

The Super D Graflex

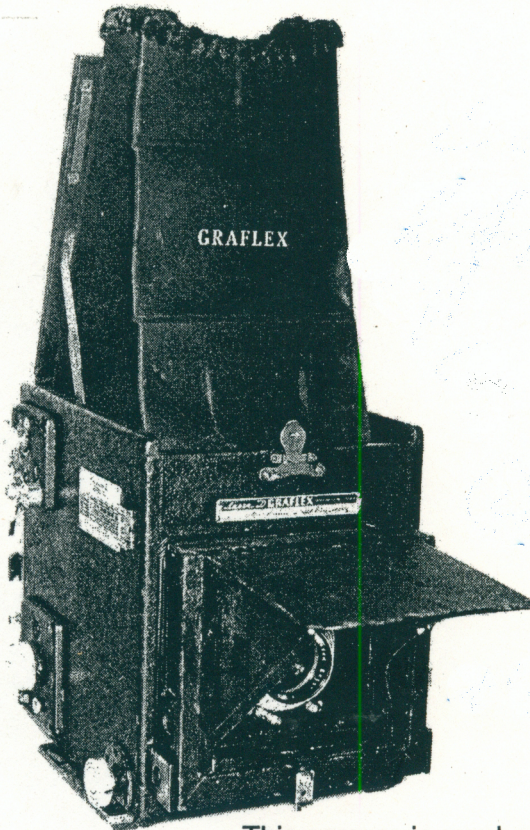
by

Ed Romney and Cliff Scofield

REPAIR

RESTORATION

USE



This camera is overhauled in the book.

The definitive book on the best and most famous large format single lens reflex camera...The Super D is still in use in professional photography. A good one commands a high price. Copyright © 2003 Edward H. Romney, All rights reserved.

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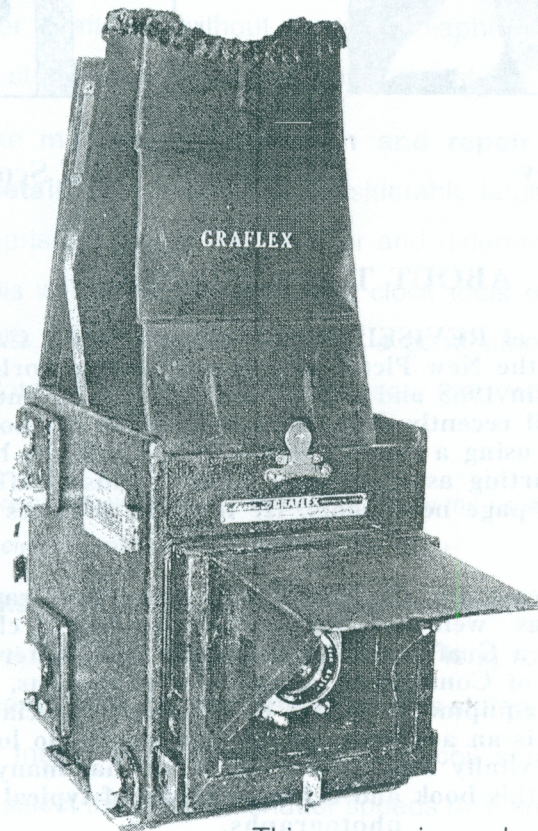
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Cliff Scofield

ABOUT THE AUTHORS

ED ROMNEY is the author of **REVISED BASIC TRAINING IN CAMERA REPAIR**. He was also the founder of the New Pictorialist Society and a worker in bromoil. He restored his first Graflex in 1968 and made a market in them and offered parts and service for many years until recently. Now he only deals in his books and repair tools. His late father had a studio using a Graflex in the 1930's. Ed has been using the Graflex professionally since 1945, starting as a teenager. Many of his Graflex pictures have been published, some were front page news shots. He took the pictures of the insides of the Graflexes.

CLIFF SCOFIELD is 98 years old. He first started using the Graflex SLR in 1921. In the 1933-1955 period he was well known as a photographer of children's recreational camps, which he shot with a Graflex SLR. He became even better known later for his color postcards and views of Connecticut resorts and attractions, most of which were taken with medium format equipment. He has been a dealer specializing in the Super D Graflex for many years and is an authority on the camera. He no longer does any repairs on the cameras but remains vitally interested in them and has many fascinating anecdotes about them that are in this book and a fine portfolio of typical Super D Graflex photographs.

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♦ The Super D Graflex, by Ed Romney and Cliff Scofield

The Graflex is the most practical, reliable 4 x 5 single lens reflex that has ever been sold. The Super D Graflex is the most advanced of the Graflexes. This makes it highly desirable both as a collectible and a practical camera for use today by the modern pro who works in 4 x 5 large format. The semi-automatic diaphragm unique to this camera is essential for modern studio work with large strobe lights. Thus this fifty year old camera is still highly valuable and well worth while preserving. Other Graflexes without the auto diaphragm are generally used with floodlights in studio work as they were in the past.

This book covers the mechanics, operation and repair of the Super D in considerable detail. This camera is considerably larger than the usual camera of today, the parts are bigger and heavier and different techniques are required in repair. Tools will be larger, more like clock tools or gunsmith tools than watchmaker's tools. The book also includes a good amount of incidental information and anecdotes from old time Graflex users that younger people will enjoy.

Note, this book is much more closely written and has more facts than the usual tech manual. Read it several times, study it closely, preferably with a Graflex in front of you.

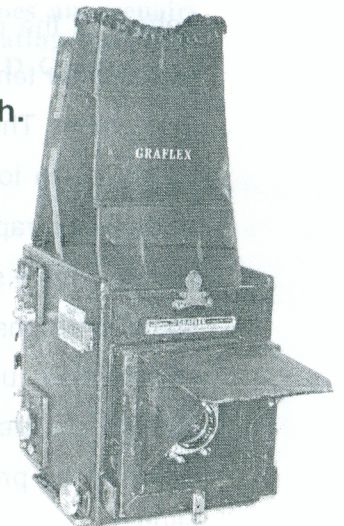
How the Graflex works: This is a focal plane shutter camera with an unusual shutter curtain that is not like other cameras at all. It is a long roll of shutter cloth with different slits for the different speeds. See Fig. 1. It is stored on a roller in the bottom of the camera. Inside that roller is a powerful coil spring that may be adjusted for tension to select the different shutter speeds by a knob on the side of the camera. The knob is turned to raise the tension and released by pressing a spring catch to reduce the tension. It turns a large geared wheel that turns a small pinion rapidly that is on a shaft in the center of this take up roller. The older cameras have six different tensions. The later Super D has only two. The shutter speed is set manually by both adjusting the spring tension and the width of the slit selected, unlike modern cameras. An escapement in the top right of the camera enables you to select the slit opening. It is wound by a key and released by pressing an L shaped catch. This is a non-capping focal plane shutter.



Fig 1 Left. The Graflex curtain is a long piece of rubberized cloth.

Fig. 2 Above. Before overhaul, camera apart

Fig. 3. Right. After overhaul.



It is essential that the mirror be pulled back to keep light from getting in when you wind the shutter. It is light tight. A mirror lock prevents you from changing the shutter slit with the mirror down and the lens shining light on the film. It has to be cocked. This lock may be disengaged for time exposures and for special purposes. So you see the Super D Graflex is far from an automatic camera. When you shoot a picture, you must cock the mirror and wind the escapement back to the original shutter speed or you will get a slower speed the next time. This is often forgotten.

Using the Super D Graflex with a strobe. Only the widest full aperture open aperture shutter opening can make a strobe picture. You set the shutter to this Open slit with the mirror cocked. The exposure is made by the mirror rising up to begin the exposure, then it trips the cloth shutter to close it when it reaches the top. The curtain tension should be at the highest setting. Strobe shutter speed is quite slow in actual cameras. It depends on the condition of the camera, the tension of the curtain and the mirror spring. The mirror spring may be adjusted in repair, but will wear the camera excessively if set too high. It should not make the camera vibrate excessively. Typically the Super D open curtain strobe synch speed on an actual camera today is 1/20 to 1/30 sec. For studio use, you must have the modeling lights dim enough so their light will not print on the film too. The actual shutter speed then will be the duration of the strobe, which is very rapid, 1/1000 sec. or so. Flash synch is obtained in most cameras by means of a switch inside the top escapement that is tripped as the mirror reaches top. There are also cameras with a separate micro switch on the side of the body that is tripped as the mirror rises.

Using the Super D Graflex with a flashbulb. You can shoot with a flashbulb exactly as you use the strobe with the curtain on Open and the mirror initiating the exposure. Then the exposure will be the duration of the flash bulb, typically 1/25 sec. This is too slow for good sharp hand held pictures. Gas filled SM bulbs give about 1/100 sec. They are hard to find today. You can also use the Super D Graflex with special long peak GE #31 or Sylvania 2A focal plane bulbs, for these you want to use the 1/1000 second settings. The focal plane bulbs work quite well with the 3 1/4 x 4 1/4 Super D camera and give an even exposure from top to bottom. In the 4 x 5 camera there may be difficulties. You need to "pack" the shutter curtain, getting all the slack out of it by winding it

several times and releasing it. You also may get some uneven exposure top to bottom if you take a vertical format picture. Horizontal shots should be OK.

Note the Graflex mirror takes a considerable time to rise after the shutter release is pressed. It is the mirror that starts the curtain. So for sports or action photography, you must anticipate the action by about 1/5 second. Old timers could do this quite well.

The automatic diaphragm consists of a housing around the iris of the lens containing a long clock spring. It must be wound separately each time it is used by a lever on its side. Cliff Scofield reports one well known New York professional photographer made a custom arrangement to have this lever cock from fish line hitched to the cocking lever and running through a hole to the back of the camera so he would not have to be walking around the camera all the time to set it. He was taking pictures of food with it. It is also possible to fit a Graflex with a pneumatic air shutter release and a hose and a bulb you hold in your hand. The camera is left on tripod and you can move around as you make your portrait shots.

There is only one size of automatic diaphragm for both the 34 and the 45 camera. The standard lens for the 45 camera is a 190mm 7 1/2 " Kodak Ektar F5.6. Optar 190mm F5.6 lenses are sometimes found. On the 34 camera it is usually a 6 3/8 inch F4.5 Ektar. On early 34 Super D's it may be a coated Kodak Anastigmat 6 3/8" F4.5 instead. Super D Graflexes were also sold by the factory without lens for the customer's lens to be installed. These will not be auto diaphragm lenses.

The automatic aperture is set by placing a pin in one of a series of holes around the lens. This today would be called a semi-automatic diaphragm. It is a scarce Graflex part. It can be very difficult to find one for a camera missing the automatic diaphragm. It is highly dependable, sometimes a little sticky with age and can be taken apart by unscrewing the front lens cell and removing the two screws on the trim ring in front. This reveals a jam screw underneath which is unscrewed so you can take off the threaded cap to the spring housing. Now you are able to reach the spring the spring to be cleaned with solvent and lubricated with light lubricant. I like silicone spray these days.

A common, but often unrecognized, Super D problem is bad diaphragm timing. Sometimes the iris does not stop down until after the shutter has tripped. It ruins pictures, of course. This is adjustable by rotating the arm that is on the lensboard held by a set screw, or by changing the angle of the splined shaft in relation to the shutter release.

