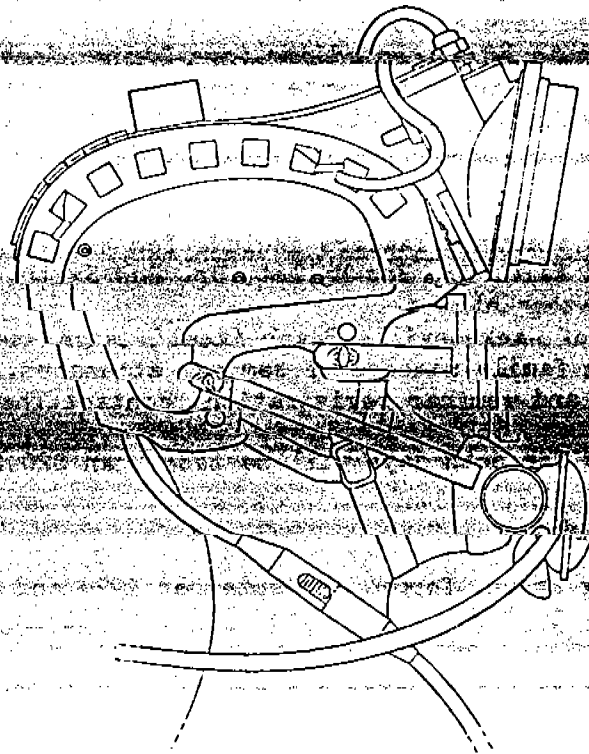


# UNDERWATER SPELEOLOGY



OFFICIAL NEWSLETTER OF THE  
CAVE DIVING SECTION OF THE  
NATIONAL SPELEOLOGICAL SOCIETY

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## N.A.C.D. SEMINAR

The National Association for Cave Diving (N.A.C.D.) has announced that its annual seminar will be held June 14th and 15th in Jacksonville, Florida. The eighth in their series of yearly seminars on Diving Science and Technology is to be held at Jacksonville Beach, directly on the ocean. The faculty will be made up of experts from all areas of both diving and cave diving.

This year's seminar will differ from past years in several respects. First, the basis of the seminar has been broadened to include all diving related sciences and technology in addition to cave diving. Second, while formal presentations of faculty topics will still be a part of the activities, the majority of the time will be spent in discussion workshops where the seminar attendee can hold conversation directly with each speaker on his field of specialized knowledge.

Some of the subjects to be presented are Cave Diving Techniques and Equipment, Hypothermia in Diving, Underwater Archeology, Habitat Projects, Stress Physiology in Diving, Psychological Profiles of the Safe Diver, Decompression Theory, Speleogenesis and Speleology, Medical Aspects of Diving, Diving Legislation, Statistics of Diving Fatalities, and Emergency Rescue Procedures.

Expected speakers and workshop leaders include Tom Mount, Dave Desautels, Larry Murphy, Dr. Edward Vale, Dr. Bob Mallot, Dr. Bob Smith, David Fisk, and Captain Jack Wright among others.

Other than the beauty of Jacksonville Beach itself, sight-seeing tours are planned for non-diving family members of seminar attendees.

For further information and seminar registration, contact The Seminar Committee, Bob Wolf, Director, 5018 Kerle Street, Jacksonville, Florida 32205. The registration fee for both days will be less than \$20.00.

## A NEW CAVE DIVING ORGANIZATION

The California Cave Diving Group, formed in September 1974 and with a membership of 14 by January 1, 1975, has located 353 cave diving sites in California. The group conducts regular cave diving trips on Wednesday evenings and weekends. It is or has conducted a series of cave diving courses in Northern California and hopes to expand this training program to Southern California by this Summer. Their newsletter, Phreatic Diver, is published quarterly with a subscription rate of \$4.00 per year. Address correspondence to: Phreatic Diver, 437 Staples, San Francisco, Calif. 94112.

## N.A.C.D. ELECTION

Two members of the NSS Cave Diving Section, Sheck Exley and Lewis Holtzendorff, have been elected by the N.A.C.D. board of Directors to the offices of president and vice-president respectively. The election took place at the December N.A.C.D. Quarterly Board Meeting in Gainesville, Florida. Both men will serve in these positions for 1975.

