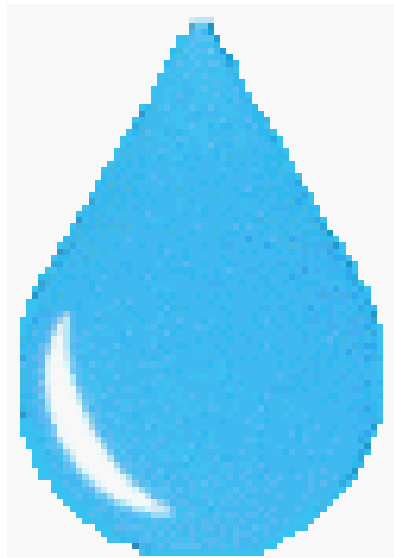


# HYDROLOGY PROJECT

## HYDROLOGICAL OBSERVATIONS

*An Illustrative Booklet*



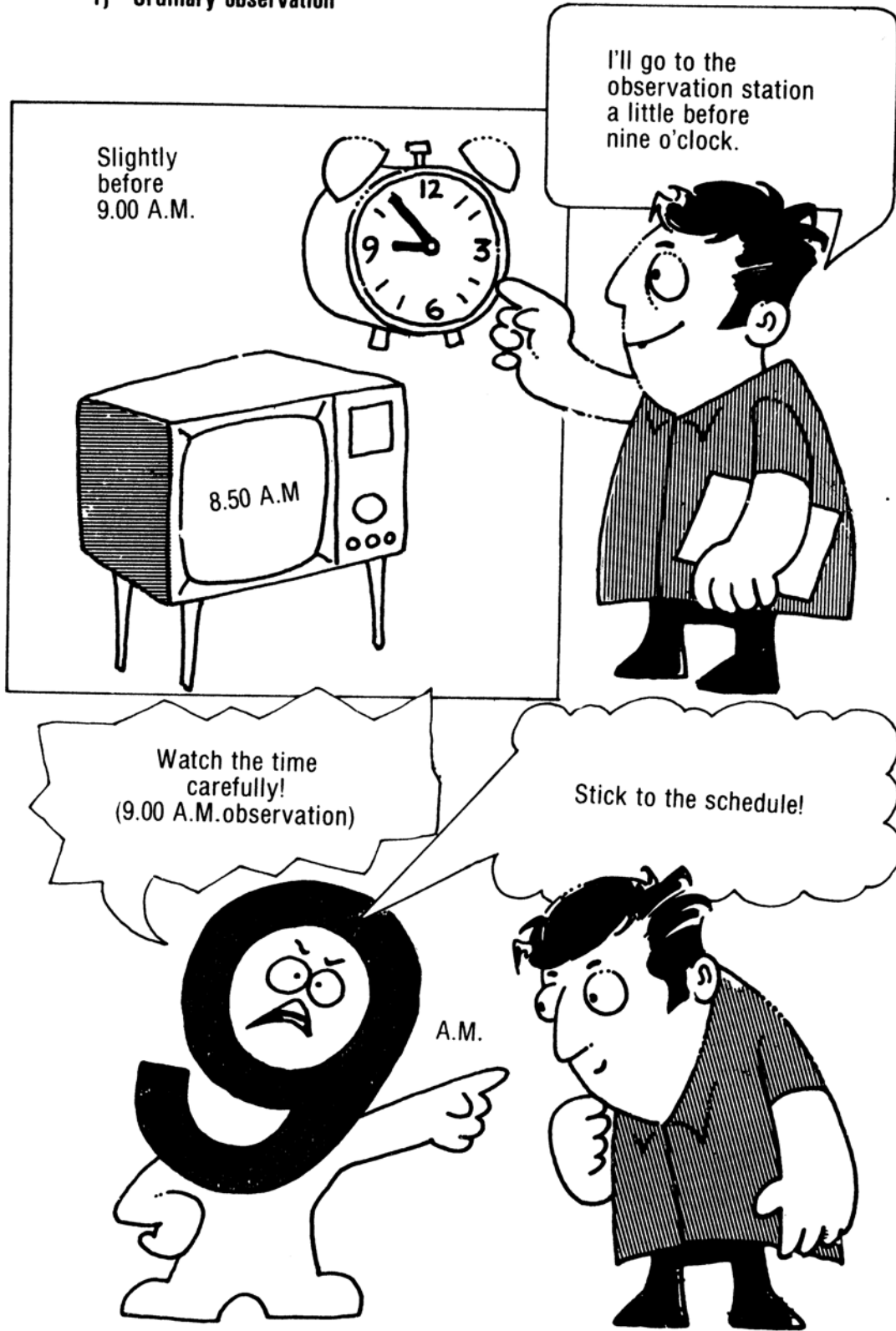
**June - 1999**

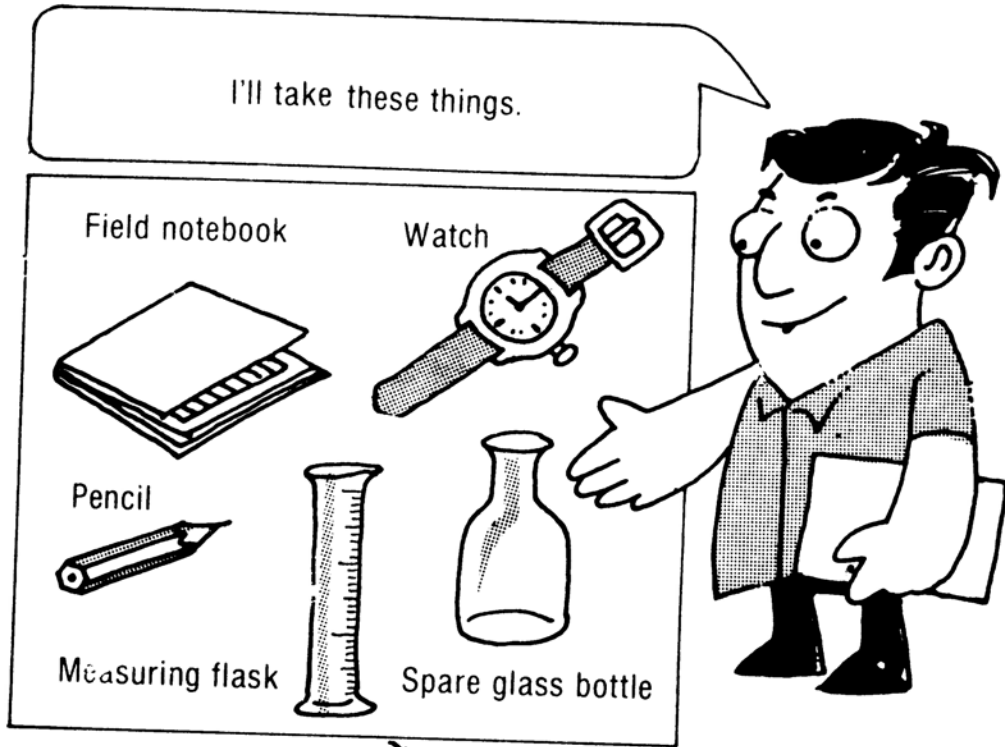
