BHJ PRODUCTS, INCORPORATED

MODEL CWG-2

ULTRASONIC DIGITAL CYLINDER WALL GAUGE

INSTRUCTION MANUAL

-IMPORTANT-
READ THIS MANUAL BEFORE ATTEMPTING
TO USE THIS INSTRUMENT.

STATEMENT OF WARRANTY:

THE BHJ PRODUCTS CWG-2 INSTRUMENT IS WARRANTED AGAINST DEFECTIVE MATERIALS AND WORKMANSHIP FOR ONE YEAR. BATTERIES AND PROBES, (SUBJECT TO WEAR) ARE EXCLUDED FROM THE WARRANTY.

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DESCRIPTION AND SPECIFICATIONS

The CWG-2 is a lightweight, portable, battery operated thickness gauge. Its designed application is accurate measurement of cast iron cylinder walls under shop conditions. Solid-state circuitry and a liquid crystal display provide ruggedness and reliability.

MEASUREMENT RANGE:	.050 to 10"+
RESOLUTION WITHIN RANGE:	.001"
GAUGING ACCURACY:	±.005 (due to rough backside of cylinder wall)
OPERATING TEMPERATURE:	0°F to +130°F
POWER PACK:	Rechargeable NiCad Batteries (*Alkaline batteries may be used but must not be re-charged)
BATTERY LIFE:	Approximately eight hours between charges for NiCad
OPERATING VOLTAGE:	11 to 13 volts, with automatic low voltage cutoff
CONTACT COUPLANT:	Petroleum based couplant is supplied with the Instrument (*Any non-metallic grease or oil of suitable viscosity may be used)

Further electronic circuit descriptions and schematic circuit diagrams can be obtained on special request, from the factory.

CONTROLS

1.	LO CAL	to adjust low end of calibration range
2.	HI CAL	to adjust high end of calibration range
3.	OFF/2”/20”	turns instrument on and sets measuring range

OPERATION

Set-up and operation MUST BE performed in the following step-by-step sequence to avoid confusion.

1. Set instrument up on bench or in carrying case.

2. Plug probe leads into either twist lock socket on top of case.

3. Switch instrument from “OFF” to “2”. A reading may appear but the display will not light up.

CALIBRATION

Proper calibration is imperative for accurate thickness readings. To establish an initial starting point to calibrate from, or if calibration becomes difficult after repeated uses, follow this initial procedure:

A. Turn both the “LO CAL” and “HI CAL” knobs counterclockwise, until both are all the way to the left.

B. Turning one knob at a time, rotate each knob clockwise until both are all the way to the right. Use the slot in the center of each knob as a reference to count the number of turns. Determine how many turns the knobs take to get from full left to full right – most knobs will rotate either 9 or 10 full turns. Record the number of turns where it can be referred to in the future.

C. Next, rotate each knob counterclockwise exactly the number of turns needed to get each to its halfway point (4.5 turns, 5 turns, etc.), using the slot in the center of each knob for reference once more.

Calibrate the instrument as follows:

1. Select the appropriate calibration standard for the type of cylinder block to be tested.

2. Apply a small amount of couplant from tube supplied to the divided face of the probe.

3. Using care to align the curved face of the probe with the inside curve of the standard, place the probe in the center of the “THIN” section of the standard and squeeze gently between thumb and forefinger. Gentle wiggling may be necessary to seat the probe into the curve of the standard. The instant that contact is made, the display will light up.
   Now adjust the “LO CAL” knob until the display reads the actual thickness of the standard.

4. Again, using care to align the divided face of the probe, move the probe to the “THICK” section of the standard (Apply more couplant if necessary). Squeeze gently between the thumb and forefinger until display lights up and adjust the “HI CAL” knob until the display reads the actual thickness of the standard.

5. During initial calibration, it may be necessary to repeat steps 3 and 4 until the instrument is properly calibrated. When repeating steps 3 and 4 and adjusting the “LO CAL” and “HI CAL” knobs, it may be advantageous to alter the process slightly as follows: Adjust the “LO CAL” knob until the reading is roughly .002 higher than the actual thickness of the THIN standard. Likewise, adjust the “HI CAL” knob until the reading is roughly .002 lower than the actual thickness of the THICK standard. Repeat this process until the instrument is very close to the final setting and at that point, adjust the LOW and HI to the actual thickness. Following this modified procedure may help to achieve final calibration faster, as the adjustments of the “LO CAL” knob can effect the reading of the “HI CAL” setting, and vice-versa. Once properly calibrated, the instrument will read both thicknesses of the standard within .001”.