## GUNTHER CAVE EXPLORATION

The California Caver, the official publication of the Western Region of the NSS has a cave diving article on the initial exploration of Gunther Cave in its March issue and may well begin to publish an increasing number of articles on cave diving. The address of the California Caver is Post Office Box 1187, Alhambra, Calif. 91802. Subscription rate is \$1.00 per year.



## HELMET LIGHT -- A CONVIENCE IN CAVE DIVING

by Stephen D. Maegerlein (NSS 8340)

The cave diver carrying a light in his hand is restricted in the tasks he can perform. Such tasks as anchoring a safety line, reeling in a line, photography and mapping are awkward when the diver is trying to hold a light. A bright light mounted on the diver's helmet frees his hands, he no longer has to think about what he is going to do with the light. The light is always aimed in his line of sight.

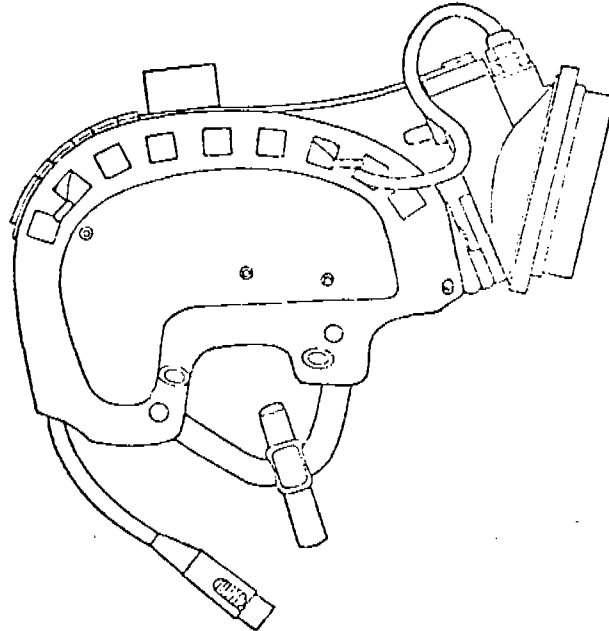


Figure 1. Helmet light (side view).

The diving helmet light is also advantageous in low visibility cave diving conditions. Cave diving in water of limited visibility is an inconvenience that divers in some areas of the country have become resigned to. It is often a waste of time to wait for the water to clear up because it does not. Visibility of 20 feet is considered excellent and visibility greater than 5 feet is good. On the return trip out of the cave system the diver expects to encounter visibility of one foot or less. The diver needs his hands free to maneuver through silt ladden passages and to keep constant contact with the safety line. Holding a diving light is an encumbrance that can be eliminated by mounting the light on the front of a helmet. The helmet also protects the head from unseen ledges the diver might swim into in low visibility areas.

Dry cavers have used the miner's electric helmet light for years. The cave diver has not used this inovation because a unit has not been available with a reliable, water proof, high intensity light. The helmet design described here has been tested extensively in Indiana during the last year in a variety of low visibility cave diving conditions. The exploded diagram, page 4, shows parts used to construct the helmet.