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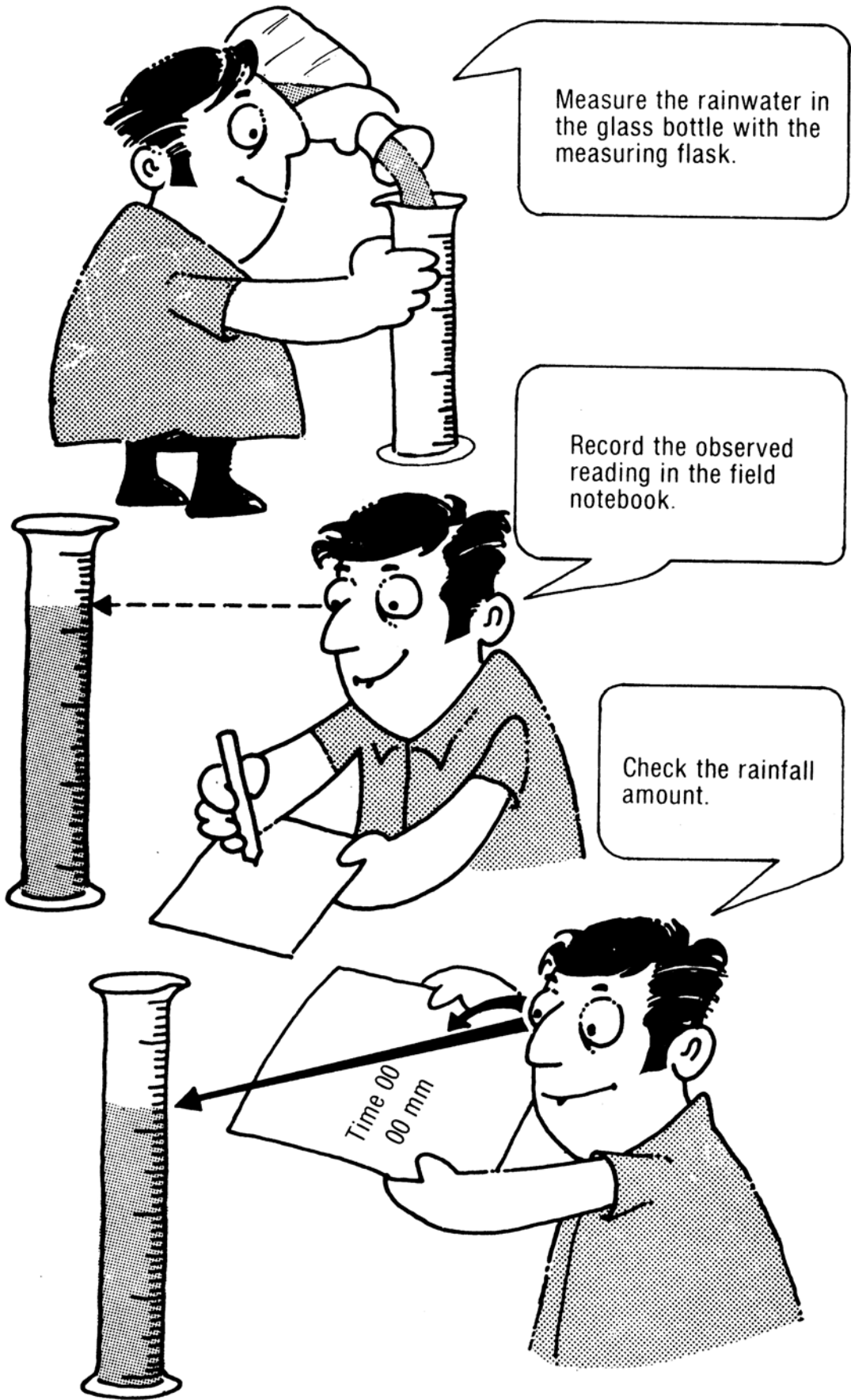
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# 1. Rainfall Observation

