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Supporting 110, 16mm, 9.5mm, 8mm, 4mm, 1mm, Microdot, & Electronic Still Photography.

9.5 PANORAMA

Newest pocketable is the Roundshot 10/10 from Hermann and Peter Seitz, of Seitz Phototecknik.

The camera is 5" high, and makes 360% pictures on Minox 9.5mm film.

Each negative is 6mm high, and 63mm long. A maximum of eight exposures per 36 exposure roll are possible.

To load the camera you must start by cutting away the plastic bar that connects the Minox cassette film chambers.

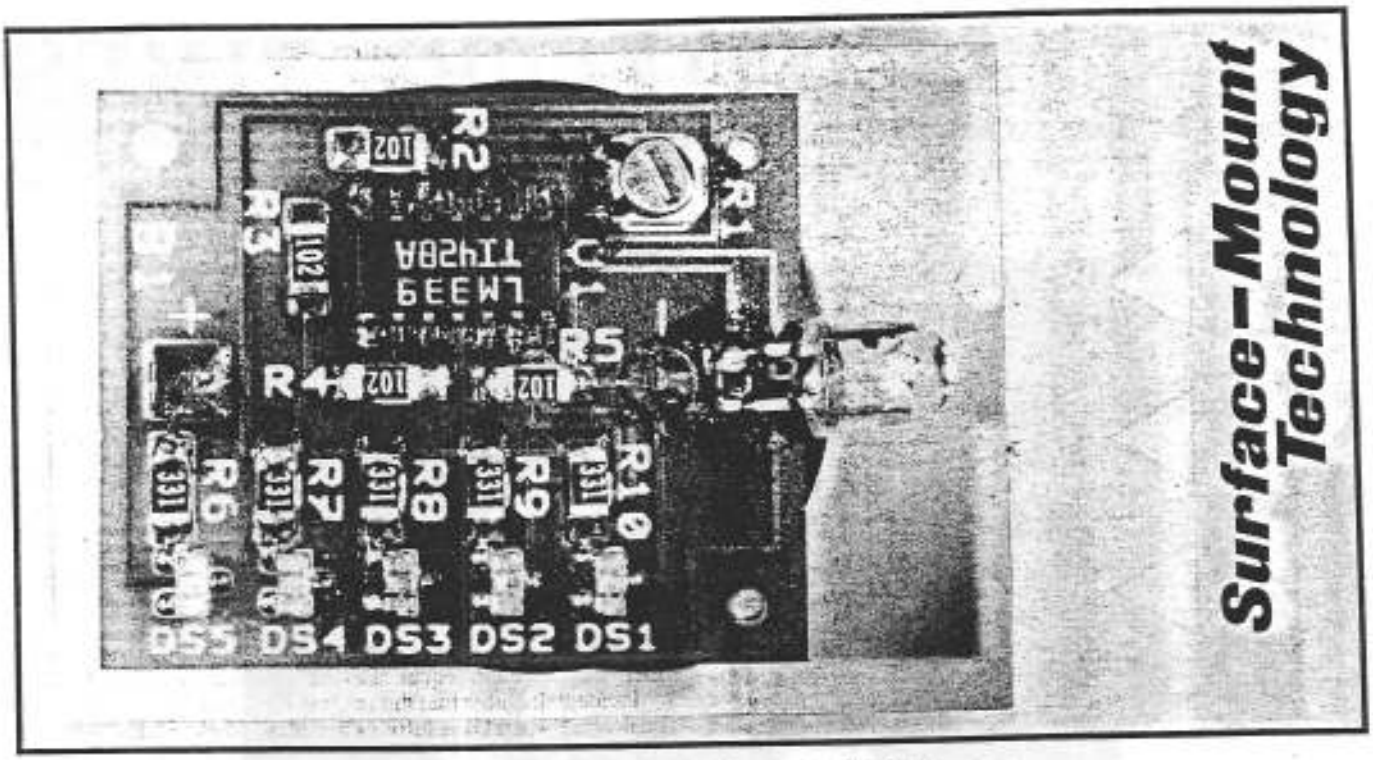
The original 10/10 has a 10mm f/16 fixed aperture lens, and shutter speeds from 1/30 to 1/250 sec. A later model has four additional shutter speeds from 1/2 to 1/15 sec.

A full size roundshot 65/5 uses 50 foot rolls of 5 inch aerial film, providing 85 x 360% views. It has a 65mm f/4.5 Rodenstock Grandagon lens. Each full circle image is about 16-1/2" long, providing 30 frames per roll.