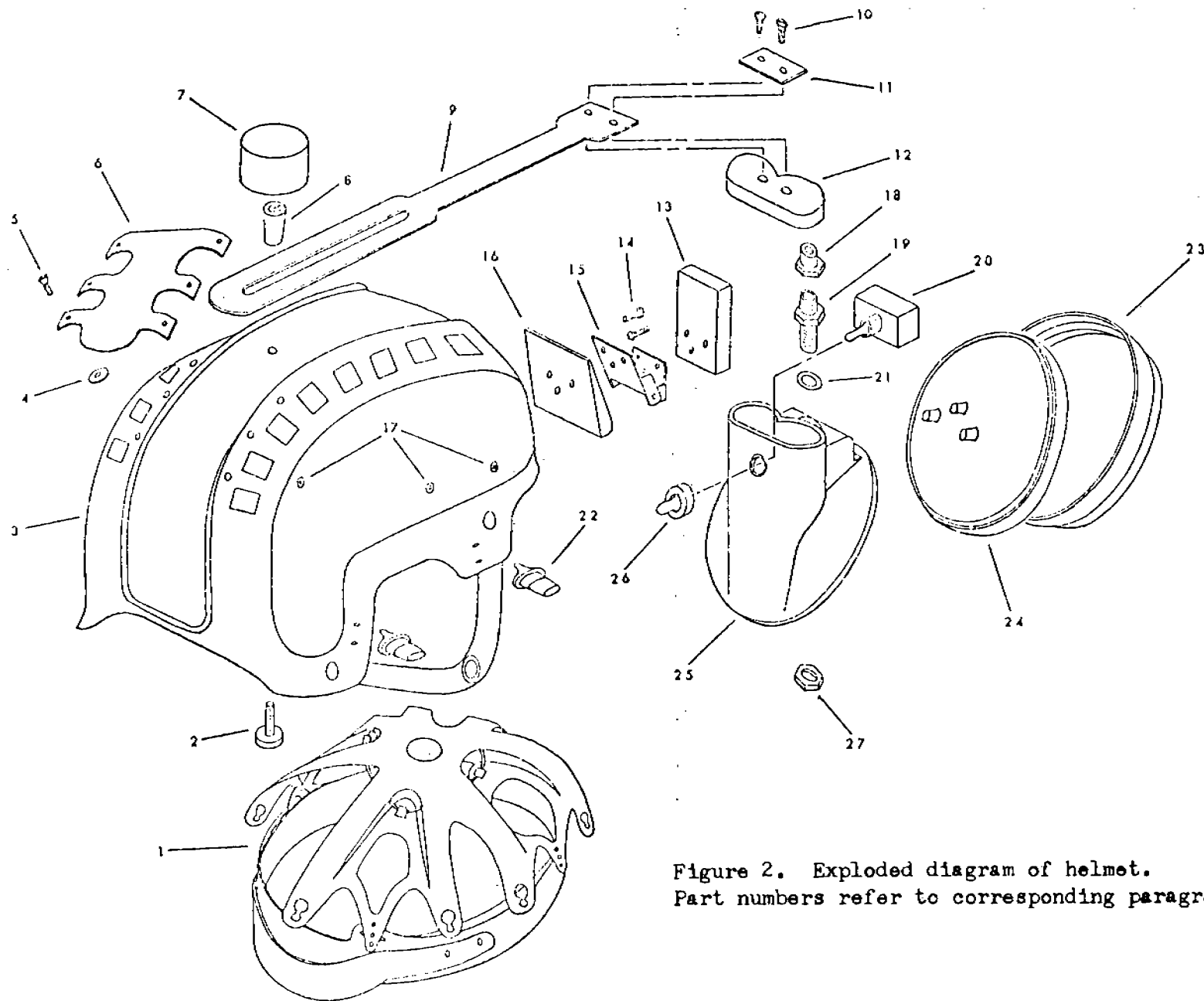