## 1) Ordinary observation







Measure the rainwater in the glass bottle with the measuring flask.

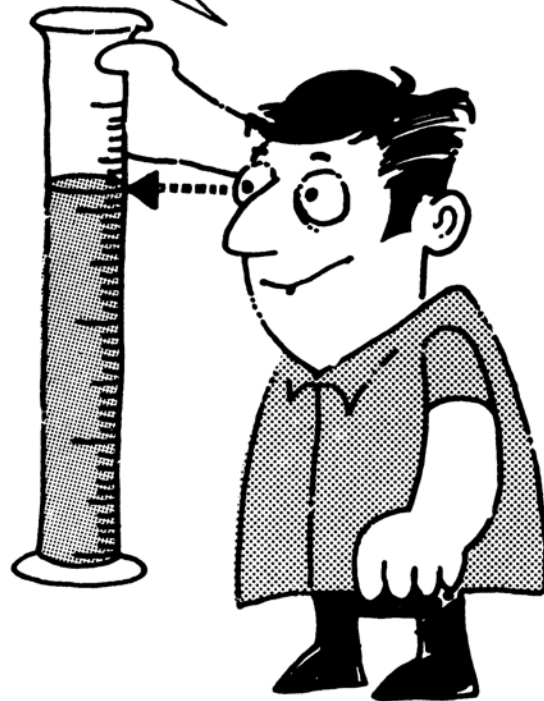
Record the observed reading in the field notebook.

Check the rainfall amount.

