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HEWLETT-PACKARD

3820A

ELECTRONIC TOTAL STATION



CERTIFICATION

Hewlett-Packard Company certifies that this instrument met its published specifications at the time of shipment from the factory. Hewlett-Packard Company further certifies that its calibration measurements are traceable to the United States National Bureau of Standards, to the extent allowed by the Bureau's calibration facility, and to the calibration facilities of other International Standards Organization members.

WARRANTY AND ASSISTANCE

This Hewlett-Packard product is warranted against defects in materials and workmanship for a period of one year from the date of shipment. Hewlett-Packard will, at its option, repair or replace products which prove to be defective during the warranty period provided they are returned to Hewlett-Packard, and provided the proper preventive maintenance procedures as listed in the Operating Manual are followed. Repairs necessitated by misuse of the product are not covered by this warranty. NO OTHER WARRANTIES ARE EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. HEWLETT-PACKARD IS NOT LIABLE FOR CONSEQUENTIAL DAMAGES.

If this product is sold as part of a Hewlett-Packard Integrated Instrument System, the above warranty shall not be applicable, and this product shall be covered only by the system warranty.

Service contracts or customer assistance agreements are available for Hewlett-Packard products.

For any assistance, contact your nearest Hewlett-Packard Repair Center listed in the Operating Manual.

IMPORTANT: READ THE INFORMATION IN THE RESTRICTED ARTICLE SHIPPING INFORMATION PACKET, INCLUDED WITH YOUR INSTRUMENT, BEFORE SHIPPING YOUR INSTRUMENT.

HP 3820A ELECTRONIC TOTAL STATION

FIELD REFERENCE GUIDE

THIS GUIDE CONTAINS ABBREVIATED OPERATING INFORMATION FOR YOUR HP 3820A ELECTRONIC TOTAL STATION. FOR MORE DETAILED OPERATING INFORMATION, CONSULT THE MAIN OPERATING MANUAL.

WARNING

DO NOT REMOVE THE INSTRUMENT COVERS. HIGH VOLTAGES AND INVISIBLE LASER RADIATION EXIST INSIDE THE INSTRUMENT THAT MAY CAUSE HARM IF CONTACTED. THERE ARE NO USER SERVICEABLE PARTS INSIDE THE INSTRUMENT.

In all correspondence, always give the serial number of your instrument. The serial number plate is located under the right standard, behind the horizontal tangent screw.

HEWLETT-PACKARD, INC. LOVELAND, COLORADO
THIS PRODUCT HAS BEEN TESTED AND COMPLIES TO THE U.S. GOVERNMENT STANDARDS
FOR RADIOLOGICAL HEALTH, CLASS 2 LASER PRODUCT, CATEGORY 1, MODEL 3820A
SERIAL NUMBER MANUFACTURED MADE IN U.S.A.

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P.O. Box 301, Loveland, Colorado 80537 U.S.A.

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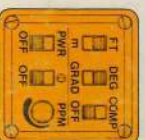
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OPERATING PROCEDURES

AUXILIARY CONTROL PANEL

- FT/M SWITCH** Selects the display units for distance measurements.
FT = Feet M = Metres
- DEG/GRAD SWITCH** Selects the display units for angle measurements.
DEG = Degrees-Minutes-Seconds
GRAD = XXX.XXXX Grads
Also selects display units for level coordinates.
- COMP SWITCH** Automatic Level Compensator Switch.
COMP = ON
- PWR SWITCH** Instrument Power Switch.
PWR = ON
- SWITCH** Crosshair Illuminator Switch.
● = ON
- PPM DIAL** Environmental Parts Per Million Correction Dial.
Clockwise = Increase

To avoid disturbing the instrument during measurements, the Auxiliary Control Panel switches should be set to the positions desired before starting a measurement sequence.



CENTERING AND LEVELING

Mount the instrument in the Leveling Base on the tripod. Center and level the instrument by means of the tripod legs; the Leveling Base screws; the bull's-eye bubble; and the optical plummet.

AUTOMATIC LEVEL COMPENSATOR

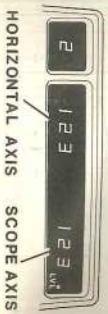
The Automatic Level Compensator should be used for most measurements to insure accuracy. To use this feature, the bull's-eye bubble must be centered and the COMP Switch must be in the COMP position. The instrument will then automatically compensate projected distance measurements and angle measurements for the residual level error.

The LVL Light indicates when the instrument mislevel is within the range of the compensator. It is on steady when within range and flashes when out of range. The LVL Light should be observed either before or after a distance or angle measurement because it is always on steady while a measurement is in progress.



The center circle of the bull's-eye bubble roughly corresponds to the maximum range of the compensator.

DISPLAYING LEVEL COORDINATES

The level coordinates may be displayed. They are displayed in either cc's or seconds, depending on the position of the DEG/GRAD Switch. The horizontal axis mislevel is displayed to the left of the display and the scope axis mislevel is displayed to the right of the display.




