



MINOX MEMO

The Journal Of The Minox Historical Society

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[Charles Trentelman](#)

Ills using Ilford HP5 pushed to 1600

PMA 2003 Report

[John Watson](#)

Vice President

Little Minox had a BIG PMA.
That about sums it up.

PMA is the Photo Marketing Association's conference, where all the companies involved with photography and imaging gather to show off their wares and compare notes.

Minox showed well. Very well.

This is a real change of fortune for Minox relative to their place in the scheme of things. With the waning of 8x11

as a consumer format, and the GT series drifting from the mainstream, Minox was barely noticed for the last decade or more.



With the management take over by Thorsten Kortemeier and his team, Minox really started a recovery. This was, oddly, in the introduction of their sport optics lines. Knowing that Thorsten came to Minox from Leica, and was heavily involved in their binoculars, does remove some of that mystery. If you look at any good hunting magazine you will probably see the very positive reviews of these very high quality binoculars and scopes.

In cameras though, Minox was suffering. The technology revolution, both with APS and digital, seemed to be passing them by, turning them into a company that made very small, high-precision dinosaurs.

And suddenly, it changed. This whole change of fortune can be described in one word: Cute.

In this Minox Memo

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It started with production of the Classic Camera line, a series of miniature reproductions of larger main-line vintage cameras by Nikon, Leica, Contax and others. This created a niche market that, while there was interest, was limited by sticking with the 8x11 format. They sold because they brought out every instinct that makes babies irresistible: small, cute, fun. They were miniature reproductions of the originals, with some slightly oversized features to allow for actual use. Who could resist?

Yet the stir was not what it could have been because the cameras did not really appeal to a mass market. 8x11 is a quirky enough format that many potential buyers would shy away from this now unfamiliar film.

The introduction of the Digital M3 has changed all that.

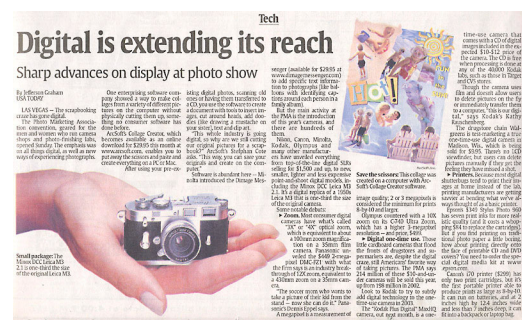
Shedding the baggage of the beloved, yet obscure, film format and going digital made these little gems accessible to all. Not just accessible, but a real eye-catcher of a camera. The response has been amazing. Here are two media reviews:

"This camera manages to be both amazing and hilarious. It's a miniature replica of the classic Leica M3 camera with a 1.3-megapixel CMOS sensor and 32MB of internal memory. There's no color LCD (just a monochrome "shots taken" LCD), no zoom, but plenty of charm."

--James Kim, Tech TV, March 6, 2003

"Nikon, Canon, Minolta, Kodak, Olympus and many other manufacturers have unveiled everything from top-of-the-line digital SLRs selling for \$1,500 and up, to new smaller, lighter and less expensive point-and-shoot digital models, including the Minox DCC Leica M3 2.1. It's a digital replica of a 1950's Leica M3 that is one-third the size of the original camera."

--Jefferson Graham, USA Today, March 3, 2003



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These are some big name consumer outlets that would normally not have the time to even mention Minox, let alone have it be the photo to represent the whole show as in the USA Today article, which used the Minox Digital M3 as an illustration for its story on the show.

The reasons do go beyond just the "cute" though.

First, the DCC M3 has changed since Photokina. It is now going to sport 2.1 megapixels rather than 1.3. This puts it squarely in the middle of the consumer pack.

Then the price is going to drop by \$50. You have to love Moore's Law. More camera, less money.

Add those with the surprisingly good picture quality, and the cute, easy to master package, and you have something that is an eye-catcher and a winner.

What other items were lost in the glare of Minox's new star?

The DC-2122 is really coming on strong. It's relatively small package and good price (around \$199) makes it a real winner. Expect to see them in more hands than just the die-hard Minox collectors. This is a serious contender.

The DC-4011 which adds a 4MP camera to Minox's line-up. This also has a zoom lens, though the specs are spotty at the moment.

A new unnamed camera is in the prototype phase. While it is too early to give any reliable stats (internally they will start out comparable to the M3 Digital and grow from there), its design is both unique and functional. A radical departure in aesthetics for the digital age creates a camera that is ergonomic and very stylish.

This camera will be designed for a younger and more fashion oriented market, and while it is not the fabled Digital LX, it is certainly a step in that direction. Watch the "Memo" for more details as they become available.

Thorsten explains: "...even Walter Zapp is very positive for the new digital technologies. The MINOX customers never wanted to have 8x11 film – they just wanted to have the smallest cameras, a "cute" camera, and the 8x11 film was the only way to make such small cameras.

So digital is the great chance for us."

So where is this all going?

Expect to see the emphasis on digital cameras for the next year or so. This venue is one that Minox is beginning to both explore and master, and needs time to develop. The optics lines have matured to the point that they do not need the refreshing that constant evolution brings, while film cameras will stretch a little longer between introductions.

