HUMBOLDT

H-3250, H-3250D, H-3248 & H-3248D

Instruction Manual

LENGTH COMPARATORS

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1. General

This equipment set consists of three main components:

- A frame with base, upright and adjustable anvil.
- A micrometer indicator of the dial or digital type with movable anvil.
- A checking reference bar - Invar Test Bar (10" or 16" effective gage length for H-3250 models or H-3248 models respectively).

The equipment meets specifications for the following tests:
ASTM C151, C157, C227, C452, C490 & C596
AASHTO M210, T107, T160

Note: For collars conforming to ASTM C878 order part number H-3257.5 and for collars conforming to ASTM C806 order part number H-3251.

This instrument is also used for measuring length changes of prismatic specimens over an effective gage length of 5". For this it is necessary to obtain an H-3249.1 5" Reference Bar and an H-3250.8 Adapter.

2. Unpacking

Your equipment was thoroughly inspected before it was shipped and should be ready to operate as soon as you have completed the set-up procedure. Notify Humboldt Mfg. Co. or your local agent and file a claim with any carriers involved if you find any damage to the machine.

Unpack all of the equipment carefully to prevent loss of small items or manuals.

3. Assembly & Set-up

Place the comparator frame on a stable surface with space on either side to locate the checking bar. A receptacle must be available for the correct power if it is to be applied with the digital model.

It is recommended the instrument be checked and adjusted when received using the Standard Invar Test Bar as follows (dial type indicator example):
With the test bar in place between the anvils, set the Large Hand and Small Count Hand (movement of 0.010) on "0". The other Small Count Hand movement of 0.100") should be set on 2. If adjustment is necessary, loosen the hex locking nut on the elevating screw at the base and adjust anvil until Small Count Hand (movement of 0.100") is on 2. Hold anvil in place and tighten lock nut at the base.

4. Operation

Use for measuring length changes of hardened cement paste, mortar and concrete prismatic specimens to 0.0001-inch accuracy.

There are two anvils with collars, both shaped to meet the measuring studs cast in the ends of the test bars. The movable anvil is attached to the end of the indicator spindle; the stationary anvil is attached to the base with a threaded elevating screw through the base and a hex lock nut. This is used for adjusting the anvil to obtain a proper reading on the indicator when checking with the Invar Test Bar (see set-up above).

In operating the Comparator, specimens should be brought to the instrument with the micrometer indicator retracted. The specimen is set in the lower anvil and the indicator is released, very slowly and carefully, to allow contact with the upper anvil.