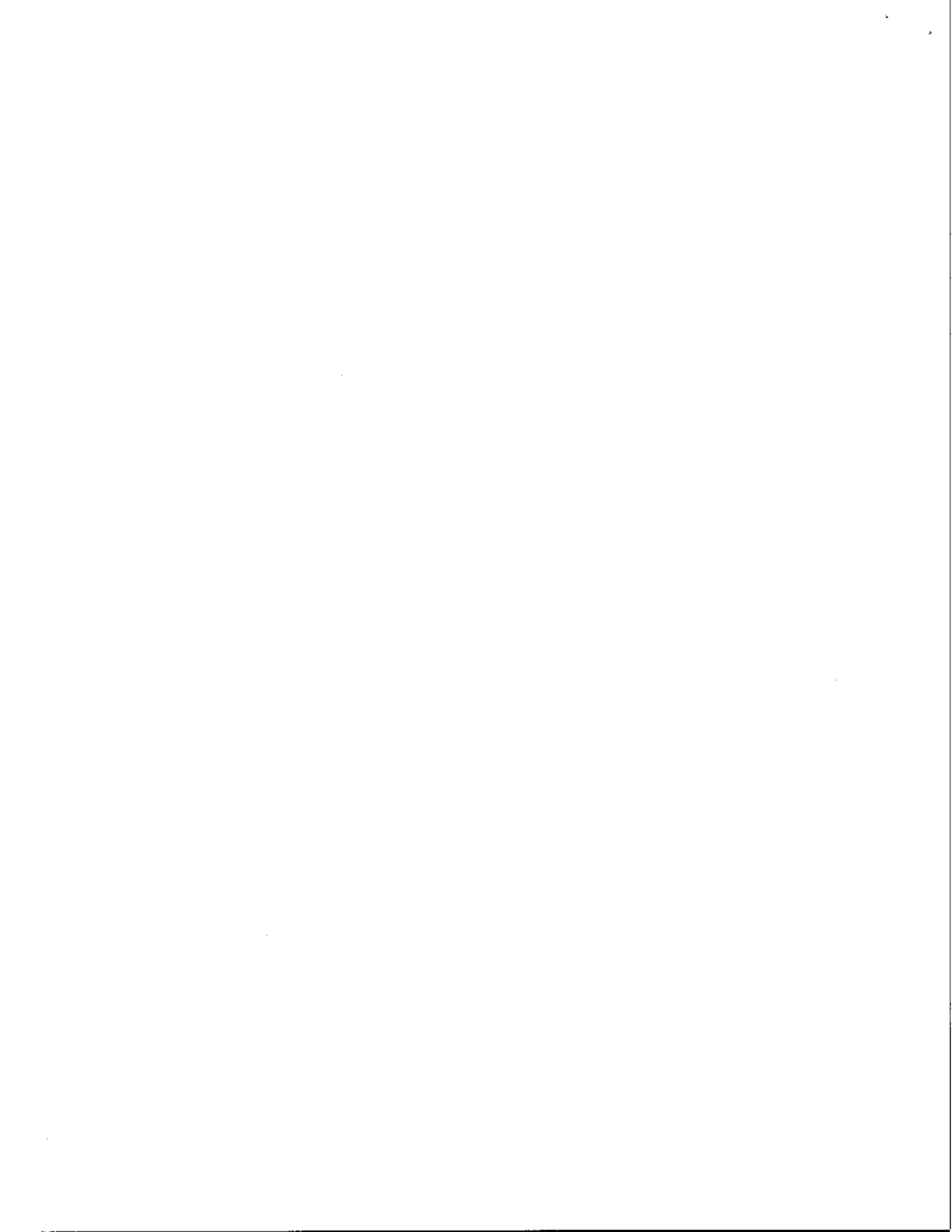