Does this digital frenzy mean that film is dead at Minox? According to Thorsten, no. Thorsten and his management team are dedicated to preserving the soul of Minox. You can expect to see 8x11 around as long as there is even the remotest justification for it to remain, and the 35mm lines will continue to develop, albeit slowly.

Minox seems to be moving forward and is taking on the challenge of the new marketplace that they find themselves in. In the process though, they are not forgetting their roots.

Get ready for a great ride! 

The Strange Case of the X-rayed Baggage

[Peter D. Zimmerman](#)
President

I just returned from a short business trip in Vienna, Austria. The trip was so short, and the conference I attended so intense, that I had very little time for picture taking. Nevertheless, I did carry a 35 mm camera and a Minox BL and shot a couple of rolls on each.

I always take precautions. Really I do. I haul my cameras, lenses, and film in transparent plastic bags in my carry-on luggage, and I stuff the gadget bag I use to tote the equipment around town into my suitcase. I fill the pockets of the gadget bag with socks and shoes and whatever else fits, so it doesn't actually take up much room in the suitcase. Before the "one carry-on item" rule went into effect, of course, everything went with me in my hands.

Now there's no way to get all that stuff onto the aircraft.

And, as I said, I go for suspenders and belt. I double check to make sure that no film, exposed or unexposed, rides inside my suitcase. I'm a nuclear physicist, so I understand radiation. A close friend – another physicist -- has been head of technology for the FAA and the Transportation Safety Administration, and he tells me that the warning against placing film in checked baggage is seriously meant. So I check and check again to be sure that all film is safely in the carry-on.

Except when I don't. And I missed a roll on my mid-March voyage. It rode through the Vienna airport (where I don't think it was zapped, because there were no warning signs), and then through Frankfurt where I'm sure it was irradiated. I'm also sure it was searched. I always put my Swiss Army Knife in the back, right-hand corner of the suitcase when I travel by air; when I got home it had been nicely placed dead center on top of all my dirty clothes and tucked under the elastic bands that hold your clothes in place.

Well, I now have quantitative proof that the radiation from baggage scanners damages even "slow" films. The minilab developed the Reala 100 color negative film (same as Minocolor Pro 100, remember), but only made an index print. The index thumbnails looked OK, so I scanned the roll. Scanning into PhotoShop gives you a real quantitative insight into the condition of the film. Most of my exposures start to have positive histograms about 8 units (out of 255) up from dead black. And they almost never have any data in the 255th bin, or even the 250th, because I try not to block up whites entirely.

This roll was very different. These pictures were fogged! Their histograms showed no information not just to the tenth bin, but often to the 30th, a clear indication of significant overall exposure, even if the clear edges of the negs looked clear to the naked eye. But the whites were the oddest, given my normal shooting pattern. They showed lots of "information" right up to data number 255 with no indication that if the scanner had gone to, say, 265 there would have been any drop-off.

The whites were blocked up; the blacks were weak. And when I magnified the image the grain was more apparent than normal.

Yes, I could save most of the pictures in PhotoShop. I adjusted the levels, top and bottom, and put an S-curve into the response to smooth out the blocked up whites. Then I did something I've never before had to do with Reala pictures. I increased the color saturation by anywhere from 20 to 50 units on PhotoShop's scale. I can make 4x6" prints from the film, and perhaps 5x7" or 8x10", but I'll never be able to frame one of the pictures

and say with pride "I think this is good, close to the best I can do."

All the techniques that "saved" the pictures "worked". That is, I can pull usable record shots off the film, but that's about it.

And if these pictures been shot with my Minox BL, the effects would have been far worse because there is so little area to a Minox negative, that the noise from the radiation damage would have been seriously magnified in any final print, even one as small as 4x6".

So be careful. The airlines mean it when they say their baggage scanners will fog your film. Had I left a roll of ISO 400 film in the suitcase, I don't think I could have salvaged much. Eight hundred speed? Don't even want to think about it. And maybe a roll of TechPan or Minopan 25 would have been just fine after only one scan, but I'm not going to take any chances in the future.

The pictures show a statue in the garden of the Belvedere palace.



Fig. 1 "before" is the raw scan. There are no good blacks, and the whites are right at the burn-out level. Color saturation is low, and you can hardly see what is going on in the area of the long roof to the left of the statue.



Fig. 2 "levels". I have adjusted the levels by bringing the black threshold to pixel value 25, about three times as high as I normally have to adjust any picture on Reala.



Fig. 3 "saturation". Surprise! You can mostly fix the color saturation by increasing it to 25 on the PhotoShop Elements 2.0 scale. This picture is beginning to look like a Reala image.



Fig. 4 "tweak". I still wasn't happy with the color which had shifted to the yellow, so I used the white point adjustment to make the sun-drenched base of the statue go white. It blocks up the whites even more, but there was no clean gray to use.



Fig 5. "Unsharpmask". As always I apply an unsharp mask as the last step. In this case it was really

necessary because the radiation fog had degraded edge sharpness in the negative.

Note: Nikon Coolscan IV, driven by Ed Hamrick's Vue-Scan program. All adjustments performed with Adobe's new PhotoShop Elements 2.0. 

The Falcon Flies. Sans Minox? One presumes.

[Charles Trentelman](#)

MHS Editor in Chief

The MHS takes somewhat mixed emotional note of the release from federal prison of Chris Boyce, 50.