5. Operation of Mechanical Dial Indicator

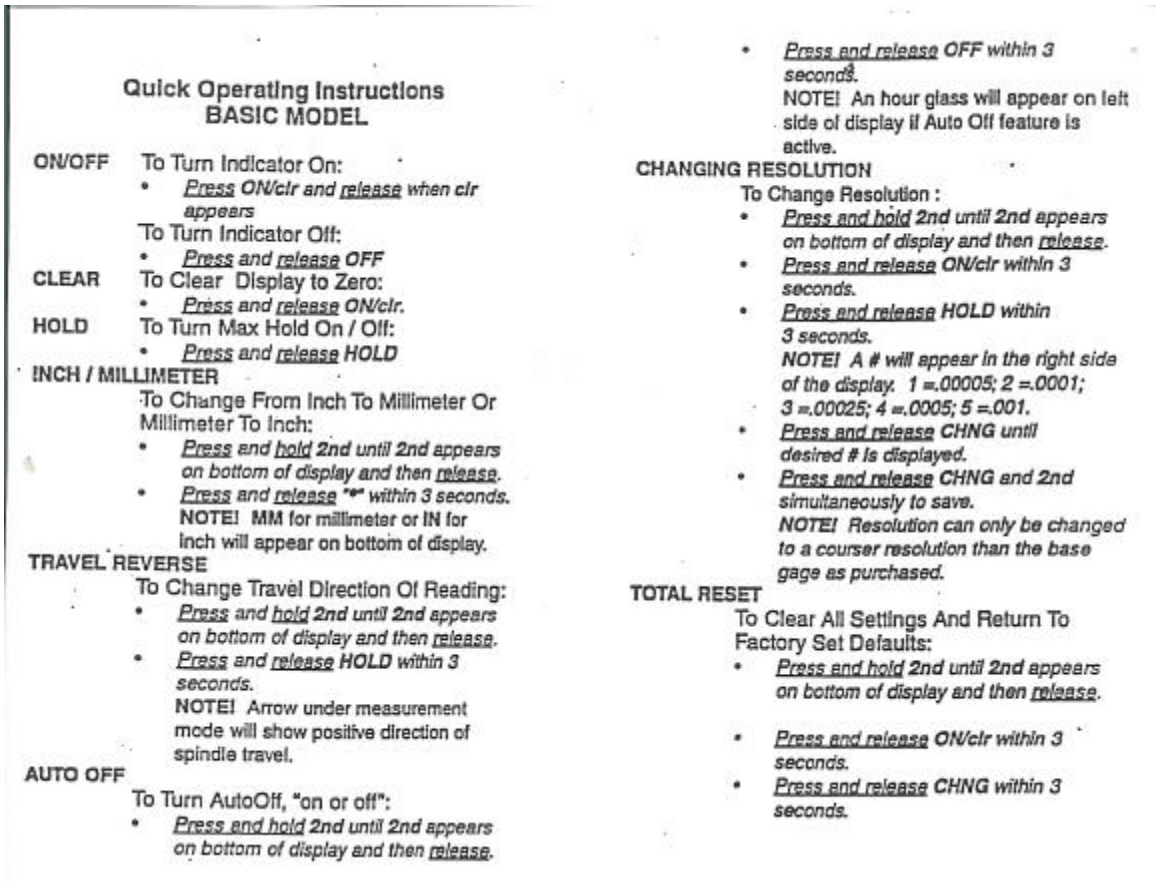
The scale around the circumference of the dial directly indicates in 0.0001" increments with a range of 0.4000". It may be rotated to set for zero at any indication of the needle pointer then locked with a set screw. Two smaller count hands with needle pointers on the face of the dial show the number of revolutions of the large pointer. One count hand shows each 0.010" of movement and the other hand each 0.100". Refer to Figure-1 for an enhanced graphical explanation.

6. Operation of Digital (Electrical) Indicator

This dual power indicator uses either internal batteries or an external AC Adapter for operating power. The standard lithium batteries are Manganese Dioxide Chemistry, listed under IEC # CR2450. A standard 2.5mm audio jack is provided for use by the 9 VDC AC adapter; center pin is "+" (positive).

Installing batteries:
Using a narrow edge screwdriver, gently pry under the tab on the left side of the Bezel and slide out the battery tray as you turn the indicator face side down. Insert two batteries, + side up, into tray cavities, then slide the tray back into its Bezel slot, taking care that the batteries stay in proper position.

The front face has several control functions; their operation is explained below:



Quick Operating Instructions
BASIC MODEL

ON/OFF To Turn Indicator On:
- *Press ON/clr and release when clr appears*

To Turn Indicator Off:
- *Press and release OFF*

CLEAR To Clear Display to Zero:
- *Press and release ON/clr.*

HOLD To Turn Max Hold On / Off:
- *Press and release HOLD*

INCH / MILLIMETER
To Change From Inch To Millimeter Or Millimeter To Inch:
- *Press and hold 2nd until 2nd appears on bottom of display and then release.*
- *Press and release "•" within 3 seconds.*

NOTE! MM for millimeter or IN for inch will appear on bottom of display.

TRAVEL REVERSE
To Change Travel Direction Of Reading:
- *Press and hold 2nd until 2nd appears on bottom of display and then release.*
- *Press and release HOLD within 3 seconds.*

NOTE! Arrow under measurement mode will show positive direction of spindle travel.

