United States Department of the Interior, Oscar L. Chapman, Secretary
Fish and Wildlife Service, Albert M. Day, Director

HIGH SPEED PLANKTON SAMPLERS

1. A High Speed Plankton Sampler (Model Gulf I-A)
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2. An All-metal Plankton Sampler (Model Gulf III)
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The Model Gulf III All-metal Plankton Sampler

The following report of an all-metal, modified 1/2-meter plankton net is a preliminary presentation of the construction plans, operational procedure, and trial results of the Model Gulf III plankton sampler. To date an inadequate number of tows has been made with the net to present tested analysis but preliminary results indicate good possibilities.

The towing cable, ¼" wire rope, is attached by means of a shackle and swivel to the upper attachment ring of the sampler. A 40-pound depressor 1/ is attached to the lower attachment ring by means of a shackle, a swivel, and a 7-foot length of 1" diameter manila line. (See fig. 5.) The 7-foot length permits the depressor to swing free of the after end of the sampler during handling operations. The 1" line is of such size and flexibility as to provide easy handling of the depressor.

When the current meters have been placed, the two meter dials are zeroed and rags placed in the meters to prevent flow wheels from turning. Just as the sampler is being lowered into the water by means of a davit, the meter rags are removed. The sampler has been lowered into and removed from the water while the ship was underway, at about 6 knots.

After the towing time has elapsed, the sampler is brought in, the meter rags replaced, and the nosepiece and net removed. The fore meter is removed and meter readings are recorded. The net is hosed down with salt water to wash all plankters into the plankton bucket. After removal of the bucket the entire net is washed with fresh water and scrubbed inside and out with a nylon bristle brush to remove any foreign matter and salt. If this cleaning operation is done thoroughly after each tow, a uniform mesh area is maintained for successive tows. The housing, net, bucket, and current meter are illustrated in figure 6.

1/ The depressor developed by John Isaacs is illustrated and discussed in the California Cooperative Sardine Research Program Progress Report, 1950, on page 19.

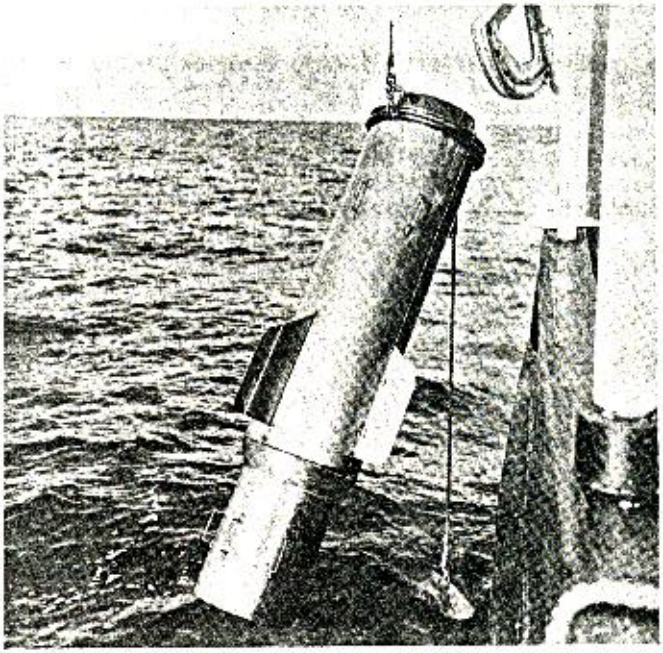


Figure 5. Model Gulf III plankton sampler rigged for lowering.