6. The instrument is now ready for use. The instrument may be switched off and on again without need for re-calibration.

7. The accuracy of the readings is dependent upon the couplant thickness and smoothness of the part. A lighter couplant should be used on smooth surfaces for accuracy. A thicker couplant is necessary on rough, corroded surfaces.

THIS INSTRUMENT MAY BE CALIBRATED FOR MOST OTHER MATERIALS PROVIDED TWO KNOWN THICKNESSES CAN BE FOUND FOR CALIBRATION.

MEASURING CYLINDER WALLS

1. Cylinders should be clean and free of dust, dirt, oil or other foreign material. Lightly rusted surfaces can be measured accurately. Severely rusted surfaces should be wire brushed at each point that is to be measured.

2. Apply a small amount of couplant from the tube supplied to the point to be measured.

3. Using care to match the curved face of the probe to the curve of the cylinder wall, press the probe against the wall. The display will light up when contact is made. Rotate the probe slightly until the readout stabilizes.

NOTES

A. Cylinder walls should be checked ¾ to 1 inch down from the top to avoid the deck thickness.

B. Experience indicates that many blocks have their thinnest point approximately 3" down from the top.

C. Blocks that have siamesed cylinders will read the total thickness between cylinders.

D. Operator preference will decide where and how many points on each cylinder will be checked.

E. Since the instrument reads thickness to the first interface, cylinders with sleeves will read the sleeve thickness only. Also, unseen holes, voids or other contaminants within the metal will result in thin readings.

POWER SUPPLY

1. Batteries

   The CWG-2 has a removable battery pack containing ten AA rechargeable NiCad batteries. Removal of the battery pack is accomplished by loosening the quarter-turn screw on the top of the instrument, then sliding the entire pack up from the screw. A spare battery pack can then be installed or, in an emergency, ten standard AA alkaline batteries can be substituted. (Standard alkaline batteries must not be recharged.)

   IMPORTANT: Deep cycling of NiCad rechargeable batteries is preferred for maximum battery life. This requires leaving the instrument switched on until the readout goes blank (Battery Cut-Off), and then recharging the batteries overnight.

2. Battery Cut-Off

   A circuit in the unit turns off the power when the voltage drops below a set level. This prevents malfunction of the instrument due to low voltage.

3. Recharging

   A small plug-in charger is used to recharge the batteries or will operate the unit from the AC line. Overnight or 14-15 hours will completely charge the batteries. The instrument should be turned off while charging.

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CALIBRATION STANDARDS APPLICATION CHART

This kit contains the following four calibration standards:

X-7	Calibration Thickness	Low_____	High_____
L-3	Calibration Thickness	Low_____	High_____
R-6	Calibration Thickness	Low_____	High_____
D-2	Calibration Thickness	Low_____	High_____

APPLICATIONS

ENGINE TYPE	CALIBRATION STANDARD
American Motors All V-8	L-3
Buick All V-8	L-3
Cadillac All 1968 & Later	L-3
Chevrolet V-8 Small Block 262-400 (except specials listed below)	R-6
Chevrolet V-8 High Nickel Casting	X-7
Chevrolet V-8 “Bow Tie Block”	X-7
Chevrolet V-8 Big Block 396-454	R-6
Chevrolet V-8 Big Block Hi-Nickel Marine Block	X-7
Chevrolet Straight 6 Cylinder	R-6
Ford V-8 Small Block 289-400	D-2
Ford V-8 Big Block 352-428	D-2
Ford V-8 Big Block 429-460	D-2

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CALIBRATION STANDARDS APPLICATION CHART – Cont.

ENGINE TYPE	CALIBRATION STANDARD
Ford Straight 6 Cylinder	R-6
Ford 4 Cylinder	D-2
General Motors Corporate V-6	L-3
Mopar V-8 Small Block 273-360	X-7
Mopar V-8 Big Block 361-440 (including Hemi)	X-7
Oldsmobile V-8 All 1967 & Later	L-3
Pontiac V-8 All 1965 & Later	L-3