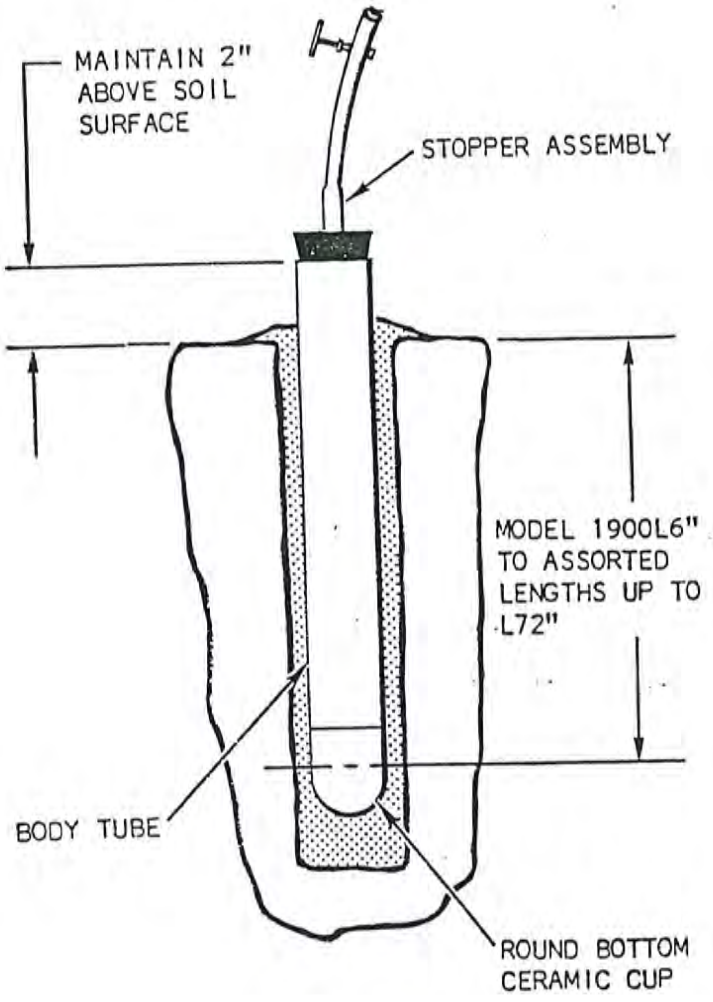
OPERATING INSTRUCTIONS for the

Model 1900

SOIL WATER SAMPLER



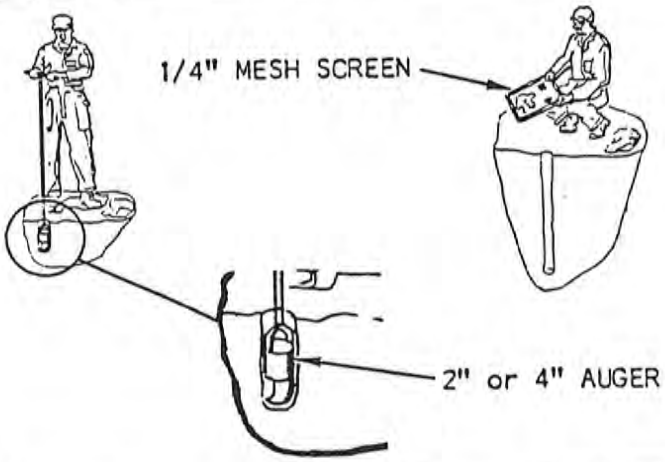
SITE LOCATION

The Model 1900 Soil Water Sampler can be installed in any location. The sampler can be installed in well drained soil or in areas where the water table is above the sampling depth. The surface area directly above the sampler should not be covered in any manner that would interfere with the normal percolation of soil moisture down to the depth of the sampler.

The samplers are normally installed vertically in the soil. However, they can be installed at an angle if this is necessary to reach some otherwise inaccessible point.