Tekno is the U.S. Distributor for the Roundshot 10/10.

Seitz cameras for the European market carry the Pan-O-Scope logo.

Inventor/designer/company owner Hermann Seitz holds pygmy Roundshot 10/10. Pro model for aerial rollfilm is in foreground.



SMT PROJECT: *LIGHT METER*

Here's a simple "dark meter" that you can build using SMC's.

FORREST M. MIMS, III

IN THIS ARTICLE WE WILL SHOW YOU A SIMPLE LIGHT METER with a built-in four-element LED bargraph readout that combines the advantages of analog and digital displays. Since the number of illuminated elements in the bargraph increases as the light reaching a phototransistor decreases, the circuit can be considered a "dark meter." A bonus feature of the circuit is that it can also be used as a four-step timer or as a simple resistance indicator.

The circuit shown in Fig. 1 can be assembled on a tiny circuit board having an area of only about 1.25 square inches, a size made possible by the use of surface-mountable components. Consequently, the circuit is much more compact than an equivalent circuit assembled from conventional through-hole components.

Though the circuit is configured as an inverse light meter or "dark meter," it can be revised so that the number of glowing elements increases with the light level. It can also be used as a timer or resistance indicator by omitting phototransistor Q1. Even if none of the applications for the circuit are of interest, you might want to assemble it anyway since it provides an excellent hands-on introduction to surface-mount technology.

How it works

There is nothing new about the design of the circuit in Fig. 1, which is often called a parallel or "flash" analog-to-digital converter. To understand how the circuit works, it's necessary to review the operation of the basic inverting comparator shown in Fig. 2. In that circuit, a reference voltage is applied to the non-inverting input of an operational amplifier operated without a feedback resistor. That provides a two-state (off-on) output voltage instead of the linear output that characterizes an op-amp operated with a feedback resistor.

A voltage input is applied to the inverting input of the op-amp. When that input exceeds the reference voltage, the output of the op-amp is low; as far as the LED is concerned, the output is ground. Therefore, the LED switches on. Series resistor R1 limits current to the LED, thereby protecting both the LED and the output-driver stage of the op-amp. When the input voltage is below the reference voltage, the output from the op-amp swings to near the supply voltage (output high). The output LED, which no longer receives sufficient forward bias, then switches off.

The circuit is called a "comparator" since it compares the voltages at its two inputs and switches *on* when one exceeds the other. The circuit shown in Fig. 2 can be changed from an inverting comparator to a non-inverting comparator simply by switching the connections to the inputs. Then the output will swing from low to high when the input voltage exceeds the reference voltage.

Referring back to Fig. 1, IC1 is a quad comparator in a 14-pin SO package. Resistors R1 through R5 form a 4-stage voltage divider with taps connected to the non-inverting inputs of each comparator. The reference voltage delivered to each comparator is determined by the setting of trimmer R1.

Each comparator in Fig. 1 functions exactly like the model comparator in Fig. 2. Therefore, the outputs from the comparators will swing, in sequence, from high to low as the input voltage rises above the reference voltage applied to each comparator. The output LED's will then switch *on* in sequence as the voltage rises.

When the circuit is configured as a light meter, the inverting inputs of the comparators are connected in common to the

