twilight

INSTRUMENTOS DE MEDICIÓN INDUSTRIAL

Densitómetro IQ150, Tobbias
TB-IQ150

T H E T O B I A S

IQ150

IQ200

COMPUTING PORTABLE REFLECTION

DENSITOMETERS

Instruction Manual

MEASUREMENT FUNCTIONS:
IQ150 Densitometer

- *Density*
- *Density Difference*
- *Dot Area*
- *Dot Gain*

MEASUREMENT FUNCTIONS:
IQ200 Densitometer

- *Density*
- *Density Difference*
- *Dot Area*
- *Dot Gain*
- *Trap*
- *Hue Error*
- *Grayness*
- *Contrast*

T H E T O B I A S

IQ150

IQ200

COMPUTING PORTABLE REFLECTION

DENSITOMETERS

Instruction Manual

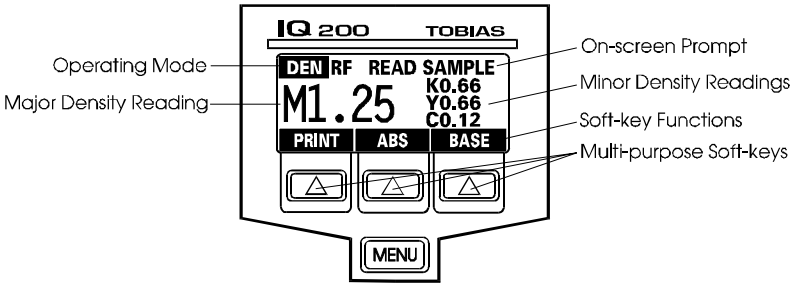
S0172/004.19

TOBIAS ASSOCIATES, INC.

50 Industrial Drive
Ivyland, PA 18974-0347 USA
Phone: 215-322-1500
Toll-free: 800-877-3367
Fax: 215-322-1504
E-mail: repair@tobiasinc.com

TABLE OF CONTENTS

Introduction



The Tobias **IQ** is a portable, computing reflection densitometer. Density readings are displayed on a large, easy-to-read LCD screen, which displays a prompt line and a legend controlled by soft keys. There are three available menus, which are selected by the [MENU] key. Each menu offers several measurement functions operated by the three soft keys. The [MENU] key is used to display the menu choices at any time (see list below). The **IQ** turns off automatically after 90 seconds to conserve the battery. Press [MENU] to restore the last display. In this manual the brackets [ ], represent the menu key and soft keys; words in quotes stand for on-screen messages, i.e. "REF".

MENU 1	• **Density [DENS]**	**(IQ150 & IQ200)**
	• **Density Difference [DIFF]**	**(IQ150 & IQ200)**
	• **Setup [SETUP]**	**(IQ150 & IQ200)**
MENU 2	• **Dot Area [AREA]**	**(IQ150 & IQ200)**
	• **Dot Gain [GAIN]**	**(IQ150 & IQ200)**
	• **Trap [TRAP]**	**(IQ200 only)**
MENU 3	• **Hue Error [HUE]**	**(IQ200 only)**
	• **Grayness [GRAY]**	**(IQ200 only)**
	• **Print Contrast [CONT]**	**(IQ200 only)**

Note: **The IQ will maintain calibration for weeks at a time; however, it is recommended that the unit be calibrated daily for greatest accuracy. The calibration routine is described under Setup in MENU 1.**

2. Density [DEN] (IQ150 & 200)

To enter Density mode

1. Press [MENU] until "MENU1" is displayed.
2. Press [DEN].

To read Absolute Density

1. Be sure "AB" is on the prompt line. If not, press [ABS]. This mode does not compensate for the paper density.
2. Read sample. The primary filter is shown in large letters, the secondary colors are shown smaller.

To read Relative Density

1. Be sure that "RF" is on the prompt line. If not, press [REF]. This allows you to "ZERO" on your paper and should be done for each job.
2. Read sample. The primary filter is shown in large letters; the secondary colors are shown smaller.

To change Base values

1. Press [BASE].
2. Read the base.

To send the information to a printer or computer

Press [PRINT].

3. Density Difference [DIFF] (IQ150 & 200)

This function allows you to set a standard house reference density value for each color and measure the differences from them across the sheet.