The samplers are available in various stock lengths for installation at depths up to 6 ft. Extra length samplers can be provided on special order, if this is necessary. However, for depths greater than 6 ft. it is normally less expensive to use the Model 1920 Pressure-Vacuum Soil Water Sampler.

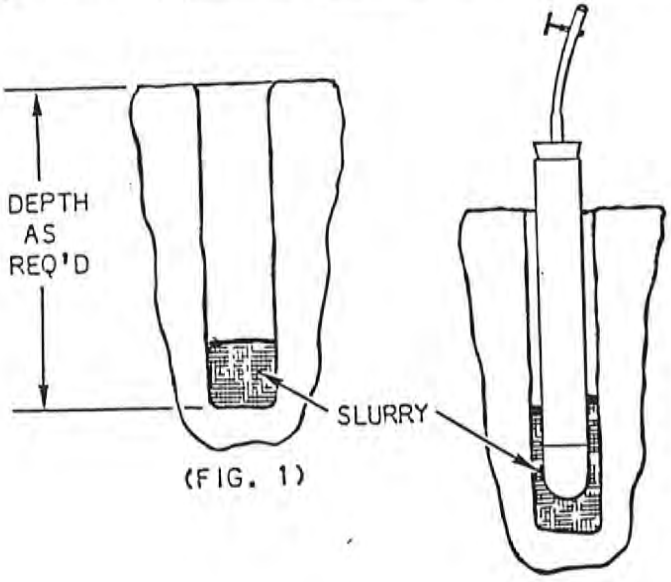
The Model 1900 Soil Water Sampler has been designed so that the body tube of the sampler projects 2" above the soil surface when the sampler is installed to the proper depth, as shown in the figure to the left.



CORING THE HOLE

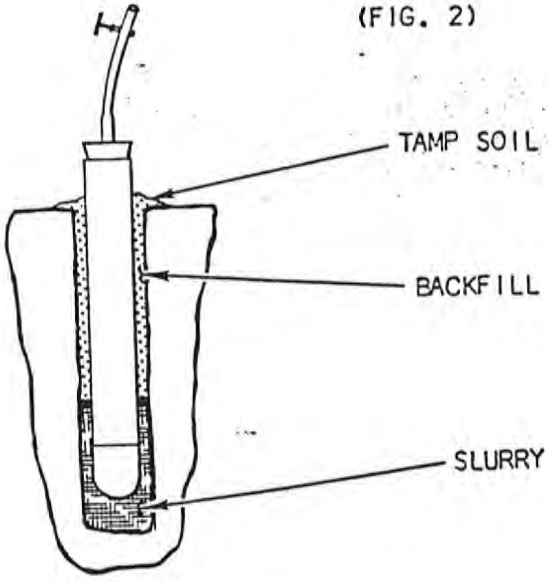
In rock-free uniform soils at shallow depths, use a 2" screw or bucket auger for coring the hole.

If the soil is rocky, a 4" auger should be used. The soil should then be sifted through a 1/4" mesh screen to free it of pebbles and rocks. This will provide a reasonably uniform backfill soil for filling in around the soil water sampler. The Model 230 Series Soil Augers can be used for this purpose.



(FIG. 1)

(FIG. 2)



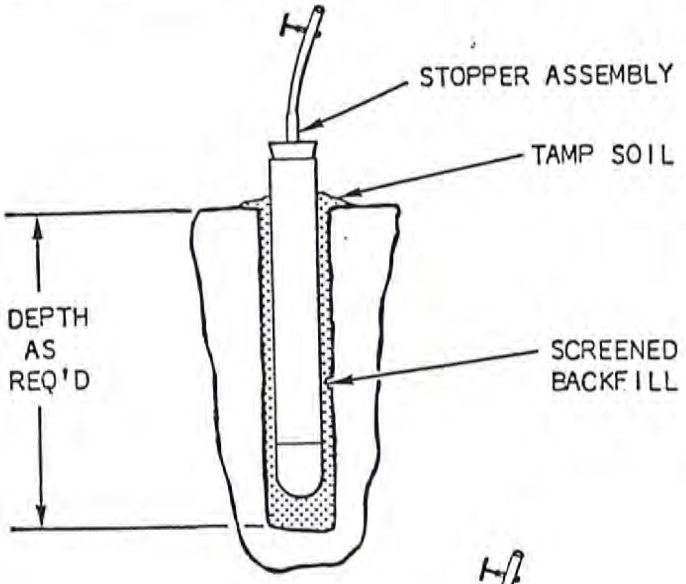
(FIG. 3)