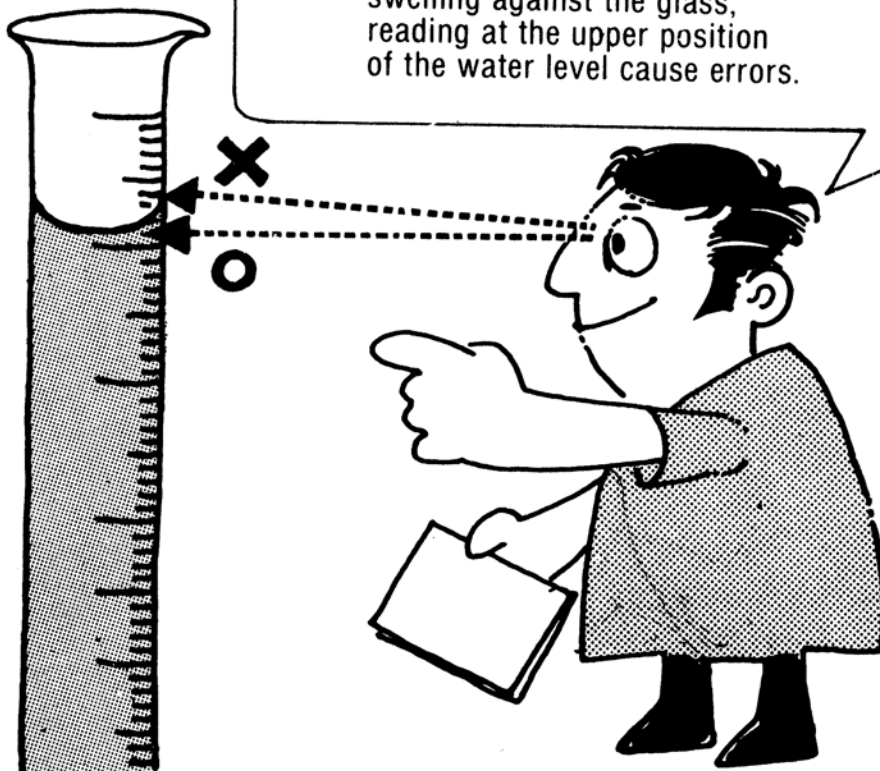


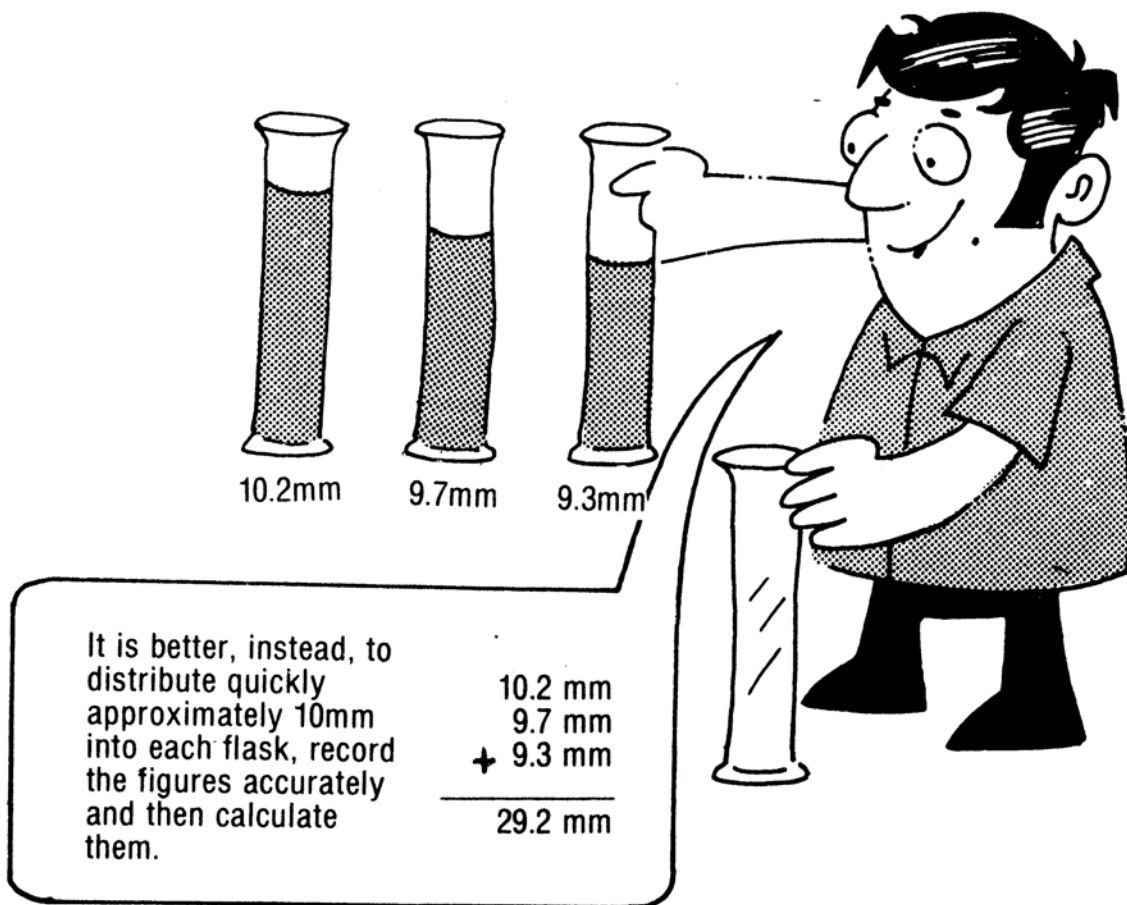
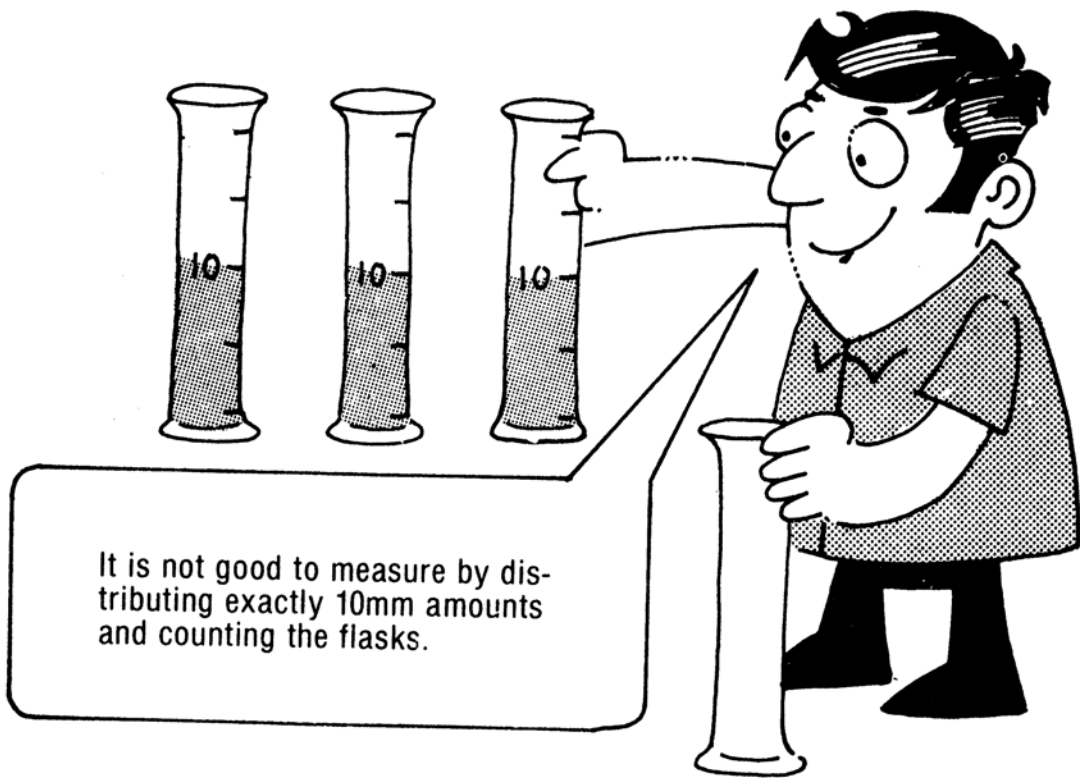
## Rainfall observation methods

While holding the measuring flask at the top so that your eyes are roughly parallel with the water level in the flask, read the level within 0.1mm of its lowest position.



Because the water level has tension on the edges of its surface which leads to swelling against the glass, reading at the upper position of the water level cause errors.

