GLOVE BAG *Tips & New Uses*

Glas-Col®

GLOVE BAG is:

Convenient - It is used like a rigid glove box but has much greater flexibility. It is made of 2.5 mil thick polyethylene, with integral gloves. Equipment is placed in through the equipment sleeve and the bag is then inflated.

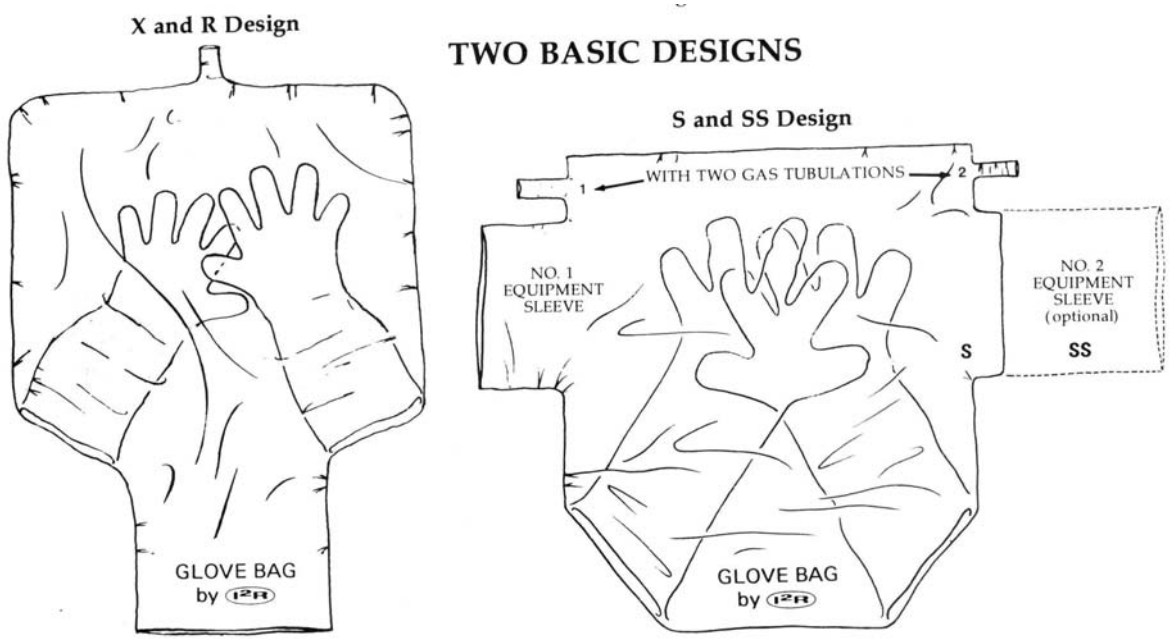
Disposable - It is economical enough to be used once and discarded, if contaminated, but it's durable and it can be used over and over if desired.

Versatile - GLOVE BAG is great for keeping air-sensitive materials from contact with air or moisture. Use it whenever an inert atmosphere is needed in reactions or in handling reagents.

Economical - Even if you have a rigid glove box in your lab, consider the GLOVE BAG. It can be purged faster than a glove box, with less gas, and can be easily adapted to fit your special needs. GLOVE BAG can facilitate any work you are doing with air-sensitive materials.

These tips describe some of the ways GLOVE BAG can be used.

GLOVE BAG is easy to use!



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INFLATING – WHAT GAS?

Ordinary "industrial grade" compressed nitrogen is 99.99% pure and is acceptable for most laboratory work requiring an inert atmosphere.

Since a GLOVE BAG holds between 1½ and 5 cubic feet of gas (X-17-17 to X-37-37) you will be able to carry out several experiments for with minimal cost.

For especially sensitive work you might consider using one of the higher purity grades of nitrogen, which are available from some suppliers. In order of increasing costs, these are called Extra Dry, High Purity, Pre-purified, Ultra High Purity, Zero, and Oxygen-Free.

These grades differ greatly with respect to the impurities, therefore, consider carefully the types of impurities that you do not want, (or that you don't mind having present): argon, neon, traces of hydrocarbons, oxygen or moisture.

If the chemicals you intend to use in GLOVE BAG are highly moisture sensitive, you may want to consider the following suggestions: use a cylinder of "Extra Dry" nitrogen and pass the nitrogen through a 4-foot column of Drierite. One scientist reports he has also placed a breaker containing fresh drying agent (P_2O_5) inside the GLOVE BAG to take care of any traces of moisture that might diffuse into the GLOVE BAG.