The automatic diaphragm is tripped when the shutter is released by a sear-like catch on the front of the camera mounted on a shaft to the lensboard. There are two types of linkage to the shutter release. The one on the 4 x 5 camera is a splined telescoping shaft. It slides back and forth as the bellows is drawn in and out. If you remove the lensboard and the back and raise the mirror you will see the shaft running along the side of the camera inside the bellows at the lower left. From the back of the camera you will see the inside of the shutter release that trips the mirror. A "S" shaped arm runs from the shutter release to a splined nut mounted around the splined shaft. Sometimes this arm may bind or fall off, or need adjustment by bending it. There is also a set screw in the arm on the lensboard so it may be rotated for adjustment. The shutter release is mounted on the outside of the camera with a plate with four screws and may be removed for adjustment or replacement. If it is worn on a well used camera the mirror will not be at 45 degrees and the camera will not focus correctly. You can make a new part or add a metal plate to the mirror frame if need be. These auto diaphragm parts are also conveniently accessed by removing the ground glass.

The 3 1/4 x 4 1/4 camera has a lever that is pivoted in the middle, cantilever fashion. Sometimes these linkages are dirty or need adjustment, made by bending them or relocating screws. Silicone lubrication is good for them. They should work very smoothly as they did on those nearly new Graflex cameras I encountered when I was young... Lots of collectible Graflex cameras today are not adjusted to nearly the smoothness and precision that is possible. See our photos of these parts to know what to do to fit them right.

The Super D Graflex lens is on a lensboard that may be removed like any Graflex board by lifting it up. This is regularly done for cleaning. The cameras will accept many other lenses including long telephotos and high speed lenses. None of these other lenses have automatic diaphragm unless they have been custom adapted by a skilled machinist. Cliff Scofield has observed several modification of this type in cameras he knows. The 15" F5.6 Wollensak or Graflex

Optar is a fine popular telephoto lens for this camera. It is much more successful than a long lens in a leaf shutter in a camera of this size because the focal plane shutter gives speeds to 1/1000 second, speeds which large format leaf shutters cannot reach. The 10 inch Optar F5.6 is used on the 34 camera. The Graflex will not accept wide angle lenses. 180mm in certain mounts is the shortest for the 4 x 5 camera. I adapted a 180 mm Plaubel F2.9 to fit my father's 4 x 5 Graflex. The factory used to offer this lens at one time. In the 34 Super D camera, 150 mm is the shortest possible lens. See the lens list in the 1938 Graflex catalog. Of course for macro use, close up only, you can use a short lens for more magnification, such as a 4 or 5 inch lens. The bellows extension on the 45 Super D is 12 inches, not enough for 1:1 pictures with the normal lens.

The bellows is hitched at the front of the camera with a metal plate with screws. These may be removed with a short screwdriver. At the back it is screwed to the outside of the camera body with small screws. It takes a long very slender screwdriver to reach them. Neats Foot Oil is good for leather bellows. But don't let it soak in enough to soften the paper stiffeners inside. Silicone spray is better for plastic ones. In many of these cameras the bellows has been replaced and you may not have a leather bellows any more. New bellows may be made or bought, or a good used one may be taken from a parts Graflex. Series D is interchangeable with Super D bellows.

Focusing : The camera is focused by a pair of racks and pinions, one on each side of the camera. The focus knob on the right is connected to a rod with the two pinions on it at each side of the camera. Adjustment is possible by relocating the screw plates that hold this shaft to reduce play. It is also possible to reform and add shim metal to make the two side pieces fit better and you could refile the teeth on the racks on a badly worn camera.

It is important that the front stay vertical so the image will be sharply in focus all over the film. It must be fairly tight. The lens mount should not roll forward by itself if you tilt the camera down. Some restorers add a splined washer to take up slack in the focusing shaft.

The mirror is in a heavy metal frame with two wood or metal sidepieces to hold the glass in. Four very flat screws in the back of the mirror frame are unscrewed to remove the mirror. At the end of the mirror are two rubber bumper pieces to cushion the mirror. They are usually hard and brittle and need to be replaced

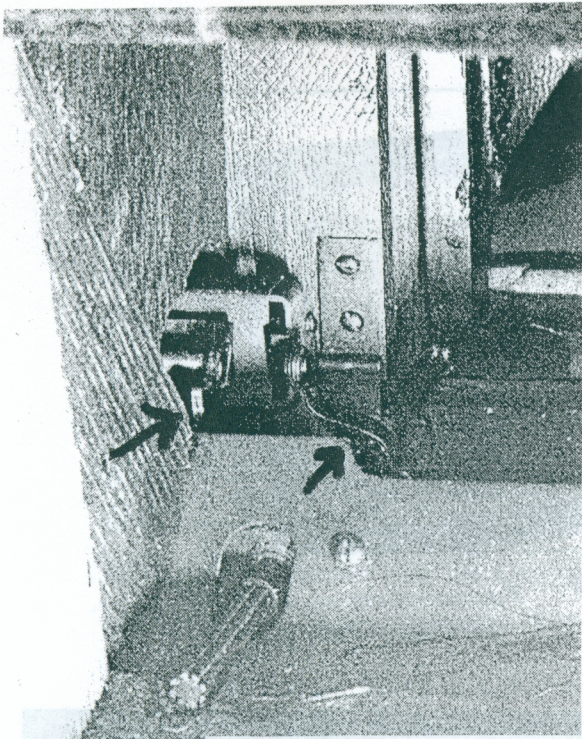


Fig 4. Shutter release module.
 Arrow points to sear that releases mirror. Curved arm stops down lens

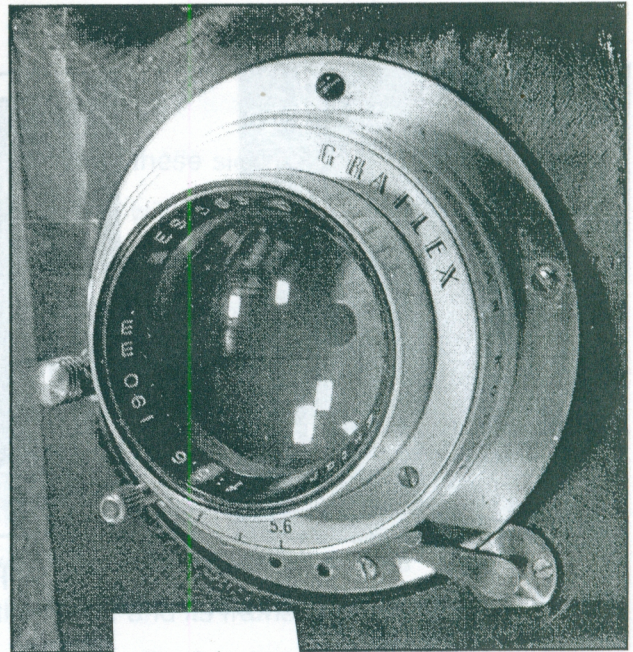


Fig. 5. Lens

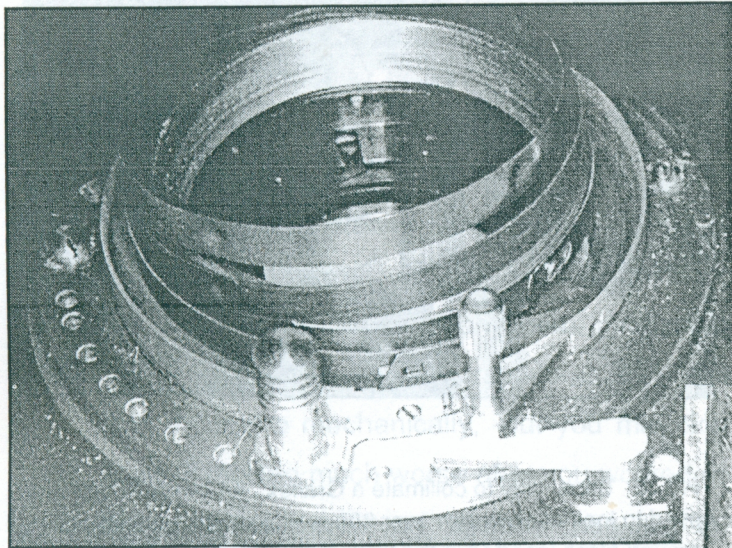


Fig.6. Auto Diaphragm Spring

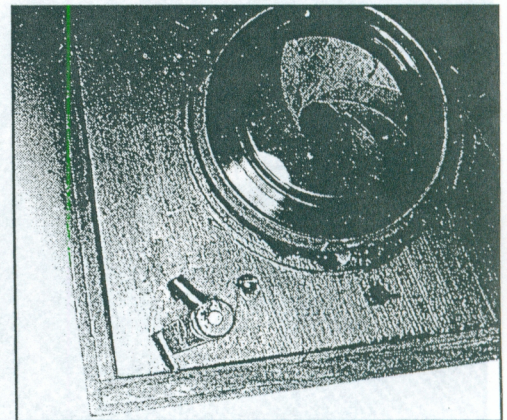


Fig. 7. Back of lensboard

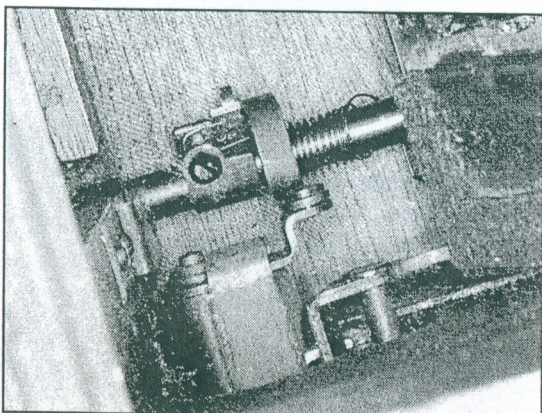


Fig 8. The 4 x 5 stop down mechanism may be worked on with groundglass removed.

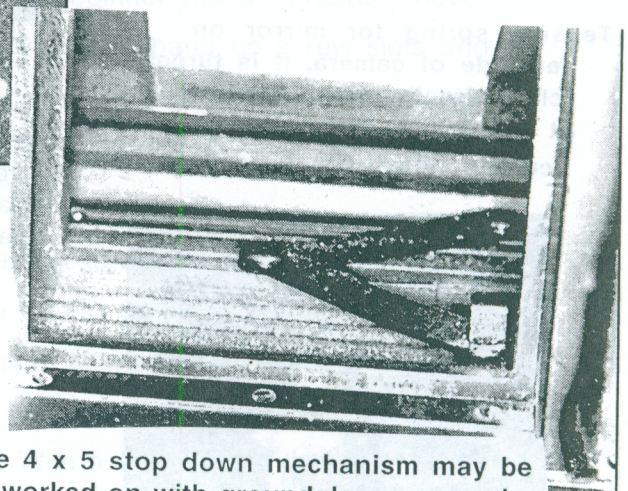


Fig 9. The unique 34 Super D diaphragm arm.

