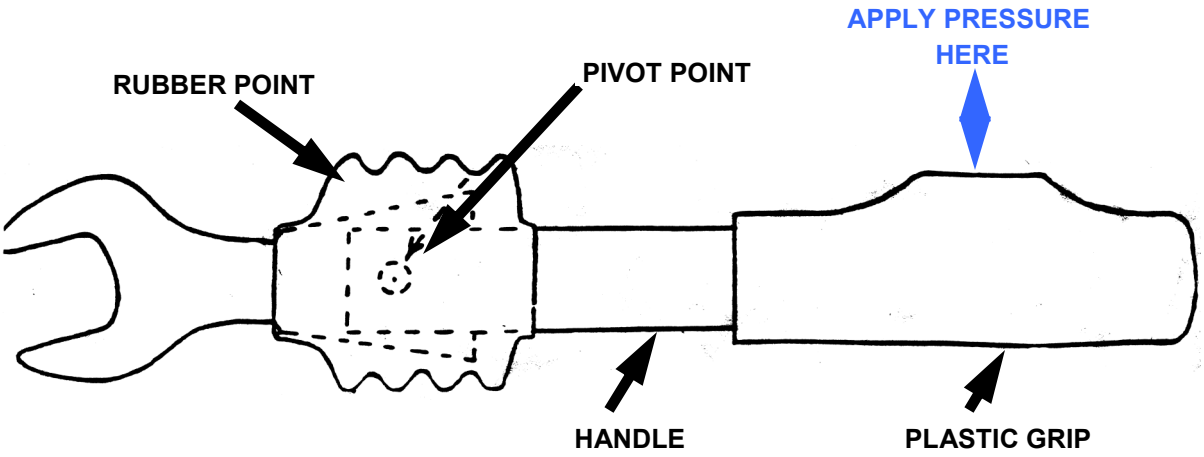
BREAKOVER TYPE TORQUE WRENCH

This wrench is designed to allow a gentle breakover at the preset torque. During this breakover, the wrench handle will pivot 17 degrees around the pivot point without exceeding the preset torque.

This design eliminates torque overshoot, which can happen with sudden breakover (*click type)* mechanisms, by allowing the user time to release the pressure on the handle.

If wrench is used infrequently, breakover mechanism should be worked several times on a test fitting before wrench is used in its application.

1) **Place wrench on fitting to be tightened.**
2) **Place hand over plastic grip such that pressure will be applied directly on the raised portion of the plastic and at 90 degrees to the handle. This positioning ensures that the distance between the applied force and the tool turning center will be the same as when the tool was calibrated.**
3) **Apply steady, slow pressure (Do not exceed one inch pound per second when approaching the torque setting.)**
4) **Release pressure when the pivoting motion us felt.**
5) **A torque wrench is an instrument. Treat it with care.**



*****************WARNING*****************

A. User should maintain a balance stance while using torque.

B. Torque Wrench should not be used near moving machinery, sharp objects, exposed voltage sources or anywhere that unexpected movement could cause injury,

C. Torque Wrench should not be toques beyond factory setting