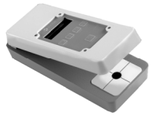
X-Rite 341C Densitometer Operator's Guide



FCC
This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Canada
This Class A digital apparatus complies with Canadian ICES-003. Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

CAUTION: Operational hazard exists if battery charger other than X-Rite SE30-177 is used.

VORSICHT: Betriebsgefahr! Bitte verwenden Sie ausschließlich das Ladegerät X-Rite SE30-177.

ADVERTENCIA: No use otro cargador de las pilas que no sea la pieza X-Rite SE30-177, por el riesgo de mal funcionamiento del equipo.

ATTENTION: Ne pas utiliser d'adaptateur autre que SE30-177 de X-Rite au risque de mauvais fonctionnement de l'appareil.

AVVERTENZA: Non usare un altro caricabatterie che non è del pezzo X-Rite SE30-177, per il rischio di malfunzionamento dell'apparecchio.

CE DECLARATION
Hereby, X-Rite, Incorporated, declares that this 341C is in compliance with the essential requirements and other relevant provisions of Directive(s) EMC 2004/108/EC, LVD 2006/95/EC, and RoHS 2011/65/EU.

Instructions for disposal: Please dispose of Waste Electrical and Electronic Equipment (WEEE) at designated collection points for the recycling of such equipment.

Limited Warranty
X-Rite warrants this Product against defects in material and workmanship for a period of twelve (12) months from the date of shipment from X-Rite's facility, unless mandatory law provides for longer periods. During such time, X-Rite will either replace or repair at its discretion defective parts free of charge.

X-Rite's warranties herein do not cover failure of warranted goods resulting from: (i) damage after shipment, accident, abuse, misuse, neglect, alteration or any other use not in accordance with X-Rite's recommendations, accompanying documentation, published specifications, and standard industry practice; (ii) using the device in an operating environment outside the recommended specifications or failure to follow the maintenance procedures in X-Rite's accompanying documentation or published specifications; (iii) repair or service by anyone other than X-Rite or its authorized representatives; (iv) the failure of the warranted goods caused by use of any parts or consumables not manufactured, distributed, or approved by X-Rite; (v) any attachments or modifications to the warranted goods that are not manufactured, distributed or approved by X-Rite. Consumable parts and Product cleaning are also not covered by the warranty.

X-Rite's sole and exclusive obligation for breach of the above warranties shall be the repair or replacement of any part, without charge, which within the warranty period is proven to X-Rite's reasonable satisfaction to have been defective. Repairs or replacement by X-Rite shall not revive an otherwise expired warranty, nor shall the same extend the duration of a warranty.

Customer shall be responsible for packaging and shipping the defective product to the service center designated by X-Rite. X-Rite shall pay for the return of the product to Customer if the shipment is to a location within the region in which the X-Rite service center is

located. Customer shall be responsible for paying all shipping charges, duties, taxes, and any other charges for products returned to any other locations. Proof of purchase in the form of a bill of sale or receipted invoice which is evidence that the unit is within the Warranty period must be presented to obtain warranty service. Do not try to dismantle the Product. Unauthorized dismantling of the equipment will void all warranty claims. Contact the X-Rite Support or the nearest X-Rite Service Center, if you believe that the unit does not work anymore or does not work correctly.

THESE WARRANTIES ARE GIVEN SOLELY TO BUYER AND ARE IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR APPLICATION, AND NON-INFRINGEMENT. NO EMPLOYEE OR AGENT OF X-RITE, OTHER THAN AN OFFICER OF X-RITE, IS AUTHORIZED TO MAKE ANY WARRANTY IN ADDITION TO THE FOREGOING.