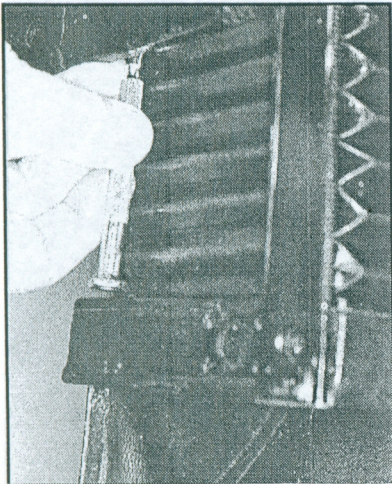


Fig.10. Removing bellows.

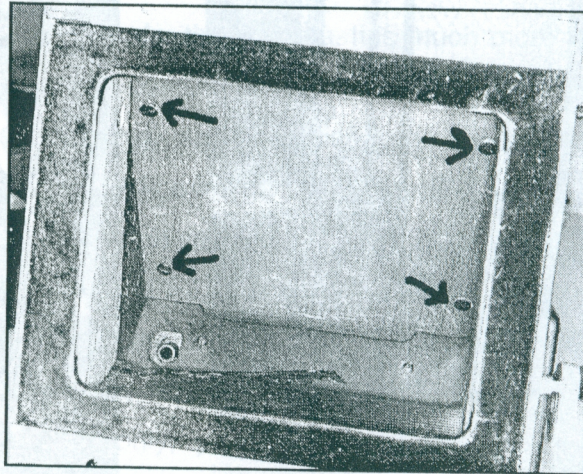


Fig.11. Four screws remove mirror. Get a front surface one.

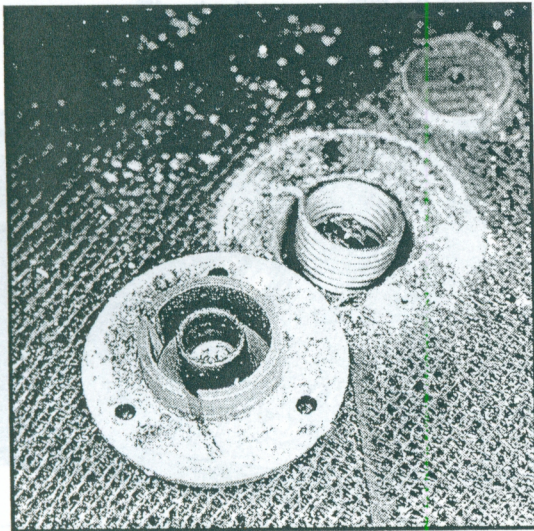


Fig. 12.

Tension spring for mirror on left side of camera. It is turned clockwise to increase mirror speed. At top right is the bushing for curtain roller with lubrication hole.

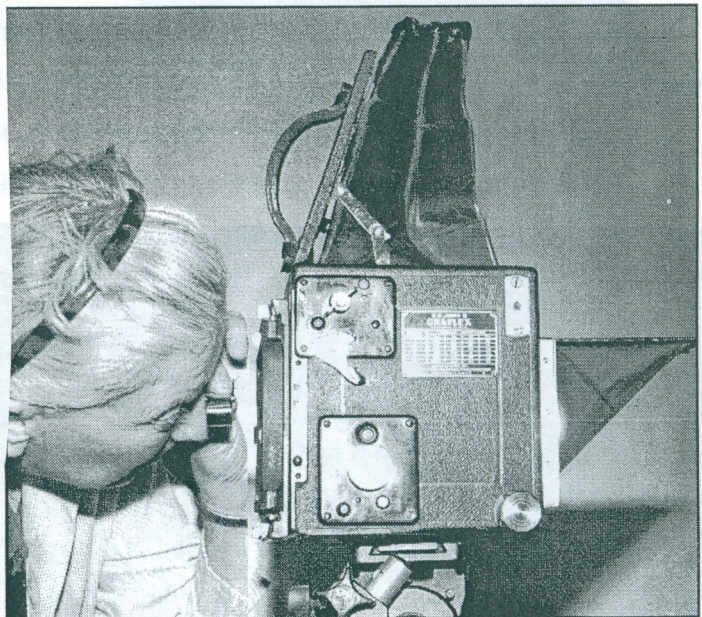


Fig.13. Usual way to collimate a Graflex. A powerful magnifier is used to look at an image over 300 feet away near infinity in the ground glass inserted in the back of the camera. Next the ground glass in the hood is examined to be sure it is equally sharp. Ground glass in finder may now be raised or lowered.

Fig. 14. To conceal a tiny nail or screw hole, drive in a splinter of wood, cut it off, then pound it in firmly and peen the end. Paint it black. Note, this is a huge enlargement.

with new rubber you form yourself. In some cameras these side pieces are metal. The mirror frame would work better if it were made with modern materials such as polycarbonate plastic and was much lighter. The mirror pivots on a shaft at the back of the camera. At the left side is the bearing for this shaft and the housing for the mirror spring. It is removed by turning three screws on its side. Then the spring may be rotated inside to increase or decrease tension. The bearing for the mirror on the right side of the camera is in the escapement housing. The mirror wind lever is hitched to this shaft by a tapered pin which must be driven out carefully. to remove the escapement cover. The long mirror shaft has three screws in it which are taken out to remove the mirror and its frame.

Mirrors may be found in actual cameras of either front or rear surface glass. Front surface is vastly preferable. No double images, much brighter. But since the light is reflected a shorter distance to the ground glass than the film, it must be raised or reversed to keep the focus. Always collimate any old Graflex you acquire. Many have problems like this and will not make a really sharp picture. Yet often owners are quite satisfied because they do not know the full potential of 4 x 5 photography!

Repairing Serious Damage, Missing Parts, Cracks, and Holes. When I (ehr) began fixing Graflexes 35 years ago, starting with Dad's camera, cosmetic beauty wasn't much of an issue. We'd repair cracked wood with extra screws, metal plates and angle pieces. Now that any 4 x 5 Super D is worth \$1000 or more, owners want them immaculate and looking in mint condition. This is hard for the repair person to attain. As a beginner you will probably never ruin a camera mechanically, but you may scratch it, bang up screw slots and leave it looking much worse after you worked on it. It takes a lot more practice to do really neat work on Graflex than just to bring the camera back to fine mechanical operation.

People drill holes and put in screws in Graflex to attach extra flash brackets, straps, meters and all kinds of things. One way to conceal a small screw hole after removing the screw is to drive one or more small splintered pieces of wood into the hole with a hammer, peen the ends with a tiny punch to make them look like grained leather and paint them black. With a bigger hole I simply find a screw that looks as if it belonged there and put it in.

Serious damage... If a Graflex on tripod is tipped over it will usually rip out the tripod socket plate in the bottom leaving a gaping hole. That happened to the camera we picture here a long time ago. It was an Air National Guard camera that came courtesy of Cliff Scofield. The military had it repaired by epoxying a heavy metal plate to the whole bottom of the camera. The plate has a 1/4-20 hole drilled in its center to hold a tripod screw. It looks clumsy, but it saved a valuable camera from destruction....and that I like. I repaired a 45 Series B this way that had a broken bottom long ago. The Super D here also has four large holes at the top front for brackets for a shoulder strap. The brackets had been removed previously and the wood on the right side of the camera had developed a crack running into one of the holes. Since I never expect to use a strap I have injected Super Glue into the crack with a diabetic's hypodermic. The crack was painted black. See the pictures. I will probably leave these holes, which are historical in a sense. Others may disagree.

Missing parts. If Super D chrome parts cannot be found, most parts from a Series D or B camera will fit but they will be gray or black. This camera here has one gray top strut from an earlier camera. Some might want to paint it bright silver with aluminum paint or replat it. It is particularly important to save all Graflex screws from parts cameras and ruined bag magazines. They are virtually unobtainable now. The wood for Graflex is mahogany. You will find 9 x 9 inch mahogany floor tiles will provide good material if a major part is cracked or missing.

The Graflex ground glass is inlet into the top of the camera. Two brackets provide adjustment. by means of screws sliding in slots. Often only the front bracket is adjustable. It must be carefully collimated if the camera is to take sharp pictures and act like a 4 x 5. Most cameras I have found needed collimation. Most old negatives you look at closely with a magnifier will be slightly out of focus. See for yourself. Here is one way collimation is done. Put a fine ground glass into the back of the camera. It may be the focusing panel that Graflex sold, or you can improvise with a piece of ground glass with the ground side facing the lens taped into an old film pack adapter. Be sure the old film pack shell is there too in order to have the correct separation. Now find a sharp image 300 or more feet away, tree branches against the sky in winter, reflections off car bumpers or glass, lights at night, something sharp and bright. Adjust the lens to infinity and

be sure it is equally sharp all over the field. Now jam the front standard in place with a piece of soft wood or something so it will not move and adjust your ground glass by raising and lowering it until it is also sharp all over the whole 4 x 5 image field. If you have trouble it may be that the mirror is not at a 45 degree angle because the shutter release sear is worn. There are many variations in collimation of existing cameras now due to modifications over the years. Addition of a front surface mirror means you have to raise the glass by the thickness of the mirror. This is often done by turning it so the dull ground side is up. If a fresnel field lens has been added, you may have to adjust for its thickness too. If your camera has been retrofitted with a Graflok back, its ground glass may be turned the wrong way too or the fresnel lens in it may be in the wrong place or omitted. There are two focusing panels for Graphic/Graflok back, one thick one designed for with the fresnel lens, the other thinner for use without it. The wrong one will give you unsharp pictures and confuse you greatly if the film back focusing is wrong. Another technique called "backsighting" may also be employed to collimate Graflexes. It is described in the Romney book, **Revised Basic Training in Camera Repair**. Basically you look inside the Graflex with a well collimated 35mm camera with 135mm or longer lens set to infinity. The viewing ground glass should be sharp and gritty looking at ANY distance that you hold your 35mm camera. Put a pencil mark on its ground surface. Now put a ground glass or other target where the film goes and it must be equally sharp.

NOT ALL SHARPNESS PROBLEMS ARE OPTICAL- I (ehr) had one rather mysterious experience some years back with a customer's Super D Graflex that would not take sharp pictures, so he claimed. I tested it and shot pictures hand held and on a table and it was fine. Finally I discovered he was using it on a metal tubular tripod of good size, but one that had a vibration period when the heavy Graflex roller blind shutter was released. Graflex camera tripods must be extremely sturdy, more than for other 4x5 cameras. Of course if you fear your tripod, you can raise the mirror separately, then make the exposure with just the curtain. Even more steady is to make the exposure with a black card held in front of the lens. Long ago I would use an old time cast iron studio stand for my Graflex indoors for portraits that rolled around on three casters. It was steady always.

Graflex Back Vs Graphic/Graflok back. Graphic film accessories slide in place. In the Graflex back they latch like a lensboard. There is much less wear in the Graflex system back. Graphic holders get thinner over the years from being slid in and out so many times, you see. Even the camera back can wear too. The Graflok back is much more popular and valuable today than the Graphic back because it accepts a 120 Graphic roll holder, Polaroid holders and other modern accessories. If you simply shoot traditional 4 x 5 film, as I do, you may prefer the classic Graflex back with its slotted holders that latch in like the Graflex lensboards. There is no sliding. They don't wear. This back will accept the very fine Graflex bag magazines holding a dozen shots, which I love. In the 1970's I (ehr) rebuilt a whole lot of them with new bags for the Navy. If you make one make it about 3/4 inch longer in the bag than the original and it will work better. Graflex made 120 roll backs for the Graflex back, but unless they have four spindles inside the frame, the film plane accuracy will not be good enough to shoot at large apertures. The film bulges. With strobe and F16 or F22 apertures that problem is moot of course. This manual is not designed merely to glorify the Graflex but to enable you to use it intelligently in serious modern photography.

