SPECTRA®
PHOTOGRAPHIC METERS
Assembly and Service
MANUAL

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PART A

MANUFACTURING

SCOPE:

This manual is in two parts

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Oct. 1968

THE SPECTRA EXPOSURE METER

GENERAL

The SPECTRA Professional and Universal are identical selenium photocell exposure meters. The Spectra Combi-500 has two photocells - a selenium and a CdS photocell. The two cells are on separate circuits. When the level of light is too low for the selenium cell to give a reading, a switch on the side of the Combi activates the ultra sensitive CdS cell which is powered by two button-type batteries.

The full scale reading on all meters is 250 fc. Multiplier slides extend this range to 25,000 fc. At the low end of the scale the Universal or Professional will read down to approximately 2 fc. The Combi-500 will read as low as 0.008 fc.

A series of direct reading slides calibrated to the various ASA EXPOSURE INDEXES are provided to enable direct f/stop reading without consulting the computer. On all three meters the photocell unit is mounted in a swivel head which can be turned in any direction. A unique Spectra feature on all meters is the famous Photosphere light collector which provides a 3-dimensional measurement of light falling on a subject.

Assembly Procedure:

The parts necessary for assembly of the Professional, Universal and Combi-500 meter are listed in TABLES 1 and 1A, Pages 17, 18, 19, 20 Part B.

Follow this procedure exactly;

1. Place case top/bottom assembly (5137) on work bench with open sides facing up.
2. Put cell glass (5022) into place in circular opening in top part of case assembly.
3. Install the lead wires (5024);
   (a) Through the top part of the case assembly insert the free ends of the two lead wires (5024) down through connecting hole into bottom case assembly.
   (b) Connect solder lug (1694) to the end of one lead wire in the bottom case assembly. The other end of this wire goes under the positive screw terminal on the right hand side of the top case assembly.
   (c) The second lead wire is connected under the negative screw terminal on the left side of the top case assembly, use screw (1847) W.S. 2-56 x 3/16 Bd. hd. brass. Attach heat sink copper alligator clip to the other end of this lead wire in the bottom case assembly and leave until step 9c

COMBI Assembly: Go to blue sheet 5A

Professional and Universal Assembly continued

4. Install photocell assembly; (5091)
   (a) Hold the photocell assembly (5091) a few inches above top case assembly.
   (b) Connect wire coming from the collector strip (smooth side) of the photocell to the negative (left) terminal on the top case assembly.
   (c) Connect wire coming from the back of the photocell to the positive (right) terminal on the top case assembly.
   (d) Lay photocell in place in circular opening on cell glass, smooth side toward glass.

(continue on next wht.pg.6);

4. Install photocell assembly (5130)

   (a) Hold Photocell assembly (5130) a few inches above top case assembly.

   (b) Connect lead wire from the negative side (smooth, collector strip side) of the photocell to the negative (right) terminal on the top case assembly. Use screws (1847) M.S. 2-56 x 3/16 Bd.Hd.

   (c) Lay photocell in place, in circular opening, on top of cell glass - smooth side toward glass, positive lead wire toward the top and to the right side of case.

   (d) Put one green filter (Wrattan gelatine # 102) into receptacl on photocell.

5. Install Booster Assembly (5114)

   (a) Hold booster assembly a few inches above photocell.

   (b) Connect negative lead wire from booster (wire on right) to negative terminal on case top.

   (c) Connect positive lead wire from booster to positive terminal on case top (Use screw (1847) M.S. 2-56 x 3/16 Bd.Hd.)

   (d) Through circular open in booster, insert photocell lead wire. (From back of Photocell)

   (e) Solder photocell positive lead wire to wire projection from switch on right side of booster.

   (f) Install battery holder (244) in channel - line up grooves. Insert batteries (1653) - observe polarity.

   (g) Put two teflon insulators (5234) on top of the back of CdS Cell.

6. Arrange the slack of all lead wire neatly into the corner crevices of the top case assembly.

(Continue Combi-500 Assembly on white page 6 par. 7)

5. Place rubber gasket (5023) on top of photocell. Position gasket so that lead wire is seated through opening in gasket.

6. Arrangethe slack of the lead wires from photocell neatly into the corner crevices of the top case assembly.

CAUTION:

Before proceeding, make sure that all lead wires are securely connected and that they do not protrude between cell glass and case, or between cell glass and photocell.

7. On top case assembly put on the case back (5007). Use two 3/16 screws (2237) for the upper part and 5/16 screws (2156) for the lower part of the case back.

8. Insert "0" slide into channel in case top assembly.

CAUTION:

Microammeter is a fragile instrument and must be handled with extreme care.

9. Install microammeter (5013 Weston) (5236 Rex):

(a) Rotate the zero corrector adjustment screw (located on the back fo the bottom case assembly) to bring the zero corrector pivot to its highest point.

(b) Hold microammeter (5013) in one hand and bend the zero corrector tongue (located on the under side of the microammeter), outward about 15 degrees.

(c) Solder the negative lead wire (Pg.5 step 3c) to the zero corrector tongue.

(d) Lower the microammeter into the bottom case assembly, seating the zero corrector tongue over the zero corrector crank and the two clearence holes inserts in the case.

(e) Use screw (1847) and lock-washer (5038) to secure left side of microammeter.

(f) Secure right side of microammeter and positive lead wire (Pg.5 step 3b) to case with screw (1847) and lockwasher (5038).

(g) Gently press down on zero corrector tongue to position it paralell to case and magnet.

NOTE: If zero corrector tongue is not correctly positioned crank will disengage from tongue when rotated.

(h) Rotate zero corrector screw (underneath case) to check if crank is properly traveling inside tongue.

(j) Put meter scale retaining screws (2095) with #2 flat washers (2176) into place located one each side of magnet. Do not tighten screws.

(k) Put meter scale plate "B" (5150 or 5233) in position between spacer washers and screws on meter - tighten screws.

(l) Temporarily put on meter cover (5087) with one screw (2237).

Calibration Procedure: (see Table III page 20)

NOTE: For this procedure, there should be no friction in the meter. (If friction is there, see part 2 of manual to correct).

1. Insert "0" slide in meter. (Remove Photosphere and meter cover if they are in place).
2. Rotate the Zero Corrector adjusting screw (on back of lower case assembly) to bring Zero Corrector Pivot to its highest point and the Zero Corrector channel in center position.
3. Lay meter on workbench - it must lie perfectly flat - meterscale side up, photocell side down.
4. Bring the pointer to read "Zero" by moving the upper hair-spring abuttment.
5. Balance the pointer:
   (a) Cradle the meter in one hand in upright position.
   (b) Tilt meter to your left about 45 degrees from upright. The pointer is now in the HORIZONTAL position and should be at "Zero" on the meter scale.
   (c) Tilt the meter to your right about 45 degrees from upright. The pointer is now in the VERTICAL position and should read "Zero".
   (d) The pointer tail is too light when the pointer reads below "Zero", too heavy when the pointer reads above "Zero", in either the VERTICAL or HORIZONTAL positions.

(e) To increase weight, move the tail weight downward along tail, or bend the tail to the right (on whichever side needs the more weight).