IN NO EVENT WILL X-RITE BE LIABLE FOR ANY OF BUYER'S MANUFACTURING COSTS, OVERHEAD, LOST PROFITS, GOODWILL, OTHER EXPENSES OR ANY INDIRECT, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES BASED UPON BREACH OF ANY WARRANTY, BREACH OF CONTRACT, NEGLIGENCE, STRICT TORT, OR ANY OTHER LEGAL THEORY. IN ANY EVENT OF LIABILITY, X-RITE'S MAXIMUM LIABILITY HEREUNDER WILL NOT EXCEED THE PRICE OF THE GOODS OR SERVICES FURNISHED BY X-RITE GIVING RISE TO THE CLAIM.

General Information

General Description
The 341C instrument is a battery operated hand-held B/W Transmission Densitometer that has achieved the accuracy and stability of our A.C. powered versions. The unique size and shape makes it an ideal totable instrument for use in the plant, the lab, or on the road.

The instrument has its own light source and illumination area. Push-button control of display power, lamp, and zero make the instrument easy to use.

The 341C measures Density, Density Difference, and Dot Area.

Specifications

Measuring Geometry	Per ANSI PH 2.19, ISO 5/2
System Response	ANSI Visual
Measuring Range	
Density	0 - > 5.0D
Dot Area	0 - 100% (positive)
Repeatability	
2, 3mm aperture	± 0.01D (0-4.0D)
3mm aperture	± 1% (4.0-5.0D)
Linearity	
2, 3mm aperture	± 0.02D (0-4.0D)
3mm aperture	± 2% (4.0-5.0D)
Zero Stability	± 0.02D per 8hr, ± 0.01D typical
Warm-Up Time	none
Measuring Location	5.5in. (14cm) throat depth
Power Requirements	
Battery Pack	SE15-43
AC Adapter	SE30-177
Instrument Rating	12VDC @ 1.2 Amps
Measurements per Charge	> 1000
Physical	
Dimensions	2.0in H x 2.9in. W x 7.0in D (5.08cm H x 7.46cm W x 17.78cm D)
Weight	Gross 2.7lbs (1.2kg) Net 1.5lbs (0.7kg)
Environmental	
Operating Range	+50° to +104°F (+10° to +40°C) 30% to 76% RH
Storage Range	-4° to 122°F (-20° to +50°C) 5% to 95% RH
Usage	Indoor Only
Altitude	2000m
Pollution Degree	2
Transient Overvoltage	Category II

Accessories

Operation Manual, Transmission Reference,
Calibration Screwdriver, and
AC Adapter SE30-177

Specifications and design subject to change without notice.
* This product covered by U.S. Patents and patents pending.

Unpacking
Remove the instrument from shipping carton. Inspect for possible damage. If any damage is noted, contact the transportation company immediately. Do nothing more until the carrier's agent has inspected the damage.

If damage is not evident, make sure the following items are included.

Registration Card (complete and mail), Transmission Densitometer, Calibration Step Tablet, Soft Vinyl Carrying Case, 2mm and 3mm Apertures, AC Adapter, and Calibration Screwdriver.

Your instrument was packaged and shipped in a specially designed carton to assure against damage. If reshipment is necessary, the instrument should be repackaged in the original carton. If the original carton is not available, contact X-Rite to have a replacement carton shipped to you.

Operating Instructions

Should your instrument become inoperative, refer to the troubleshooting chart on the opposite side of this sheet. If the problem cannot be rectified, refer the instrument to X-Rite or an authorized service center for proper servicing.

Applying Power
Your densitometer is designed to operate from the internal battery pack or from the AC adapter. As an added feature, the instrument will operate on the AC adapter with the battery pack removed.

AC Adapter Operation
Before using: Make sure the voltage indicated on the AC adapter complies with the AC line voltage in your area. If not contact your dealer.

The instrument automatically turns on when the AC adapter is plugged in. You can turn the instrument off at any time by pressing the OFF button.

Battery Operation
THE INSTRUMENT SHOULD BE FULLY CHARGED BEFORE USING FOR THE FIRST TIME. SEE BATTERY CHARGING FOR DETAILS.