INSTALLATION OF SOIL WATER SAMPLER USING A SOIL SLURRY

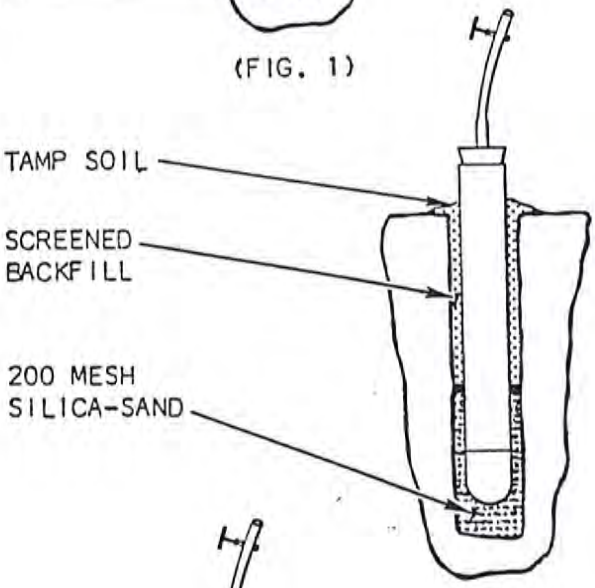
(Fig. 1) After the hole has been cored, mix a substantial quantity of soil from the bottom of the hole with water to make a slurry which has a consistency of cement mortar. This slurry is then poured down to the bottom of the cored hole to insure a good soil contact with the porous ceramic cup.

(Fig. 2) Immediately after the slurry has been poured, push the soil water sampler down into the hole so that the porous ceramic cup is completely embedded in the soil slurry.

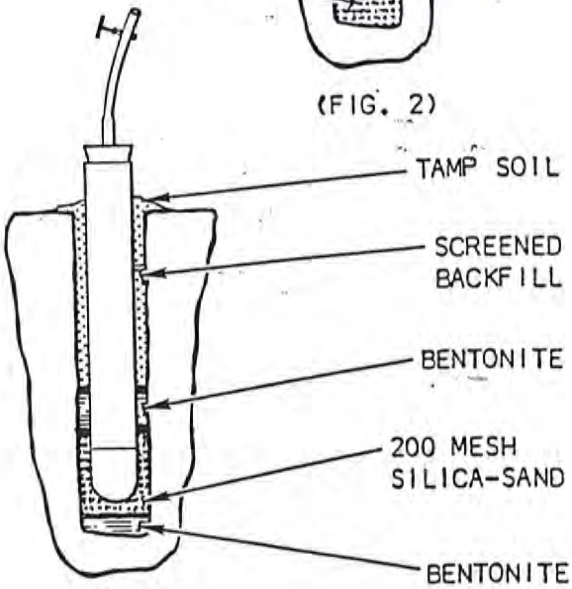
(Fig. 3) Backfill the remaining area around the soil water sampler, tamping soil firmly, to prevent surface water from running down the cored hole. Backfill hole with native soil free of pebbles and rocks.