(f) To reduce weight, move the tail weight upward on tail or, bend the tail to the left (on whichever side is too heavy).

(g) Repeat steps (b) to (f) until pointer reads "ZERO" in VERTICAL and HORIZONTAL positions.

6. Put a Photosphere on meter.

7. Remove "0" slide.

8. Temporarily put meter cover on - use only one screw (2237)
9. Place meter on Photometric bench at the 250 fc mark.
10. Adjust proper voltage of 800 candlepower lamp (used as secondary calibration standard).
11. Meter should now read 250 fc. If reading is below 250 fc charge the magnet. If reading is too high, "age" the magnet. If, after charging the magnet, meter is still reading low, replace photocell with one of a higher output.
12. When the meter is reading correctly at 250 fc, move it along photometric bench and note the readings at 125, 64, 32 and 16 fc. If these readings are consistantly high, replace meter scale with a "C" scale; if consistantly low, use the "A" scale. Photospheres have slightly different densities and sometimes changing a Photosphere may help give a finer adjustment.

NOTE:

"Inside the block" is within the tolerance of accuracy allowed in the calibration of this meter.

13. The neutral density (X10 attenuator) filter, located on the forward baffle of the photometric bench, is now put over the light beam. The meter should now read 10 fc at the 100 fc mark on the bench. (This checks the tracking at 8 and 10fc)

14. The ASA index slides and multiplier slides (5098 and 5111) are now calibrated according to values given in TABLE III (Page 20). A small moto tool is used to open up the holes in the slides to adjust the readings.

COMBI-500 ASSEMBLY: Go to blue sheet (9A)

Professional and Universal Assembly, Cont'd . .

Finishing Procedure:

After calibration, the meter is returned to work bench, proceed as follows:

1. Remove meter cover assembly.
2. Put pointer stops (5039) in place underneath meter scale retaining screws, allowing 1/8 inch for pointer travel both ends of arc.
3. Assemble meter cover gasket (5041) and meter cover and mount both on meter with four screws (2237).
4. Computer:

   Assemble the computer on the computer insert at the back of the photocell unit, according to the following sequence:

   (a) Cupped washer (5034) inside of cup down.

   (b) Computer bottom assembly,

   (c) Put a smudge of grease on computer bottom assembly. (especially the detent holes).

   (d) Computer center plate (5033) E.V. window toward the top.

   (e) One .004 washer (5035) and one .008 washer (5035-A)

   (f) Computer top plate (5033)

   (g) Lock assembled computer to the computer insert with computer screw (5036).
5. Take appropriate name plate having proper serial number on it and attach it on back of meter case (below the zero adjusting screw).

Continue on white page 10.

COMBI

CdS CELL CALIBRATION (using Photometric Bench) Method #1

1. Test batteries (press test switch, pointer should indicate 64 fc or higher.
2. Place meter in jig on Photometric bench at 32 fc mark.
3. Adjust voltage of lamp on Photometric Bench.
4. Place N.D. 2.00 in light path.
5. Activate CdS circuit - pointer should indicate 32 fc.
6. Adjust reading by changing filters in the CdS cell as follows:

Wratten Filter #96	Reading Adjust
N.D. 0.10	1 block (on meter scale)
N.D. 0.20	2 Blocks
N.D. 0.30	3 Blocks
#102 (Green)	5 Blocks

CdS CELL CALIBRATION (using PRC standard illuminant).. Method #2

1. Check batteries, by pressing battery test switch located at top of Combi-500. Pointer should indicate 64 fc or higher.
2. Place Combi on Standard Illuminant. Activate CdS circuit (by pressing switch located on side of meter). Reading should be 32 fc.
3. Adjust reading to 32 fc, if necessary, by using N.D. Filter in the photocell receptacle as follows:

Wratten Filter #96	Reading Adjust
N.D. 0.10	1 Block (on meter scale)
N.D. 0.20	2 Blocks
N.D. 0.30	3 Blocks
#102 (Green)	5 Blocks

ADJUST RED X-10 SLIDE (Table III, page 20)

1. Place meter on photometric bench at 25 fc mark.
2. Insert "Red X-10" Slide in meter.
3. Switch on light on photometric bench and adjust voltage to standard illumination.
4. Activate CdS circuit (by pressing switch located on side of meter). Reading should be 250 fc.

6. Assemble Instruction Manual, Warranty Card with correct serial number, basic calibration card stamped with serial number etc. with each meter.
7. Put ASA and Multiplier slides into flannel bag (5042).
8. Give meter and items 6 and 7 to Inspector for final inspection.

Final Check Out:

The meter is carefully inspected with special attention to the following points:

(a) Pointer is at zero.
(b) Pointer is balanced.
(c) Pointer travels smoothly without friction.
(d) Computer - Correct assembly - Works smoothly.
(e) Photometric bench check-out.
(f) X10 and X100 slides check-out.
(g) Overall appearance? - Screws tight? - Scratches? Clean glass?, etc.

The inspector will sign Basic Calibration Card when check-out is satisfactory.

NOTE:

Do not go to final packaging until the Basic Calibration Card has been signed by the Inspector.

Final Packaging:

Materials needed for final packaging are listed in TABLE II.

1. Cover the 4 screws in the meter cover and the two screws on the case back with screw head seals (5235).
2. Stick Emblem Decal (5037) on top of computer screw.
3. Gently polish meter with a soft cloth moistened with silicone emulsion (LE45). Scratches should be removed on buffing machine.
4. Assemble Professional and Combi-500 equipment in carrying case as follows:

(a) Photodisk assembly
(b) Photogrid assembly

5. Use small moto tool (Hand drill), if necessary, to adjust opening in Red-X slide.

Finishing Procedure

After calibration the meter is returned to the work bench, proceed as follows:

1. Remove meter cover assembly (5237)
2. Put pointer rest plate (5238) in place underneath meter. scale retaining screws.
3. Put pointer stops (5039) in place on top of pointer rest plate underneath meter scale retaining screws, allowing 1/8 inch for pointer travel both ends of arc.
4. Assembly meter cover gasket (5041) and meter cover assembly (5237); mount both on meter with four screws (2237).

Continue assembly of Combi-500 on white page 9, par. 4 COMPUTER:

(c) Flannel bag (5042) with slides

(d) Meter

(e) Neck strap (5081)

5. Close case
6. Assemble all paperwork; Manual, Warranty Card, Calibration Card etc., and put in plastic envelope.
7. Wrap plastic envelope (with all paperwork in it) around meter case.
8. Put everything into display box bearing the meter serial number.

Place Universal Meter and Field Case in Display Box. Assemble manual, warranty card, etc., and put into display box lid with correct Serial No. on bottom of box.

SPECTRA

EXPOSURE METERS

TECHNICAL MANUAL

PART B

SERVICING

Oct. 1968

SERVICING

Define the Problem

When a Spectra Exposure Meter malfunctions, it is first necessary to determine the precise nature of the trouble in order to effectively service the meter. A careful diagnoses is stressed because if this is not done properly, either poor service or too-costly repairs may result.