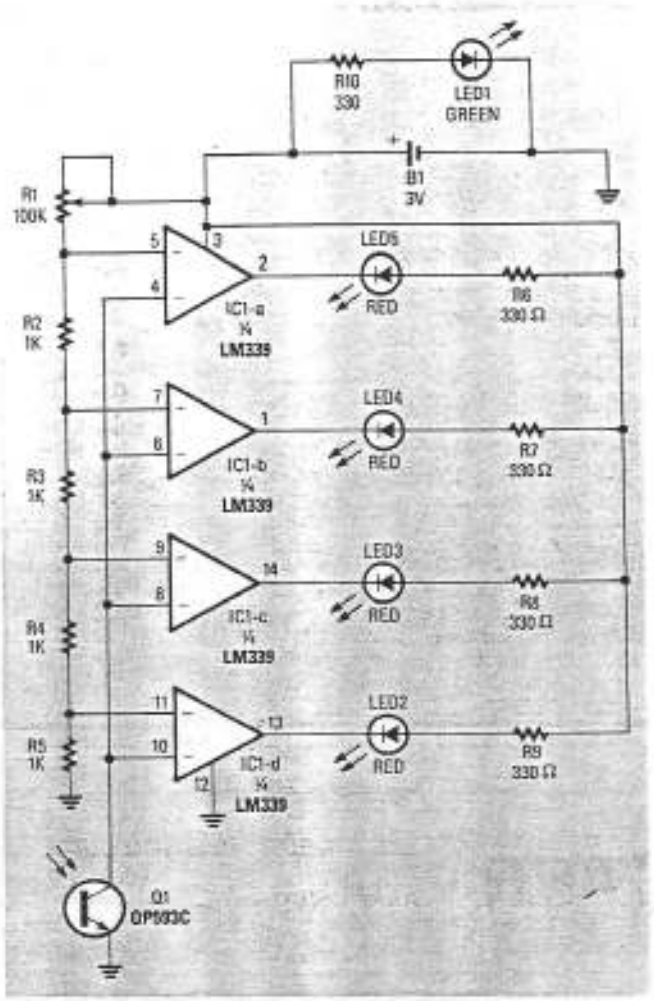


FIG. 1—USING SURFACE-MOUNT COMPONENTS this bargraph "dark meter" can be assembled on a circuit board with an area of just 1.25 inches.

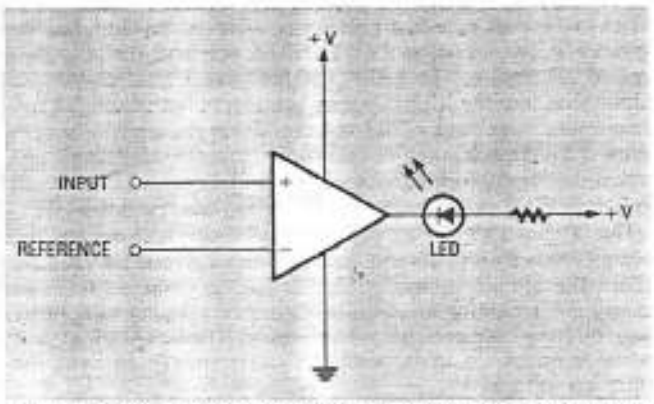


FIG. 2—IN AN INVERTING COMPARATOR, the output is low when the input voltage exceeds the reference voltage; the output is high when the input is lower than the reference voltage.

collector of phototransistor Q1. When Q1 is illuminated, its collector-emitter junction conducts, thereby placing all the inverting inputs within a few millivolts of ground. For most settings of R1, each of the four reference voltages exceeds that value. Therefore, when Q1 is illuminated, the output from each comparator is high and its respective indicator LED is off. As the light level at Q1 is gradually decreased, the voltage at the inverting inputs rises until it exceeds the first comparator's reference voltage (pin 10). The output from that comparator (pin 13) then

PARTS LIST

All resistors are 1206 size SMC's unless noted

R1—100,000 ohms, trimmer potentiometer, Micro-Ohm RV43B-CV or equivalent
R2–R5—1000 ohms
R6–R10—330 ohms

Semiconductors

IC1—LM339 quad comparator, SO-14 package
LED1—Green LED, SOT-23 package, ROHM SLM-13M or equivalent
LED2–LED5—Red LED, SOT-23 package, ROHM SLM-13V or equivalent
Q1—OP593C NPN phototransistor (TRW), or equivalent

Other components

B1—CR2320 or similar 3-volt lithium coin cell
Miscellaneous: Lithium coin cell holder (Keystone P/N 107), PC board, Reusable adhesive or masking tape, 25 or 30 mil solder
A complete kit including a drilled, etched, and plated PC board, Q1, all SMC's, battery, battery holder and solder is available from the Heath Company, Benton Harbor, MI 49022 for $19.95 plus postage and handling; for credit-card orders, call 800-253-0570. Michigan residents must add appropriate sales tax. Specify catalog number SMD-1.

swings from high to low and LED1 switches on. Additional LED's switch on in sequence as the light level continues to fall.

Incidentally, note that the common inverting inputs appear to be floating when Q1 is fully switched off (dark). Actually, a few tenths of a volt appear between those inputs when Q1 is dark. The inputs can be connected to the positive supply through a pull-up resistor, but leaving them "floating" makes the applications discussed at the end of this article possible.