At the other extreme of moisture content, we have a report of a scientist who uses his GLOVE BAG for work in "moisture saturated" atmosphere.

Since some scientists use GLOVE BAG primarily for dust-free applications – they don't worry about the presence of either oxygen or moisture, they simply used filtered air!

One scientist reports that he uses helium gas with the GLOVE BAG for his ordinary lab work. He likes the fact that helium is lighter than air: "It pulls the bag up for nice easy access to the equipment inside." (Of course any gas will fully inflate GLOVE BAG. Helium may make the top surface rise higher.)

However, some scientists use heavier purging gases. Several scientists we have talked to use Aragon.

One correspondent reported that he found an "aquarium pump" (ordinarily used for bubbling air thru a small home aquarium) to be a simple, convenient device for inflating GLOVE BAG. This can be very handy if your application calls for inflating GLOVE BAG with ordinary air.

We also have a report from California of CO_2 being used to inflate a GLOVE BAG "out in the field." In the absence of a cylinder of gas, the scientist used a piece of dry ice inside the GLOVE BAG. As the dry ice evaporated it inflated the chamber and maintained and inert atmosphere.

ANAREROBIC APPLICATION

If you are concerned about the permeability of GLOVE BAG to moisture and/or oxygen, purge continuously as the GLOVE BAG is being used, thus any traces of moisture or oxygen that diffuse through the walls are swept out.

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CLOSING UP EQUIPMENT SLEEVE

Even before GLOVE BAG and its contents have been purged and inflated, you should plan on how you intend to close up the equipment entrance sleeve. There are several different methods of closure. They include our Handy- Lok closure, or our Quick-Closing Aluminum Clamp, as well as several improvised arrangements, shown here.

HANDY-LOK CLOSURES FOR X17-17 and S and SS GLOVE BAG

Our standard closure is the Handy-Lok. It has two parts: (A) the grooved base strip, which is fairly rigid and has a self-adhesive backing, and (B) a flexible spline, which fits into the grooved strip and seals GLOVE BAG.

HANDY-LOK FOR LARGER GLOVE BAG

When using Handy-Lok for any of the larger GLOVE BAG, you will have to join two or three of the 13" base pieces together. To ship the Handy-Lok in the same carton as the GLOVE BAG, we cut the rigid base pieces into 13" lengths. (The spline pieces being flexible are not cut, for they can be rolled up in the carton.) The base pieces are adhesive-backed and our instructions show you how to join two or three pieces in line.

QUICK CLOSING CLAMP

A particularly handy way to close off the equipment sleeve is to use a Quick-Closing GLOVE BAG Aluminum Clamp. To use, open the clamp, place the sleeve across it, and close the clamp. The resulting folds are quite tight. The clamp is durable, easy to use, saves time and is reasonably priced. Clamp 108D AC-13 is 13" long, and can be used with X-17-17, S, or SS GLOVE BAG. A longer Clamp (108D AC-24) has a 24" length and can be used on X-27 models of GLOVE BAG. (Sorry, no quick closing clamp available for 37" models.)

HEAT SEALING

If ever you have an application where it is imperative that GLOVE BAG be tightly sealed, you may wish to heat the sleeve. If you seal the sleeve at some distance from the GLOVE BAG you will be able to cut off the seal and reseal the GLOVE BAG several times. Various hand-operated heat sealers are available for sealing polyethylene bags.

AND FINALLY…

For many applications it is neither necessary nor desirable to achieve a completely tight seal in closing GLOVE BAG. A small leakage out of the GLOVE BAG (if it is nitrogen or other nontoxic gas) is sometimes preferred, since it will result in a continuous flow of fresh gas into the GLOVE BAG.

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CONNECTING AND PURGING THE GLOVE BAG

3/8” ID Tubing Required

Once the GLOVE BAG is hooked up to the inert gas supply, we suggest that you open the flow control valve slightly and gently purge the empty GLOVE BAG. Then, while still purging, insert your equipment into the GLOVE BAG thru the equipment entrance sleeve. if the equipment is bulky and contains an appreciable amount of air, you can save time and purging gas by purging each piece independently before placing it in the GLOVE BAG.

An alternative purging procedure when using bulky apparatus containing residual air is to use a long purging tube that extends into GLOVE BAG through the gas inlet tabulation. Then, when the piece of apparatus is placed inside the GLOVE BAG, you can insert the end of this purging tube into the equipment and purge it directly.