Boyce is probably as famous as anyone in the nation, except perhaps some lovely people named Walker, for using the Minox camera as a spy tool. In the late 1970s he used a B model of our favorite photographic instrument to photograph, and transmit to the Russian Embassy in Mexico, hundreds of pages of secret information about U.S. military and spy satellite technology. Spy systems that cost this country millions, if not billions, were compromised for a pathetic \$77,000.

As I said, we are somewhat mixed.

On the one hand, he's a stinking traitor who cost this country a lot of money, possibly lives, and set back intelligence work for years. He threatened national security and used our camera to do it. The nerve!

On the other hand, there's no denying the glamour of it all: A Minox "spy" camera being used very famously and effectively by a very high profile spy. A book, "The Falcon and the Snowman" was written by Robert Lindsey which includes a picture of Boyce's very own B model Minox, complete with tripod adaptor. The book even details how the Russians, trying to teach Boyce and his companion, Andrew Daulton Lee, the finer points of subminiature photography, gave them a Minox measuring chain. The Russkies did not, it should be noted, give them the camera. They had to buy that themselves.

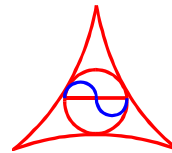
A movie, of course, was made in 1985, with Timothy Hutton playing Boyce and Sean Penn playing Lee. In the

movie a purist will note that the Russians, and Boyce, both flash Minox cameras that are identified as B but are most assuredly LX models, probably both the same camera. In the scene of Boyce photographing documents they also show a "viewfinder shot" with the document oozing in and out of focus, something we all know a Minox user never sees, not unless the Russians invented an SLR adaptor for it.

And in one scene they show a make-shift darkroom set up by Boyce's companion, Lee, in which strips of film way too long and wide to be Minox can be seen. There's also a Durst 6 by 6 enlarger. Great enlarger, I used to have one, but not much good for Minox, especially making the 8 by 10s everyone is flashing around. The post is way too short to handle the extension, unless he had a short lens.

Yeah, I know: Picky picky picky.

Boyce's pal, Lee, was paroled in 1998. Boyce was



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originally sentenced to 40 years, and certainly didn't make his case any easier when he escaped from prison in 1980. He was on the run for 18 months, hanging around with anti-government types in Idaho and Washington, robbing banks to make ends meet. One can also wonder how much he was ever rehabilitated: An interview in an Australian news publication several years ago showed him still pretty hostile to the U.S. intelligence agencies he betrayed. Boyce's anger, which prompted his spying in the first place, was kicked off originally when he found out about the CIA meddling in Australian politics.

In any event, the system says he's paid his debt, and so I guess he has and wish him well. He's still going to be on parole for a long time, and one can only wonder if "photography" is on his list of prohibited activities. It is easy to make an argument that he should take it up again. After all, there are few Minox photographers who have made as much from their work as Boyce did, although his subject matter was somewhat unique, as was his patron.

On the other hand, why should he not? In the era of the email, digital camera and so on, the use of actual film to secret documents around the globe sounds almost quaint, although it may still have a roll I don't know about. Still, if Boyce does want to take up photography, we might recommend a Speed Graphic.

The MHS executive committee considered the idea of giving Boyce an honorary membership in the Society for his contributions to the spread of the fame of the Minox camera, but then came to its senses, had a good laugh and went on to other business. 

A Minox ME-1 Electronic Flash Repair

[Sam Goldwasser](http://www.repairfaq.org/sam/rball.htm)

You can see many other of Sam's repair articles at <http://www.repairfaq.org/sam/rball.htm>. Please pay special attention to the warnings on his site. Flash repairs can be dangerous!

Patient: Three-part unit for one of those teeny-tiny Minox spy cameras.

Symptoms: Dead on both AC and rechargeable battery power.

Testing: Not applicable - done via email.

I was contacted about this rig via email and attempted to walk Stan through the diagnostic and repair process. With such an old device, any rechargeable battery was almost certainly dead and any electrolytic capacitors would also be highly suspect.

Since the unit acts totally dead both from its battery as well as the AC adapter, I first suggested replacing the NiCd cells. Having accomplished this, and letting it charge overnight, there is now at least some quite whining to indicate that the inverter is running. However, the ready light still does not come on even after several minutes (cycle time should be under 10 seconds).

I next suggested that Stan should attempt to measure the voltage on the battery as well as the energy storage capacitor to determine how far - if at all - it is charging. I warn Stan to take extreme care around the cap - those can be lethal!

The report isn't promising. On battery alone, the battery voltage is stable at 2.45 VDC and the cap only charges to 48 VDC or so; on AC to 170 VDC. Even the latter is much less than the expected minimum of 300 VDC. What is going on?