Making a rollholder for the Graflex back. Buy the later 45 Graphic rollholder with improved film flatness and four spindles. Take a perfect 45 Graflex holder. Cut the rollback to exactly the same size, grind off the lip that Graphics use for a light seal and shim the sides with aluminum so they act just like the slots in the Graflex holder. Mill a slot in it like the Graflex holder. Paint it all dull black. This is the best way to get a really good rollback.

The Graflex revolving back. The picture shows how it is made. It is removed by taking out ten flat head screws in its back and four oval screws in its side flange. You have to rotate it part way to see all the screws, some which are concealed under the rotating part. Never put oval head screws in instead of flat or you will damage it badly. There is velvet between where the holder goes and the back. If worn, it must be replaced. Sewing centers and thrift shops will have velvet or can supply used items you can cut up. The slotted slider that keeps the holder in place often gets loose screws. Fill their holes with cement and put them back and be sure they are tight and that it takes a fair amount of pressure to slide this piece. Silicone spray will make these parts work smoother. This whole assembly is virtually trouble-free.

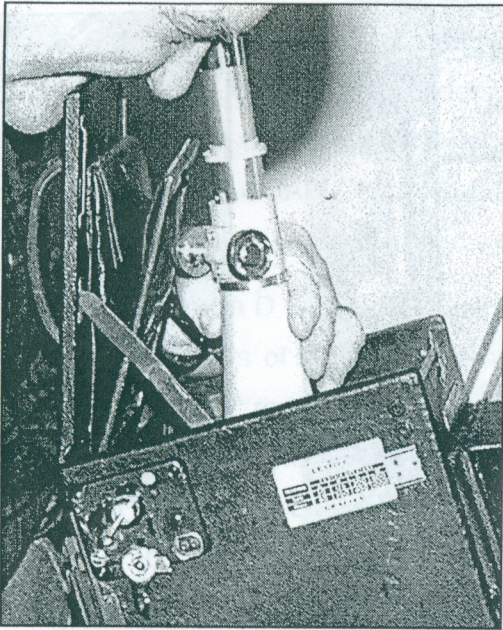
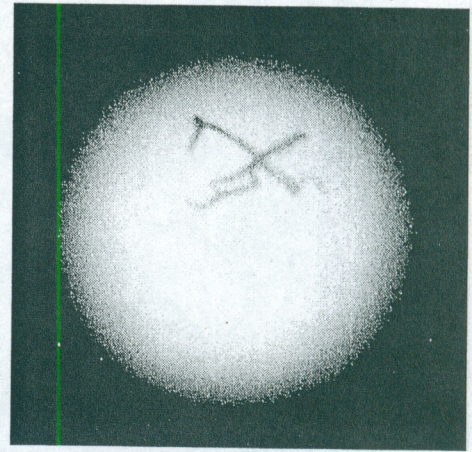


Fig. 15. Small industrial microscope is good to check the sharpness of the reflex finder image. It should be sharp at the same focus as the ground glass in the film plane. Remember holder and ground glass panel depth also affect collimation. Check them too



A sharp backsight target. Camera is collimated. Test both film plane and reflex finder ground glass this way with Graflexes. More information on backsighting is in my Revised Basic Training in Camera Repair text.

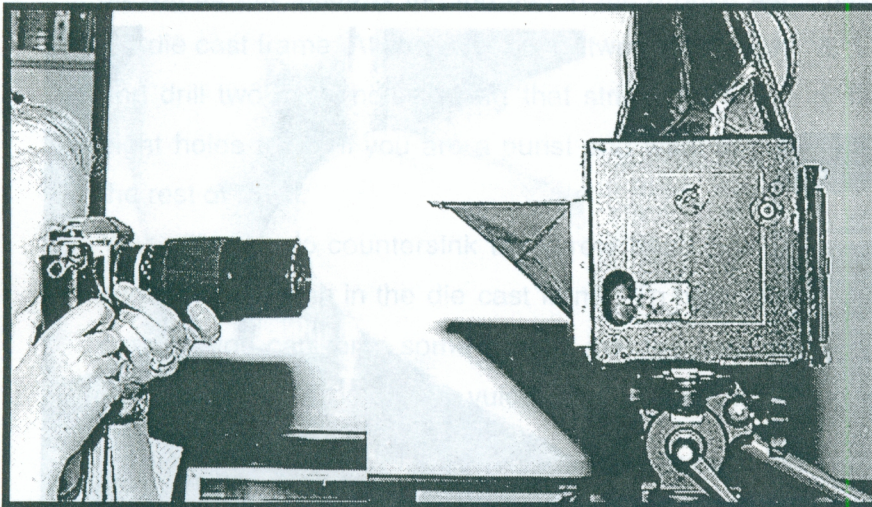


Fig. 16. Backsighting is a technique I devised in which a well collimated 35mm camera with a long tele lens is used as an auto-collimator. Both cameras are set on infinity. A ground glass with a pencil mark or a clear plate glass with a scratch are inserted at the film plane of the camera you are testing. Open both lenses wide and look into the camera you are testing with the tele lens. If the test camera is at infinity, the test mark will be sharp REGARDLESS of the distance the two cameras are apart. Test the Graflex ground glass the same way. Focus must be identical. This method permits photographers to set their cameras without expensive test equipment. See photo at top right. . .

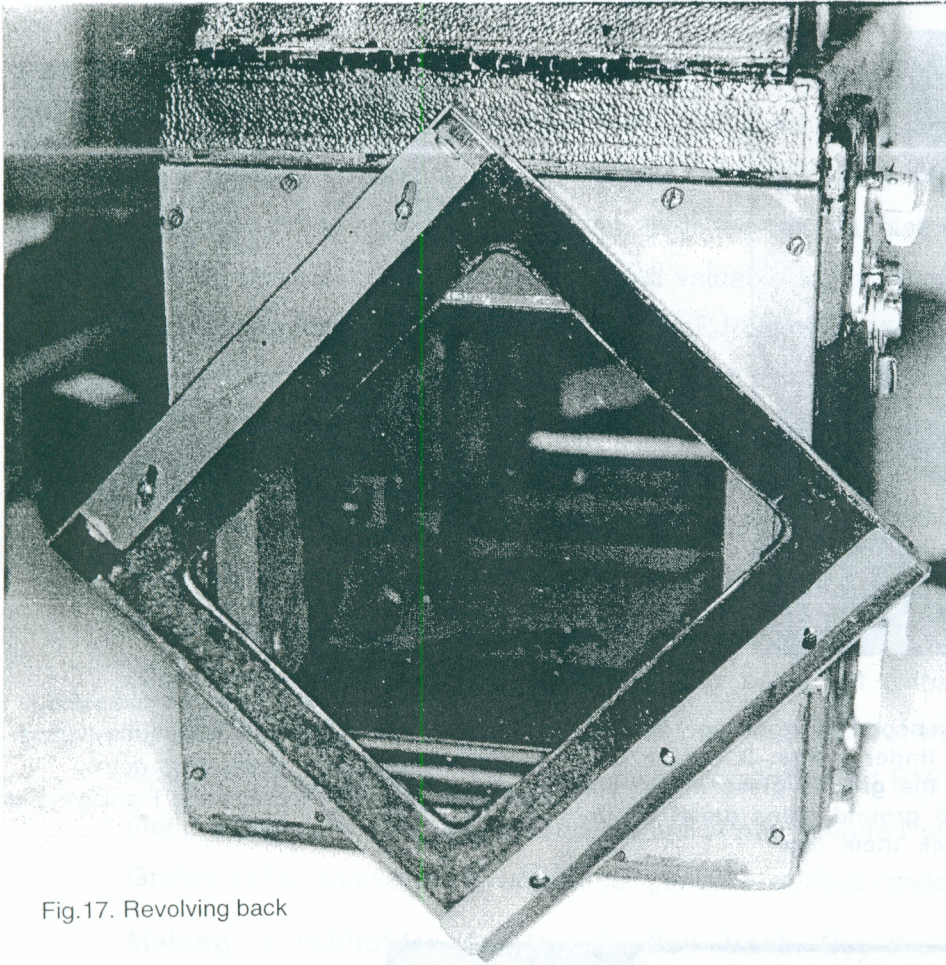


Fig. 17. Revolving back

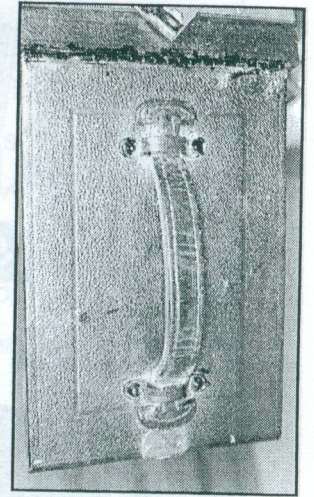


Fig. 18. Top and handle

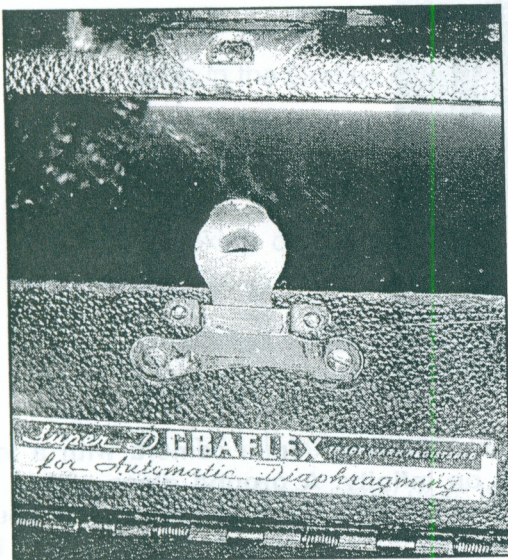


Fig. 19. Top catch can loosen with age

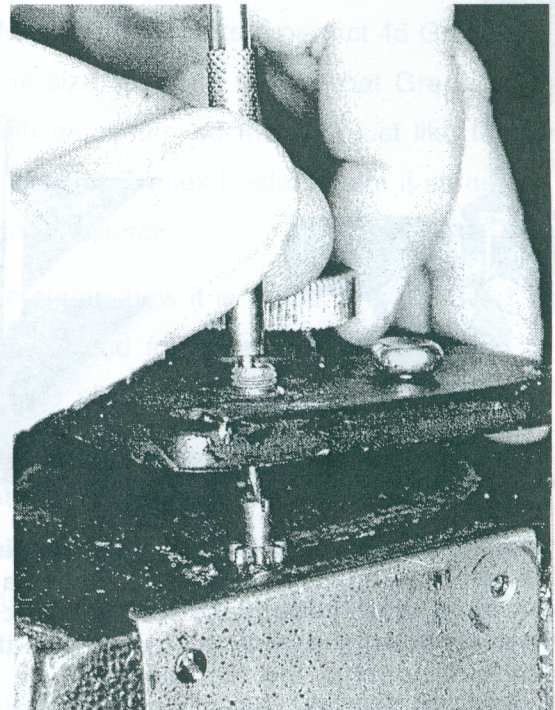


Fig. 20. Adjusting shutter spring tension

CLIFF SCOFIELD'S memo on converting 4 x 5 Graflex camera backs to GRAFLOK. Graflex holders are 6 1/4 x 4-7/8th by almost 1/2 thick, the sides are slotted, the face has a slot for a light trap. RITEWAY and other sheet film holders for GRAFLOK are 4-5/8 x 6-3/4 by 7/16th with ridged light traps. Film DEPTH varies, unfortunately, which can disrupt collimation.