AUTO OFF
To Turn AutoOff, "on or off":
- *Press and hold 2nd until 2nd appears on bottom of display and then release.*
- *Press and release OFF within 3 seconds.*

NOTE! An hour glass will appear on left side of display if Auto Off feature is active.

CHANGING RESOLUTION
To Change Resolution :
- *Press and hold 2nd until 2nd appears on bottom of display and then release.*
- *Press and release ON/clr within 3 seconds.*
- *Press and release HOLD within 3 seconds.*

NOTE! *A # will appear in the right side of the display. 1 =.00005; 2 =.0001; 3 =.00025; 4 =.0005; 5 =.001.*
- *Press and release CHNG until desired # is displayed.*
- *Press and release CHNG and 2nd simultaneously to save.*

NOTE! *Resolution can only be changed to a courser resolution than the base gage as purchased.*

TOTAL RESET
To Clear All Settings And Return To Factory Set Defaults:
- *Press and hold 2nd until 2nd appears on bottom of display and then release.*
- *Press and release ON/clr within 3 seconds.*
- *Press and release CHNG within 3 seconds.*

7. Replacement Parts

Refer to the diagrams in Figure 2 for identification of parts and contact the Humboldt Sales Department for assistance.

8. Internal Memory

"Logic" Series indicators and remote displays include internal non-volatile memory to store all factory default and user settings. When the indicator is turned on, user settings and preset numbers will be the same as when the indicator was turned off.
Note: Many of the user settings are stored when the indicator is turned-off by using the "OFF" key, or when the indicator turns itself off (AUTO OFF). However, if the indicator is turned-off by removing power (by disconnecting the AC adapter or cutting power through the Data I/O connector), some or all of the user settings and/or changes may be lost.

9. Operating Precautions

9.1 Do not use the bottom of the spindle stroke as a base of measurement reference, as it is protected with a rubber shock absorber to prevent shock to the internal mechanism. The spindle should be offset 0.005" ~ 0.010" (0.12 ~ 0.25 mm) from the bottom of travel.

9.2 Use of CDI type MS-10 or similar sturdy stands or fixtures for indicator mountings, where the base plate and indicator are mounted to a common post, is highly recommended for accurate and repeatable readings. The indicator must be mounted with the spindle perpendicular to the reference or base plate. If the indicator is stem-mounted protect the indicator from attempted rotation, and from being struck or bumped, to prevent stem/case mechanical alignment damage. Do not over-tighten the mounting mechanism, and use clamp-mounting rather than set screws if at all possible, to prevent damage to the stem.

9.3 The bezel face can be rotated from its normal horizontal position for convenient viewing. Rotation is limited to 270 degrees and attempts to force it past its internal stop may damage the indicator.

9.4 Frequently clean the spindle to prevent sluggish or sticky movement. Dry wiping with a lint-free cloth usually will suffice, but isoprophyl alcohol may be used to remove gummy deposits. Do not apply any type of lubricant to the spindle. Spindle dust caps and spindle boots are available for operation in dirty or abrasive environments.

1" Spindle dust cap – Order CDI Part #A21.0131
1" Spindle boot – Order CDI Part # CDI70-1

Use a soft cloth dampened with a mild detergent to clean the bezel and front face of the indicator. Do not use aromatic solvents as they may cause damage.

9.5 Extremely high electrical transients-from nearby arc welders, SCR motor/lighting controls, radio transmitters, etc-may cause malfunctions of the indicator's internal circuitry or "ERROR 1" indications, even though the electronic design was created to minimize such problems. If at all possible, do not operate the indicator in plant areas subject to these transients. Turning the indicator "OFF" for a few seconds, then back "ON" from time-to-time may eliminate any problems. Also, use an isolated AC line (for AC adapter operated indicators and AC powered remote displays), or an AC line filter-plus solid grounding of stands and fixtures-is recommended in these conditions.