(FIG. 1)



(FIG. 2)



(FIG. 3)

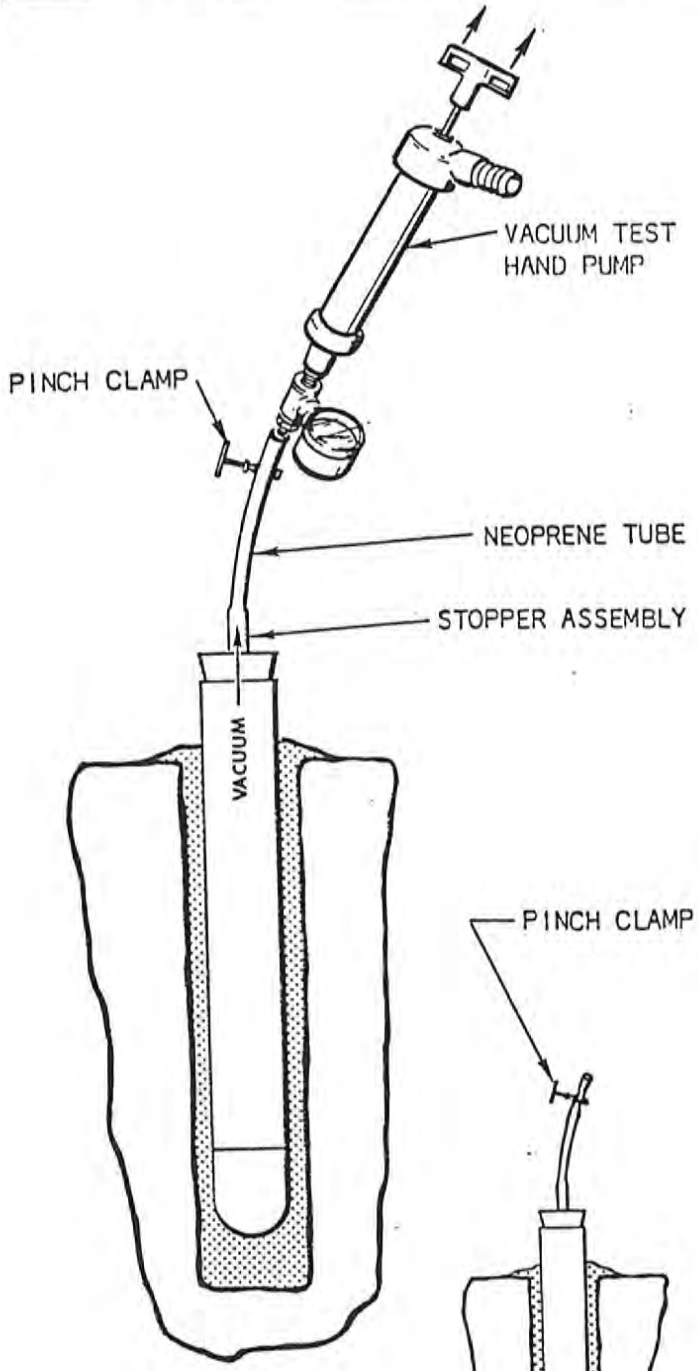
ADDITIONAL METHODS OF INSTALLING THE SOIL WATER SAMPLER

(Fig.1) Core hole to desired depth, insert soil water sampler and backfill the hole with native soil, tamping continuously to insure good soil contact with the porous ceramic cup and complete sealing of the cored hole.

(Fig.2) Core hole to desired depth, pour in a small quantity of crushed 200 mesh pure silica-sand of almost talcum powder consistency (commercially available under trade names of Super-Sil and Silica Flour). Insert soil water sampler and pour another layer of the 200 mesh silica-sand at least six inches deep around cup of the soil water sampler. Backfill the hole with soil free of pebbles and rocks, tamping continuously with a long metal rod to insure against surface water channeling down between the soil and the body tube of the sampler.

(Fig. 3) Core hole to desired depth, pour in a small quantity of wet bentonite clay. This will isolate the sampler from the soil below. Pour in a small quantity of 200 mesh silica-sand and insert soil water sampler. Pour another layer of 200 mesh silica-sand at least six inches deep around the cup of the soil water sampler. Again, add a small quantity of bentonite as a plug to further isolate the ceramic cup and guard against possible channeling of water down the hole. Backfill the remainder of the hole with native soil free of pebbles and rocks, tamping continuously with a long metal rod.