To enter Density Difference mode	1. Press [MENU] until "MENU1" is displayed. 2. Press [DIFF].
To change the reference value	1. Read sample. 2. Press the [SAVE]. Readings will be compared to that standard. 3. To adjust, press [REF], then [+] or [–] until correct. Press [SAVE] to save and go on to next color. When all are adjusted, press [SAVE] to save and exit. Press [MENU] to exit during routine.
To find Density Difference	Read the sample. The density difference and reference values will be displayed.
To send the information to a printer or computer	Press [PRINT].

4. Setup [SETUP] (IQ150 & 200)

To enter Setup mode

1. Press [MENU] until "MENU1" is displayed.
2. Press [SETUP].

To calibrate the unit

1. Press [CAL] key.
2. Follow prompts and read ZERO and CAL patches on the reflection standard.
3. Calibration should be done daily.

To check calibration

1. Press [DEN]. Be sure the unit is in absolute density mode, "AB". If "RF" is displayed, press [ABS].
2. Read ZERO and CAL patches on the reflection standard. Density values should match those on the envelope. If not, recalibrate unit.

To adjust values to another calibration plaque

1. Press [SETUP], [CAL] and then [PLQ].
2. Move ">" by pressing [NEXT] until it points to next value to be changed.
3. Adjust value by pressing [–] or [+].
4. Repeat as needed for other colors.
5. Press [MENU] to exit.
6. Read Calibration Plaque again.

To test the source lamp

1. Press [CAL].
2. Press [LAMP]. "LAMP IS ON" should be displayed and the source lamp should illuminate. If not, replace lamp.
3. If lamp operates in test but not in calibration, perform [DFLT].

To reset the unit to factory default values

1. Press [SETUP], then [DFLT].
2. To reset, press [DFLT] again to save or press either [EXIT] key to abort.
3. Values reset automatically; press [MENU] to proceed.
4. The unit automatically switches to calibration plaque setup mode; check these values against envelope of calibration plaque and adjust if necessary using [+] or [–] key to increase or decrease value.
5. Press [MENU] to proceed.
6. Recalibrate unit by following prompts.

To change the I/O (Input/Output) variables

1. Following [DFLT], you may need to restore I/O values. Press [I/O] in setup mode.
2. Press [NEXT] to cycle, [STEP] to change, and [SAVE] to save the new values..

Print/Transmit Function (IQ150 & 200)

The data obtained from the **IQ** can be transmitted to a serial printer or computer either manually by pressing the [PRINT] key or automatically after a reading is taken.

To enter Print/Transmit function

1. Press [MENU] until "MENU1" is displayed.
2. Press [SETUP].

To select printer mode

1. Press [NEXT] until the arrow is pointing to "PRT".
2. Toggle from "MAN" (manual) to "AUTO" by pressing [STEP].

To exit

Press either [SAVE] or [MENU] to save and exit.

Dot Area [MENU2] (IQ150 & 200)

To enter Dot Area mode

1. Press [MENU] until “MENU2” is displayed.
2. Press [AREA].

To use Murray-Davies equation

1. If unit is in the Murray-Davies mode, "M/D" is displayed.
2. To change base value, press [BASE] and read the base.
3. Read the solid patch.
4. Read the tint patch (for accuracy, read ***adjacent*** solid and tint patches.)
5. To switch to Yule-Nielsen equation, press [YULE]. (Then follow Step 3 below.)

To use Yule-Nielsen equation

1. If the unit is in the Yule-Nielsen mode, the "N" value is displayed.
2. To change the base value, press [BASE] and read the base.
3. To change the "N" value, press [N], then [+N] or [-N]. Exit by pressing [MENU].
4. To switch to Murray-Davies equation, press [N], then [M/D].
5. Determine dot area by reading the solid, then the tint patches (for accuracy, read ***adjacent*** solid and tint patches).
6. Dot area is shown as a percentage.

To send the information to a printer or computer

Press [PRINT].

Dot Gain [GAIN] (IQ150 & 200)

Dot gain, as a percentage, is calculated as measured dot area minus the reference value.