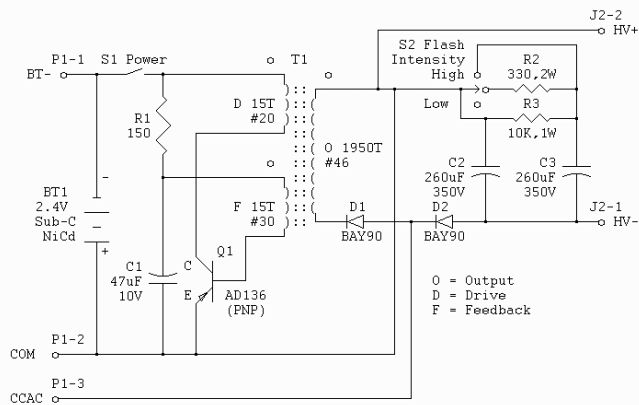
Since Stan noted that the capacitors retain their charge for hours, it is unlikely that they are bad - leaky - but just in case, I suggest just replacing them with any sort of capacitor with similar uF rating and at least equal voltage rating (for testing only) - those from disposable cameras would be most appropriate and FREE if you know where to ask!

No change at all. At this point, Stan suggests that he is over his head on this one and is about to give up. So, I volunteer to look at the unit if he pays shipping both ways.

A few days later.....

The flash head itself is about as big as the entire camera with the power supply and charging adapter being somewhat larger. Actually, the power supply is a lot larger. I don't suppose spies generally like to use electronic flash in covert operations too often anyhow!

My first step is to reverse engineer the circuit. I don't expect anything particularly unusual but this will make any troubleshooting a lot easier:



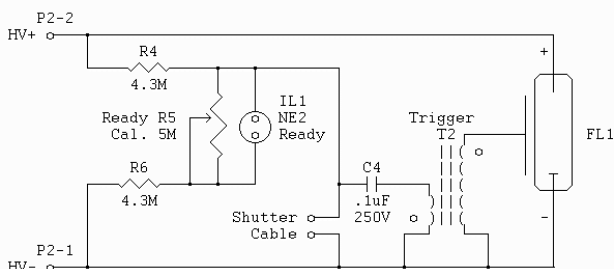
Minox ME1 Inverter and Energy Storage Capacitors

Note: The BAY90 rectifiers cross to 1000 V, 2.5 A general purpose diodes.

The Flash Intensity switch, S2, selects between 12 W-s and 24 W-s. There are actually three positions. Apparently, you are supposed to pause in the middle one called "Hold 1 Sec" when switching between power levels for at least 1 second (surprise, surprise!) to allow the capacitor voltages to equalize! I would assume that the reason for this is to prevent damage to the switch contacts.

The flash head is separate from the power supply and appears to be very much like any of the other strobes. However, note the adjustment for the ready light!

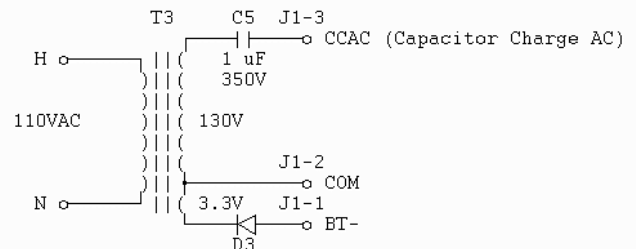
I was not willing to completely disassemble this unit so some of the actual components and wiring were guessed:



Minox ME1 Ready and Trigger Circuits

The wall adapter/charger provides both the current to charge the 2 cell NiCd battery and a high voltage AC output (CCAC) to power the flash when plugged into an outlet regardless of the state of the batteries. When

operating from the wall adapter, D1 and D2 in the power supply unit in conjunction with C4 form a voltage doubler that takes the 130 VAC (>80 V peak) output of the adapter and produces over 300 VDC to charge the energy storage capacitors:



Minox ME1 AC Line Circuitry

Some interesting features I was not aware of previously - which might have helped to narrow down the problem (and possibly give up - as you will see):

It is a dual energy flash - a switch selects between low and high power modes. There are two energy storage capacitors. This really doesn't affect anything but at least explains why Stan was referring to two large capacitors....

The AC adapter generates the high voltage directly via a clever little voltage doubler in the power supply and its own isolated 130 VAC transformer winding. This is significant.... Having two basically independent means of powering the unit both be messed up implies a problem on the secondary side of the inverter since there is nothing else in common.

Since the capacitors (and other sources of leakage) have been eliminated, on a wild guess, I decide to replace the high voltage rectifiers. The are marked "BAY90" which crosses to 1000 V, 2.5 A (probably less but that is what my ECG book says). Replacing with suitable diodes and.... No change at all.

There is only one other thing that can prevent the capacitors from charging from the AC adapter - an open inverter transformer secondary. This would not be fun. Indeed, all efforts check its resistance failed. The transformer is bad. Can it be repaired? I don't think so - not unless the break is at the end of the winding on the outside. No such luck. In fact, after unwinding all 1,950 turns of #46 wire, I never did find it - probably one of the 50 or so times I thought I broke this super fine wire in the process, it was already broken. :(No way to get that back together anyhow and the ferrite core was in several pieces as well....

So, go to plan B....

I tell Stan to see if he can locate another similar unit at auction or elsewhere to use for parts - even if it doesn't work. Within a half hour, he replies that an eBay on-line auction lists an identical model - with the identical symptoms - and it was still available at \$37. No way I said, it may have the same problem as well and thus not be repairable! (That unit finally sold for \$83 - Yikes! - and it could be a dud.)

So, I volunteer to perform a transplant.....