PROCEED AS FOLLOWS:

1. Obtain from the customer as much information as possible pertaining to the nature of service required.

2. Examine meter for any obvious sign of damage or malfunction-stuck pointer, broken parts etc.

3. Examine meter for hidden signs of malfunction - short circuit, hairspring damage etc.

4. Check meter for calibration and tracking.

5. Examine microammeter for metal chips, lint, etc. on core.

6. Repair meter as needed. (See trouble shooting chart).

TROUBLE SHOOTING

NO.	PROBLEM	PROBABLE CAUSE (S)	REMEDY
1.	Pointer stuck at "0" or "250"	Pointer has jumped stops.	Adjust Pointer stops (part 5039)
2.	Pointer stuck at a random point scale.	(a) Metalic chips or lint around microammeter core. (b) Coil pivot out of jewel. (c) Microammeter core pushed out of line.	(a) Clean microammeter. (b) Loosen jewel, seat pivot in place and tighten jewel. (c) Gently force core back into place.
3.	Pointer vibrates or shivers erratically.	(a) Jewel too loose. (b) Cell contacts loose or dirty. (in early models a copper collector ring was used for cell contact.)	(a) Tighten jewel. (b) Check all connections. On older models clean collector ring and rough up sensitive collector strip on cell face.
4.	Pointer moves too slowly.	(a) Friction in jewel. (b) Short circuit in micro-ammeter or photocell.	(a) Loosen jewel. (b) Install new microammeter or photocell.
5.	Pointer will not zero.	(a) Jewel friction. (b) Metalic chips or lint on microammeter core. (c) Damaged hairspring.	(a) Loosen Jewel. (b) Clean Microammeter. (c) Gently reform hairspring.
6.	Pointer will not balance.	(a) Damaged hairspring. (b) Pointer cross-piece has come loose from coil.	(a) Gently reform hairspring. (b) Place cross-piece in correct position. Put one drop of crystal cement between cross-piece and coil. Quickly turn microammeter face down on bench and allow 15 minutes to dry.
7.	Pointer moves freely when meter is tilted, but makes no response to light. (See also # 12)	(a) Open circuit between coil and pointer cross-piece contacts. (b) Open circuit between coil and bottom hairspring abutment. (c) Open circuit between photocell and microammeter.	(a) Wind end of coil wire around cross-piece at base of pointer a few turns and solder, use a spot of flux. (b) Wind end of coil wire around abutment. Solder. Use flux. (c) See remedy 3b.

NO.	PROBLEM	PROBABLE CAUSE (S)	REMEDY
8.	Meter functioning normally except not reading correctly. (See also; Calibration Procedure)	(a) Meter out of balance.	(a) Balance and zero (See Calibration Procedure Part A this manual)
		(b) magnetic field too low or too high.	(b) Charge magnet to get higher response. Age magnet to go lower.
		(c) Wrong cell output.	(c) Use higher cell output for higher response. Use lower cell output for lower response.
		(d) Full scale ok but doesn't "track" over entire scale.	(d) Select proper meter scale "A" "B" "C" etc.
9.	Swivel head too loose.	Collar has slipped.	Remove microammeter. Remove computer. Place meter in case assembly jig and tighten swivel head. Replace microammeter and computer.
10.	Swivel head rotate through 360° and does not come to a stop.	Abutment stop broken in bottom case.	Disassemble meter as in # 9 above. Remove collar pin assembly. Remove cup washer. Remove and discard bottom case. Reverse procedure to re-assemble. Use case assembly jig to position and hold meter while tightening collar pin assembly.
11.	Pointer broken off.		Heat base of pointer with small soldering iron to loosen shelac adhesive. With tweezers, remove end of pointer. Reverse procedure to install new pointer. May be necessary to add additional drop of shelac to cross piece.

COMBI-500

TROUBLE SHOOTING (also see white pages)

NO.	PROBLEM	PROBABLE CAUSE(S)	REMEDY
12.	Pointer moves freely when meter is tilted but does not respond to light.	(a) Open circuit in boaster circuit (see also #7 in white pages). (b) Faulty mili-switch (5119) (c) Broken CdS cell	(a) Remove computer and back plate to expose booster. Inspect all solder joints and repair as needed. (b) Replace miliswitch (5119) (c) Replace CdS cell (by unsoldering 2 connecting wires at each side of cell). (d) On older models clean cell and collector ring contacts. Inspect solder connection between cell pressure plate and booster.
13.	Reading too low on booster circuit.	(a) Old Batteries (b) Filter pack too dense (c) Short in circuit (d) Faulty miliswitch	(a) Replace batteries (5119) (b) Remove N.D. filters as needed (see calibration procedure). (c) Inspect booster for bare wires and excessively large solder joints. Insulat as needed. Put 2 teflon insulators on back of Cds (to insulate it from computer stud on meter back cover plate). (d) Replace mili-switch.

MAINTENANCE

Use a steel needle mounted on a wooden handle to clean microammeter of magnetic metal chips or lint. A small triangle (about 1½ inches long) of stiff paper is used to get in between the core and the coil to remove non-magnetic foreign material.

CAUTION:

MICROAMMETER IS A FRAGILE INSTRUMENT AND MUST BE HANDLED WITH EXTREME CARE.

A small non-magnetic wrench is used to adjust jewel control screw located on the side of the core.

A hairspring tweezers must be used when any work is being done on the hairspring. Gentle pressure on one side of the hairspring will cause a reaction on the opposite side.

When cementing pointer cross-piece to coil, make sure that the cement does not drop down on to the hairspring - this is why it is recommended to quickly turn the microammeter face down.

Sometimes the coil wire is too short when repairing an open circuit. If this occurs at the bottom hairspring abutment, repair is impossible - discard the microammeter. If the coil wire is too short at the top pointer cross-piece, it is usually possible to unwind the wire from the coil one complete turn and then make the repair.

TABLE I

SPARE PARTS LIST FOR SPECTRA EXPOSURE METERS, MODELS S-500, S-501 P-250, P-251, U-750, U-751, LD-300

The Following Parts are for all Models:

Catalog Number	Description
5033	Computer Top Plate
5032	Computer Center Plate
5006	Meter Cover (No glass no nameplate)
5028	Glass for Meter Cover
5007	Case Top - Back Cover
5072	Photosphere
5071	Photosphere Mounting Ring
5073	Retaining wire for Photosphere/Photodisk
5022	Cell Glass
5382	Photogrid II plastic part
5083	Photogrid II metal part
5077	Photogrid II mounting ring
5076	Photodisk Diffuser Material
5075	Photodisk Clear Material
5074	Photodisk Mounting Ring
5443-A	W-Meter Scale "A"
5443-A+	W-Meter Scale "A+"
5443-B	W-Meter Scale "B"
5443-C	W-Meter Scale "C"
5373-A2	R-Meter Scale "A"
5373-A+	R-Meter Scale "A+"
5373-B	R-Meter Scale "B"
5373-C	R-Meter Scale "C"
5013	Microammeter-W (Use with W Scales)
5013	Microammeter-R (Use with R Scales)