The maximum range of the Automatic Level Compensator is approximately ± 400 cc (2 minutes). If the mislevel exceeds this range, the display will indicate overrange by displaying 999 (grad units) or 324 (D.ms units) and the LVL Light will flash.

TO DISPLAY LEVEL COORDINATES: Press  .

Existing level coordinates are displayed.

TO DISPLAY THE LEVEL COORDINATES STORED IN THE INSTRUMENT'S MEMORY (COORDINATES USED BY THE INSTRUMENT TO COMPENSATE THE LAST MEASUREMENT):

Press  .

If the last measurement did not use the compensator, the display will be zero.



TO OBSERVE CHANGES IN THE LEVEL COORDINATES:

Press  .

The LVL Light will not flash when tracking level coordinates.

MANUAL LEVELING

The instrument level can be adjusted manually:



Press   and adjust the Leveling Base Screws to obtain the desired level accuracy. If the range of the compensator is exceeded, the display will jump to 999 (grad units) or 324 (D.ms units) and begin to flash.

NOTE

MANUAL LEVELING IS NOT NECESSARY IN MOST CASES BECAUSE THE AUTOMATIC LEVEL COMPENSATOR WILL AUTOMATICALLY COMPENSATE FOR ANY MISLEVEL WITHIN ITS RANGE.

SETTING THE HORIZONTAL CIRCLE

The horizontal circle can be set to any desired reference angle by use of the coarse and fine circle adjusters.

Press   to follow the circle position on the display.

SETTING AND CHECKING THE PPM CORRECTION

See page 12, for instructions on how to determine the correct PPM correction.



The PPM correction is displayed to the left of the display. The Return Signal Strength is displayed to the right of the display at the same time.




The PPM correction should be set at the beginning of a day of surveying and whenever changes in atmospheric pressure or temperature warrant resetting.

Also, the PPM Dial setting should be checked whenever the instrument has been turned off in case the dial has been accidentally moved. If it is not reset, the instrument will automatically use the existing dial setting.


SETTING THE PPM DIAL

TO SET THE PPM DIAL FOR A DESIRED CORRECTION: Press   The PPM Dial setting is repeatedly read and displayed. Turn the PPM Dial to obtain the desired PPM correction.

CHECKING PPM

TO CHECK THE PPM CORRECTION STORED IN THE INSTRUMENT'S MEMORY: Press  

The PPM correction currently in the instrument's memory is displayed.

TO CHECK THE PPM DIAL SETTING: Press  The PPM Dial setting is displayed and the dial setting is stored in the instrument's memory.

AIMING

(If necessary, adjust for parallax.)

To aim at the reflector, unlock the tangents and use the symbol in the coarse sight to line up on the target. Look through the telescope and focus on the reflector. Line up the crosshairs close to the correct aiming point and lock the tangents. Use the tangent screws to aim exactly at the correct point.

A suggested aiming procedure is to slightly overshoot the aiming point with fast motion; back up just past the point with slow motion; reverse and come to the point.


For single prism reflectors, aim exactly at the apex (center) of the reflector. For triple prism assemblies, aim at the center of the top prism. For a 6 prism configuration, aim at the center of the configuration.



MEASURING DISTANCES

PROCEDURE

Aim Correctly at the Target

Press Any Distance Key.

 Measures and displays slope distance corrected for index of refraction (PPM). Does not measure or compute and store zenith angle or other distance components.

 or  Displays horizontal or vertical distance corrected for earth's curvature and refraction, index of refraction and, if the COMP Switch is in the COMP position, instrument mislevel.

Zenith angle and all other distance components can be recalled by pressing the RCL Key and then the desired key.

If recording more than slope distance, use the horizontal or vertical distance key and recall other components rather than making a separate measurement for each component. This procedure conserves battery power and saves time.

Example:

- Press  Record horizontal distance
- Press  Record slope distance
- Press  Record vertical distance
- Press  Record zenith angle

TYPES OF DISTANCE DISPLAYS

- Steady Display = Good Measurement
- Flashing Display = Marginal Measurement Or Unable To Compensate for Level.
- Flashing 0 Display = Unable To Measure.
- Flashing Keycode Display = PPM setting not checked before first distance measurement after turn-on.

DIST LIGHT

The DIST Light gives a rough indication of the measurement conditions. If, after pressing a distance key, the DIST Light is on most of the time, atmospheric conditions are probably good. If the DIST Light is only flickering slightly (off most of the time), atmospheric conditions are probably poor or beam is being interrupted. If the DIST Light is completely off but the return signal strength is above 70, the Reflector Attenuator Cap must be used or the number of prisms reduced.

RETURN SIGNAL STRENGTH

When measuring distances less than 300 metres (1000 feet), the Reflector Attenuator Cap may be required. If you are having difficulty obtaining a good measurement, be sure to check the return

signal strength. The return signal strength is displayed to the right of the display when the PPM/SIG Key is pressed. The return signal strength should be between 10 and 98.