To apply battery power, press the ON button. The instrument automatically turns off after 2 minutes of inactivity to conserve battery life. To manually turn the instrument off, press the OFF button.

CAUTION: When the batteries are nearly discharged, a small arrow in the upper left-hand corner of the display appears as an indication that the batteries are in need of recharging. When the arrow appears on the display, the read lamp is disabled. If the arrow displays during a measurement, the data for that measurement will be incorrect. **The batteries must be immediately recharged once the arrow indicator is displayed.** The densitometer will not operate at all if the batteries have completely lost their charge, until the AC adapter is plugged in.

Battery Charging
THE UNIT SHOULD BE FULLY CHARGED BEFORE USING FOR THE FIRST TIME. The unit can be operated while the batteries are being charged. The batteries take approximately one hour to reach a full charge from a discharged state.

NOTE: After batteries are fully charged (indicated by Green LED off), remove the AC adapter and operate the instrument from battery power until the display indicates that charging is required. Following this charging method will help prolong the life of the batteries

Before charging: Make sure the voltage indicated on the AC adapter complies with the AC line voltage in your area. If not contact your dealer.

1. Plug small connector end of the AC adapter into side of unit.
2. Plug detachable line cord in the AC adapter and plug the line cord into the wall receptacle.

A fully charged battery pack provides over 1000 measurements typically.

LED Indicator
The LED indicator located next to the power input receptacle has three modes to provide feedback of the battery status. The three modes are explained below:

Solid Green LED – Indicates that the batteries are being charged.

Continuous Blinking Green LED – This occurs when the charging requirements for the batteries are being evaluated (or when no battery pack is present). After a short period of time, the LED will turn on solid indicating charging is taking place.

Green LED Off – Indicates that the batteries are fully charged. You should remove the AC adapter at this point and operate the instrument from battery power until the display indicates that charging is required.

Occasional Blinking Green LED – This occurs when the instrument attempts to evaluate batteries for a brief time.

Nulling (zeroing) Procedure
Null must be established each time instrument power has been removed for more than one second. This is because the electronic memory is lost with power removal. Null remains very stable (±0.02D) as long as power remains on. Null the instrument as follows:

1. Select Density or Dot.
2. Remove film from reading area.
3. Lower the reading arm. Press the "NULL" button and hold while pressing the "MEASURE" button.
4. Hold both buttons down until the reading on the display has stabilized.

Absolute Den Measurement
Measure Absolute Density as follows:

1. Select Density by pressing "DEN" button (Density Mode is activated when the decimal is on in the display).
2. Null the instrument as previously explained.
3. Center the film area to measure directly over the aperture, under the reading arm. If you are reading a sensitometric step, the center 1/3 of the step should be measured.
4. Lower the reading arm. Press the "MEASURE" button and hold until the reading on the display has stabilized.
5. Remove pressure on the "MEASURE" button so that the reading arm rises. The density measured is displayed until the button is pushed again.

NOTE: When measuring density values above 2.50D:

- The "MEASURE" button must be held longer to ensure accurate measurements.
- Care should be taken that the reading head light seal is completely on the surface of the film being measured. Always measure density with the film emulsion side up.

Den Comparison Measurement
Compare Density readings as follows:

1. Select Density by pressing "DEN" button (Density Mode is activated when the decimal is on in the display).
2. Place the reference film over aperture. Null the instrument as previously explained.
3. Place the film to be compared over the aperture and measure the density. This measurement is the difference between the reference film density and the compared film density. A minus (-) display indicates the compared film is a lower density.

NOTE: The unit can zero on densities up to 1.00D.