To convert a D GRAFLEX back to simplified Graflok film usage, take the slide bar wood pieces of top and bottom of the Graflex back and SHIM them inwards to make 4-5/8th room for the holder slots. GRAFMATICS FILM PACK ADAPTERS ROLL HOLDERS POLAROID 545 will now fit this squeezed area, RITEWAYS will NOT fit, NO LIP.

To convert FULLY there are a number of ways or reconstructing a GRAFLEX back.

1. Remove the entire back from camera body, remove screws on sides and face, rotate back so you uncover hidden wood screws. Lift off, take off the wood strips from ends behind and underneath brass frame or cage, undo all 18 screws from the bronze ring. Take a Speed or Crown PACEMAKER die cast Graflok FRAME, clamp in proper position and drill through the bronze rings holes with a small drill so you do not destroy the threads in the bronze ring, make a series of holes in the die cast frame. At both sides, drill two holes Right & Left, lift off the felt strip and drill two more holes along that strip area at top of film area and below it, eight holes total. If you are a purist and want to get under the slide bars go for the rest of them.

You will need to countersink the screw head holes in some areas to keep the screw heads flush in the die cast frame. To have the felt packing seat well at all corners you can force some stuffing into the hollow areas in the rear of the die cast frame. RTV room temp vulcanizing at auto stores was suggested.

Now your back is done, put it back on the camera, and check ground glass-rear ground glass and under hood, adjust under hood to make the MATCH, to collimate them for sharp pictures.

2. Take a GRAPHIC VIEW CAMERA Graflok frame, 6-3/8 square and cut it down to 6 x 6 inches. It will now drop in that opening, now screw on to frame, affix your focus panel, and it is done. It is THICKER so the film plane is deeper than before. Raise the glass under hood to match. You can CUT a Crown diecast frame to

drop in there also, it comes close to the slide bars—top and bottom. Screw that also into brass “cage”, check glass.

3. THE FACTORY procedure; procure an aluminum or wood plate to exactly fit a Graflok back die cast frame and clamp it onto the camera back to get all 18 holes lined up; drill through for placement, ream out the holes in the plate so the 2/56 1/4” screws will penetrate into the bronze ring, turn it over, screw it on, screw on the Graflok diecast back to this plate and you have a flush imitation of the “FACTORY” method. The GRAFLEX 2 on 1 divider back has a wood frame which, if sanded down, will make such a “plate”, the right opening for film and a perfect fit for the Graflok back, in fact most of them come with that back die cast frame in position. Catalog part No. 9014. Handy woodworkers will make their own from thin plywood or whatever, plastic veneer, metal or whatever will work. I do not (yet) know of any easier ways, parts, used GRAFLOK backs seem to run \$100.00 upwards complete.

So you have approx. a \$100 in parts and an hour to 2 hours time, so if you expect some regular repair depot to do this for you, if they will take it on, do your own guessing at how much it will cost you. I used to make this conversion to Graflok here on GRAFLEX back cameras we take in, the Super D's to help sell them to folks who wish to use their modern sheet film holders that fit all their other equipment. GRAFLEX holders, bag magazines, and roll holders are still available used for those not concerned with dual usage. I (CS) personally used thirty bag magazines and fifteen wide based Grafmatics during some 20 years in the field of recreational camp and school photography. (1935 - 55) Reloading and weight became a problem; we switched to roll film backs eventually.

The full sized large ground glass viewing, and the preset iris lens of the Super D Graflex, are a beautiful pictorial tool appreciated by those who have used these cameras for many years.

4. One other common method to convert to Graflok, is to take off the brass cage, flatten the built—up bent—up sides, so you have a FLAT plate affixed to the bronze ring. Attach a GRAFLOK frame to this, at four corners through the rear, you'll find about 3/4 or inch machine screws 2/56 will poke up through face of the diecasting near the slide locking bars. Now file off any projections and paint over.

Any excess of the flattened plate that projects beyond the diecast GRAFLOK frame can be ground or filed off to make a smooth looking finished conversion.

More Graflok conversion data—Tony Armato, a skilled Graflex restorer, would mill down a Pacemaker Graflok or a Graphic View back to drop in the cleared Graflex back area. He would glue it in with epoxy and add 2-56 screws at the corners for safety. This is easier than the factory method yet is secure and works well. Tony also modifies the 34 Super D Graflex to use a 45 Graflok back and 4 x 5 holders. The advantage is the readily available 45 film. It is not a revolving back, but the image size is 4 1/4 x 4 1/4 square on the 45 cut film. Still it makes a handy and very worthwhile camera. A Linhof Universal back will also fit this way if milled. But it has a very deep casting and you have to raise the ground glass in top a lot to compensate unless you mill it down a lot. If there is too little room the ground glass will break on closing the top!

The Graflex hood and top panel. The top panel has a piano hinge at the back that is screwed to the wood of the camera with four flat head screws. They are under leather. Often it gets loose and makes the camera feel old, shaky, and battered. It is the screws that are the problem. Put GOOP cement in their holes and secure them firmly. Also cement the brass part of the hinge to the wood. That part endures a lot of strain.

Graflex handles are of fine leather. New ones may be bought, see supply section, or made by a leather shop. See Dick Paine's picture. Or they may be sewn up again if the leather is coming apart. The handle is held in place by two leather straps and four rivets with washers on each side. Often by now the leather is rotten and can pull loose causing you to drop the camera. There are several ways to repair this. For Dad's camera, I (ehr) simply cut new straps of heavier new leather, inserted stainless steel screws in place of the rivets and put nuts on the other side. I had to inlet them a bit more so they wouldn't touch a back of the hood. This might horrify a purist, but the handle has never come loose in over 30 years more use. A more elegant solution is to make or buy new rivets and install them just like the old ones and mash their ends into the washers. This procedure is well described in an article in www.graflex.org.

Graflex hoods wear rapidly. New ones may be bought from people who make bellows or you can make one yourself. Better hoods can sometimes be found on parts cameras. To make one, you get the old one and take it apart and spread it

out on a table and use it as a pattern. Save all the little treated cardboard stiffeners carefully and remember where they went. Maybe take a picture of it apart. Make the new hood a bit larger since they shrink with fifty years of age. Get a pliver from a leather supply place, a very thin piece of leather. Lay the cardboard pieces down on it exactly as they were on the old hood and glue them in place with a temporary glue like rubber cement. Now get some black cloth for the inner liner. Glue it in temporarily. The seams are at the back of the hood. Now fold up the hood to look like a hood and be sure it will fold easily and actually fits the camera without strain. When it is OK glue it with really strong glue. The bottom plate, you will see, is in two parts and you must glue the leather and cloth in between. The metal cross piece for holding the top of the hood to the camera is held by prongs which may break. Cement will probably be necessary to hold it too. There are originality problems. It is virtually impossible to make the soft fluffy top for the hood. And it is virtually impossible to reproduce the Graflex lettering. You can cut the lettering out of the old hood and glue it in place and it will look fairly good.

Note well...Modern cements are much stronger than they used to be. We can now repair rips in hoods with a patch. GOOP, sold in local hardware stores is much stronger than older glues and very flexible.

Other types of hoods. People have made chimney type hoods such as Hasselblad has, some with a magnifier in them. They do not fold. Cliff Scofield tells of a short photographer who made a much shorter Graflex fabric hood which he liked. The viewing level is far below eyelevel on a big Graflex. You will need to use a stool or a stepladder quite a lot for eyelevel pictures. You can also hold the camera upside down above your head to shoot over a crowd, as Cliff Scofield points out.

The Graflex top cover is latched by a brass arm in front with a dimple in it which impinges on a round plate in the top of the camera with a dimpled hole in it. If these parts wear, the camera can open accidentally. They may have to be bent, filed or even replaced so the camera will stay shut. Note that heating brass parts rapidly with a torch and letting them cool gradually make them springy, unlike steel..

Lens Shades. Super D and D Graflexes have a front lens cover like an awning that is also a lens shade. Cliff Scofield says, on installing this awning cover and

flaps, it is far easier to screw in the side flaps first and then push hard to get the top spring plate attached. If you try it the other way the spring tension while trying to screw in the side flaps makes it quite a hard job. You have to hold the lid down with tape to attach the side screws. Quite awkward. I (ehr) am not too fond of the awning lens shade. I usually remove it on a camera I own to make it easier to set the lens aperture. I use a regular tubular lens shade instead. I made mine like the ones they had in the old days by wrapping heavy leather around a large filter ring that fit my lens.

The Graflex Focal Plane Shutter...THE MOST COMMON GRAFLEX REPAIR...THE MOST COMMON REASON A GRAFLEX WILL NOT WORK is that someone has forgotten and left it wound up and the spring has lost its tension. This does not kill the camera; one simply has to increase the tension. To do so, merely remove the bottom tension setting housing which is held by four wood screws...(more in some cameras). Then set the tension to the next halfway click above #1 and rotate the roller spring counter-clockwise until you have enough tension so the curtain will go from the "0" position, open to the unmarked last closed position on low range smoothly when the shutter is tripped. In some Super D's and older Graflexes low range is marked Tension #1.

You will find that there is a slot at the end of the spindle, and it is possible to stick a small jeweler's screwdriver through the hole in the tension plate which you have just removed, and turn it to wind on tension, and then pop the plate back on with the gears in mesh. It is often possible to set the tension without removing the plate completely. Just pull it enough so the gears are free. The hole where the spring spindle runs is covered with a cap nut in most cameras. It must be removed.

SLUGGISH OLDER GRAFLEXES. The usual older Graflex is also sluggish because it is filthy inside. You clean out the inside by removing the back and the bottom plate. Blow the inside out with air and dust it with a small brush and "Q" tips. Dry cleaning fluid may remove more dirt. Dishwashing detergent, ammonia and water have been used carefully. To remove the bottom simply remove the back feet if there are any and take out the little wood screws and pry it off carefully. Try not to lose any screws.

LOOKING INSIDE...When you have the back and bottom off you have a good chance to see how the camera works and whether the curtain needs replacing.

Simply grasp the curtain in your hands and give it a pull. It will pull out from the bottom a way and you will realize that the spring is in the bottom and the release in the top. There are two idler rollers. If these are worn in their bushings they will chatter when the shutter is working. This is a very common problem. The rollers are held on a frame which is removed by pulling wood screws which are set into the side of the camera from the inside. It takes a stubby handle screwdriver to reach them. The frame is also hitched to a metal shield to the bottom compartment by tiny round headed screws. When you have the frame removed, you may decide to make new end pieces, rebush the old ones or simply squeeze them in a vise if the wear is slight.