SPARE PARTS LIST FOR SPECTRA EXPOSURE METERS, MODELS S-500, S-501, P-250, P-251, U-750, U-751, LD-300

The Following Parts are for all Models:

Catalog Number	Description
5043	Zero Slides
PC-140	Slides ready for Calibration not stamped with ASA
5086	Collar
1372	Collar Set Screws
5085	Case Top/Bottom Assembly
5042	Flannel Bags for Slides
5039	Pointer Stops
5081	Neck Straps
5041	Rubber Gaskets
5037	Emblem (on computer screw)
5036	Computer Screw
5237	Meter Cover wtih glass and pointer lock - no nameplate
5238	Pointer Rest Plate (for use with Microammeter-W only)

The Following are for Models S-500 and S-501 only:

5156	Computer Plate Bottom Assembly for Model S-500
5441	Computer Plate Bottom Assembly for Model S-501
5127	Selenium Photocell
5120	CdS Cell
5155	Decal - Serial No. for Model S-500
5438	Decal - Serial No. for Model S-501
5114	Booster (Complete)

SPARE PARTS LIST FOR SPECTRA EXPOSURE METERS, MODELS S-500, S-501 P-250, P-251, U-750, U-751, LD-300

The Following are for Models S-500 and S-501 Only:

Catalog Number	Description
5119	Switches for Booster
5117	Switch Buttons
1653	Batteries
5116	Battery Holder
C-140	Set of Slides (15) Uncalibrated
5125	Red X Slide for Model S-500
5351	Red X10 Slide for Model S-501
5126	Case Back Plate (Top)
5121	Name Plate "SPECTRA Combi"

The Following are for Models P-250, P-251, U-750, and U-751:

5059	Computer Bottom Plate Assembly Models P-250, U-750
5442	Computer Bottom Plate Assembly Models P-251, U-751
5091	Selenium Photocells
P-140	Set of Slides (14) Uncalibrated
5028	Name Plate "SPECTRA Professional"
5148	Name Plate "SPECTRA Universal"
5027	Decal - Serial No. for P-250
5439	Decal - Serial No. for P-251
5149	Decal - Serial No. for U-750
5440	Decal - Serial No. for U-751

The Following are for Model LD-300:

5141	Cover for Case Top
5140	Name Plate "SPECTRA Candela"
5142	Decal - Serial No. for LD-300

SPARE PARTS LIST FOR SPECTRA EXPOSURE METERS, MODELS S-500, S-501 P-250, P-251, U-750, U-751, LD-300

Manuals:

250/750	Instruction Manual - Models P-250, U-750
S-500	Instruction Manual - Model S-500
3-014	Instruction Manual - Models P-251, U-751, S-501
300 x100	Instruction Manual - Candela LD-300

Service Manual for all SPECTRA Exposure Meters --- Free

TABLE III

CALIBRATION OF STANDARD SLIDES

At 1000 fc 1/50 sec. shutter speed

ASA INDEX	F/STOP
125 (x10)	10 (100 fc)
12 (x100)	3.2
10	2.8
16	3.5
25	4.5
32	5
40	5.6
50	6.3
64	7
80	8
100	9
160	11

At 250 fc for 1/50 sec. shutter speed

ASA INDEX	F/STOP
200	6.3
250	7
320	8
400	9 (optional slide)
500	10 (optional Slide)

Combi-500 Only

Slide at 25fc	Reading
"Red X10	250 fc

TABLE IV

Equipment and Tools

PHOTOMETRIC BENCH:

1. 8' Lathe bed type bench with hinged carriage and special jig to hold meters and marked off in footcandles. (source: CENCO, Chicago).
2. Lamphouse with cooling fan.
3. 800 Candle power lamp calibrated for horizontal candlepower. (Source: NATIONAL BUREAU OF STANDARDS,Washington,D.C.)
4. A.C. Read-out voltmeter (Source: WESTON, Newark,N.J.)
5. Line voltage regulator. (Source: SORENSON, So. Norwalk,Conn.)
6. Light baffle.
7. Filter N.D. 1.00 (Source:Kodak)
8. Variac (Source: POWERSTAT, Bristol, Conn.)

MAGNET CHANGER:

12 volt D.C. Magnet Charger (Source: Allen Electrical Equipment Company, Kalamazoo, Mich.)

DEMAGNETIZER:

Demagnetizer Coil (Source: Weston,Newark,N.J.)

TOOLS:

Set of non-magnetic instrument repair tools. Eye loupe 4X.

ADHESIVE:

Watchmakers crystal cement. (Source: L & R Mfg. Co., Kearny,N.J.)

LUBRICANT:

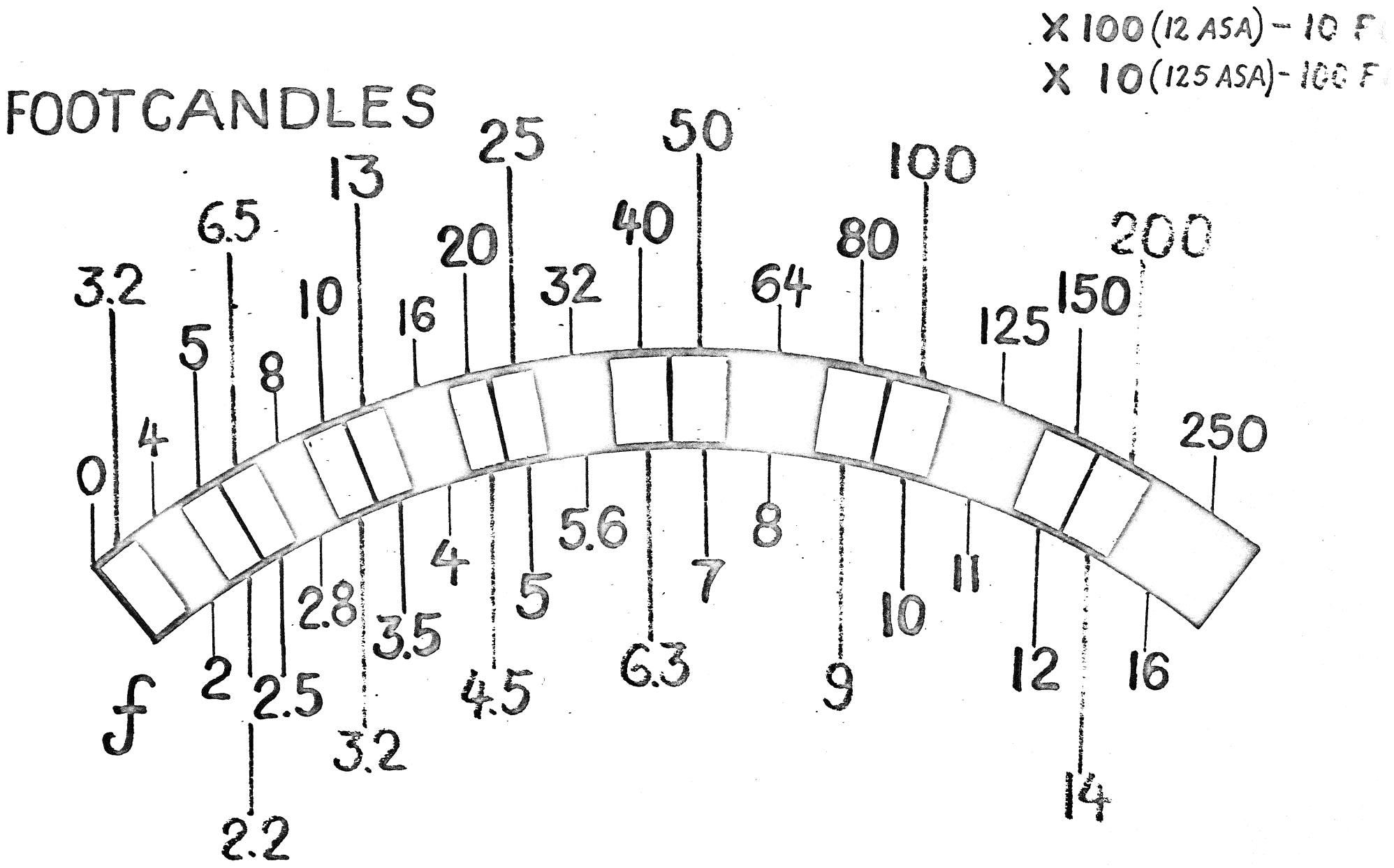
Heavy cup grease (or petroleum jelly)