There are other methods of installing the soil water sampler that may be used, largely dictated by the type of soil you are concerned with and the tools available. The primary concern in any method of installation is that the porous cup of the sampler be in tight, intimate contact with the soil, so that soil moisture can move readily from the pores of the soil through the pores in the ceramic cup and into the soil water sampler.



(FIG. 1)

(FIG. 2)

COLLECTING SOIL WATER SAMPLE

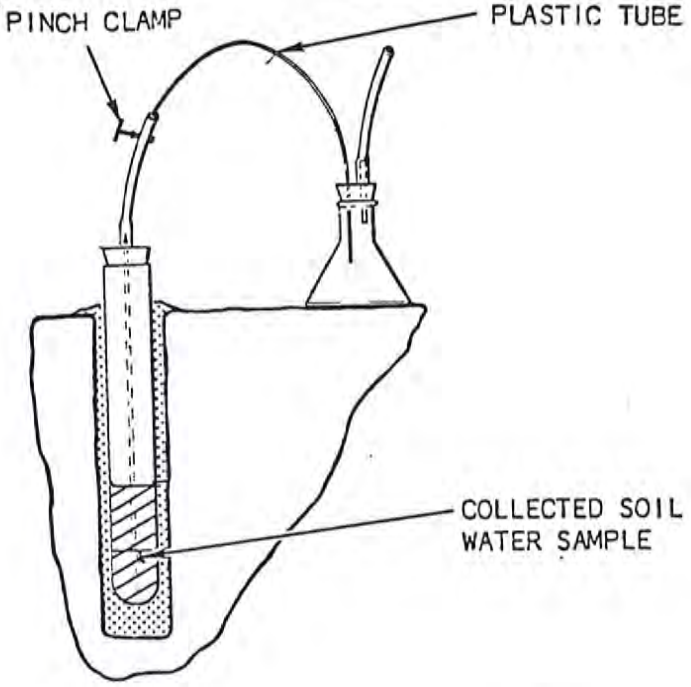
After the soil water sampler has been installed in the field, the accessory items as shown on page 6 are used for collecting a soil water sample.

(Fig.1) To collect a sample, the pinch clamp on the stopper assembly is opened. The serrated tube fitting on the end of the vacuum dial gauge adapter is then inserted into the neoprene tube of the stopper assembly. The vacuum hand pump is then stroked until a vacuum of perhaps 60 centibars (18" of mercury) is created within the sampler, as read out on the vacuum dial gauge.

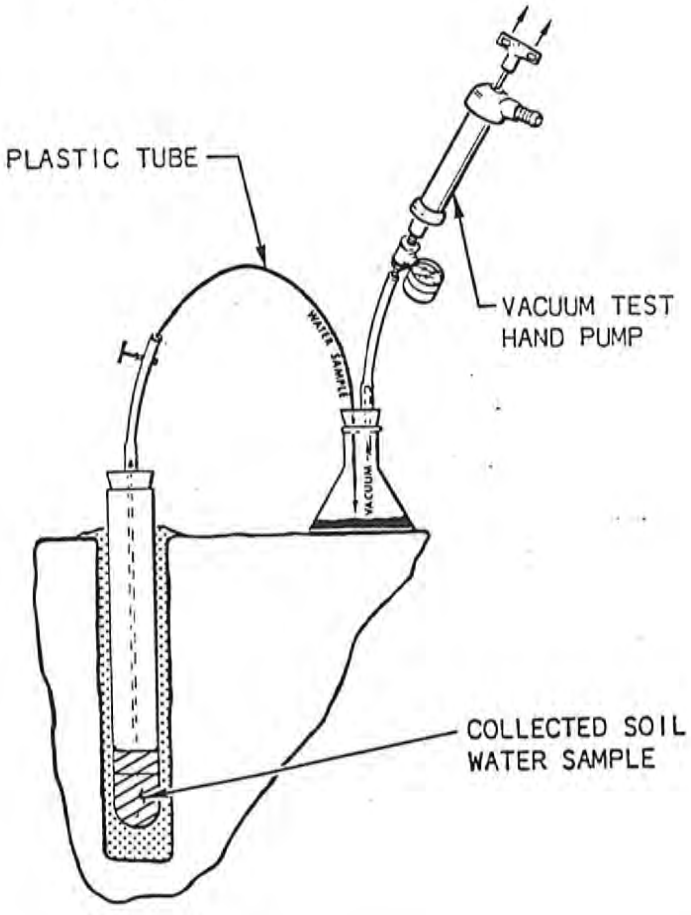
(Fig.2) The pinch clamp is then closed securely to seal the sampler under vacuum. The hand pump can then be removed for other uses. The sampler is allowed to set for a period of time under vacuum.