Sometimes a camera is jammed because an amateur took it apart and left these sheet metal pieces bent and binding on the shutter curtain. Now, is the time to check. When you re-install it, be sure nothing is binding on the curtain.

CHECKING A SHUTTER CURTAIN...Hold it up to sunlight and look through it. You can do this without taking the camera apart. If you see any pinholes at all the curtain must be replaced. If it has cracks and feels brittle, it is done for. No recoating or treatment or patching will have any effect for very long. Once long ago, Cliff Scofield had a curtain break on a Graflex at the strap while he was photographing a children's' recreational summer camp way off in the woods. He sewed it back together with heavy thread and went on and finished shooting the rest of the pictures. The curtain has to be very strong to stand a thousandth of a second exposure at highest tension.

Making a Curtain--To make the new curtain simply measure out the cloth and make it the same size as the old. Cloth must be a rubberized cloth ideally of .008 inch thickness. It may be made of one piece of cloth or, in emergency if you cement very carefully, it can be made with several pieces or separate straps. The new curtain should have extra material at each end to allow for adjustment. You can either pry out the little brass bindings to the shutter slits and use them over...or make new ones out of brass shim stock. A third less desirable alternative is simply to fold a little extra material over piano wire and cement it. You can also make the new slits by folding the cloth over straight brass shim stock, although this is not original. New cement and cloth is enough stronger so it is much easier than it used to be to make curtains hold together. It is important that the slits be exactly parallel and just as wide at each side or you will get

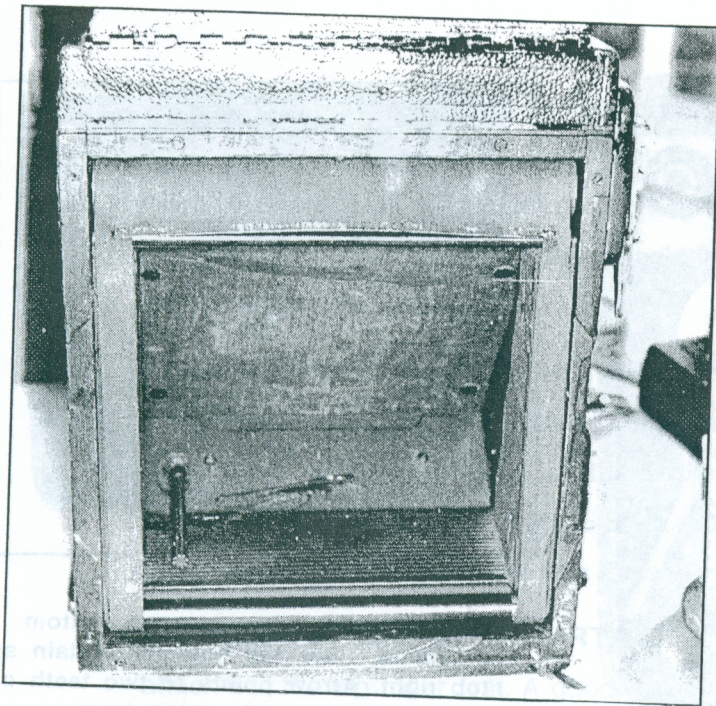


Fig. 21. Back removed showing curtain. This one needs a lot of work and cleaning. Brass binding strip has to be repainted or it will fog picture,

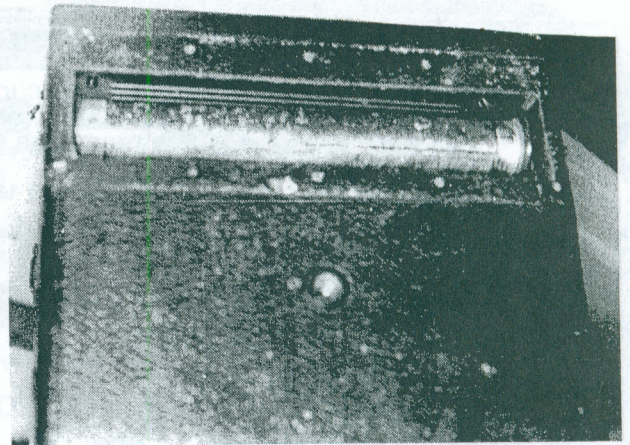
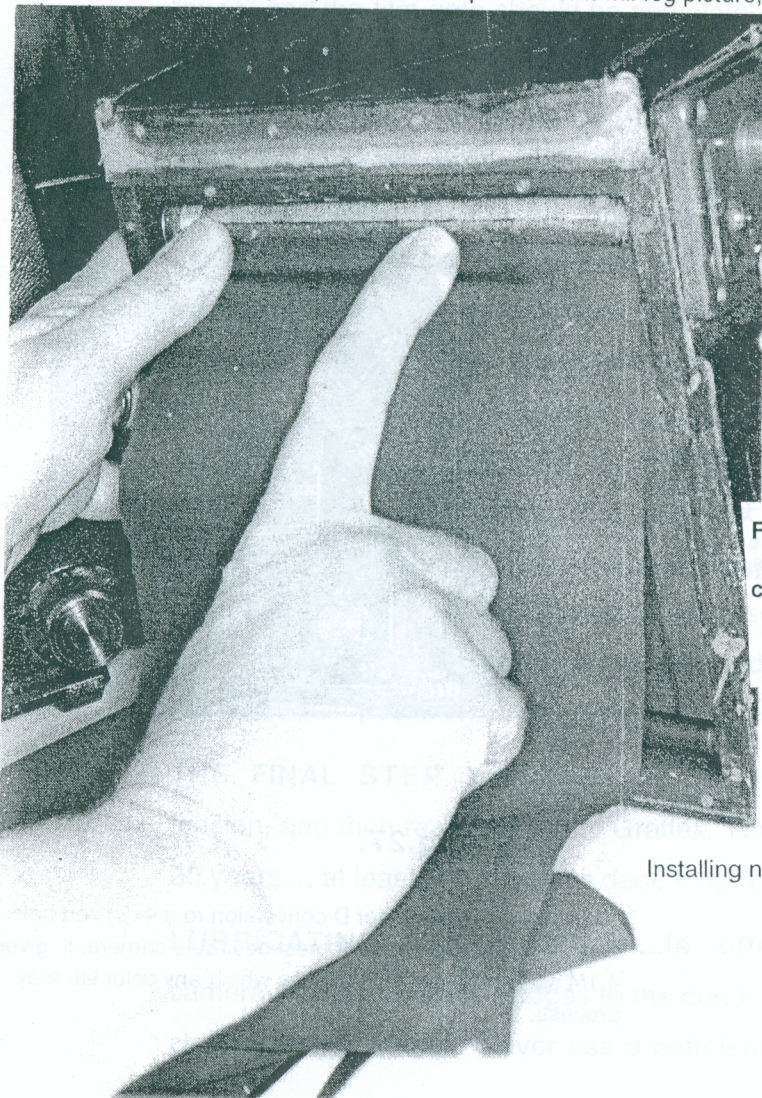


Fig. 23. Curtain is next glued permanently to bottom roller.



Installing new curtain to top roller

Fig.22

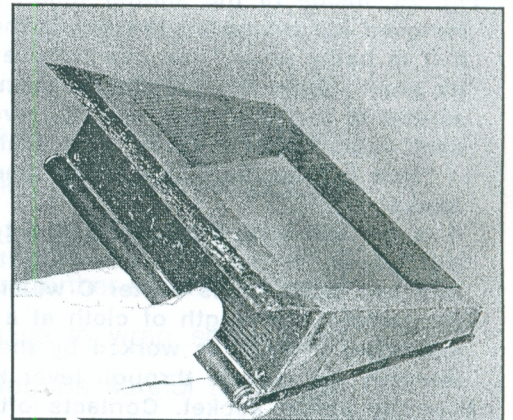


Fig. 24. Wood block with metal frame with the two curtain idler rollers. In older cameras they often chatter, or refuse to turn at all. They need tightening or rebushing. Lubricate very lightly with silicone.

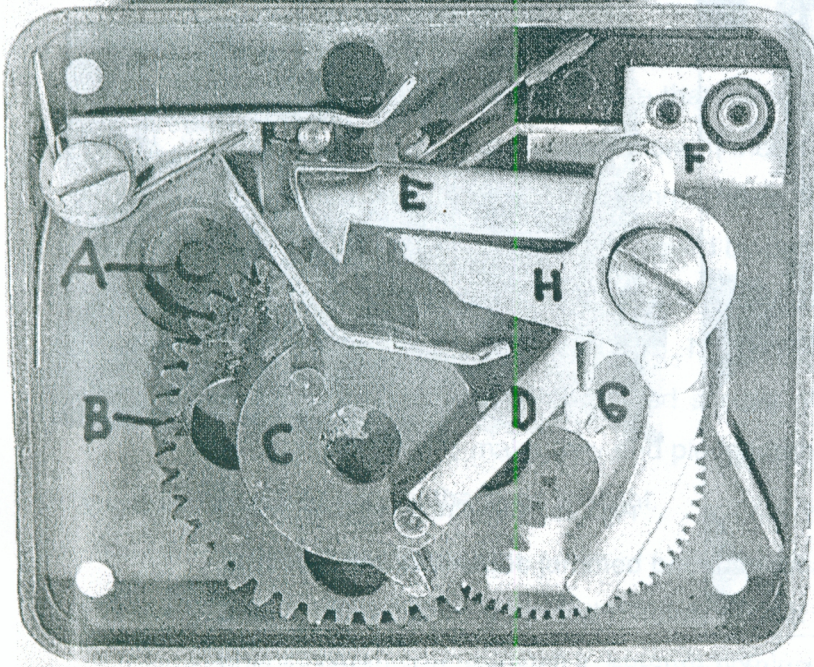


Fig. 25. Inside of the shutter timer. It may be removed by driving up the pin in the mirror shaft. If it is badly stuck, you can remove the mirror from its shaft inside the camera by taking out three screws in the shaft and pull the lever out with its shaft intact. A real secret here that may save damage.

Now look at the inside of the timer to see how it works.

A is the hole for the shaft of the top curtain spindle with pinion. It has been removed. It turns gear B with two studs in its center C which measure out the curtain one length of cloth at a time for each exposure. D which is worked by the mirror releases the curtain through lever H. E is the ratchet. F is the synch socket. Contacts often need cleaning on a camera being restored. G is the speed indicator dial. It has an odd ratio of teeth so Dial B usually has to be turned several times in installing the shutter until the dial numbers line up right.

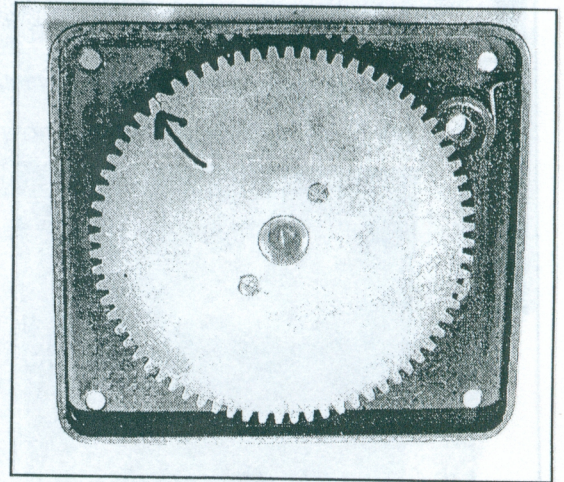


Fig.26. Spring tension setter gear in bottom of camera. See the hole for curtain spindle top right. Arrow points to two teeth crimped together to prevent spring from unwinding completely.