10. Additional Display-Operating Prompts & Conditions

10.1 Flashing Digit or ± sign – Digit or sign affected by CHNG key when setting or changing preset numbers.

10.2 Flashing Reading with High or Low displayed – Reading is out of tolerance, to high or low side.

10.3 Flashing, Entire Display – Short "OFF"/Long "ON" – Low battery warning.

10.4 Error 1 – Spindle speed too fast, high electrical noise, etc.

10.5 Error 2 – Counter overflow, i.e. counter number (spindle + preset number) out of counter range.

10.6 Error 3 – Improper tolerance combination (not applicable on BASIC models), i.e. both "HIGH" and "LOW" set to "0" or same number, or "LOW" set to a higher number than "HIGH". Occurs only when "TOL" is on.

10.7 Error 4 – Display overflow (not applicable on BASIC models), i.e. number too large to be properly displayed. Moving spindle to acceptable range eliminates error message.

11. Data Output

"LOGIC" Series indicators and remote displays provide users with multiple data output formats. The output format in use is determined by the cable attached to the indicator when it is turned on. Cables for each format can be purchased from CDI. These cables also provide remote control of "ON/CLR" and "HOLD" functions, plus +5V regulated power input. For special applications, an "ERROR FLAG" output and or custom cables also can be provided; contact CDI for information. CAUTION: Use of cables other than those provided or approved by CDI can cause irreparable damage to the indicator or data output port and such damage is not recovered by the CDI limited warranty.

Standard RS232 Format – Communications protocol is 1200-baud, no parity, 8 data bits, 1 stop bit. RS232 can be read by any IBM PC-compatible computer, RS232 serial printer or other device, provided the device can be set to this protocol. A DB25 pin adapter may be necessary for non-standard devices. "WINDOWS" terminal and other communications software, "WEDGE" software, etc., may be used with this format.

Cables Required: CDI #G03-0018 – For IBM Compatible, PC (CDI Indicator to DB25F)

CDI #G03-0021 – For CDI serial printer types G19-0001/G19-0002 & G19-0003 (CDI indicator to DB25M)

MITUTOYO COMPATIBLE FORMAT – Use with MITUTOY compatible printers, collection devices, etc.

Cables Required: CDI #G03-0019 – CDI indicator to MTI 10 pin

CDI (Multiplexed BCD) Format – Furnished with pigtails one end.

Cable Required: CDI #G13-0034 – Also maybe used for remote control of "ON/CLR" or "HOLD" functions, or external power (+5V) regulated input. (CDI indicator to pigtail wires.)

BYPASS FORMAT – Permits indicator to be used as a probe for the CDI remote display: bypasses "raw" unprocessed signals from the detector system directly to the data output connector. In this operation mode, power for the indicator is supplied by the remote display.

Cables Required: CDI #G13-0022 – CDI indicator to 6 pin DIN

IMPORTANT: Indicator and remote display must be of same resolution. If the (2) are different base resolutions, you will experience compatibility problems.

12. Maintenance

Since the indicator(s) have precision bearing surfaces, frequent cleaning of the spindle to prevent sluggish or sticky spindle movement is recommended. Although dry wiping of the spindle with a lint free cloth will usually suffice, isopropyl alcohol can be used if necessary to remove gummy deposits. Do not apply any type of lubricant to the spindle. The bezel and front face can be cleaned using a soft cloth dampened with a mild detergent. Use of aromatic solvents could cause damage. Spindle dust cap and spindle boot are available if the gage is to be operated in very dirty or abrasive environments.

For electric digital indicators removal of batteries is highly recommended if the indicator is to be stored or operated on AC adapter power for an extended period of time, to prevent damage to the indicator from battery leakage or corrosion. A periodic check of the batteries for corrosion or leakage is also recommended.