POLISH:

Silicone Emulsion (LE 45)

PAINT:

Craftint "Cerise"


X 100 (12 ASA) - 10 F
X 10 (125 ASA) - 100 F
FOOTCANDLES
0
3.2
4
5
6.5
8
10
13
16
20
25
32
40
50
64
80
100
125
150
200
250
f
2
2.2
2.5
2.8
3.2
3.5
4
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5
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6.3
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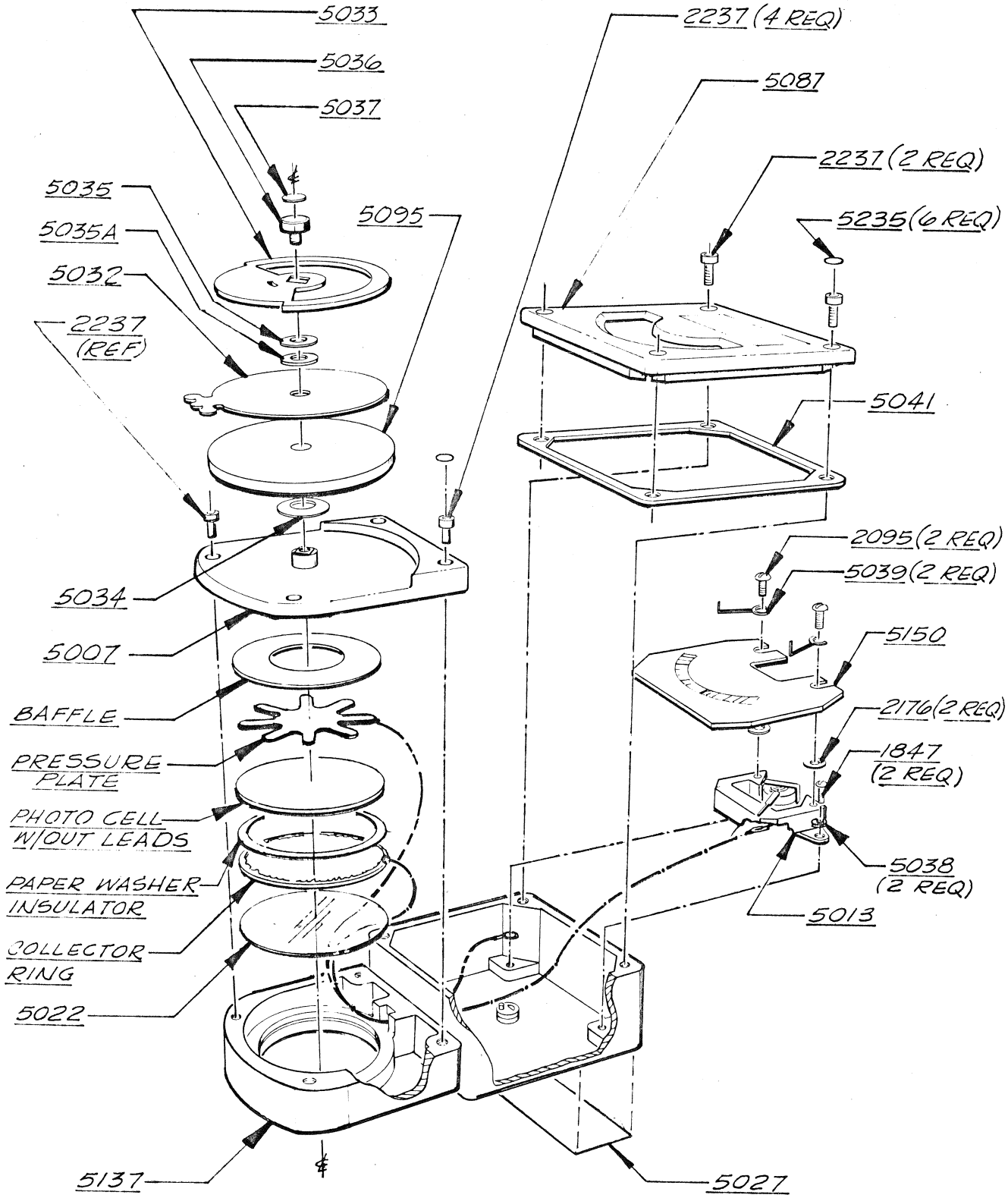


FIGURE I
EXPOSURE METER
"PROFESSIONAL" (ORIGINAL MODEL)