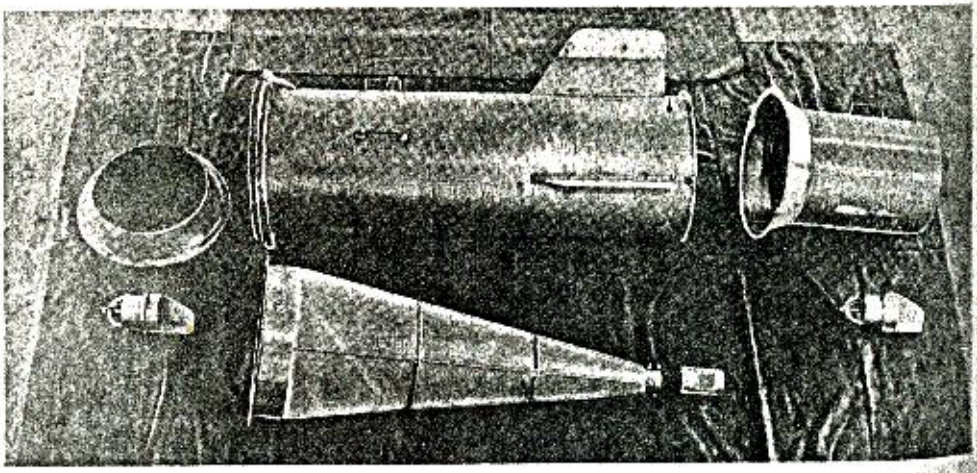


Figure 6. Exploded view of Model Gulf III plankton sampler.