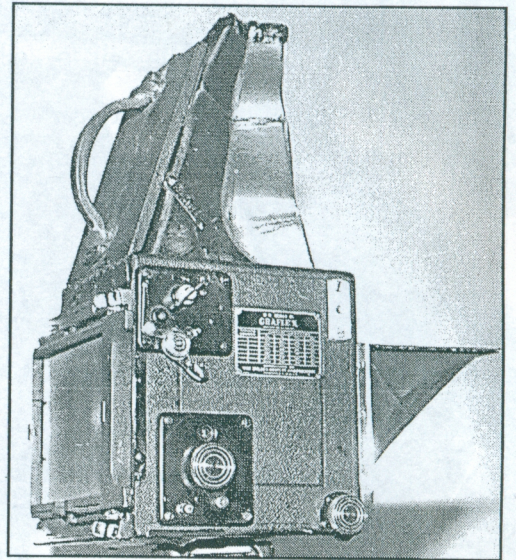


Fig.27.

Very well done 34 Super D conversion to a 4x5 fixed back Graflok by Tony Armato. A most desirable camera, it gives a 4 1/4 square image on 4 x 5 film which any color lab may process.

uneven exposure density left to right. It is particularly important that the 1/4" and 1/8" slit be carefully made. But errors up to a quarter inch in length between slits will never be noticed. A modern way to make an accurate curtain is to place the old curtain on a very accurate copy machine or digital printer such as the Canon Imaemaker. Use your copy as a pattern.

Curtain Dimensions. The late 45 Super D curtain is not the same dimension as the Series B, D and RB Auto curtain. The slits measure 1/8 " , 1/4", 1/2", 1 + 3/8" , and 6 3/4 " respectively on the Super D. On the Series D curtain the slits are 1/8 " , 3/8" , 3/4 " , 1 1/2 " and 6 3/4 ". Not all replacement curtains bought now actually fit. I got one once that was too wide and had to trim its sides.

INSTALLING THE NEW CURTAIN. When your new curtain is completed, attach it to the top roller first. A good cement to use is GOOP... Set the top roller two clicks past open for a trial, and cement the curtain on to it. Then set the dial to "open" and the film gate should be completely open. If not, slip it one way or the other before the glue has dried. When you think you have it right, wind it to the various slits without attaching it to the bottom roller yet. Then trip the shutter and pull the curtain with your hand being sure that the desired slit actually travels all the way across the opening each time. A slight error in initial placement becomes greatly magnified after the top roller gets rolled out to the 1/8", 1/1000 slit. Also if your new cloth is thinner than the previous, the slits will come out spaced closer together. If the cloth is thicker, they will be farther apart. The usual problem is that they are too close, and then you have to wrap some extra material around the top roller to increase its diameter. Be careful not to get cement on the curtain or the idler rollers or it will jam later. Do not attach the curtain to the bottom shutter roller and apply tension until the glue on the top roller has firmed, or it will slip and you will lose your timing. Whenever you attach the cloth to a roller be sure it is parallel and not binding. Contact cement will bind a curtain positively in one place. Slower drying glues permit adjustment.

THE FINAL STEP is to attach the curtain to the bottom roller and set the tension, and then reassemble the Graflex. You won't have to do the job again for 30 years.... at least--- if you have done it right.

LUBRICATING THE GRAFLEX...is often overdone...Often you see a camera with soiled frayed edges to the curtain. This shows someone oiled it. The cloth usually is ruined. Never use a petroleum based lubricant. Silicone Spray

and Spray Teflon and sometimes a bit of Silicone grease are the best Graflex lubricants. You can remove the bearings to the curtain rollers on the left side of the camera with a little spanner or the points of scissors firmly held. Then they may be cleaned and lubed. They unscrew. Or you can inject lube through the little holes in them if you are careful not to put in too much. The bearings on the right side are in the housing plates and may be lubricated. The Graflex shutter was meant to work with a good amount of friction. If over lubricated with modern synthetic lubricants, it can bounce.

OTHER GRAFLEX REPAIR PROBLEMS...To remove the top escapement plate you have to take off the mirror lever first. It is held by a tapered pin which is narrow at the bottom. You must drive it up from the bottom of the camera to remove it. If you break or bend it, another pin can be turned quickly from a nail. After the mirror lever is removed, the top escapement plate pulls off easily. Of course the slit timing will be lost. But nothing will fall out. All the gears except the curtain roller gear are firmly attached to the plate. To reestablish the timing, set the curtain to OPEN by hand and the escapement indicator window to read "0" and remesh the gears. The little wheel that reads "A B C D" or in openings in fractions of an inch is actually a reduction gear driven off the escapement gear. It is not an even multiple reduction so you will have to go through many turns until all the indications line up evenly in the windows at every slit. Often this dial is off when you get a camera to work on.

The usual reason the escapement will not work at all is that the mirror tension is too weak to trip it. If it can be tripped by the "time" lever it is OK. The mirror tension, if weak, may be increased by rotating a little plate on the left side of the camera held by three screws. The mechanical parts in the escapement are sturdy. Wear, which is rare, can be seen by the eye. The escapement parts may be duplicated fairly easily. There is no source of new Graflex parts.

GETTING THE SHUTTER SPEED CORRECT...The shutter speed of the Graflex is mainly influenced by the size of the slit selected. A tremendous change in tension will only alter the speed by a factor of about 2x you will see from the shutter chart. It may be hard to get a camera to give accurate slow speeds if it is worn. If you can get a good 1/30 sec. the other speeds should all fall into line. Please note the speed standards of long ago permitted the 1/1000 to be as much as 33% slow. Lots of Graflex cameras go off at about 1/700 sec

when set for 1/1000. That doesn't bother me. As a humorous aside, note that the advertised 1/1250 sec. shutter speed of the 1930's Contax II was determined by the sales dept. It was actually 1/000 sec. after shutter tolerance was subtracted. And 1/1000 sec screw mount Leicas are known to fire at an actual speed nearer 1/700 sec. The late John S. Carroll told me this. I have also noted that Compur shutters marked 1/500 sec actually go off at about 1/400 sec in test. A good easy way to test a back shutter without a tester is to compare negative density with a known accurate front shutter which you attach temporarily to your Graflex.

The Graflex shutter does speed up as it reaches the bottom of the picture, but this does no harm, it makes your skies and backgrounds a little darker since the lens inverts. But, you're in trouble if you have curtain bounce. It can bounce if the tension is too great, the friction too little and the escapement stops the curtain too near the film roller. It is supposed to go on moving a bit after it made the picture. To correct bounce you either have to relocate the curtain on the top roller by pulling the cement loose, or slip the gear in the escapement one tooth. Often slipping the gear one tooth is too much. A Graflex overlubricated with modern synthetic lubricants will sometimes bounce.

Recovering a Graflex with leather. Cosmetic restoration. I (ehr) did this job once with a camera that was dropped in water by its owner. It is hard to do and laborious in time. Never cover a Graflex with vinyl plastic and be sure to get a Morocco leather identical to the original. Try local leather supply shops in large cities and the Tandy leather work stores which often will have matching leather. It is easier to cover with leather than plastic because it stretches a lot when wet and will cover wrinkles and defects. Make a paper pattern first for practice and copy that when you cut the expensive leather. Single edge razor blades do most of your cutting. The secret of getting large flat panels wrinkle-free is to first glue in tufts of cotton or paper in the center and pull the leather tightly over it. You pull like crazy and use C-clamps and Fiberglas strapping tape to hold it while it dries. Elmer's glue and Tandy leather cement are the glues I generally used long ago. You can press new trim lines into the new leather like the ones that were original with a heated flat tool like a file handle or knife back. Wet the leather and press very firmly. Fiebings make a good leather dye sold in shoe stores to refinish your leather and also to spruce up a battered original camera. The Neat's Foot Oil

they sell is a wonderful leather restorer for an old dried out Graflex. Keep applying it heavily and you will be amazed how much of it the old camera will soak up.

Don't use plastic wood for holes, dents and battered corners. A slurry made from glue and actual sawdust from the camera is much better. If the corners of the camera are tattered and scuffed, a coating of epoxy will hold them in place... in a user camera. You can even build up smashed ends with it. Use only original materials in cameras in collections supposed to be strictly original. Working cameras can have stronger materials. Steam from an iron will raise dented places in a wood camera body quite remarkably.

Special Notes on the 3 1/4 x 4 1/4 Super D Graflex

This smaller camera was introduced in 1941. Earlier versions, like the camera pictured here, have the older shutter with speeds from 1/10 to 1/1000, a coated Kodak Anastigmat lens instead of an Ektar (I've found them identical in performance---very fine) and a synch socket on the left side of the camera. The lens is F4.5, instead of the F5.6 on the larger camera. This is a most excellent, very practical camera, except that 3 1/4 x 4 1/4 cut film is unobtainable unless you cut it yourself... More seriously, commercial color labs cannot process it. The camera is often used with a 120 Graflex roll back with success. The best solution is to convert the 34 back to use 4 x 5 cut film as Tony Armato has been doing for some years. He grafts a 45 Graflok on to the 34 very skillfully. What you get out of the camera when you take a picture is a 4 x 5 cut film with a 4 1/4 x 4 1/4 image on it. This can be processed by commercial color labs very easily, so your troubles are over. This back also takes Polaroid holders and a Graflex rollback. This camera is very highly recommended.

The auto diaphragm linkage on the 34 camera is different from the 4 x 5. There is no rotary splined shaft. Instead an arm hinged in the middle, hitched to the shutter release, reaches out and lifts the lever on the back of the lensboard to release the catch to stop down the lens. It is virtually trouble free. See picture. The 34 camera will also accept the 190mm F5.6 automatic Kodak Ektar lens for a longer focus and a 10" F5.6 Optar telephoto. Many other lenses can be adapted to it.

RESOURCE LIST

The most up-to-date Graflex resources are found by searching the web. Go to WWW.graflex.org Also try: Graflex Historical Quarterly, Mike Hanemann, publisher, hanemann@highstream.net, JC Welch editor, staff@equinoxphotographic.com or Ken Metcalf at metcalf537@aol.com. Midwest Photo 641-261-1264 at 3313 N, High Street. Columbus, OH 43212 has used Graflex cameras and accessories. Steve Shuart in Kane Pa. and and Fred Lustig at 4790 Coughin Pkwy, Reno, NV 89609 sell parts. Lustig bought the entire inventory of the west coast branch of Graflex service and holds it closely. He likes to install the new curtains he makes himself . Tony Armato at 516-744-8120 is a skilled and sincere Graflex restorer, but is not accepting new work at present . Try not to waste the time of restoration persons on the telephone if you are not going to be a customer.. They get a huge number of calls.