There is nothing particularly unusual about the requirements - charge some large caps to around 300 VDC. Any vanilla flavored pocket camera needs to basically do this. However, just any unit would not necessarily work:

It runs on a pair of NiCd cells totaling 2.4 V so the circuitry out of a disposable camera is not appropriate, being designed for 1.5 V operation.

The inverter may need to run continuously. For this reason as well, the disposable camera solution is unacceptable since they usually are activated by a push button and may only be designed for short duty cycle operation.

AC operation must not be affected.

The circuitry must fit in the case.

Checking the schematics for each of the other battery powered flash units in the document: "Notes on the Troubleshooting and Repair of Electronic Flash Units and Strobe Lights and Design Guidelines, Useful Circuits, and Schematics", it seemed that the one described in the section: "Photoflash circuit from Keystone pocket camera" might work if it could accommodate the 2.4 V NiCd rather than 3.0 V Alkaline battery it expects. This is often the case since Alkaline voltage is not really constant at 3.0 V but drops gradually as they are used up (NiCd voltage is nearly constant until the charge is exhausted). Therefore, it probably should work down to about 2.0 V (but with longer cycle time). And, the lower effective series resistance of NiCds would partially offset the lower initial voltage. I have a couple of the Keystone units so it is easy to try.

A simple test jumpering 4 wires confirmed functionality. The actual inverter portion of the Keystone flash occupies a volume of about 1" x 1-1/4" x 3/4" or just slightly more than that of the original dead inverter transformer! Some quick action with a hacksaw and nibbling tool resulted in a cute little circuit board that

could be tucked into the available space. Some electrical tape assured that there would be no nasty short circuits. The chopper transistor was left exposed so any heat from it would have somewhere to go.

The excised circuit was attached to the positive terminal of the battery, the negative (center) at the switch, and the two secondary leads of the inverter transformer, taking care to get the polarities correct (the waveform out of the inverter is asymmetric and it would not work well if reversed). Except for T1 (dead) and C2 which I removed, all other components were left in place since they shouldn't affect anything.

It seems to work fine on both power settings and on battery or AC. The voltage on the energy storage capacitors stabilizes at about 315 to 325 VDC in all cases. The battery charges fine. What more can you ask?

At first, I thought there was one slight problem: When plugged into an AC outlet with the power switch in the 'on' position (meaning the inverter is also running - the flash operates from AC with this switch off), I was afraid the voltage will eventually climb beyond the safe limits of the capacitors. Then, about 3 AM the next morning I realized there was a missing plastic piece that Stan had not sent me to prevent the switch from being moved into the 'on' position with the adapter plugged in (or vice-versa).

Comments: There is no doubt this unit would have hit the land-fill had it not been for my curiosity in determining what exactly was wrong - since the behavior didn't make sense given my (initially incorrect) understanding of the basic design. Once the nature of the AC adapter was revealed, everything fell into place. Had stand tested the transformer and found it to be open, I would have probably just suggested a nice funeral.

Fortunately, the original inverter was so huge compared with the replacement that space was not a problem. I also believe that the cycle time is now about half of what it was originally so that is an added bonus. I bet the unit will produce more shots on a single charge as well.

Virtually all small battery powered electronic flash units use circuit designs that are very similar. Over the years, parts - particularly the chopper transistor and transformer - have improved greatly, thus the decreased size and increased efficiency. (MHS)

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How it Works: The Minox Shutter

[Rick Oleson](#)

Of all the world's great camera designs, the Minox is perhaps the most remarkable. Developed in Latvia by a firm that had never produced a camera before, the very first Minox combined shutter speeds from 1/2 to 1/1000, focusing to 8", automatic parallax compensation viewfinder, built-in filters and a 50 exposure roll of film all in a package so small you could carry 8 of them in the space occupied by one Leica M3 without a lens.

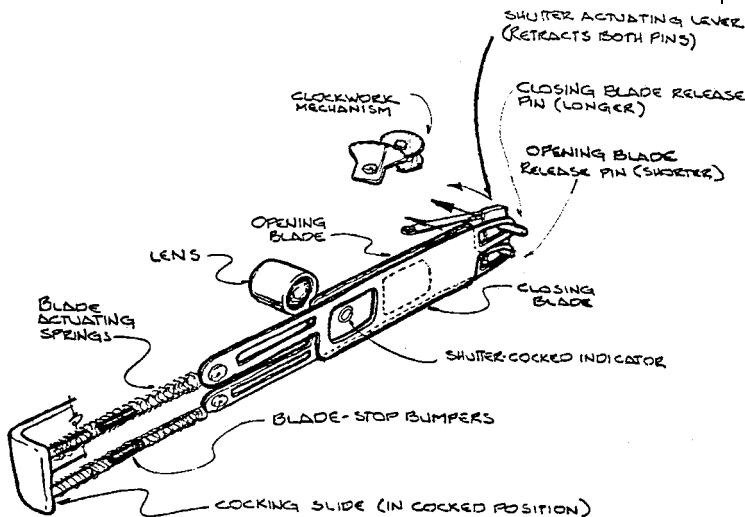
As one might expect for this list of credits, the inside of a Minox is a veritable wonderland of mechanical ingenuity, and the story of its origins could easily make a book in itself. But rather than try to stuff a book into one newsletter, I'll try to confine myself to a single area of the Minox design, the shutter mechanism.