MEASUREMENT TIME

The time required for a distance display will depend on the atmospheric conditions and the range. Minimum time is 4 to 5 seconds. There is no specific maximum time. However, if over a minute elapses with no display, corrective action should be taken to improve measurement conditions.

TRACKING DISTANCES

In the tracking mode of operating the instrument automatically displays repeated measurements. Tracking is primarily used to facilitate layout. Therefore, measurements made in the tracking mode are made faster and are less accurate than normal measurements.

The Automatic Level Compensator is not used when tracking, even if the COMP Switch is in the COMP position.

To operate in the tracking mode, simply press the TRK Key and then the desired distance key.

-  Repeatedly measures and displays slope distance.
-  or  Repeatedly measures and displays horizontal or vertical distance.

Other distance components and zenith angle can be recalled but tracking operation is stopped. Recalled component is the result of the last tracking measurement before the RCL Key was pressed.


IMPORTANT NOTE

WHEN MEASURING ANGLES, BE SURE TO PRESS KEYS LIGHTLY SO THE POINTING OF THE INSTRUMENT IS NOT DISTURBED.

Angle measurements do not require a reflector because the instrument reads internal circles. Any suitable aiming point may be used.


PROCEDURES

Measuring Zenith Angles


Aim Correctly. Press 

Zenith angle is automatically compensated for instrument mislevel if the COMP Switch is in the COMP position.

Measuring Horizontal Angle

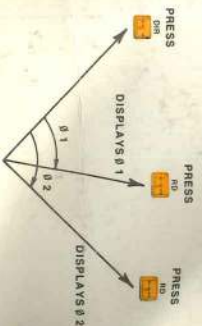
Aim Correctly at Backsight. Press 

Measures and displays the horizontal angle. Also stores angle for recall or for use as the reference angle. Measurement is automatically compensated for instrument mislevel if the COMP Switch is in the COMP position.

Aim Correctly at Foresight. Press 

Automatically subtracts angle stored during last DIR measurement and displays the difference as a clockwise angle. Measurement is automatically compensated for instrument mislevel if the COMP Switch is in the COMP position.

Example:



IMPORTANT NOTE

WHEN MAKING A SERIES OF HORIZONTAL ANGLE MEASUREMENTS USING ONE REFERENCE ANGLE, BE CAREFUL NOT TO PRESS THE DIR KEY DURING RD MEASUREMENT. IF THE DIR KEY IS PRESSED, A NEW REFERENCE ANGLE WILL BE MEASURED AND STORED. THE ORIGINAL REFERENCE ANGLE WILL BE LOST FROM INSTRUMENT MEMORY.




TYPES OF ANGLE DISPLAYS

- Steady Display = Good Measurement
- Flashing Display = Unable to Compensate for Level or Within 1 Grad (1 Degree) of Zenith.

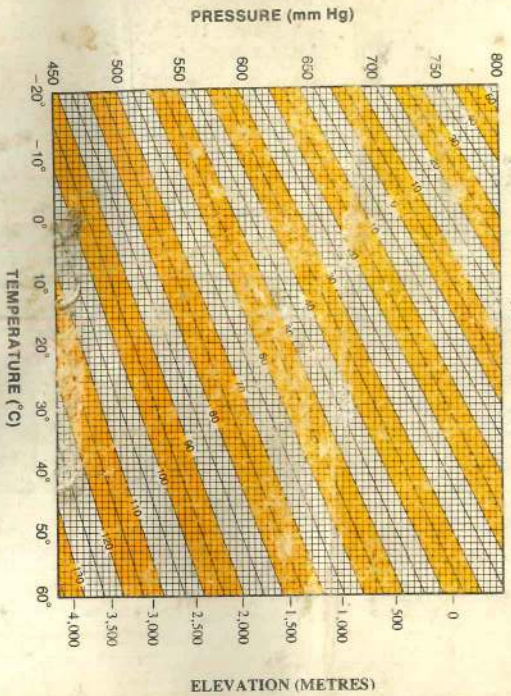
TRACKING ANGLES

Any angle can be tracked simply by pressing the TRK Key before the angle key.

The Automatic Level Compensator does not operate in the track mode, even if the COMP Switch is in the COMP position.


-  Repeatedly measures and displays zenith angle.
-  Repeatedly measures and displays horizontal angle.
-  Repeatedly measures and displays the difference between the previously measured DIR horizontal angle and the present horizontal angle. The difference is displayed as a clockwise angle.

ENVIRONMENTAL CORRECTION
(Metric)



ENVIRONMENTAL CORRECTION (PPM)

Procedure

1. Locate measured or estimated temperature on horizontal scale.
2. Locate measured or estimated absolute pressure on vertical scale.
3. Locate the intersection of the temperature and pressure on the chart and interpolate between adjacent PPM lines to determine the PPM correction required.
4. Press  and set PPM to desired value.

Rules of Thumb

- .1 PPM Distance Error
≅ 1°C/2°F Temperature Error.
- ≅ 2.5mm/0.1 in Hg Pressure (30m/100 Ft) Error.

ENVIRONMENTAL CORRECTION
(English)