Preparing the circuit board

Figure 3-a shows a suggested layout for the circuit board; the board itself is shown in Fig. 3-b. Also, an etched, silk-screened,

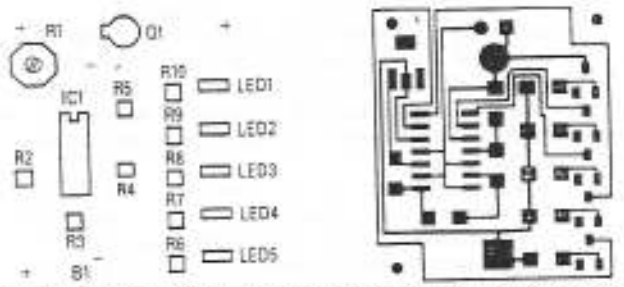


FIG. 3—USE THIS LAYOUT *a* when building the circuit. The PC board is shown in *b*.

and pre-tinned board is available as part of a kit that includes all necessary components; see the Parts List for more information. Note that the board in the kit also includes a solder-mask coating that both simplifies soldering and greatly reduces solder-bridge problems. The board also includes drilled mounting holes for a Keystone 107, or equivalent, lithium coin-cell holder.

If you build your own board, follow the tinning procedure given in the LED-flasher project described elsewhere in this special section. Also review the SMC soldering procedures given elsewhere in this special section before soldering SMC's to the circuit board.

Begin construction by installing the LM339. Be sure to solder a corner pin first. If the device stays aligned over the remaining pads, then continue soldering.

Next, install the chip resistors one at a time. If you use the tape method to hold the chip resistors in place, you can solder one terminal of each resistor; then you solder the remaining terminals. You can use the same approach when installing the LED's. No matter which method you use, until you become an experi-

continued

LIGHT METER

continued

enced hand-solderer of SMC's, it is essential to carefully inspect each and every junction with a magnifying lens.

Next, solder trimmer R1 to the board. Since cementing R1 to the board might interfere with its rotor if you are not careful, it's best to use a bit of masking tape to secure R1 in place for soldering.

If you want to use the circuit as a light meter, solder Q1 in place next. However, if you want to use the circuit for one of the specialized applications that we'll describe later on in this article, you should omit Q1 and, instead, solder a pair of stranded, insulated hookup wires to its two mounting holes.

Note that Q1 is a conventional through-hole component. The prototype used a tiny surface-mount phototransistor (Stettner Electronics CR10TE1). However, that meant that the phototransistor was aligned in the same direction as the readout. The result was that someone viewing the readout could cast a shadow over Q1, affecting accuracy.

To overcome that, the surface-mountable version of Q1 was replaced with a leaded phototransistor that can be installed facing away from the person viewing the readout.

The leads of the phototransistor are installed in two holes drilled in the circuit board adjacent to the negative battery holder terminal. The emitter of Q1, which is indicated by a small protruding tab (see Fig. 4-*a*), must be installed in the hole connected to the negative battery-holder terminal. Therefore, bend Q1's leads as shown in Fig. 4-*b* and insert both leads through the bottom side of the circuit board so that Q1 points away from the circuit board as shown in Fig. 4-*c*. When the circuit is complete, Q1's leads will emerge from the board under the battery-holder. Therefore, be sure to keep those leads close to the board. Solder Q1's leads to their footprints and clip off the excess lead lengths.

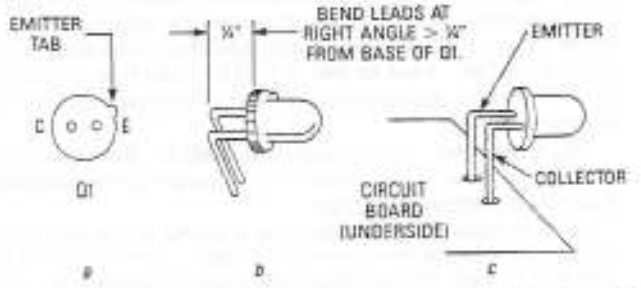


FIG. 4—THE PHOTOTRANSISTOR'S EMITTER is indicated by the tab (*a*). When installing the device, bend the leads (*b*) and mount it so that it is pointing away from the circuit board (*c*).

Complete assembly of the board by installing the lithium coin-cell holder on the underside of the board. Be sure to orient the holder so that its positive terminal (the uppermost battery contact) is inserted in the hole marked +. Solder the terminals in place and clip off the protruding pins. Use caution; the clipped terminals may fly away from your clippers with considerable force.