To enter Dot Gain mode

1. Press [MENU] until "MENU2" is displayed.
2. Press [GAIN].

To cycle through the reference values

1. Select 25%, 40%, 50%, 75% or 80% by pressing [REF] repeatedly.
2. Press [MENU] to exit.

To change to base values

1. Press [BASE].
2. The next reading becomes the new base. Each channel maintains its own base value.

To calculate Dot Gain

1. Read solid.
2. Read tint patches (for accuracy, read ***adjacent*** solid and tint patches).

To send the information to a printer or computer

Press [PRINT].

Trap [TRAP] (IQ200 only)

To enter Trap mode	1. Press [MENU] until "MENU2" is displayed. 2. Press [TRAP].
To read the Trap value	1. Read the first down color sample. 2. Read the second down color sample. 3. Read the overprint sample. 4. The density will appear briefly, then the trap value.
To change base density	1. Press [BASE]. 2. The next density reading becomes the new base. Each channel maintains its own base value.
To identify composite colors	Magenta/Yellow yields Red; Cyan/Yellow yields Green; Magenta/Cyan yields Blue.
To send the information to a printer or computer	Press [PRINT].

Hue Error [HUE] (IQ200 only)

To enter Hue Error mode

1. Press [MENU] until "MENU3" is displayed.
2. Press [HUE].

To determine Hue Error

1. Read the sample.
2. The three color densities will be displayed along with the hue error, expressed as a percentage.

To change base density

1. Press [BASE].
2. The next reading becomes the new base. Each channel maintains its own base value.

To display Grayness

1. Press [GRAY].
2. Return to the hue error mode by pressing [HUE].

To send the information to a printer or computer

Press [PRINT].

Grayness [GRAY] (IQ200 only)

To enter Grayness mode	1. Press [MENU] until "MENU3" is displayed. 2. Press [GRAY].
To change the base value	1. Press [BASE]. 2. The next reading becomes the new base. Each channel maintains its own base value.
To determine Grayness	1. Read the color sample. 2. The highest and lowest color densities will be displayed along with the grayness expressed as a percentage.
To display Hue Error	1. Press [HUE]. 2. To return to grayness mode, press [GRAY].
To send the information to a printer or computer	Press [PRINT].

Print Contrast [CONT] (IQ200 only)

To enter Contrast mode	1. Press [MENU] until "MENU3" is displayed. 2. Press [CONT].
To determine Contrast	1. Read the solid patch. 2. Read a 75% tint patch. 3. Its density will appear briefly, then the printing contrast.
To send the information to a printer or computer	Press [PRINT].

Frequently asked questions

Why won't the lamp light? Usually caused by loss of calibration, or misuse and resulting in misalignment of base plate. The lamp itself is usually OK. IQ units have error checking in the software. When an error is detected, the lamp driver is turned off, and remains off until the error is corrected. This is to prevent erroneous readings from occurring.

The light spot reflecting off the target webbing when the unit is misaligned will give erroneous readings. Possible solutions include realignment and/or resetting the unit to its Default (DFLT) settings. (see other references to DFLT)
Units in poor condition should be sent in for servicing to correct the conditions that lead to the occurrence of error messages. The densitometers must be in perfect working condition in order to be able to be calibrated correctly.

Can wrong base values give an ERROR message? Yes, occasionally the wrong base values (ones that are too high) are stored and thus cause RF (Relative) densities to read wrong. Review the manual for proper use of base.

Should I clean the calibration plaque before using it? Calibrating to an unclean calibration plaque can change your reading by 0.10D or more. Clean the plaque with window cleaner prior to each use. Do not trust your eyes to judge if a plaque is clean. The densitometer can "see" smudges that you can miss. Smudges on the white or zero spot of the plaque are read by the densitometer as an increased density, while smudges on the black spot reduce the density.

How can I match two densitometers? After calibrating to the calibration plaque, color response of the densitometer can differ from other densitometers. Color response is not a calibration; it depends on the filters and the optics of a densitometer. As no two densitometers respond to color exactly alike, do not judge one against another. If color is in dispute, rely only on an approved color standard such as a "T ref" available from Tobias Associates (see parts list).

A densitometer with minor variance can comply with the color standard by means of the SLOPE program. Refer to the SLOPE instruction sheet.