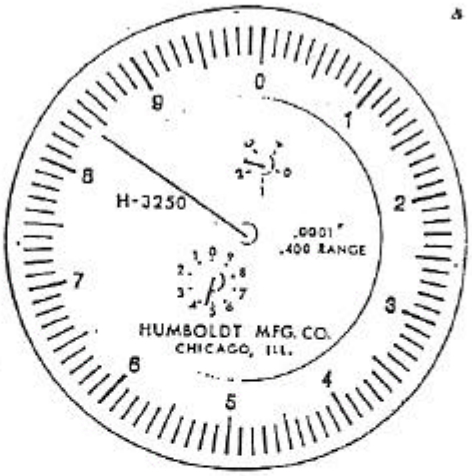
13. Warranty

Humboldt Mfg. Co. warrants its products to be free from defects in material or workmanship. The exclusive remedy for this warranty is Humboldt Mfg. Co., factory replacement of any part or parts of such product, for the warranty of this product please refer to Humboldt Mfg. Co. catalog on Terms and Conditions of Sale. The purchaser is responsible for the transportation charges. Humboldt Mfg. Co. shall not be responsible under this warranty if the goods have been improperly maintained, installed, operated or the goods have been altered or modified so as to adversely affect the operation, use performance or durability or so as to change their intended use. The Humboldt Mfg. Co. liability under the warranty contained in this clause is limited to the repair or replacement of defective goods and making good, defective workmanship.

CAUTION: Keep hands, clothing and other objects away from moving parts when the machine is in operation.

14. Drawings

PROPER READING INSTRUCTIONS FOR
HUMBOLDT MODEL #H-3250



Total range of the indicator is .400 and each graduation of the large hand is .0001".

One full revolution of the large hand is .010".

One full revolution of the middle hand is .100".

The small revolution hand counts the number of times the middle revolution hand passes zero.

EXAMPLE

Large hand on 84.
Middle rev. hand between 4 and 5.
Small rev. hand between 2 and 3.

The actual reading is .2484.