Dot Area Measurement
Dot Area readings will be 00.0% for the nulled area of film representing "fringe dots." Dark areas above 3.00D will measure approximately 100%.
Measure Dot Area as follows:

1. Select Dot Area by pressing the Dot button (Dot Mode is activated when the decimal is off in the display).
2. Null (zero) on the "fringe dot" area of the film to be measured.
3. Lower the reading arm. Press the "MEASURE" button and hold until the reading in the display has stabilized.
4. Remove pressure on the "MEASURE" button so that the reading arm rises. The Dot Area measured will be displayed until the button is pushed again.

Light Table Illumination
The light table is only illuminated by a depression of the "MEASURE" button.

Calibration

Frequency of Calibration Test
Under normal operating conditions, the instrument calibration test should be performed once a week.

Calibration Test
Calibration of this instrument should remain stable over a long period of time and over an extended range of voltage and temperature. However, if calibration is questioned, a calibrated step tablet is provided to check against. Handle this tablet with care so that no dirt or fingerprints are deposited on the film surface.

Check calibration while in Density mode, in the center of the step tablet area marked "CAL." This measurement should be within +0.02D of the value marked on the step tablet.

Always return the step tablet to its protective cover.

Den Calibration Procedure
If calibration is required, proceed as follows:

1. Select Density by pressing "DEN" button.
2. Insert a small screwdriver into the hole on the right side of the instrument, engaging the potentiometer slot inside.
3. Measure the calibrated step tablet in the center of the area marked "CAL."
4. If the reading in the display does not equal that of the calibrated step tablet, adjust the potentiometer until it does.
   - To increase scale factor, rotate the screwdriver clockwise.
5. Check the units null (zero) and renull if necessary.
6. Repeat Steps 3 and 4 until the calibration and null settings are exact.

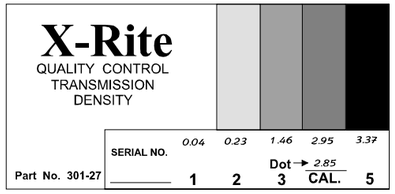
NOTE: The instrument measures for only a few seconds after the "MEASURE" button is pressed and held. Potentiometer changes after the bulb turns off and will not be noted until a new measurement is made.

Dot Calibration
A Method For Obtaining Practical Dot Area Measurement
The geometry standards for Transmission Densitometry are the American National Standards Institute (ANSI) Ph2.19 and the International Standards Organization (ISO) 5/2. These and the other supporting standards were produced with only density in mind. When a unit adheres to these standards, it may produce dot area measurements that are not in agreement with practical dot area values seen and used in the industry.
Until a new or revised standard is developed and approved for the graphic arts industry, the only proper and correct methodology is to produce densitometers to the existing standards.

Therefore, in order to achieve practical dot area measurements, a special dot area calibration procedure is necessary and is described below.

Dot Calibration Procedure
1. Verify calibration of the unit using the calibration step tablet supplied with the unit and using the procedure outlined in Den calibration procedure.
2. Measure the dot area of a known 50% dot (i.e., UGRA plate control wedge or RIT microline resolution target) making sure to zero on the base of the film.
3. Take the displayed value and subtract 50% from it. Take this new value and move the decimal point over one digit to the left (i.e., with a unit that measures to the nearest percent, a displayed value of 51% - 50% = 1%. Moving the decimal point one digit to the left produces .1).
4. Subtract the value obtained in step 3 above from the "Cal" step value on the step tablet. Write this number below the number already there and add the words "DOT" to the left of the new value. (i.e., "Cal" step value of 2.95D - .1D = 2.85D should be written on the "cal" step of the step tablet). Refer to the example on page 10.

EXAMPLE



5. Recalibrate the densitometer following the Den calibration procedure, but replace the "hi entered" calibration value with the new "Dot cal" number generated in step 3.

The densitometer will now measure practical dot area correctly. This procedure does understate the HIGH densities somewhat (i.e., a 4.56D Dmax would really be a 4.8D from the example above), but this is not a significant amount when dealing with Dmax. If density measurements traceable to a standard are required, then recalibration to the original density stated on the step tablet will be necessary.