Figure 2. Exploded diagram of helmet.  
Part numbers refer to corresponding paragraphs.

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Helmet parts description (see figure 2):

- 1) The scalpcap webbing and sweatband, used in safety headgear, were used as a helmet liner. They were manufactured by Fibre-Metal and purchased from a local construction supply store.
- 2) A  $\frac{1}{4}$ " diameter, 1" long bolt was used as a lamp strap anchor. The head of the bolt was potted in epoxy cement so that it could be glued inside the helmet with rubber cement.
- 3) The helmet shell is a plastic ice hockey helmet, model SD300, extra large size. It was manufactured by Cooper in Canada and distributed by K-Mart stores in the U.S.A. The helmet comes with an elastic chin strap. The foam plastic helmet liner was removed and discarded. Part of the front and back of the helmet were sawed away to allow more room for the neck in back and mask in front.
- 4) Brass spacers,  $\frac{1}{8}$ " thick, were used between the helmet and the guide plate (6).
- 5) Flathead,  $\frac{1}{2}$ " long, brass machine screws and nuts (not shown) were used to bolt the guide plate (6) to the helmet.
- 6) The lamp strap guide plate is used to hold the lamp strap loosely against the helmet. It was cut from  $\frac{1}{8}$ " thick,  $3\frac{1}{2}$ " by 4" aluminum and bent to fit the helmet contour.
- 7) A  $1\frac{5}{8}$ " diameter, 1" high, plastic bottle cap was used for a knob handle to secure the lamp strap (9).
- 8) The threaded core for the knob handle was made from a  $\frac{1}{4}$ " diameter, lead sheathed bolt anchor for masonry. The lead sheath was discarded. The end of the threaded core was sealed with tape and the core was potted into the bottle cap (7) with epoxy cement.
- 9) The lamp strap was cut from  $\frac{1}{8}$ " thick,  $1\frac{1}{2}$ " by 12" Teflon. The Teflon was purchased from Cadillac Plastic and Chemical Co. (CPCC). The strap can be moved back and forth to adjust the lamp angle as visibility changes. The flexible strap also acts as a shock absorber if the lamp is jammed into a rock ledge.
- 10) Flat head, brass machine screws were used to attach the lamp strap to the lamp housing plate (12).
- 11) The strap clamp plate,  $\frac{1}{8}$ " thick,  $\frac{3}{4}$ " by  $1\frac{1}{2}$ " aluminum, is used to hold the lamp strap against the lamp housing plate (12).
- 12) The lamp housing plate is used to seal the lamp housing (25). The plate was cut from a piece of  $\frac{3}{8}$ " thick,  $1\frac{1}{2}$ " by  $2\frac{1}{2}$ " Plexiglas G plastic. The bottom of the plate was cut around the edge with a router to form a  $\frac{1}{8}$ " shoulder so that the shoulder will fit inside the lamp housing. The plate was glued to the lamp housing with Plexiglas cement. The plastic and cement were purchased from CPCC.
- 13) The lamp hinge block,  $\frac{3}{8}$ " thick,  $1\frac{1}{4}$ " by  $2\frac{1}{4}$ " Plexiglas G, was glued to the back of the lamp housing (25) with Plexiglas cement.
- 14) Round head, nickel plated screws were used to attach the lamp hinge (15) to the lamp hinge block (13) and the helmet hinge block (16).
- 15) The stainless steel hinge was made from a camera housing latch sold by Ikelite Underwater Systems (IUS). The rivets holding the spring loaded latch mechanism were drilled out and the latch mechanism was discarded.
- 16) The helmet hinge block was cut from a  $\frac{3}{8}$ " thick, 2" by  $2\frac{1}{4}$ " piece of Plexiglas G. The block was cut at an angle and sanded down to give the lamp beam the proper inclination. The block was glued to the helmet with Plexiglas cement.
- 17) Support buttons (see figure 2 and 3) for the scalpcap webbing (1) were made from  $\frac{3}{8}$ " diameter nylon rod and  $\frac{1}{8}$ " diameter aluminum pop rivets.



To make the nylon washers, a 1/8" diameter hole was drilled in the end of the rod and the edge of the rod was beveled away from the hole using an abrasive wheel. The beveled section was then cut off to form a washer shown in figure 3. The nylon rod was purchased from CPCC.

18) An acorn cap nut, which contains a rubber gasket, seals a two conductor, 1/4" diameter, electrical cord in the lamp housing.

19) The cable feedthrough, 1/2" O.D. was made of chrome plated brass. The feedthrough and nuts (18 and 27) were purchased as a kit from IUS.

20) The three position switch with center off is used inside the lamp housing (25) to control the low and high beams of the dual filament lamp (24). The switch was purchased at a local electronics store.

21) An o-ring seal was used between the cable feedthrough (19) and the lamp housing (25). The 1/16" diameter cross section o-ring supplied with the cable feedthrough is too small to seal against the beveled hole of the lamp housing. A thicker o-ring was made by cutting out a section of 1/8" diameter cross section o-ring from a large o-ring and gluing it together to form a 1/2" I.D. o-ring. Oneida Instant-Weld adhesive worked very well for gluing the o-ring together.

22) Quick release tabs were installed in front of and behind the ear openings of the helmet. The fasteners are bent over and glued in place on the inside of the helmet shell (3). The front set of tabs are used to attach the face mask and the back set of tabs are for the Hellephone mouth mask (see cover).

23) The Lexan lens cap comes with the lamp housing (25). The edge of the lens cap may have to be painted to avoid glare if the edge of the cap is in the diver's field of vision.

24) The General Electric model 4308, 6 volt, dual filament headlamp was purchased from IUS. The screw terminals on the back of the bulb were unsoldered and replaced with 18 gauge hook-up wires. The bulb will not fit in the housing with the screw terminals in place. Wire nuts were used to make the electrical connections with the switch and cord.

25) The lamp housing was made from an older model of the C-Lite I Lexan case. It and the lens cap (23) were purchased from IUS. The battery case was cut away and the battery terminal post inside the case was cut off to allow room for the switch. A 1/2" diameter hole was drilled in the back of the case to accommodate the switch (20). The edge of the hole was beveled to seat the switch boot (26).