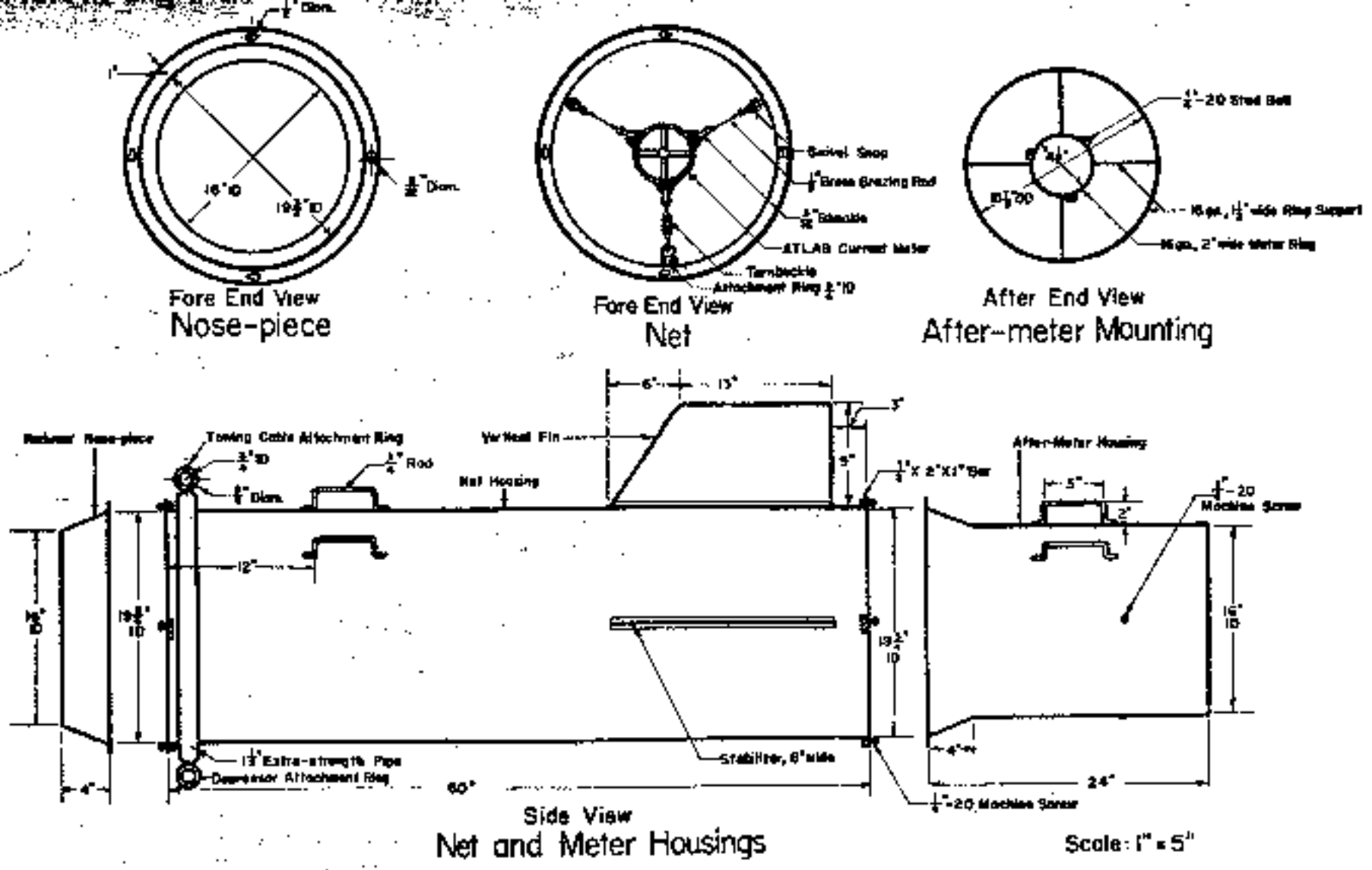
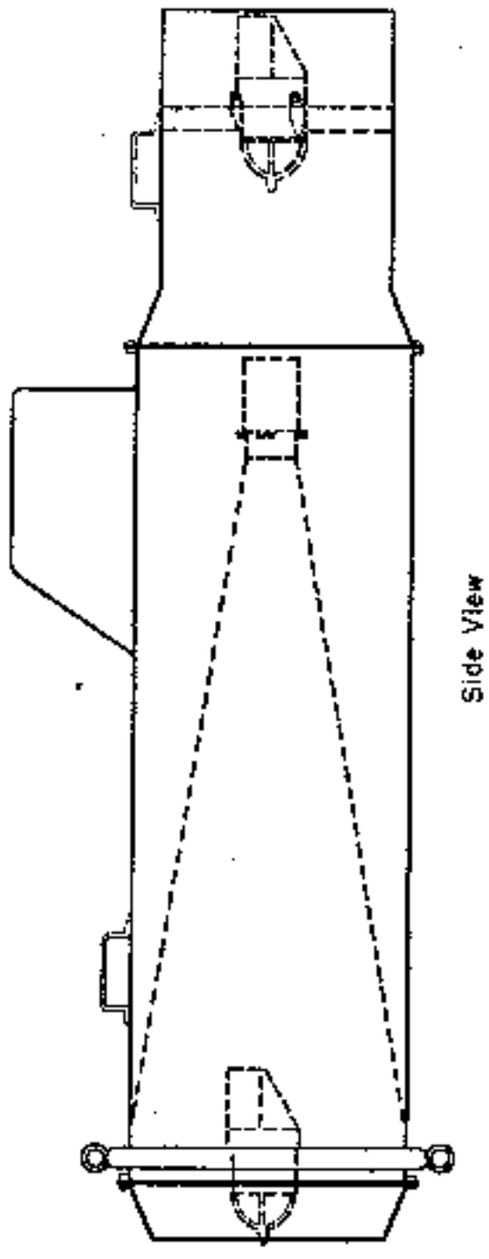
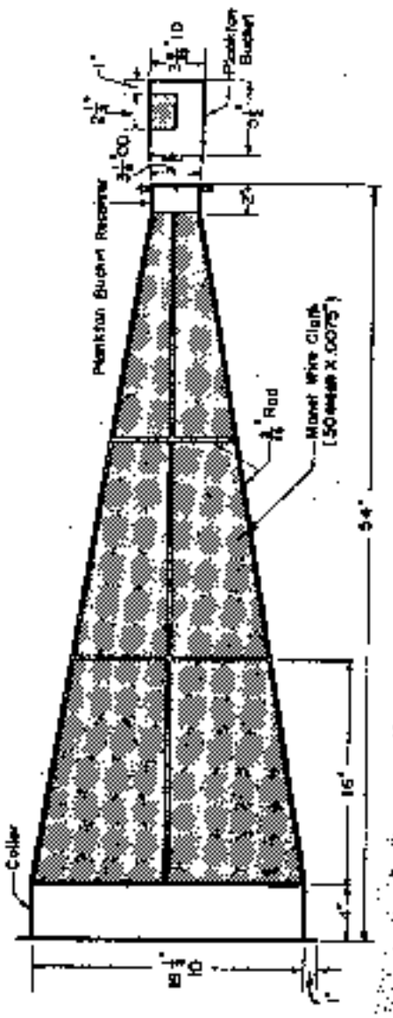