How can I convert my 3/16" aperture unit to a 1/16" unit? Units with 1/16" aperture are useful in reading the narrow control strips. Units thus converted are designated with the letter "A" at the end of the serial number. The pitfall is confusing "aperture" with "target". Do NOT attempt to convert a 3/16" aperture unit to a 1/16" unit by simply changing the target. The sizing of the light spot originates within the optic head, and has such, this conversion has to be done here at the factory.

Source Lamp Replacement

1. To verify that the source lamp needs replacing, perform the test described on page 4, under Setup.

2. Close and latch the unit shut and wait for the unit to turn off.

3. Turn the unit over and remove the two Phillips head screws in the front of the unit and the two black Phillips head screws on the rear panel.

4. Carefully separate the halves of the case. These are connected by a thin ribbon cable. Use extreme care not to damage the cable when separating the two halves.

5. Loosen the lamp retaining screw. Slide the lamp out of its hole.

6. Unplug the lamp wires from their posts. Plug the new lamp wires onto the post and slide the lamp fully into its hole. Gently tighten the retaining screw. Over tightening will break the lamp.

7. Place the two halves of the unit back together being careful not to pinch the ribbon cable between them.

8. Replace the four Phillips head screws.

9. Perform the software calibration.

Battery Pack Replacement

1. The **IQ** uses rechargeable NiCad batteries. NOTE: Batteries do NOT need to be fully discharged. Tobias has run the batteries on a conditioner prior to shipment. (See Step 8 below). Fourteen hours are required to fully charge the unit.

2. Repeated undercharges will damage the battery pack. If the unit was charged overnight and the readout still displays a "LOW BATTERY" message, the replacement of the NiCad battery pack (Part #A1496) is necessary.

3. Close and latch the unit shut and wait for the unit to turn off.

4. Turn the unit over and remove the two Phillips head screws in the front of the unit and the two black Phillips head screws on the rear panel.

5. Carefully separate the halves of the case. These are connected by a thin ribbon cable. Use extreme care not to damage the cable when separating the two halves.

6. Remove the screws holding the battery plate in place and unplug the two connectors. Replace the old battery pack (Tobias part #A1496) with the new one, replace the screws and reconnect the connectors.

7. Place the two halves of the unit back together being careful not to pinch the ribbon cable. Replace the four Phillips head screws.

8. LOW BATTERY messages occur in TWO stages. The first stage, or early, 'Low Battery' messages appear briefly on the upper part of the display and are easy to miss; however, if you see one, that is the time to take the unit out of service and recharge it. The second or final 'Low Battery' message is in the center of the display --- the unit will then turn off, and attempts to turn it back on can fail.

Error Messages

Density Out of Range	Recalibrate unit; perform [DFLT].
Incomplete Reading	Appears whenever the unit is taking a reading and the unit is not held down long enough for the reading to stabilize.
Low Battery	Shows that the batteries have discharged to such a point that the unit will not perform properly. The unit should be charged overnight. When the battery pack will no longer hold a charge, it must be replaced.
Negative Density	This message will appear when in any mode other than density or density difference. It indicates that the density measured was less than the base density of the paper or base material, or the reference values are incorrect.
Printer Off Line	The printer may not be selected, be connected, or may be out of paper.
System Fault	The unit detected an internal failure. Turn unit off by simultaneously pressing the left and center keys, then press [MENU] to turn back on. If the message continues to appear, contact the factory for service.

Unable To Calibrate Unit	The message will be followed by a number from 1 to 5. **For 1 or 3: C**heck the calibration plaque values. The values displayed for the CAL and ZERO swatches must match the values of the CAL plaque. **For 2 or 4:** There is mechanical damage or an electronic problem; contact the factory. **For 5:** Unit is not receiving enough light and the lamp should be checked. If lamp is functioning, check alignment of the target. Also, it could be a problem with the electronics of the unit.
Unstable Reading	Possible causes: the unit may of been moved while reading densities, the lamp's output is not stable, or the lamp has burned out.
Value Overflow	Indicates a calculation overflow. In the dot area or dot gain mode the solid value was substantially less than the tint value, indicating the values were read in reverse order. In trap mode the overprint density may be read in the wrong order.
If "ERROR" is displayed repeatedly when calibrating	Press [SETUP] [DFLT] for default values, then follow prompts for default calibration (see page 5).
Keyboard locks up, odd readings, or "ERROR" appears on the display	To enter factory default values, press [SETUP] [DFLT], then follow prompts described on page 5.