The vacuum within the sampler causes the moisture to move from the soil, through the porous ceramic cup, and into the sampler. The rate at which the soil solution will collect within the sampler depends on the capillary conductivity of the soil, the soil suction value within the soil (as measured with tensiometers), and the amount of vacuum that has been created within the sampler. In moist soils of good conductivity, at field capacity (10 to 30 centibars of soil suction as read on a tensiometer), substantial soil water samples can be collected within a few hours. Under more difficult conditions it may require several days to collect an adequate sample.

In general, vacuums of 50 to 85 centibars (15" to 25" of mercury) are normally applied to the soil water sampler. In very sandy soils it has been noted, however, that very high vacuums applied to the soil water sampler seem to result in slower rate of collection of the sample than lower applied vacuums. It is our feeling that in these coarse, sandy soils, the high vacuum within the sampler may deplete the moisture in the immediate vicinity of the porous ceramic cup and hence reduce the capillary conductivity, which creates a barrier to the flow of moisture to the cup under these circumstances. In loams and gravelly clay loams, users have reported collection of 300 to 500 ml of solution over a period of a day with applied vacuum of 15" of mercury (50 centibars) when soils are at field capacity. On waste water disposal sites,



(FIG. 3)



(FIG. 4)

some users have obtained up to 1500 ml of sample within 24 hours after cessation of irrigation with 1" to 2" waste water on sandy or clay loam soil.

(Fig.3) To remove the soil water sample from the sampler, a simple assembly is usually made up consisting of a small diameter (3/32" O.D. or less) plastic tube, a two-hole rubber stopper, a flask or bottle, as shown.

The pinch clamp on the sampler is opened and the small diameter plastic tube is inserted into the end of the neoprene tube on the stopper assembly and pushed down until it reaches the bottom of the sampler.

(Fig.4) The vacuum hand pump is then connected to the other hole in the stopper. Stroking the hand pump creates a vacuum within the bottle or flask which in turn sucks the sample up from the sampler and into the collection bottle or flask.

If it is more convenient, the stopper assembly can be removed from the sampler so that the collected sample can be removed with a pipette or other means. However, repeated removal and replacement of the rubber stopper assembly can disturb the seal between the soil and the body tube of the sampler, particularly on shallow units.

Subsequent samples are collected by again creating a vacuum within the sampler and following the steps as outlined above.

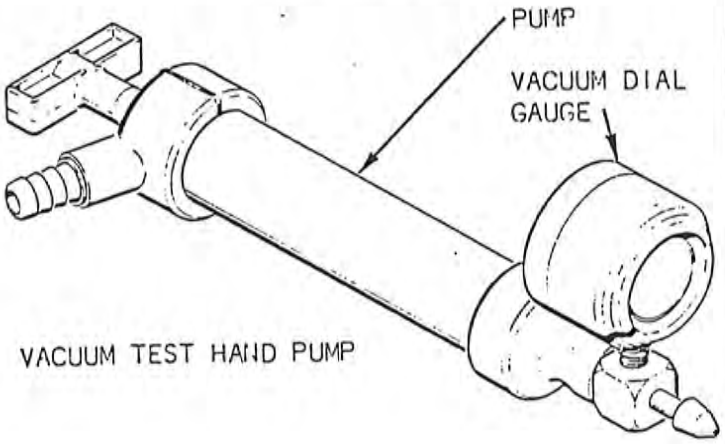
MAINTENANCE

There are no maintenance requirements for the soil water samplers other than protecting the exposed end of the body tube and the stopper assembly from physical damage. The end of the neoprene tube on the stopper assembly should be covered or plugged to prevent debris from entering the tube and later contaminating the sample.