We have another note from the same man, suggesting that you can put the gas-purging control valve (a Hoke valve) inside the GLOVE BAG. You can then control the flow of gas from inside – while you have your hands in the GLOVE BAG manipulating your apparatus. Be sure to connect the Hoke valve to the inert gas supply with tubing, which is able to withstand the supply pressure.

WHAT PRESSURE SHOULD YOU USE?

We are often asked: “What pressure can I use in my GLOVE BAG?” The answer is somewhat surprising. If you put more than 1 cm (of HG) pressure on the GLOVE BAG, you’ll have trouble inserting your arms into the GLOVE BAG sleeves.

Under ordinary conditions, you’ll probably use only about 2 or 3 mm (Hg) pressure. Or stating it differently, inflate the GLOVE BAG like a soft pillow – not like a balloon!

HOLDING GLOVE BAG IN PLACE

While some scientists like the mobility of GLOVE BAG, (and may even hold a GLOVE BAG in their lap) other scientists like the GLOVE BAG to stay put in one place – on the bench. If the bench top is non-porous, you can use two suction-cup Boston clips to hold the GLOVE BAG fixed. We suggest attaching the clips either at the rear corners or front corners of the GLOVE BAG.

Another scientist suggested that you can use double-face Scotch Tape on the underside of the GLOVE BAG so the GLOVE BAG will stick onto the lab bench! Warning: Don’t use any more tape than you need; it’s sometimes hard to get off.

One scientist reported that he holds down his GLOVE BAG with two “lead bricks” placed in the rear corners.

ADD A FLOOR OR BASE

Some people add a floor to their GLOVE BAG to help hold it in place. Different types of floors are used. A soft floor will overcome the effect of a hard bench top. Here are a variety of tips we've received on the subject of floors, bases and mats.

Two different soft floors:

1. Use a rectangle with rounded corners cut out of heavy polythene or vinyl matting that you can buy in hardware stores.

2. Or use a rubber mat, such as an automobile floor mat; some sizes are excellent for use with GLOVE BAG.

Note: If you are concerned about traces of residual air in your experiments, better not use a porous mat as a floor within the GLOVE BAG. However, if you really like such soft, porous mats consider using them underneath the GLOVE BAG; you might even attach the mat to the outside of the GLOVE BAG with double-faced tape. This will give you the cushioning effect of the porous foam, without introducing the entrapped air inside the GLOVE BAG.

EXTRA CONNECTIONS

Some scientists, when they want an extra gas connection into their GLOVE BAG, poke a hole in the wall (using a pointed object). They then insert a piece of tubing thru the hole and tie the polyethylene tightly around the tubing.

This can be accomplished using a various types of tubing: plastic, rubber, or glass. You can also use a plastic tubing connector. The polyethylene wall can be gathered and tied tightly around the connector with a rubber band, tape, or twisted wire. Incidentally, you can introduce electric cords into a GLOVE BAG the same way.

OTHER APPARATUS USED IN A GLOVE BAG

When working with chemicals sensitive to moisture, a spectroscopist finds it handy to put a pellet press and his IR cell inside a GLOVE BAG. He is able to make the pellets and load the IR cell in a dry atmosphere inside the GLOVE BAG.

Since moisture can affect Cronar film used in electron microscopy, GLOVE BAG can be used in transferring dried film from a film box to cassettes. The film is dried by evacuation in a large vacuum box, and then placed in an X-17-17 GLOVE BAG along with the cassettes. Use of a GLOVE BAG reduces the pumping time and lowers the degree of contamination of the electron microscope.

A more prosaic use of GLOVE BAG is to use it when mixing and applying epoxy cement. A nitrogen atmosphere keeps moisture away from the mixture; the epoxy sets up with "glass-like" clarity.

One scientist prepares easily oxidizable compounds, reports that instead of transferring the materials out of the GLOVE BAG and then into a desiccator, he puts his desiccator inside the GLOVE BAG. He is able to do all his preparation and transferring in the nitrogen atmosphere. At the end of the experiment, he removes the desiccator containing his samples from the GLOVE BAG. As he reports, "the compound never comes in contact with oxygen."

"In order to hold things such as flasks in a GLOVE BAG, use a ring stand which has been cut off o an appropriate height. In addition to being an extra pair of hands in the GLOVE BAG, the short ring stand holds the GLOVE BAG in place with its heavy base."