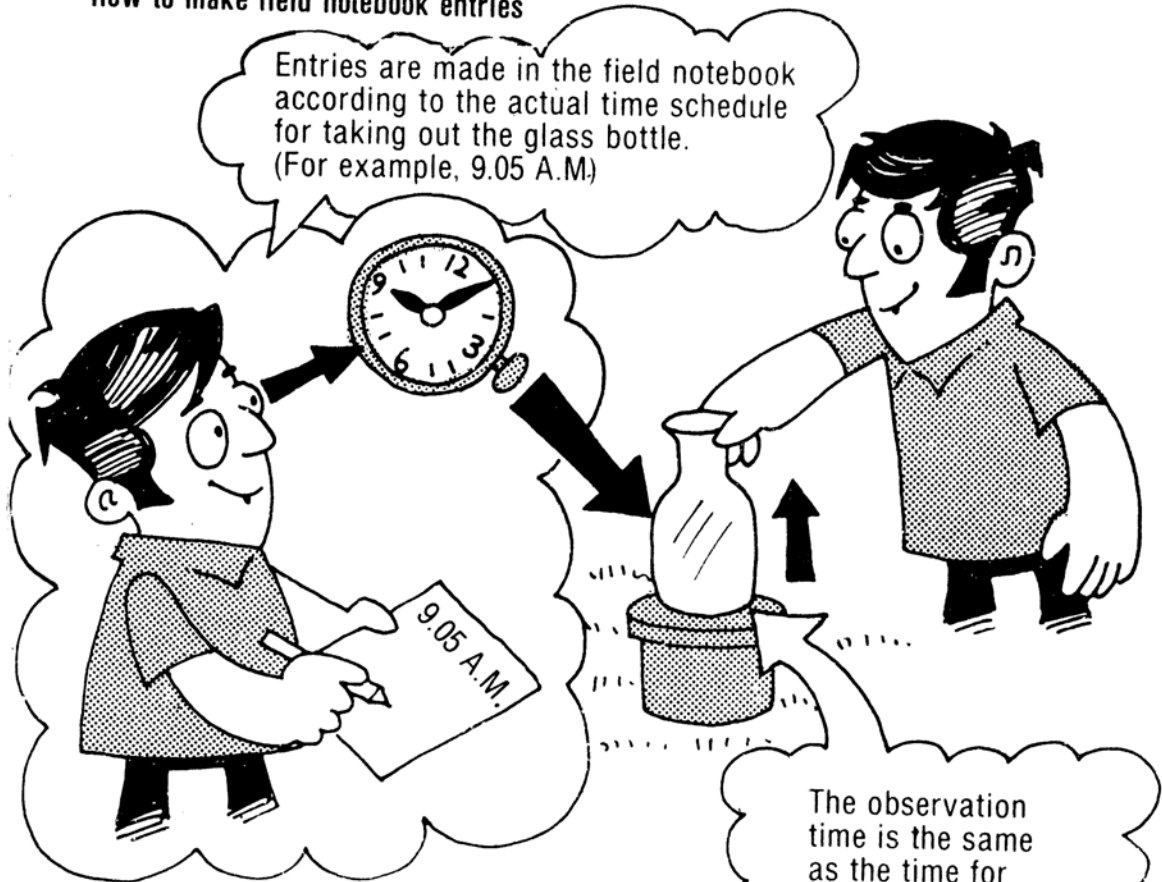






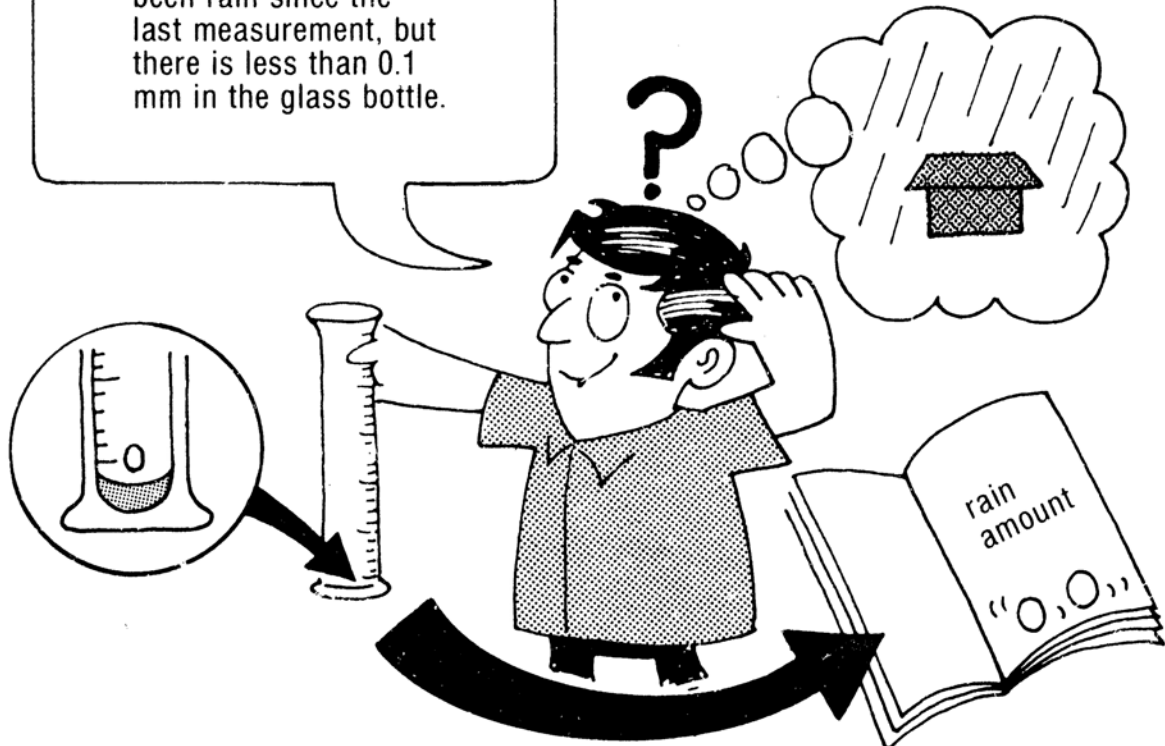