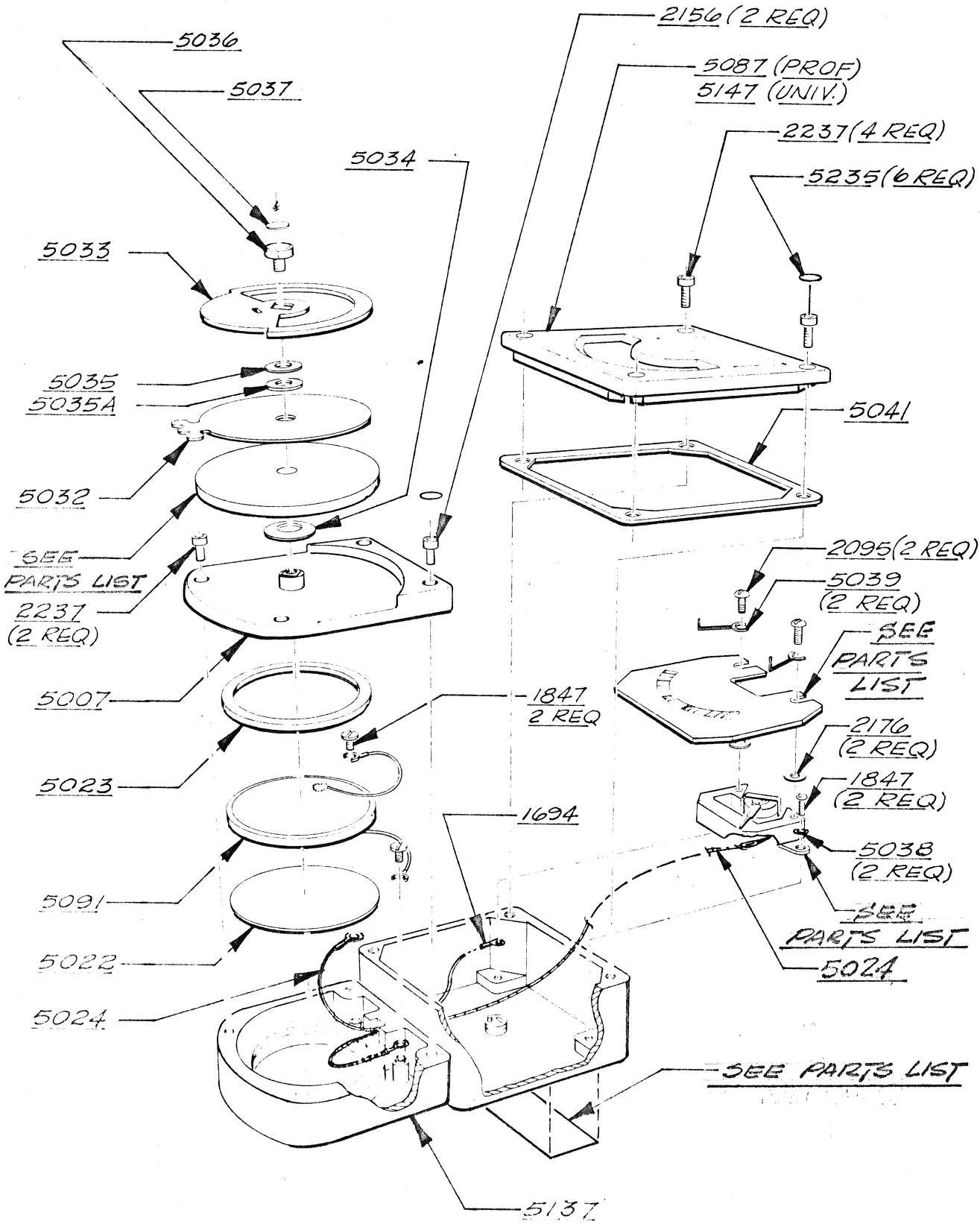


FIGURE II

EXPOSURE METER

PROFESSIONAL & "UNIVERSAL" (CURRENT METERS)

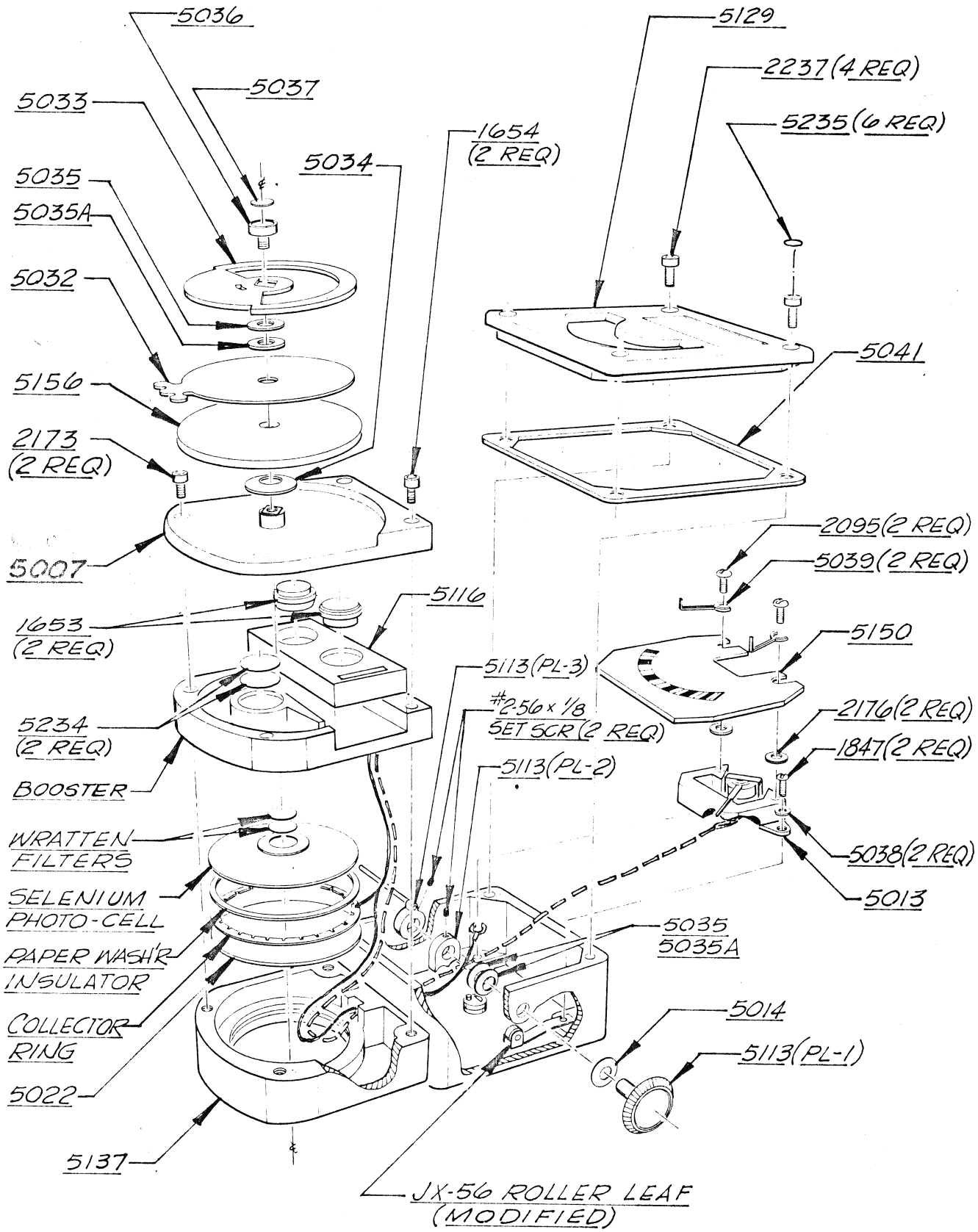


FIGURE III
EXPOSURE METER
"COMBI-500" (ORIGINAL MODEL W/POINTER LOCK)