A chemist reported that he grinds dried plant materials in a Waring Blender in a GLOVE BAG. (The electric cord was extended through the gas inlet.)

A scientist working with fine mesh aluminas, uses GLOVE BAG as a "storage chamber." He ran into trouble with the powdered alumina spilling and spreading around when he sampled it. His solution was to use a large glass-baking dish to hold the powdered material. A large shallow dish was apparently very convenient when he wanted to scoop up a fresh sample.

GLOVE BAG USES IN THE LIFE SCIENCES

A lot of customers may be part-time botanists and horticulturalists. One person suggests that by completely enclosing plants in GLOVE BAG, you can have a miniature greenhouse with built-in gloves, and you can treat your plants to any atmosphere desired.

Several orchid enthusiasts have suggested that GLOVEBAG would be an appropriate chamber for starting orchid plants. "Orchid seeds are generally grown to seedlings in an agar nutrient solution in Erlenmeyer flasks. The seeds and nutrient must be placed in the flasks in an absolutely sterile environment. The slightest contamination by fungus or mold will destroy the plants." GLOVE BAG inflated with air and sterilized by NaOCI solution provides an excellent answer to this problem.

A New York State biologist, who also uses GLOVE BAG with insects, reported that after his experiments with the insects are over, he places his small olfactometers containing the insects into GLOVE BAG. Then, using the gloves, he removes the lids and kills the insects with CO_2. He likes the procedure because the GLOVE BAG insures that no insects will escape, and at the same time the gloves give him a convenient way of manipulating the olfactometers. After he kills the insects, he empties the olfactometers, saves them and the GLOVE BAG for future experiments.

Another use for GLOVE BAG with fruit flies is a chamber for studying Controlled fumigation (determining the LD_{50}). When the experiment is over, the insects can be disposed of along with GLOVE BAG.

Moving up to larger biological systems, we find GLOVE BAG has been used as a disposable incubator. In work with rabbit fetuses taken by Caesarean section for teratogenic studies, a scientist found that a battery of four GLOVE BAG could readily maintain as many as 32 rabbit fetuses for periods of up to 72 hours. The advantage of GLOVE BAG for this work is that "it needed neither sterilization nor decontamination, and is disposable."

GLOVE BAG USED BY PHYSICIST

GLOVE BAG goes out into the field with another scientist who uses it in an open boat to protect scientific equipment from salt spray and moisture. GLOVE BAG protects the equipment and yet the gloves allow access "to switches and controls".

Another physicist reported that he uses GLOVE BAG to enclose welding operations. He "T.I.G." welds up titanium capsules before they are inserted in a nuclear reactor to have their contents irradiated. The argon from the torch both inflates the GLOVE BAG and maintains an inert atmosphere in it. We questioned our correspondent about the heat from the T.I.G. torch, and he replied, "The heat from the arc is almost entirely radiant, and the polyethylene doesn't absorb enough to do damage. A large heat sink is used to clamp the titanium capsule."

Yet another welding report: "GLOVE BAG are currently being used to provide a protective inert gas atmosphere for inert gas welding of parts where multiple pass welds are required, or where back up gas is needed to prevent oxidation of the welded area."

USE OF GLOVE BAG WITH APPARATUS THAT EXTENDS OUT OF THE GLOVE BAG

So far, we've considered apparatus that is small enough or compact enough to fit inside a GLOVE BAG. Here are some applications involving apparatus that sticks out of a GLOVE BAG:

A GLOVE BAG can also be used for titrations of oxygen sensitive solutions. While one normally thinks in terms of enclosing a complete burette in a large GLOVE BAG, you can use a standard size GLOVE BAG (108D X-17-17H) and have the upper portion of the burette protrude through a small hole. The GLOVE BAG can be fastened to the burette with a rubber band; there is enough room inside a 108D X-17-17H for a magnetic stirrer.

When distilling moisture-sensitive compounds, it may be convenient to have the distillate receiver mounted in a GLOVE BAG, with the main part of the distilling equipment outside. This makes it possible to change receivers without exposing the apparatus to air. This arrangement has been used in preparing compounds such as $VOCl_3$.

USE OF GLOVE BAG WITH MICROSCOPE

Microscope-peering scientists have found that GLOVE BAG provides a handy chamber for containing a microscope when one wishes to work in a controlled atmosphere.