Maintenance

General
The densitometer should be referred to the factory for repair within this warranty period. Attempts to make repairs within this time frame may void the warranty.

Always verify instrument calibration to assure proper instrument operation. Make sure all connections are properly made.

Cleaning
The exterior of the instrument may be wiped clean with a cloth dampened in water or mild cleaner whenever required.

Factory Repair
X-Rite, Inc. recognizes the need to provide complete technical repair service to their customers. Because of the complexity of the circuitry,

all circuitry repairs should be referred to the factory or an authorized repair station.

The manufacturer will repair any densitometer submitted past warranty. Shipping costs to the factory shall be paid by the customer and the instrument shall be submitted in its special carton as a complete unaltered unit.

Lamp Replacement
A spare Lamp Assembly for the 341 (P/N 341C-137) can be obtained from X-Rite, Inc. should your lamp fail. Replace as follows:

NOTE: Refer to illustration on page 13.

1. Unplug the AC adapter from the instrument.
2. Remove the bottom cover from the instrument by removing the four screws.
3. Unplug the lamp connector from the P.C.B. assembly.
4. Remove the two screws holding the lamp assembly. Remove the lamp assembly.

CAUTION: Make sure the new lamp surface is clean. Remove smudgemarks with alcohol on a lint-free cloth.

5. Install the new lamp into the lamp chamber assembly with the screws removed in Step 4.
6. Attach the lamp connector to the lamp plug on the P.C.B. assembly.
7. Secure the bottom cover to the instrument with the four screws removed in Step 2.

Battery Replacement
⚠ If it becomes necessary to replace the battery pack, use only part number SE15-43 supplied by X-Rite. To replace the batteries, use the following procedure.

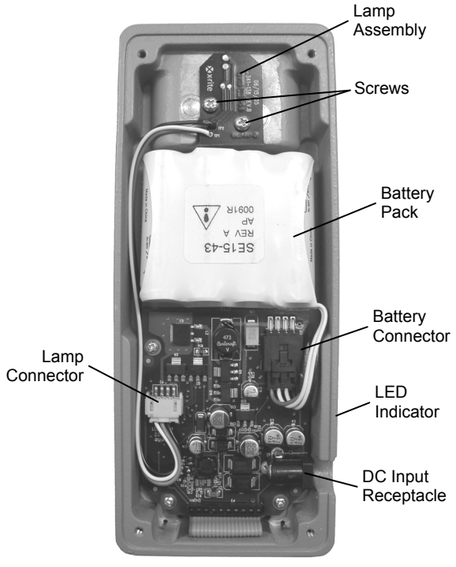
NOTE: Refer to illustration on page 13.

1. Unplug the AC adapter from the instrument.
2. Remove the bottom cover from the instrument by removing the four screws.

3. Unplug the battery connector from the P.C.B. assembly and remove the old battery pack.
4. Install the new battery pack into the instrument.
5. Attach the battery connector to the battery plug on the P.C.B. assembly.
6. Secure the bottom cover to the instrument with the four screws removed in Step 2.

Troubleshooting Chart
The following chart is included to aid in troubleshooting your instrument. While troubleshooting, use caution to avoid danger of an electrical shock. While replacing parts always turn off the power.

Trouble	Cause	Remedy
Display will not light. (No decimal point)	Discharged or bad batteries. Internal component failure.	Recharge or replace. Return to the factory or authorized service center.
Displays do not light (decimal point lit)	Power is just turned on. Internal component failure.	Press measure button. Return to the factory or authorized service center.
Light source will not light.	Failed light source. Discharged or bad batteries. Internal component failure.	Replace light source. Recharge or replace. Return to the factory or authorized service center.
Reading will not change.	Internal component failure.	Return to factory or authorized service center.
Reading will not hold.	Internal component failure.	Return to the factory or authorized service center.
Display turns off when measure button is pushed.	Weak batteries.	Recharge batteries.



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