(which is dependent on the position of the shutter speed dial). When released, the lever draws back far enough to fully withdraw the shorter pin from the opening blade which is pulled across by its coil spring until it comes to rest against a stop bumper. In this position, a rectangular hole in this blade is aligned with a similar hole in the closing blade,, allowing light to enter the lens. The activating lever, meanwhile, has run into the timing mechanism and has been slowed down. Once it has passed through the required delay, the lever proceeds until the longer pin is withdrawn and the second blade travels across. Now the openings in the two blades are no longer aligned and the shutter is closed. The timing mechanism is unusual in a few respects; first, a single gear set of simple design covers all speeds from 1/2 to 1/1000: most shutters require at least two or three gear sets to cover such a wide range. Second, the spring driving the actuating lever is opposed by a weaker one acting directly on the gear set, and both are totally independent of the springs powering the blades themselves. And third, because of this unusual spring arrangement, the timing mechanism literally winds itself back up with its rewinding spring when the camera is closed. Which brings us back to our story.

To re-cock the shutter which has just been released, the camera body is "closed". In this operation, the bumpers which stopped the blades now push them back to the starting position. The actuating lever is also returned to its starting position and the timer rewinds with a faint buzzing sound which lasts for about a second.

Although the triggering and timing mechanisms are now cocked, the shutter springs themselves will be tensioned only when the camera is reopened for the next exposure.

Clever as it is, though, the original Minox design does have its shortcomings. One of these is that the closing action automatically advances the film even if no exposure had been made. And while a non-resettable 50 exposure frame counter was probably fine when Minox film came only on a 50 shot roll, it's a bit inconvenient with today's 36 exposure loads. Potentially more serious though, is the inherent delicacy of the small parts which make up the mechanism. Spring breakage is a real possibility; and in a device that requires a pair of .001 inch thick blades to be pushed into position, the slightest obstruction can result in total and permanent disaster. Still, it's easy to find a 30 year old Minox still working, and many have survived hard use to become famous tool's of espionage and military intelligence for two generations. 



The Minox shutter is a two blade guillotine type, similar in action to a focal plane shutter but located in front of the lens. Its paper-thin stainless steel blades travel horizontally by the force of two tiny extension springs, and- timing is provided by a gear train mechanism tucked into the space above the viewfinder. Both blades are released by a single lever which withdraws two unequal-length pins from the end of the blades. Since both pins move in the same direction, at the same speed and at the same time, the shutter speed is determined by the difference between the lengths of the two pins (which is fixed) and the speed at which the lever moves

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Tech Tips

Steve Uhrig

MHS Board Member

Editor's Note: Steve Uhrig, MHS board member, is also a dealer in Minox cameras and -- how shall we say it? -- specialized surveillance apparatus. His web site (swssec.com) is fascinating just to browse through, and not only because of his extensive listings on Minox cameras, which are a history lesson all in themselves.

This gives him a wide expertise in the emerging digital world starting from the early days, which Minox so brilliantly entered at the PMA show in Las Vegas. Here is a discussion he wrote recently on some aspects of the early development of those cameras. This piece is a follow on to a thread discussing digital cameras and how to evaluate them on different levels).

We manufactured CCD cameras for a while and had to deal with the problem of electronic noise in the early days.

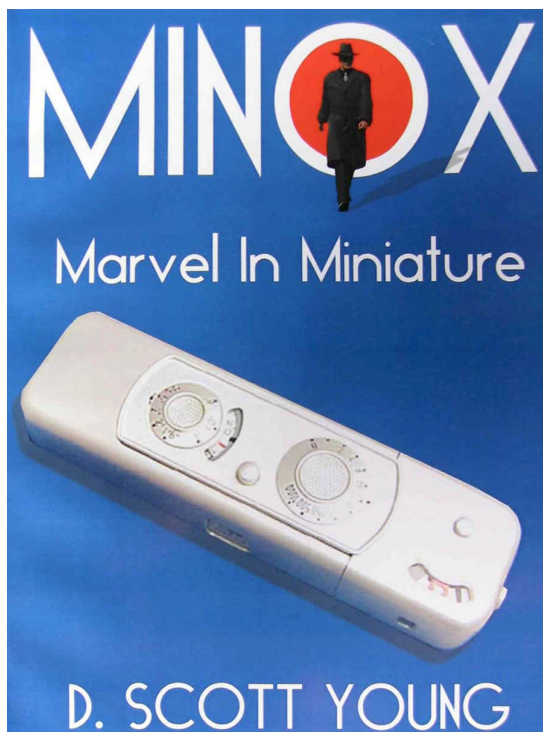
Noise is not directly a function of the CCD. Noise

happens when an inexpensive (not necessarily small) CCD or whatever image sensing element is used. And remember CCD is only one type of electronic image sensor in use, but has become sort of a generic description.

Inexpensive image sensors need more light to produce an equivalent output. Electronic amplification is much cheaper than higher quality and more sensitive image sensors. Being as virtually every product on the planet is price driven, and few buyers look at any spec other than price, cheaper image sensors and amplification frequently wins out over a better image sensor capable of operating in a lower light environment on its own.