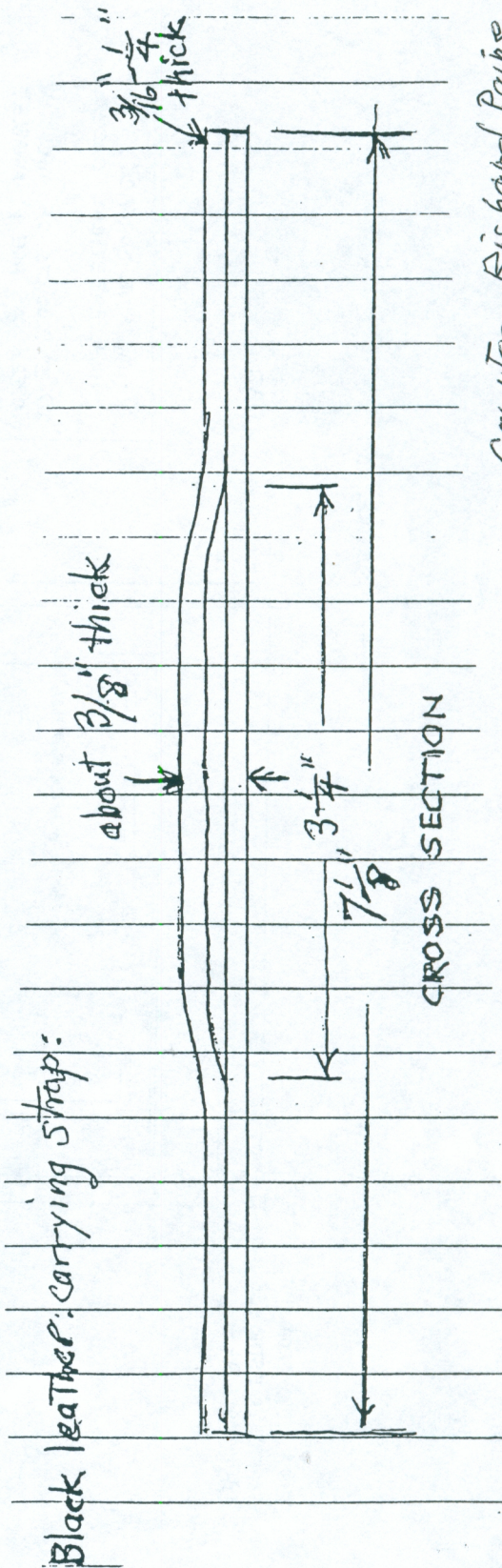
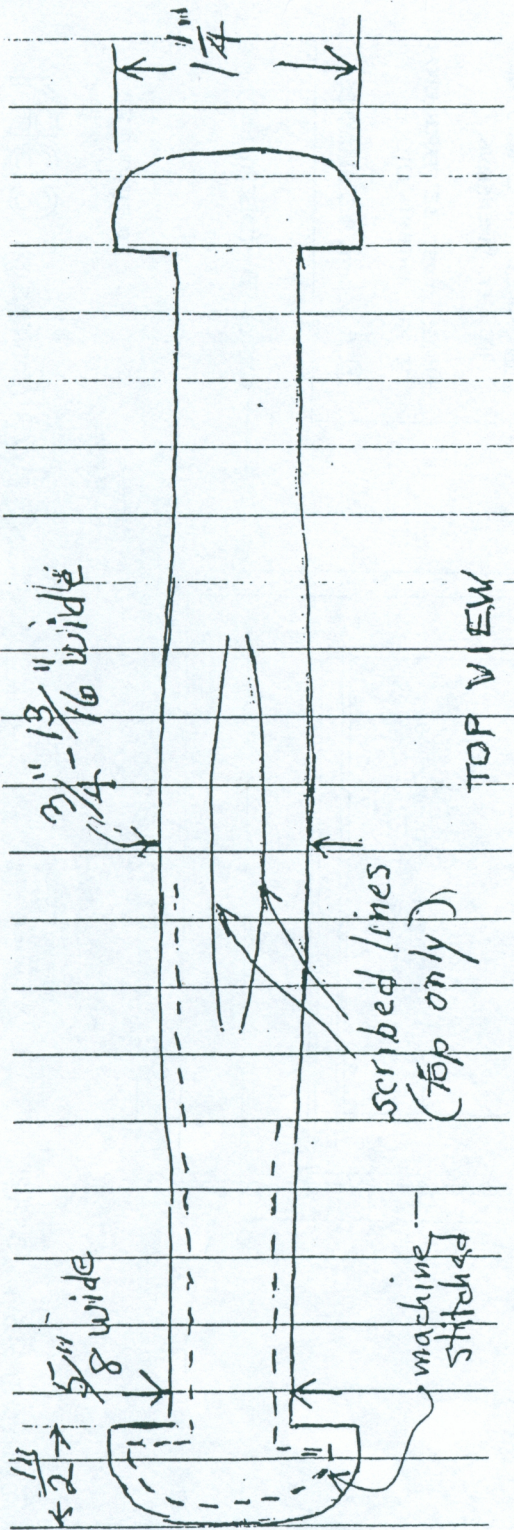
Richard Paine, a fine gentleman, is the author of the definitive and top ranking book on collecting Graflex and on Graflex ID, entitled, **A Review of Graflex**. now sold by the Camera Shopper magazine and on the net. You need that book. He does not sell cameras or parts, but he has been most helpful and friendly to collectors. He is a former Navy photographer who used Graflex SLR's in World War II.

GRAFLEX BACKGROUND INFORMATION

The cameras became famous by the early 20th Century. Graflexes were the only practical action-stopping hand cameras in those days. They took most of the pictures of the Wright Brothers flying their airplanes, of early auto races, of action in World War I battles and many athletic events such as the exploits of Babe Ruth. . Famous people used Graflex: Admiral Byrd at the South Pole, Martin and Osa Johnson in the jungle, Lowell Thomas with Lawrence of Arabia in the desert, and Karl Struss and many of the Pictorialists. Graflex SLR continued to be the leading news camera until the 1930's, when Speed Graphics with coupled rangefinders and flash synch became more popular. Now the Super D is much in demand for very exacting advertising photographs of products, such as food, that must be taken with 4 x 5 and for upscale portrait and view camera type work. Its auto diaphragm and synch permit very powerful studio strobes in umbrellas to be used, as is the custom today. A 4 x 5 Super D Graflex today, even though the camera will be over 40 years old, is still much in demand and quite valuable! Many of them remaining lack the Graflok back today, or the autodiaphragming mechanism is defective or missing because another lens was installed. A Series D Graflex may be converted to function as a Super D if you have these parts or can make them.

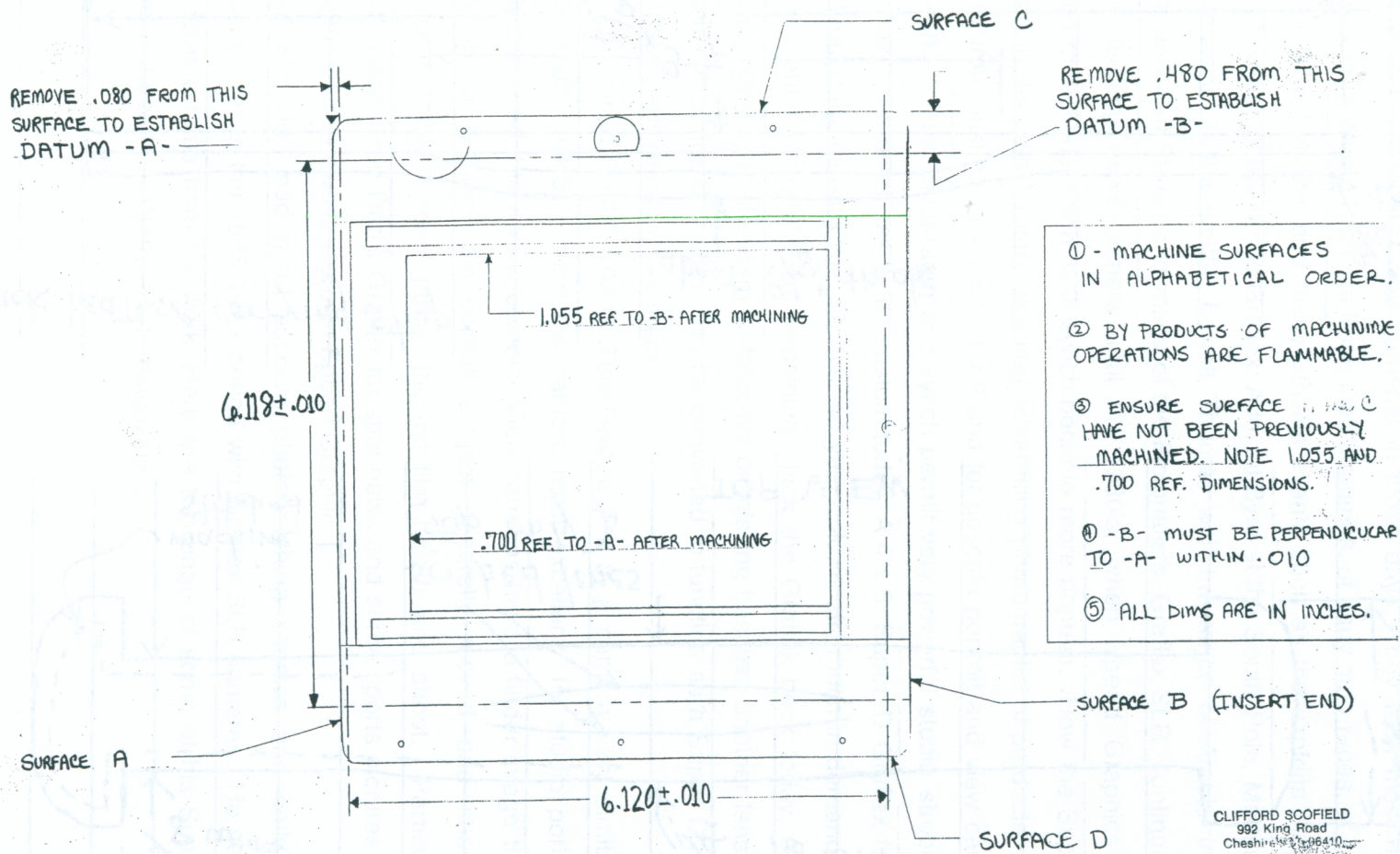
I, ehr, used Dad's 1020's Tele-Graflex 4 x 5, a camera very similar to Series D, after 1945. I found the camera most excellent for studio portraits, greatly preferred it to a view camera. View cameras have a finder image that is upside down. I found the portrait subject generally moved and changed expression before I could put in the cut film holder and shoot. Particularly babies! I also used Dad's Graflex for spot news and some sports pictures as a teenager before I owned my own Speed Graphic.

Cliff Scofield had great success photographing scenics and children's summer camps in the 1935-1955 period with Graflex SLR cameras. He gained considerable fame from his work. Here are two page of some of his Super D Graflex pictures from Vermont Life magazine...



Courtesy Richard Payne

APPENDIX



MAKE FROM CASTING: 31914, 31914-2

CLIFFORD SCOFIELD
992 King Road
Cheshire, CT 06410

CLIFFORD SCOFIELD
992 King Road
Cheshire, CT 06410

"CLIFLOCK" BACK CONVERSION COPY
12-26-94