Freezing conditions will not damage the samplers. The samplers are normally left permanently in place throughout the year.

ACCESSORY ITEMS FOR OPERATION OF THE SOIL WATER SAMPLER

1900K1 SERVICE KIT CONSISTING OF:



TUBING

1/16" O.D. X 1/64" WALL NYLON TUBE

5/64" O.D. X 1/64" WALL NYLON TUBE

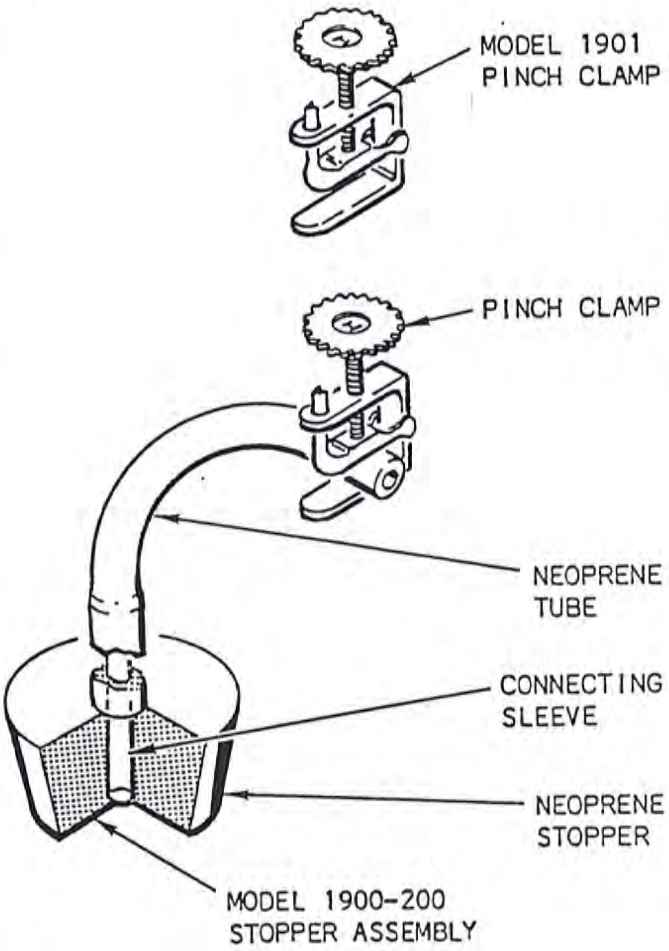
3/32" O.D. X 1/64" WALL NYLON TUBE

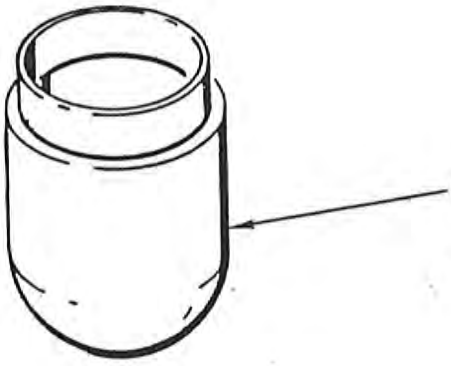
3/16" I.D. X 1/8" WALL NEOPRENE TUBE

(ORDER NUMBER OF FEET REQUIRED)

NOTE:
ALL ACCESSORY ITEMS ARE AVAILABLE FROM SOILMOISTURE EQUIPMENT CORP.

REPLACEMENT ITEMS FOR THE SOIL WATER SAMPLER





SOILMOISTURE EQUIPMENT CORP. P.O. BOX 30025, SANTA BARBARA, CALIF. 93105 U.S.A.

805 964-3525