Figure 7. Details of Model Gulf III.



Side View
Model Gulf III Plankton Sampler



Side View
Net

Figure 8. Side view, Model Gulf III.

The sampler is then assembled and is ready for the next towing operation. The after meter remains in the unit at all times.

Discussion

The Model Gulf III plankton sampler has been used for only a limited number of tows so final judgment will be reserved until adequate testing has been completed. At this time, however, it can be said that the sampler indicates good possibilities. Specimen condition is good and compares favorably with silk net collections at slower speeds. The sampler tows very well, with the aid of the 40-pound depressor, at speeds to 6 knots. The wire cloth used (50 mesh x .0075") duplicates very nearly No. 1 silk mesh. Coarser meshes would undoubtedly improve the effectiveness with the larger marine forms. Performance at higher speeds and with a variety of meshes will be studied in the near future.

Figures 7 and 8 illustrate the construction of the Gulf Model III plankton sampler. The line drawings describe the suspension of the Atlas current meter in the forward end of the plankton sampler and illustrate the orientation of the net and bucket with respect to the housing and the current meter.

Preliminary examination of samples taken reveal several deep sea forms not previously recorded in our silk net tows. Tentatively identified are these: Diplophos 7.0 cm., 4.5 cm., 3.9 cm., and Stomias 5.3 cm. Several squid were taken, the largest being 4 cm. in overall length. No squid have been recorded from our previous silk net samples.

The chief disadvantages of the sampler are: initial high cost, and because of the large size, awkwardness for handling the unit in rough weather. Though the initial cost is high it should outlast many silk nets because of its construction and non-deteriorating materials. Handling difficulties can be overcome with adequate gear. A special cradle on the ship deck provides safe, secure storage.

Construction and Operation Advantages of the Model Gulf III Plankton Sampler over the Conventional ½-meter Silk Net

Conventional ½-Meter Silk Net	Model Gulf III Plankton Sampler
1. Net tears when towed at high speeds.	1. Wire cloth net will not tear when the sampler is towed at high speeds.
2. Many of the more agile forms evade the net when it is towed at slow speeds.	2. At high speeds possible with the metal sampler some of the more agile forms may conceivably be captured.

Conventional ½-Meter Silk Net	Model Gulf III Plankton Sampler
3. Clogging results when spines of some of the plankters tangle with the soft fibers of silk net.	3. Clogging resulting from tangling of plankter spines with wire meshes is less than with soft fibers of silk net because of rigidity of the wire meshes.
4. Net is difficult to clean because of softness of silk fibers which hold plankter spines. Silk net is too fragile to scrub properly.	4. Cleaning can be quickly and easily accomplished by scrubbing with a brush.
5. Special care is necessary to prevent excessive deterioration.	5. No special care is necessary to prevent excessive deterioration since monel is one of the more corrosive-resistant metals.
6. Conventional towing bridle disturbs water immediately ahead of net which very likely results in many organisms evading the net.	6. The towing and depressor cables are attached to the sampler behind the mouth of the net, hence they do not disturb the water ahead of the net.
7. Flow as determined by current meter in the mouth of the net is of questionable accuracy.	7. Two current meters are used, one in the mouth of the net and one in the housing behind the net, to determine the volume of water which passes through the net.

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