However, amplification generates noise. More amplification generates more noise. Lower light levels will require more amplification of the output from the image sensor. When the camera's amplifiers are running wide open (low light levels), they generate more noise. Turn your stereo up on an empty channel and you'll see a perfect example of this. Anything operating wide open generates noise. That's why electronics types try never to run anything wide open, whether it be audio, RF, video or whatever.

The 'noisier' cameras probably operate quite well when



Large format, soft cover, 193pp, illustrated b&w

Minox - Marvel in Miniature By D. Scott Young

The first new book on Minox cameras in years, this delightful exploration of Walter Zapp's most enduring design triumph, the Minox 8 x 11 camera, shatters forever the myth of the Minox as solely a spy camera. A comprehensive history of the inventor, his cameras and the Minox camera are nicely set against the backdrop of world events, with comparative views of other subminiature cameras to clearly illustrate the place the Minox occupied in history, as well as its impact. Covering every model of Minox subminiature camera and most accessories through to the year 2000, this book will be an invaluable reference to both researcher and collector alike.

A personal interview and correspondence with the inventor himself, as well as reproductions of articles and letters written by Zapp provide the reader with a unique insight into his design philosophy, his motivation and his reaction to his camera earning an international reputation as one of the premier tools of the espionage trade.

New and experienced users of these cameras will relish the user's guide, complete with camera and accessory operating instructions and a primer on beginning photography aimed at new shooters. Every facet of photography, particularly Minox photography, from film selection and loading to darkroom processing and printing is clearly introduced.

The most reasonably priced Minox book to come along in years, **Minox - Marvel in Miniature** can be ordered directly from the publisher for US \$15.00, via the Internet at <http://www.1stbooks.com/>. It can be purchased in any fine book store such as [Barnes & Noble](#), Waldenbooks, B. Dalton and others; simply inquire at the counter if it is not on the shelf. International orders can be handled by Petra Keller at www.camerabooks.com.

ISBN 1-58721-068-1 Released June, 2000

there is enough light to keep the amplifiers from being driven so hard. I would suspect noise on all cameras is most evident in low light situations.

As to sensor size, sometimes smaller image sensors actually are more light sensitive, because the optics can gather and focus more light on a smaller area. However, everything is a compromise. Smaller image sensors mean fewer pixels. Usually there is a trade-off between light sensitivity and resolution. Different cameras may move the dividing line. The very best images will need a lot of light, very similar to using super slow/fine grained film in a studio with extensive lighting. This allows the image sensing element to operate where they are the happiest: in their most linear region and with a minimum of amplification.

A good test can be done at home easily. I can prove the same thing with my Nikon 990 digital. Turn it on at night in a room where you have a dimmer on the room lights.

Focus on something through the *electronic* viewfinder, and drop the light down slowly with the dimmer. You will not see much initially, but as you lower the light, the automatic gain control will increase the gain. At some point as you continue to lower the light level, you will see noise in the viewfinder pick up, frequently all at once as some stage switches. Better cameras with more sensitive image sensors or lower noise amps will accept lower amounts of light before the noise becomes objectionable.

A good spec to look for, if it is given, is SIGNAL TO NOISE RATIO, or s/n ratio. A higher ratio (higher first number) is better. These are not absolutes as there are plenty of marketing games to be played here, but a higher s to n ratio should result in less noise in lower light instances. Sometimes only a single number is mentioned, in deciBels (dB). A good camera will have a noise level less than 50dB. Higher numbers are better in this case. In the 40dB range is pretty poor.

Plain sensitivity quoted in lux or footcandles is nearly meaningless unless the spec indicates whether that is light levels striking the image sensor directly, through an Fpointwhatever lens which may not be the lens actually on the equipment, or light reflected off a scene with X% reflectivity, through the lens on the device, onto the image sensor.

The last spec is the most honest, but since it is all a numbers game, most refer only to the amount of light actually striking the image sensor. This is nearly a useless spec. On video cameras I put on an optical bench, essentially 100% of the specs are lies. The

manufacturers don't believe anyone has the ability to measure the true sensitivity in the field, so they all exaggerate and think they won't get caught. Amongst slightly informed buyers who think they know how to read specs, the lower number wins the order. There would be a big shift in sales statistics if the numbers were required to be proven. When we manufactured CCD cameras twenty years ago we took a standard U.S. made camera and pulled out the image sensor and threw it away. In the early days the things were socketed. We had an arrangement with the manufacturer of the image sensors to buy the best signal to noise ratio image sensors they produced, of the type used in that camera. Assembly lines, then and now, try to produce the best quality they can, and quality is tested into the product, not manufactured in. Every image sensor is tested, and ones performing better are sold as better spec units, at higher prices. All have potential for dead pixels, signal to noise, frequency response and a million other specs. Better sensors go into higher end cameras. Cheaper ones go into cheaper cameras. The difference may not be noticeable to Joe Sixpack, but would be to a professional. There is a reason there still are \$10,000 digital cameras on the market. The image sensor alone in them probably costs more than the entire consumer grade digital camera.

We took the lowest noise and most light sensitive image sensors and popped them into the commercial camera. These were perhaps 0.1% of total production, and they were expensive. Since we were generating an image at lower levels and with less noise, we could change some circuitry and amplify more before swamping the image with noise. We sold the camera as a high performance lower light camera, and the military ate them up, far more than we could supply. Then economies of scale took over, the Pacific Rim started stamping out cameras with cookie cutters, prices came down from thousands to hundreds, and we got out of the business. At the ISC (International Security Convention) in March 2003, solid state video cameras, complete ready to operate, were selling for \$11 each in 1000 piece quantities.