Testing the circuit

If you have installed Q1, the circuit will function as a light meter when lithium cell B1 is installed in its holder. LED1 will glow to indicate the power is on. Use a jeweler's screwdriver to adjust trimmer R1 for the desired sensitivity. For best results, perform the adjustment with the circuit in subdued light. Generally, LED2–LED5 will switch off when Q1 is brightly illuminated. Those LED's will then glow in sequence as the light reaching Q1 is progressively reduced.

You can switch the circuit off by removing B1. Or, you can slip a small piece of paper or thin plastic under, or a short length of heat-shrinkable tubing over, the uppermost battery-holder electrode.

Going further

As noted previously, when Q1 is omitted the circuit can be used for other applications. For example, when a discharged capacitor is connected in the circuit in place of Q1, LED2–LED5 will glow in sequence as the capacitor is charged by the small voltage appearing at the common non-inverting inputs. One application for that configuration is as a timer whose period is determined both by the size of the capacitor and the setting of resistor R1.

The timing intervals can be increased by increasing the value of the capacitor. A new timing cycle can be started at any time by momentarily shorting the capacitor.

Another interesting application is to use the circuit to indicate resistance. When the input leads are open, all the LED's will glow. If a variable resistance is connected to the circuit in place of Q1, LED2–LED5 will glow in sequence as the resistance is lowered. We're sure that you have often wished for a visual continuity checker.

Finally, keep in mind that the circuit as presented here functions as a parallel array of inverting comparators. It can be revised to function as a parallel array of non-inverting comparators simply by reversing the connections to the inputs of the four comparators.

Holiday from ice: shooting snow scenes without mounting an Arctic expedition

If the reality of mushing through the snowy landscape in freezing weather tempers your photographic ardor, there's a simple way to take the warm comforts of home with you into the field. As long as your car has a good heater and respectable snow tires—chains if you plan to go the rural route—then it can double as a toasty mobile shooting platform. And you can bring along your favorite equipment without fear of losing it in a snowbank, spreading it out on the seat for quick-and-easy changes of film, lenses, and filters.

A few specialized accessories may make taking pictures from your car more practical. A tabletop tripod, for example, is useful for steadying a camera against your shoulder or a seat back, should you need to use shutter speeds that are longer than those usually advised for handheld work. And there are other supports specifically designed to substitute for a tripod in the small quarters of your car, all of which feature a standard tripod-screw mount for your camera.

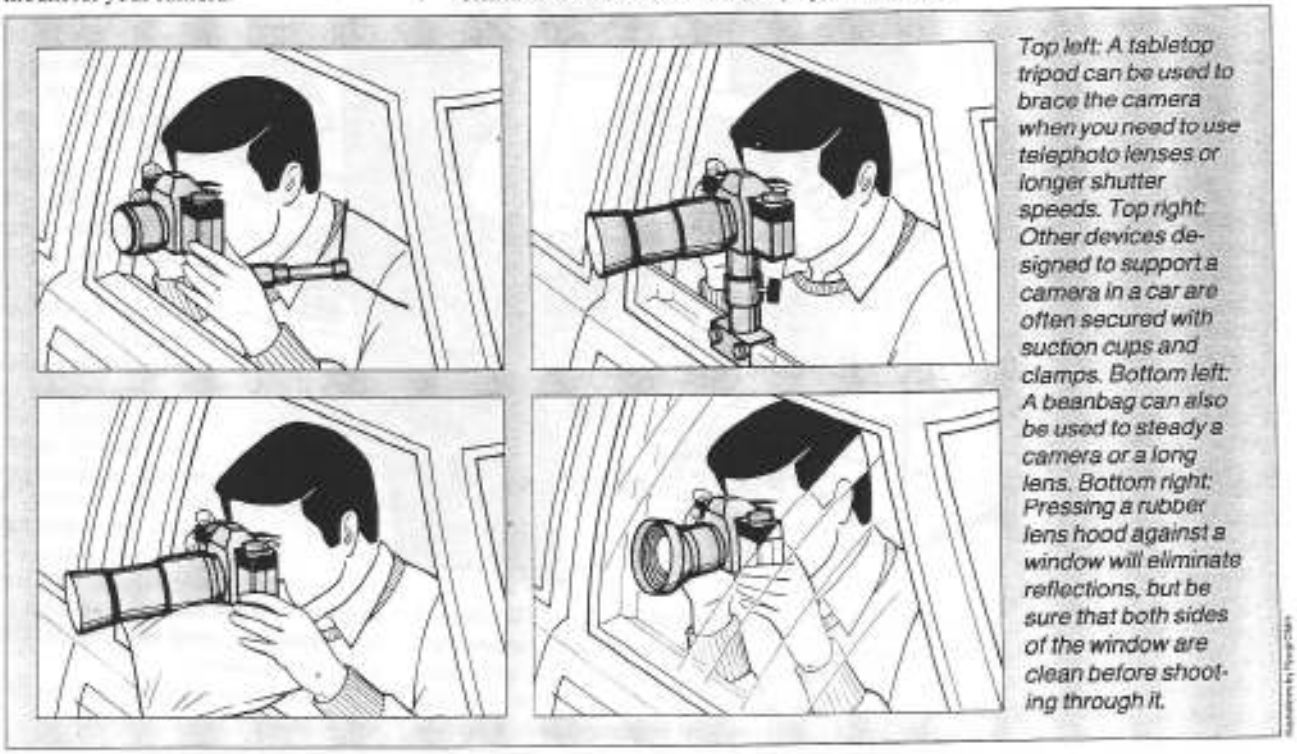
Some of these can be secured to a locked steering wheel or column with a clamp; others attach to window surfaces with a large suction-cup base. One can even be mounted on the top edge of a partially rolled-down window, although this design could make things a bit drafty. A beanbag (easily made by filling a cloth sack with dried beans or peas) draped over the bottom of the window frame will steady a long lens almost as well.