Unit Dead	Reset **IQ** by pressing switch at rear of unit through small hole on center of back panel, then recharge. On older models without the reset hole, unplug battery pack for five minutes, plug back in, then recharge at least 14 hours. Also check for proper operation of charger.

Specifications

Electronics	Microprocessor Controlled
Optical Design	ANSI PH 2.17 Status "T"
Measurement Range	0.00 to 2.50 Density
Accuracy	±0.02
Precision	±0.01
Display	Supertwist Liquid Crystal (32 x 80 dot matrix)
Serial I/O	
Baud Rate	300 to 19,200 baud (user programmable)
Data Format	7 data bits, odd parity or 8 data bita
Handshaking	Automatic
Power Source	NiCad Battery Pack
Recharge Time	14 hours
Dimensions	7½ x 4 x 3¼" (L,W,H)
Weight	28 oz.

Parts List

Calibration Plaque	A2088
Instruction Manual	S0172
NiCad Battery Pack	A1496
PCB to PCB Flat Flex Cable	P0610
Storage Pouch	P0605
Charger Unit	P0642
Source Lamp	A2122
RS-232 Cable	P0609
RS-232 "MAC" Modem Cable (Optional)	P0874
RS-232 Serial Adapter (9-Pin) (Optional)	A2017
"SER CAP" Serial Capture Program (Optional)	A2007
"SER CAP" Manual (Optional)	S0367
T-Ref Standard (Optional)	P0707

Appendix: RS-232 Primer

Printers are usually equipped with either a RS-232 serial interface or a parallel interface. The **IQ** is designed to work with printers equipped with an RS-232 interface.

RS-232 is an Electronics Industries Association (EIA) recommended standard for connecting computer devices together to exchange information (data). It defines the electrical characteristics of the signals in the cable that connects the devices. The standard specifies a 25 pin connection, though as few as two lines can be used to connect devices for one way communication. Three to nine lines are typical for most applications.

In addition to the seven data bits, the code provides for a parity bit. The parity bit is sent after all of the data bits have been transmitted and is used to insure the integrity of the data bits. Parity is either even, odd or none. If even parity is used the parity bit is set on or off so that the total number of on bits is even. Odd parity sets the parity bit so that the total of these bits is odd. If no parity is specified, the bit is not sent at all.

Although ASCII is a seven bit code it is often sent in an eight bit format when used with graphic printers. If an eight bit format is used the last bit is usually ignored except when printing graphics.

The **IQ** can be set to transmit either 7 bits with odd parity or 8 bits with no parity. The rate at which the bits are transmitted is determined by the baud rate. The number of characters per second is approximately equal to the baud rate divided by ten. For example, 1200 baud would equal approximately 120 characters per second.

If the receiving device cannot accept characters continuously, then handshaking must be utilized. Handshaking is a means for the receiving device to tell the sending device to temporarily stop sending data. Handshaking may be either hardware or software.

With hardware handshaking, one of the RS-232 lines is turned off whenever the receiving unit cannot accept data. The unit stops sending data until the line is turned on again.

With software handshaking, the receiving unit sends an ASCII code back to the transmitting unit when it cannot accept any more data. The transmitting unit will suspend transmission until it receives a code from the receiving unit telling it to send more data. This mode is usually referred to as XON/XOFF handshaking. The **IQ** senses the form of handshaking in use and automatically responds to it.

RS-232 defines two types of computer devices: Data Terminal Equipment (DTE) and Data Communications Equipment (DCE). For proper operation when connecting two devices, one must be set for DTE and the other must be set for DCE. Most printers and personal computer serial ports are defined as DTE equipment. The cable supplied with the **IQ** will allow you to connect it to these devices by simply plugging it into their connector. If the device is defined as a DCE or the **IQ**'s cable will not plug into the other device, call the factory for assistance.