Even now, thermal imagers and such cool the image sensing element to reduce noise levels, caused by something similar to Brownian motion, where the noise is generated by molecules inside the image sensor crashing into one another. This motion slows down with cooler temperatures. Thus, you can run very high gain and low noise, making the overall instrument perform better.

Early cooling was by the expansion of compressed gas, usually Argon. Modern cooling is with Stirling or some such solid state technology.

Modern surveillance video cameras play even more games to operate well in low light, but that's straying too far off on a tangent.

Moral: Price should not be a major consideration. There are more specs to look at than sensitivity and number of pixels. More important to many will be a camera containing a quality, low noise image sensor. 

Older Memos Come Alive

Larry Feldman
Technology Manager

Most of the visitors to Minox.org, are by now familiar with The Minox Memo - now in it's second year of publication. Fewer people though, may not realize that this is the "Second Series."

The original Minox Memo hails from the earliest days of the Minox in the United States. The Minox Memo, was published for 16 years by The Minox Processing Labs, starting in 1956 and ending in 1972.

Up to now it was difficult to locate copies of this rare piece of Minox History. A few copies will appear on eBay from time to time, and a few scanned issues can be seen on the web, but if you wanted to view the entire collection it is all but impossible.

Until now.

With the assistance of Minox Germany, and with issues from the personal collection of Don Thayer Jr. who operates the Minox Processing Laboratory, the collection is slowly being reassembled by the Minox Historical Society. Ultimately the collection will be available on CD-ROM, but until it does, we've arranged a preview.

Starting today, scans of each issue are being posted on our web site. As a member of The Minox Historical Society you are invited to preview this unique collection as issues are posted. As of this writing, Volumes 1-4 are available for your review. We do hope that you enjoy this unique and practical, glimpse into Minox History. The project is located at:

<http://www.minox.org/classicmemo/> 

What is it?

John Watson
Vice President



If you have ever tried to use your EC or ECX flash with any of your other Minox cameras, you either had one of these adapters, or you were very frustrated. Known as the 69124 Flash Adapter, this part converts the five pin configuration of the EC and ECX flash guns, to the standard PC socket on the end of most metal bodied 8x11 Minox cameras.

This adapter is included as a standard item with any LX/TLX package that includes a flash unit.

A button on the side moves a latch that catches on the LX/TLX flash nipple. On older style cameras, a friction fit is used. 

New Product Introductions

Keeping a clear picture even in twilight with the new night-vision devices from MINOX

The demand of outdoor enthusiasts for innovative, handy and practical MINOX products is growing continuously. Multifunctional measuring equipment and binoculars from the renowned company in Wetzlar are considered reliable and ideal companions for all nature activities.



purposes on land or at sea, for viewing, observation and hunting or for protecting objects: the MINOX NV 300/NV 200 permit silent and discrete observation even in advanced twilight and at night. For this purpose, light frequencies from the brightness of stars or horizon radiation, which are not perceived by the human eye, are amplified and objects pointed to are reproduced in a brilliant, clear and pin-sharp image through the excellent, multi-coated lens systems in combination with an incorporated infrared illuminator. The optical system of the MINOX NV 300 which weighs a mere 500 grams, provides a 10,000 x light amplification and 2.5 x magnification. The MINOX NV 200 which is even smaller and weighs just 330 grams provides an 8,000 x light amplification and 2 x magnification.

Besides its outstanding technical qualities and the famous MINOX compact dimensions, both of these innovative night-vision devices boast superb design features. The ergonomic shape of the body with a special soft-touch lacquer finish, featured by both NV 300 and NV 200 models, allows extremely easy handling making them ideal companions for all outdoor activities at night. Both instruments come with a case and battery and are available from stores as of February 2003.

Technical data:

	MINOX NV 200	MINOX NV 300
Infrared illumination	yes	yes
Optical magnification	2	2,5
Lens diameter	32 mm	46 mm
Optical system	2 groups in 3 elements	3 groups in 5 elements
Tube type	Gen 1+	Gen 1+
Tripod thread	2 AAA	1 CR 123A
Tripod thread	-	yes
Dimensions	78x131x45 mm	83x174x55 mm
Weight	330 g	500 g
Guarantee	2 years	2 years



With the presentation of two pocket-size night-vision devices MINOX GmbH now completes its product range and simultaneously breaks new ground. In spite of their wee dimensions the MINOX NV 300 as well as the MINOX NV 200 keep you in the picture and well oriented - even in a moonless night which is just lit by the stars. MINOX GmbH again demonstrates its competence in miniaturized top-of-the-range technology, in keeping with its traditional values.

Night-vision devices are needed when binoculars, even with top light-gathering power and high twilight factor, approach their optical limits. Whether for orientation

Advertise in the Minox Memo!

Pages	1 issue	2 issues
1 Page	\$50	\$75
½ Page	\$35	\$50
¼ Page	\$25	\$35
4 line classified	\$15	\$25

Contact John Watson at johnw@minox.org for more information.

Minox Memo

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