A microscopist who used a microscope in a GLOVE BAG with eyepiece protruding thru the polyethylene wall liked this arrangement because he was able to gas-sterilize the whole set up. He used ethylene oxide, propiolactone, or other gaseous sterilizing agents.

Another scientist who works with cathetometer microscopes reported that GLOVE BAG helps him when he is studying cold objects. Having dry nitrogen around the microscope keeps moisture from condensing on the optics.

Another microscopist attaches the GLOVE BAG to his binocular microscope. His approach is to remove the complete upper part of the microscope, cut a hole in GLOVE BAG, and then fit the microscope back together with the lower part in the GLOVE BAG ad the upper part outside!

A different approach has the microscope outside the GLOVE BAG. In this tip, the user puts a glass window in the GLOVE BAG and has the microscope outside. He recommends using a 45x50 mm cover glass that he tapes to a rectangular hole cut in the GLOVE BAG. He suggests taping both inside and outside in order to withstand the slight internal pressure of the GLOVE BAG.

MISCELLANEOUS

GLOVE BAG can be a great help for fieldwork. This scientist uses GLOVE BAG as a part of his "portable laboratory." If he encounters a dusty environment, he uses a GLOVE BAG to protect parts of his computer and his disk drive for the deleterious effects of the dust…. helps keep his computer up and running!

We are told that Helium-Neon lasers "expire" as a function of time whether they are run or not (i.e., just sitting on the shelf). That's why new units are usually guaranteed for only one year. The common reason for failure is a loss of *He* gas by diffusion from the laser tubes.

"A *He-Ne* laser having failed from lack of *He*, can be restored to normal operation by storing it in a GLOVE BAG for 7 to 10 days under a pressure of approximately 1 atmosphere of *He* gas. The diffusion process is thus reversed, but under these conditions the rate of diffusion of *He* into the glass envelopes is over 100 times greater than the reverse equilibrium process. This application of a GLOVE BAG saves the considerable cost of replacing the laser tube."

An enterprising chemist developed a clever way of using GLOVE BAG for her work with light-sensitive materials. She simply inserted GLOVE BAG in a dark trash or garbage bag; when it was absolutely necessary to "peek" at what her hands were doing, she cut a small hole or narrow slit in the outer bag.

Although the great majority of GLOVE BAG applications involve working with apparatus inside GLOVE BAG, "here's one for the books!" One scientist projects his notebook from being contaminated in his nasty lab atmosphere by keeping his notebook and a pen inside a GLOVE BAG. Since standard GLOVE BAG is fairly transparent, he simply slips his hands in the gloves and makes his notebook entries when necessary…sure keeps the pages clean!

OTHER GLOVES

For applications where you need better fitting gloves, use latex gloves over the built-in gloves of GLOVE BAG. This tip is particularly helpful when you have to manipulate small equipment.

Place latex gloves in the GLOVE BAG and after purging the GLOVE BAG, put your hands into the gloves and pull the latex gloves over the GLOVE BAG gloves. *Note:* This arrangement "Reduces the strain on the built-in gloves and lessens the chance of splitting them."

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TO USE ADAPTOR RINGS

Assuming that you have a pair of Adaptor Rings**:**

STEP 1. Spread an uninflated GLOVE BAG out in front of you just as you would line it up for normal use.

STEP 2. Working through the equipment sleeve, cut off the Gloves, which are an integral part of the GLOVE BAG as close as possible to the base of the fingers in order to leave the maximum sleeve length. (see Fig. A)

Note: The cut may be made with scissors. However, a smoother, more tear resistant edge is produced by use of a sharp knife or a single-edged razor blade. We suggest that you use a straightedge for a guide.

STEP 3. After cutting off the finger portion of the gloves, pull the two sleeves inside-out, so that you are working outside of the bag. (if you are using an "R" model GLOVE BAG, the sleeves would already be outside the bag outside)

STEP 4. Insert the new gloves into the GLOVE BAG sleeves in the orientation in which you will be using them; i.e. thumbs up, palms facing each other. Have the cuffs of the gloves even with ends of the sleeves. (See Fig. B.)

STEP 5. Slip an Adaptor Ring over the GLOVE BAG sleeve and the new glove. The raised lip of the Adaptor Ring should face away from the GLOVE BAG. (See Fig. C.) The GLOVE BAG sleeve and rubber glove should both protrude about 1½ to 2" past the end of the ring.

STEP 6. Fold the end of the GLOVE BAG sleeve back over Ring, so that the ring is completely covered. (See Fig. D.)