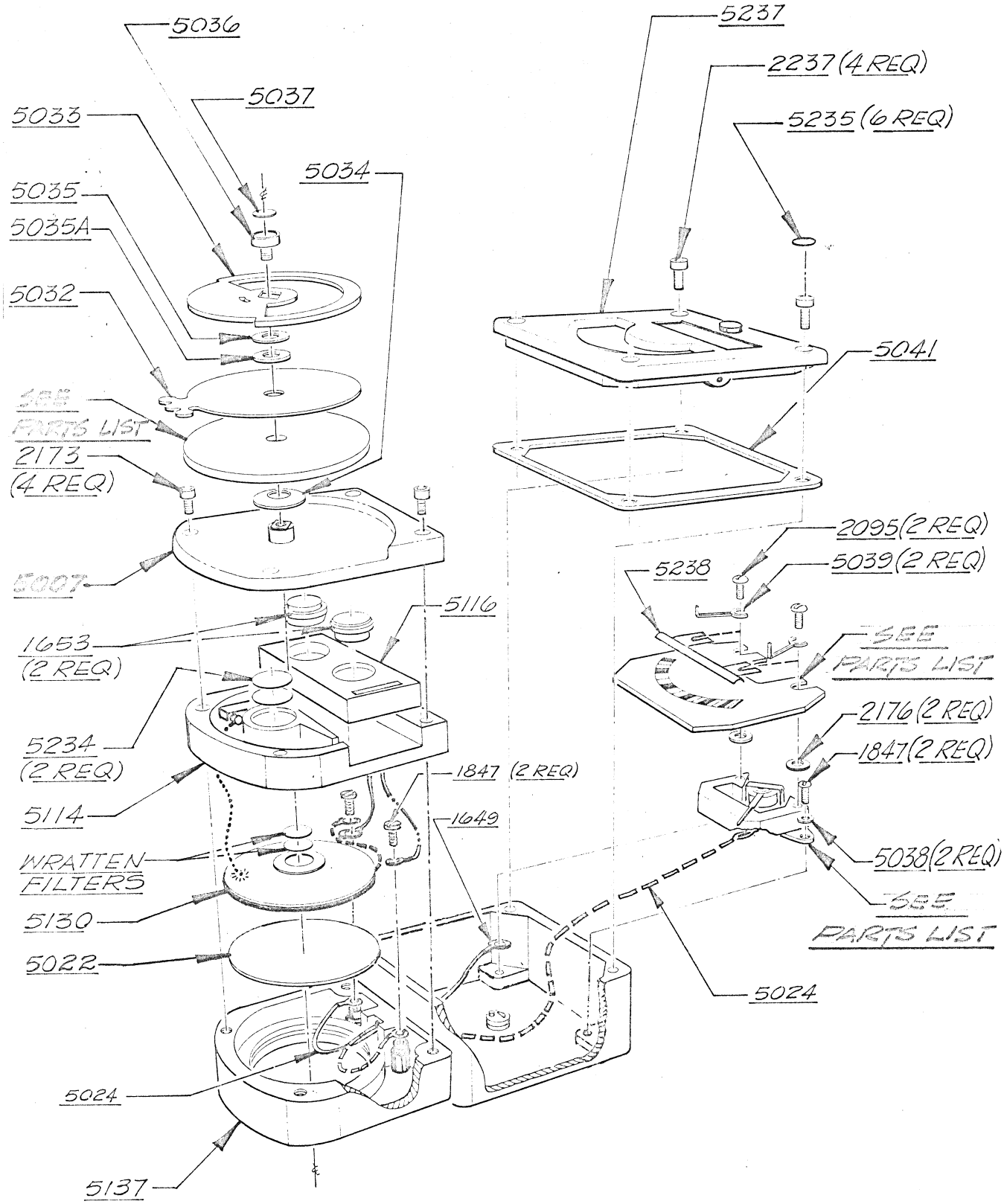
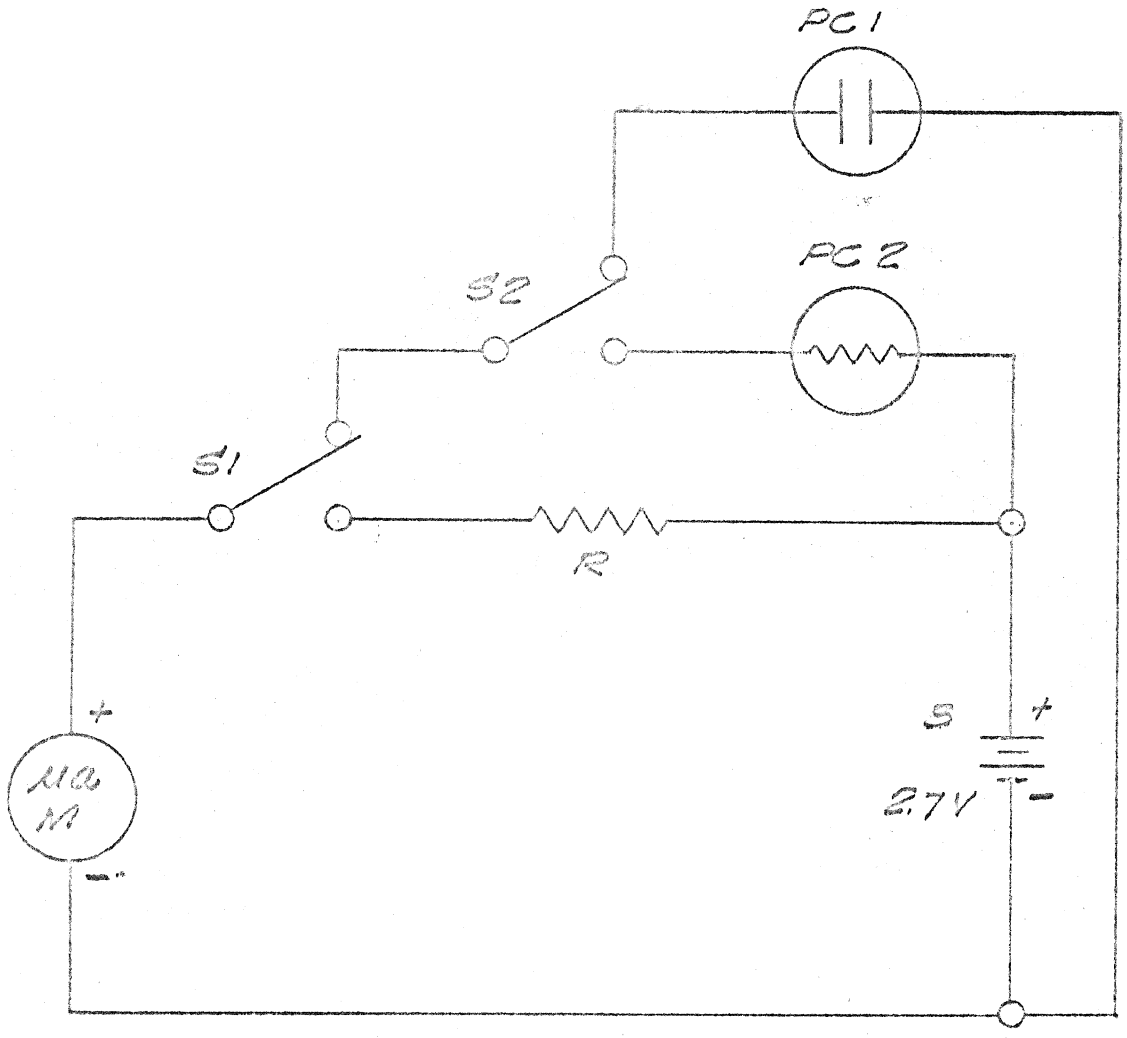