If you decide to keep the windows closed, be wary of several problems related to shooting through glass. The most obvious of these is reflections, which can be eliminated by mounting a rubber hood on your lens and pressing it against the window. Another is dirty glass. Be sure to bring along a soft, clean cloth for wiping clean both sides of the window; if necessary, wet a paper towel with your car's windshield-washing solvent to clean off stubborn dirt. Also, avoid shooting through curved window surfaces because they will distort your subject.

Remember that autofocus (AF) systems may focus on glass, making the entire landscape unsharp; turn them off and focus manually. If you're using a compact automatic camera in which you can't turn the AF system off, you'll run less risk of its focusing on glass if you roll down the window to shoot. Also keep in mind that tinted glass may contribute a bluish cast to color photographs. This problem can be corrected with an 81-series warming filter, such as an 81A.

To reduce vibration, always turn your engine off before you shoot. And for safety's sake, never sit for a long time with the engine running and the windows completely closed; a defective exhaust system may cause carbon monoxide to accumulate in the car.

Finally, bring along enough warm clothing and boots, even if you have no intention of leaving your car. You never know what emergency might force you to brave the elements, such as a perfectly arranged landscape that can be shot only from an embankment—up to your waist in snow. ○



Top left: A tabletop tripod can be used to brace the camera when you need to use telephoto lenses or longer shutter speeds. Top right: Other devices designed to support a camera in a car are often secured with suction cups and clamps. Bottom left: A beanbag can also be used to steady a camera or a long lens. Bottom right: Pressing a rubber lens hood against a window will eliminate reflections, but be sure that both sides of the window are clean before shooting through it.

how to deal with dealers

Photo dealers, like cameras, come in a staggering variety of sizes, types, and quality grades. Whether they're found in small, local camera stores, big department-store chains, discount houses, or mail-order companies, they all have one thing in common—they'd like to make a sale.

At the elite end of the dealer spectrum are salespeople who know what they're talking about, honestly want to help you get the best equipment for your purpose, take time explaining features and options, and have competitive prices. At the other end are quick-buck artists who are simply out to make the most profit in the least amount of time and could hardly care less about your long-term satisfaction or repeat business. Many dealers, especially those with the lowest prices, fall somewhere in between these two extremes.

What constitutes an ideal dealer? It really depends on you. If you're generally in the market for new equipment and know exactly what you want before walking into the store, low price, reliability, and a liberal return policy may be your most important criteria. If you expect your dealer to take time providing information and guidance, it may be well worth spending a few bucks extra.

Whatever type of dealer you choose, when you find a good, honest one who steers you right, stick with him—a photo enthusiast can have no better ally. And if you do encounter one of the dishonest, discourteous bad apples, run for the nearest exit or hang up the phone. The following tips should help you to figure out which dealers are which.