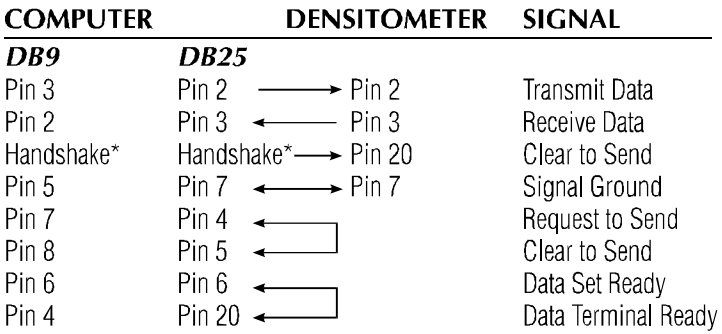
The **IQ** will communicate with most printers with as few as two connections between them, ground and transmit data. If your printer requires XON/XOFF handshaking, then three connections, including receive data, are required.

Refer to the operator's manual that came with your printer to determine the baud rate and type of parity required. Refer to the chapter on I/O setup in this manual in order to set the **IQ** to match these values.

Connections to a Computer

The RS-232 output of the **IQ** may be connected to a computer so that the data can be saved in a disk file or manipulated by a program on the computer.

To connect the **IQ** to a computer, a cable that provides each of the devices with the appropriate signals they need to operate correctly must be used. The diagram below shows the cable connections required to connect the **IQ** to an IBM PC, AT, or compatible computer. These machines may be equipped with either a 9 pin or a 25 pin connector. Pinouts for both of these connectors are shown.



***Optional connection.** "Clear to Send" is used to allow the computer to inhibit the transmission of data until it is ready. Transmission is enabled when it is high and inhibited when it is low. The pin used on the computer depends on the model and software being used.

Slope Calibration for the IQ150 & IQ200 Densitometers

The SLOPE mode can bias the calibration of the IQ150 or IQ200 so that the displayed density will match that of another densitometer. Densitometers from different manufacturers have differing optical characteristics; therefore they do not always display the same density values across their full operating range. When the slope calibration has been selected, the IQ150 or 200 applies a multiplier to every reading to compensate for these differences. Following pictures are EXAMPLES only.

To enter the slope values, press the [SLOPE] key. When this mode is first entered, the values of the slope multipliers will be displayed.

If you wish to change the slope of any color channel, read a sample patch of that color, preferably on the main process colors of the control strip or the T-ref. (Retain the sample in a safe place when this session concludes, so that you can return to it for future slope sessions.) After you read the patch, its color and density will be displayed. At this time you can change the displayed density value by pressing the [+] or [-] key until the desired value is attained. To the right of the density display will appear the number signifying the slope multiplier. (It will be a slight variation above or below 1.000, for examples: 0.950 or 1.050) Do not use numbers that are extreme amounts in attempts to compensate for a defect.

This number to the right of the density reading is the multiplying factor that is used to bias the density value to its new value. Once the desired density value has been attained press the [SAVE] key. The slope value will be thereby stored and will be used on subsequent readings.

After a channel has been sloped with a value other that 1.000, a delta or triangle symbol will be displayed after its density whenever any reading is performed.

REMINDER NOTE: Unit must be calibrated to the (cleaned) part number A2088 plaque prior to this slope procedure. Slope is NOT done with the plaque. To proceed with slope setting you must have a known good color control strip, or T-ref, or similar sample, with full process colors Black, Magenta, Yellow, and Cyan. Slope is done one color at a time. After the session is complete, retain the sample in a safe place for future use.

Two or more IQ densitometer units: Slope each unit one color at a time to the T-ref or to a known good control strip with the ideal or previously established density values written next to each sample. Do not expect the slope multiplier numbers to match, as no two units are exactly the alike.

To use IQ units with a differing brand of densitometer: If you decide that the differing densitometer model should serve as the master unit, then take readings with that master unit on the T-ref, record readings, then slope each IQ unit to match those readings upon reading the same sample. Do not forget to press [SAVE] as each one is read.

TOBIAS
ASSOCIATES, INC.

50 Industrial Drive
Ivyland, PA 18974-0347 USA
Phone: 215-322-1500
Toll-free: 800-877-3367
Fax: 215-322-1504
E-mail: repair@tobiasinc.com

twilight

INSTRUMENTOS DE MEDICIÓN INDUSTRIAL

LLÁMANOS

+52(81) 8115-1400 / +52 (81) 8173-4300

LADA Sin Costo:
01 800 087 43 75

E-mail:
ventas@twilight.mx

www.twilight.mx

/ twilightsadecv / twilightsadecv / twilightsadecv