26) The rubber switch boot was purchased from IUS. The switch normally supplied with this boot is only an on-off switch and not suitable for the two filament helmet light. The boot has a standard thread size used for electrical switches. Silicone grease was placed in the boot before assembling the switch.

27) The retainer nut is supplied with the cable feedthrough (19).

The cable assembly (see cover and figure 1) was made with 2 1/2 feet of 18 gauge, two conductor, electrical cord. It was secured to the inside of the helmet shell (3) with two electrical ties. The quick disconnect cable plug is an Amphenol, 4-pin, microphone connector, available from a local electronics store. Each wire was soldered to two pins inside the

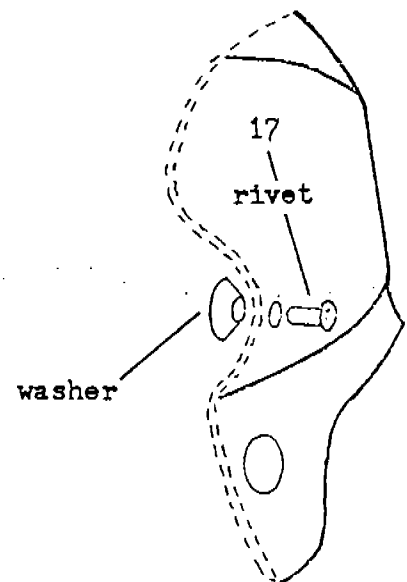


Figure 3. Cutaway view of side of helmet shell.



microphone jack connector to improve the electrical contact and to increase the amperage capacity of the connector. The solder joints and cord inside the connectors were coated with silicone cement (General Electric RTV rubber cement) before each connector was assembled. The connector is not water proof and therefore is probably not suitable for salt water diving.

The lamp operates for 2 hours on the 39 watt high beam or 4 hours on the lower intensity, 20 watt flood beam when powered by an 8.4 volt, 10 amp hour nicad battery pack. Construction of the battery pack will be featured in a future newsletter. The 39 watt beam is used when large passages are encountered and in silty water. The flood beam is adequate for small passages and conserves power for long exploration trips.

The face mask used is a Dacor Tuna model. The back of the mask strap was cut off and female quick release fittings were installed in the side straps (see cover). The fittings are the type used on wet suits.

The mouth mask was supplied by Helle Engineering Inc. The mask is used when the diver needs to talk into an underwater communication microphone or when a tape recorder throat microphone is used. The head strap was cut off and female quick release fittings were installed. The mask is shown with the microphone side port plugged with a cork as when only a tape recorder throat microphone is being used. The mouth mask is easily interchangeable with a regulator mouthpiece. A plastic electrical tie is used to secure the mouth mask to the regulator.

The diving helmet described is designed to hold the primary light, as well as to give the diver's head some protection. The helmet, and a similar helmet designed by Clarence Dillon, have been used to explore to depths of over 130 feet in the Rise of Lost River. The Helmet is very useful in the low visibility water of Indiana cave systems. Exploration, photography and mapping are much easier than with a hand-held light.

Several of the helmets, not including battery pack and masks, have been built for less than 50 dollars each. The light described in this article was constructed from materials which were readily available, and will perhaps provide guidelines for others to build helmet lights suited to their needs. There are numerous designs and materials that can be used to construct a helmet light. The use of a particular manufacturers product is not intended as an endorsement.

The helmet should be checked out in open water before attempting to use it for cave diving.

#### Some sources of materials:

1. The ice hockey helmet was purchased at a discount store (K-Mart) for \$10.00.
2. Used nicad batteries were obtained from ESSE Warehouse, 368 South Maridian St., Indianapolis, IN 46225.
3. Inexpensive scrap plastic was obtained from Cadillac Plastic and Chemical Co. which has distributors in most major cities.
4. The lamp unit housing and some of the hardware were obtained from Ikelite Underwater Systems, 3303 North Illinois St., Indianapolis, IN 46208. The lamp housing was made from an older model of the C-Lite I case. The empty case was purchased for 5 dollars from IUS. The new model of the C-Lite should also be suitable, if the old case is not available.
5. The mouth mask was obtained from Helle Engineering Inc., 7198 Convey Court, San Diego, CA 92111.