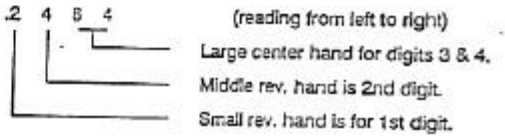


FIGURE-1

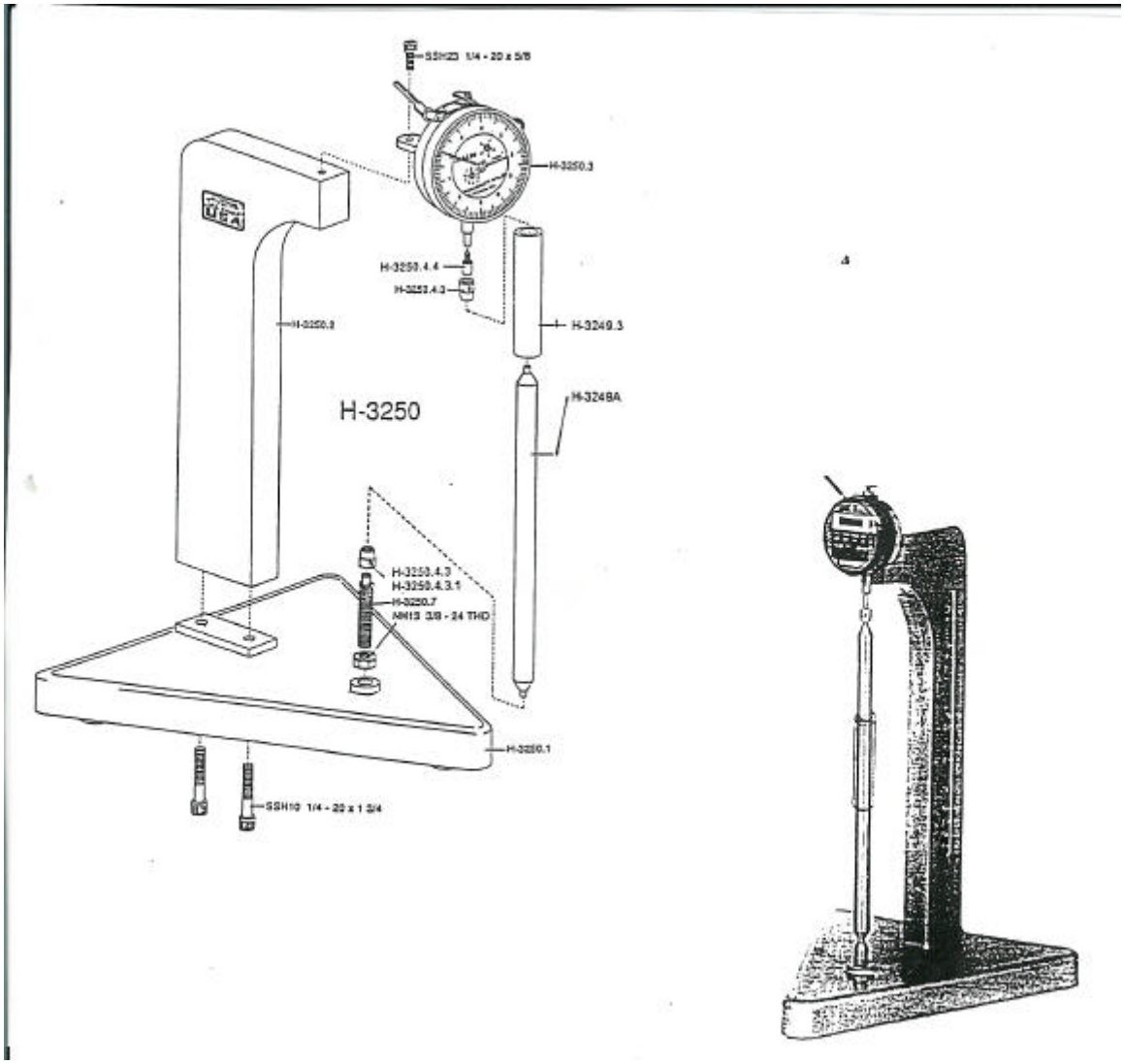
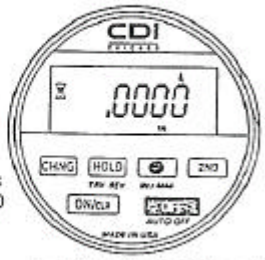


FIGURE-2

Operating Instructions

To Turn
AUTO OFF On/Off



• Press and hold **2ND** until **2ND** appears at bottom of display, then release.

• Press and release **OFF** within 3 seconds.

NOTE: An hour glass appears at left side of display if AUTO OFF is active.

To
CLEAR DISPLAY...

to zero

• Press and release ON/CLR.

To Verify
DATA I/O FORMAT

• Press and release **2ND**, **ON/CLR** and **2ND** in sequence. Format information is displayed for about 3 seconds, then indicator automatically returns to normal operation. Format information displayed is:

RS232	= "rS232"
MTI compatible	= "SEr"
CDI mux BCD	= "Cdi"
Bypass	= "bP"

IN/MM and **AUTO OFF**.

CHNG - Used with 2ND key to activate selectable resolution.

To Use
HOLD

To turn HOLD On/Off:

• Press and release **HOLD**

• **MAX HOLD**—Holds and displays highest reading.

NOTE: Pressing **CLR** button resets indicator to spindle position.

To Change
INCH/MILLIMETER

To change from one to the other:

• Press and hold **2ND** until **2ND** appears at bottom of display, then release.

• Press and release ⊕ within 3 seconds. NOTE: **MM** or **IN** will appear at bottom of display.

To Turn
INDICATOR ON

• Press **ON/CLR** and release when clr appears.

To Turn
INDICATOR OFF

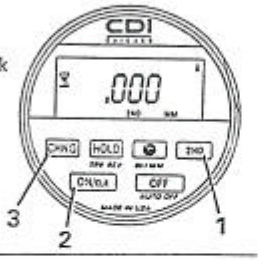
• Press and release **OFF**

To
Reset to DEFAULT

A total reset: clears all settings and returns to factory-set defaults...