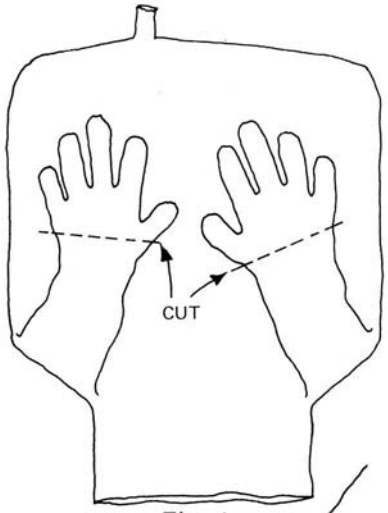

Fig. A

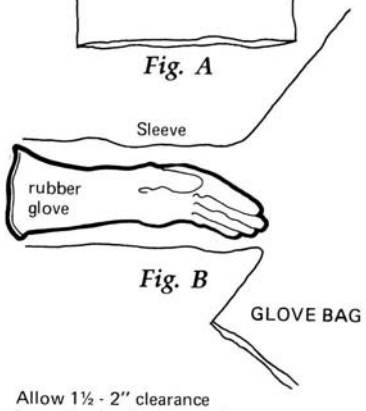

Fig. B

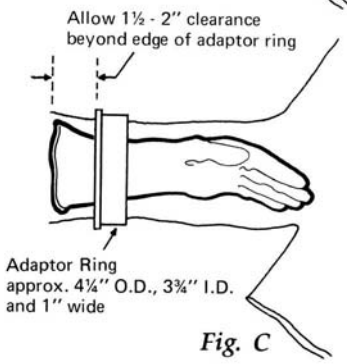

Fig. C

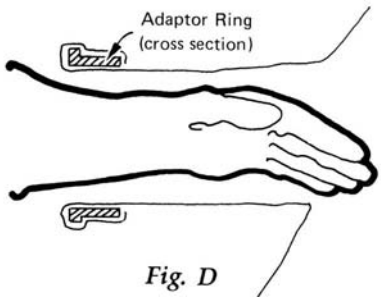

Fig. D

TO USE ADAPTOR RINGS (Cont.)

STEP 7. Stretch the cuff of the rubber glove back over the ring, covering the polyethylene and the ring completely.

STEP 8. The elastic tension of the glove will usually hold the end of the polyethylene GLOVE BAG sleeve firmly against the Adaptor Ring. For added security, a large rubber band, a piece of dressmaker's elastic, or other elastic material, should be wrapped around the ring assembly. (See Fig. F.)

STEP 9. You have now completed the installation of the first glove; the second glove can be attached in a like manner.

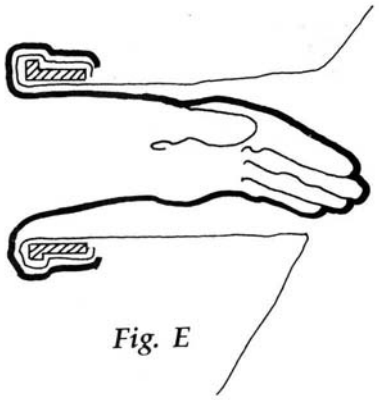

Fig. E

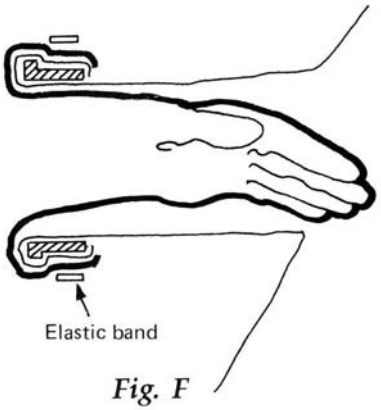

Fig. F

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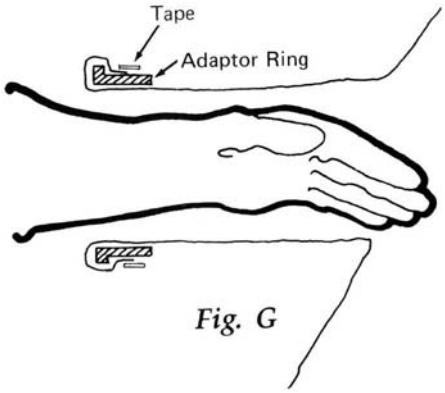

Fig. G