FIGURE IV
EXPOSURE METER
"COMBI-500" (CURRENT MODEL)



PC 1	VACTEC SELENIUM CELL - OUTPUT = 300 μA AT 250 FC W/1100 Ω. LOAD.
PC 2	SYLVANIA #504L CAD. SULPHIDE CELL
S1, S2	#810 MILLISWITCHES.
B	#625 (2 CELLS)
M	WESTON MECHANISM
R	39K RESISTOR

FIGURE I

"COMET 220" WIRING DIAGRAM

PHOTO RESEARCH

S P E C T R A

PHOTOGRAPHIC PARTS LIST

P.R. STOCK #	DESCRIPTION	DEALER NET PRICE
5004	Case Bottom (Prof.,Combi, Cand. LD300, Cand. X100)	$ .65
5086	Collar Pin Assy.	1.16
5444	Case Cover (Prof. Candela LD-300)	2.00
5447	Case Cover with Pointerlock (Combi, Candela X100, Spec.)	5.22
5041	Case Cover Gasket	.06
5005	Case Top (Prof.,Combi,Cand.LD-300,Cand.X100)	.77
5007	Case Top Back (Prof.)	1.05
5126	Case Top Back (Combi)	1.04
5141	Case Top Back (Candela LD-300)	.51
5359	Case Top Back (Candela X100)	4.38
5417	Computer Assy. (Prof.)	4.13
5396	Computer Assy. (Combi)	4.79
5442	Computer Bottom Plate Assy.F. (Prof.)	1.16
5441	Computer Bottom Plate Assy. F.(Combi)	1.31
5032	Computer Center Plate	.65
5033	Computer Top Plate	.59
5036	Computer Screw	.32
5022	Cell Glass	.14
5270	Cover Glass	.68
	Lead Wires with Terminals (red & black)	
5091	Photocell Assy. (Prof.Candela LD-300)	3.63
5130	Photocell Assy. (Combi,Candela X100)	4.23
5021	Photocell (Prof. Candela LD-300)	3.27
5127	Photocell (Combi, Candela X100)	3.50
5120	CDS Cell	1.44
5023	Cell Rubber Gasket (Prof. Candela LD-300)	.17
5128	Cell Rubber Gasket (Combi,Candela X100)	.17
5114	Booster Assy. (Combi,Candela X100)	5.16

P.R. STOCK#	DESCRIPTION	DEALER NET PRICE
5115	Booster Case, Black Implex	$ .33
5116	Battery Holder, Black Implex	.33
5309	Battery - Mallory TR 113R	2.00
1653	Battery - RM 625	.44
1633	Battery Contacts	.30
5119	Booster Milliswitch	1.22
5117	Plexiglass Button	.08
5236	Mechanism (Rex)	8.50
5013	Mechanism (Weston)	14.50
5285	Zero Corrector (Rex)	.30
5012	Zero Corrector (Weston)	.06
5387	Metal Scale Plate, Candela (REX)	.33
5138	Metal Scale Plate, Candela (Weston)	.09
5350	Metal Scale Plate, Candela X100 (Rex)	.14
5305	Metal Scale Plate, Candela X100 (Weston)	.14
5388	Metal Scale Plate, Prof. (Rex)	.14
5443	Metal Scale Plate, Prof. (Weston)	.08
5388	Metal Scale Plate, Combi (Rex)	.08
5443	Metal Scale Plate, Combi (Weston)	.08
5238	Pointer Rest Plate	.27
5039	Pointerstop	.05
5026	Cover Nameplate (Professional)	.14
5121	Cover Nameplate (Combi)	.14
5140	Cover Nameplate (Candela LD-300)	.14
5304	Cover Nameplate (Candela X100)	.14
5037	Emblem P.R.C.	.05
5439	Serial No. Plate (Professional)	.12
5438	Serial No. Plate (Combi)	.14
5142	Serial No. Plate (Candela LD-300)	.10
5348	Serial No. Plate (Candela X100)	.14
5038	Washer, Split Lock Bronze No. 2	.02
2175	Washer, Brass	.02
5034	Washer, Bronze	.02
5034	Washer, Bronze, Cupped	.02

P.R. STOCK #	DESCRIPTION	DEALER NET PRICE
5035	Washer	$ .02
2237	Cover Screws 2/56 x 3/16 Phillister	.02
1804	Back Cover Screws 2/56 x 3/8 Phillister	.03
2173	Back Cover Screws (Combi, Candela X100) 2/56 x 5/8 Plastic Screwcovers	.03
5051	0-Slide	.80
5052	X10-Slide	.80
5125	Red X10-Slide (Combi,Candela X100)	.80
5361	X100-Slide	.80
5053	16-Slide	.80
5054	25-Slide	.80
5055	32-Slide	.80
5057	50-Slide	.80
5058	64-Slide	.80
5059	80-Slide	.80
5390	100-Slide	.80
5061	160-Slide	.80
5062	200-Slide	.80
5063	250-Slide	.80
5064	320-Slide	.80
	Set of Slides (Uncalibrated) Professional	7.50
	Set of Slides (Uncalibrated) Combi	8.00
	Set of Slides (Uncalibrated) Candela	2.00
5291	Set of Slides (Average Calibration) Prof.	10.00
5292	Set of Slides (Average Calibration) Combi	10.75
	Set of Slides (Average Calibration) Candela	3.00
5530	Slide Pouch (Leather)	.33
5559	Slide Pouch (Leather) Large	3.95
5088	Photosphere Assy.	1.70
5072	Photosphere (Unmounted)	.32
5071	Photosphere Ring	1.17
5089	Photodisk Assy.	1.61
5074	Photodisk Ring	1.23
5075	Photodisk Material (Clear Acetate)	.09
5076	Photodisk Material (Vinylite)	.09

P.R. STOCK #	DESCRIPTION	DEALER NET PRICES
5349	Photogrid Assy.	$ 3.44
5077	Photogrid Ring	1.25
5382	Photogrid Diffuser Honeycomb (Plastic)	.69
5383	Photogrid Diffuser Honeycomb (Metal)	.62
5073	Retainer Ring	.02
5249	Photoshield Assy.	1.76
5262	Lighthood Assy.	3.33
5213	Ground Glass Photoreader Assy.	9.77
5081	Neck Strap	.14
5081-A	Neck Strap for Viewing Glass	.18
5605	Viewing Glass, Color Contrast	4.47
5606	Viewing Glass, Panchromatic	4.47
5529	Carrying Case (Prof., Combi)	4.79
5558	Field Case (Professional)	4.11
5557	Field Case (Combi)	4.26
5143	Field Case (Candela LD-300)	5.18
5296	Field Case (Candela X100)	5.18

MODEL "D" PARTS

5550	Meter Cover Plexiglass	.27
5549	Photocell A5	2.85
5547	ASA Slides 16, 25, 32 Stamped & Drilled	.17
5548	Photosphere (Unmounted)	.39
5555	Photosphere Ring	.60