1. Press and hold **2ND** until **2ND** appears at bottom of display, then release.
2. Press and release **ON/CLR** within 3 seconds.
3. Press and release **CHNG** within 3 seconds.

NOTE: Cannot be done if Lock feature is on.



To Change
RESOLUTION

- Press and hold **2ND** until **2ND** appears at bottom of display, then release.
- Press and release **ON/CLR** within 3 seconds.
- Press and release **HOLD** within 3 seconds.
- Use "CHNG" key to step through available resolution selections:

1 = .00005"	(.001mm)
2 = .0001"	(.002mm)
3 = .00025"	(.005mm)
4 = .0005"	(.01mm)
5 = .001"	(.02mm)

- Press and release **CHNG** and **2ND** simultaneously to save. Note: Only resolutions coarser than indicator resolution-as-purchased are available.

To Enter
TEST MODE

- Press and hold (for more than 5 seconds) **ON/CLR** to enter/exit display and key test mode.

To Change
TRAVEL DIRECTION

- Press and hold **2ND** until **2ND** appears at bottom of display, then release.
- Press and release **HOLD** within 3 seconds. Note: Arrc in upper right corner will show positive direction of spindle travel.

NOTE: Most functions are active on release of key(

Appendix: Manual for Electronic Indicators

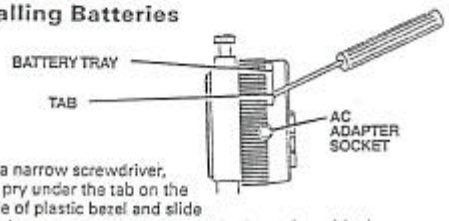
Getting Started...

Choice of Three Power Sources

1. Batteries

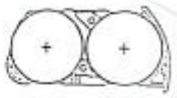
A set of two Manganese Dioxide Lithium batteries will operate this electronic indicator for approximately 250 hours of normal usage. Because milliampere-hour ratings vary widely with manufacturers, normal usage time is very hard to predict. The lithium battery used in this indicator is an IEC standard, type CR2450. The indicators are shipped with the batteries not installed, and should not be installed until battery operation is desired. NOTE: This indicator has an "AUTO-OFF" feature to conserve battery life. After 10 minutes of "no activity" (no key presses or spindle movement), the gage will turn itself off. This feature may be disabled if continuous operation is desired; see "AUTO-OFF On/Off" instructions in this book.

Installing Batteries



Using a narrow screwdriver, gently pry under the tab on the left side of plastic bezel and slide out the battery tray as you turn the indicator face side down.

Insert two batteries, "+" side up, into tray cavities, then slide the tray back into its bezel slot, taking care that the batteries stay in proper position.



2. AC Adapter

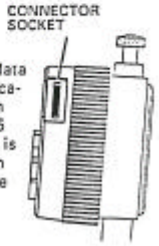
AC adapters (providing 9VDC at 30ma. maximum to the indicator from a 115 or 230 VAC, 50/60 Hz line source) may be purchased from CDI. Although other 9V AC adapters with a 3/32" (2.5mm) mini-plug (center +) may be used, CDI adapters are recommended because they include current limiting to prevent damage from line fluctuations.

For 115 V (USA) operation - Order CDI Part #G11-0012

For 230 V (Europe) operation - Order CDI Part #G11-0014

First insert the mini-plug into the socket on the lower left side of the bezel (see drawing on page 2), then plug the adapter into a wall outlet. After turning the indicator "ON", disable the "AUTO-OFF" feature; see "AUTO OFF On/Off" on page 6.

3. Data I/O Connector



Power also may be provided through the data I/O connector, for special fixturing or applications where the indicator is integrated with another piece of equipment. A ripple-free 5 VDC (4.9 to 5.1V) regulated voltage source is required. CDI Cable #G13-0034 or a custom variation of another CDI data cable must be used. Contact CDI for full information.