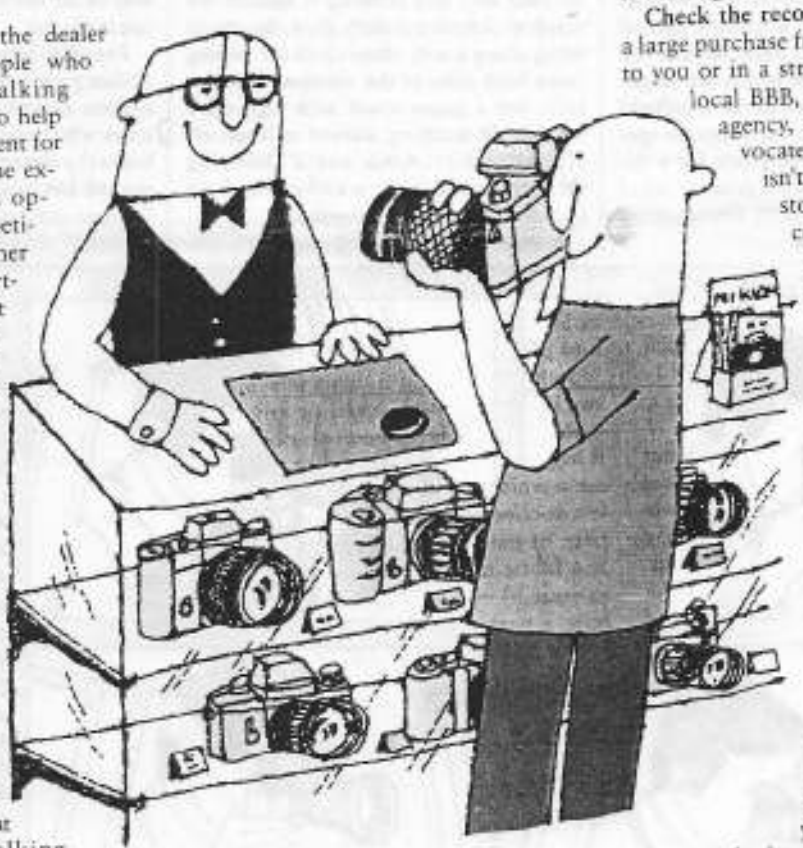
Do your homework. Dealing with salespeople is a lot easier if you know what equipment you want and have a good idea of what it should cost. To narrow down your selection, mull over your photographic needs and wants, then read test reports, news reports, brochures, and ads on equipment that interests you. To check prices, look them up in newspaper or other print ads or scan the mail-order section in the back of this magazine. Once you cull your choices, examine them in person.

Ask questions. The quickest way to find out whether a dealer knows what he's talking about and is honest is to ask lots of questions. A good dealer will know the features of the equipment he's selling and be willing to explain differences between competing brands. His opinions will be presented in a reasonable manner. Beware of dealers who knock major brands with strong language or try to foist off little-known brands. Be suspicious of dealers who are loath to sell you what you want, refuse to honor their advertised prices, or charge extra for normally included items like lens caps and battery covers.

Stand your ground. Once you've come to an informed decision on buying a particular piece of equipment, stick with it. Don't let yourself be switched to something else because the item you want isn't in stock or you can get a "great deal." And don't settle for the salesman's demonstrator—you want a fresh camera in a box.

Keep your cool. If a dealer says something outrageous, has an obvious hidden agenda, is impolite, ignores you, or takes you for a fool, don't get mad, raise your voice, or waste your time arguing. Just get even—depart gracefully, don't go back, and warn your friends. If you're actually cheated, report it to the Better Business Bureau (BBB) and local or state consumer-protection agencies.

Check the record. Before you make a large purchase from a store unknown to you or in a strange city, calling the local BBB, consumer-protection agency, or the consumer advocate on the local paper isn't a bad idea. Even good stores may have a few complaints on file, but steer clear of stores with records of excessive problems.



Expect the expected. Don't expect the harried clerk at a discount store to debate the fine points of four different point-and-shoots in the midst of the lunch-hour crunch. Don't expect the mail-order phone guy to be a technical whiz who knows exactly which autofocus system does what. In short, be reasonable. Don't pay more than you have to, but don't expect the local camera store that lets you browse to meet the low discount price to the penny.

Be fair. Don't spend 45 minutes picking a dealer's brain and then buy the camera down the street for $10 less. If his price is way out of line, tell him so and give him a chance to make the sale. Not only will this assuage your conscience, it will encourage good dealers to stay that way. *Jason Schneider*