## How to make field notebook entries

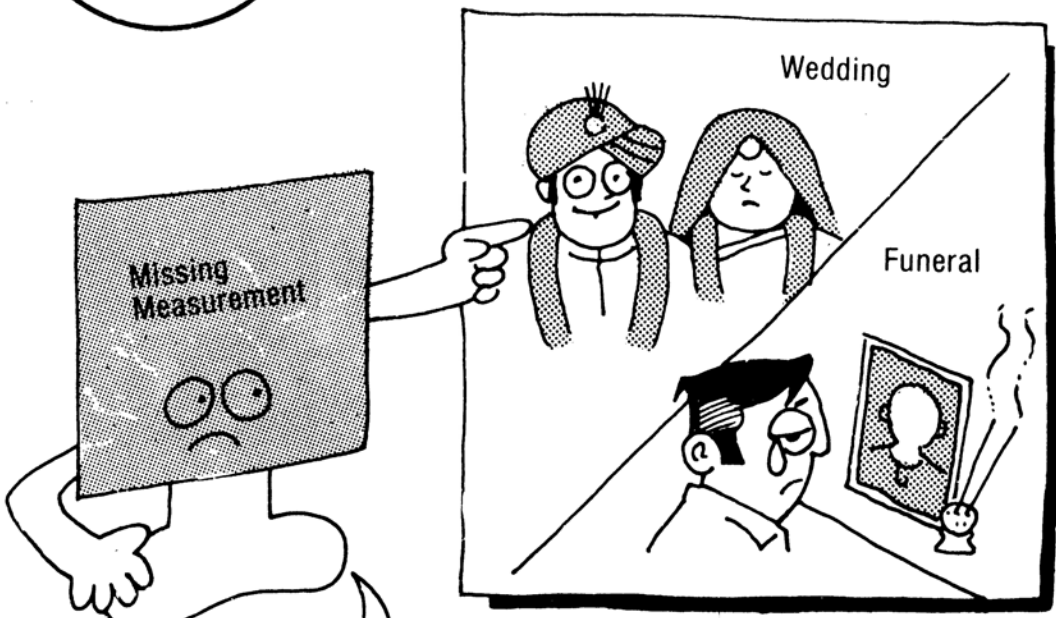
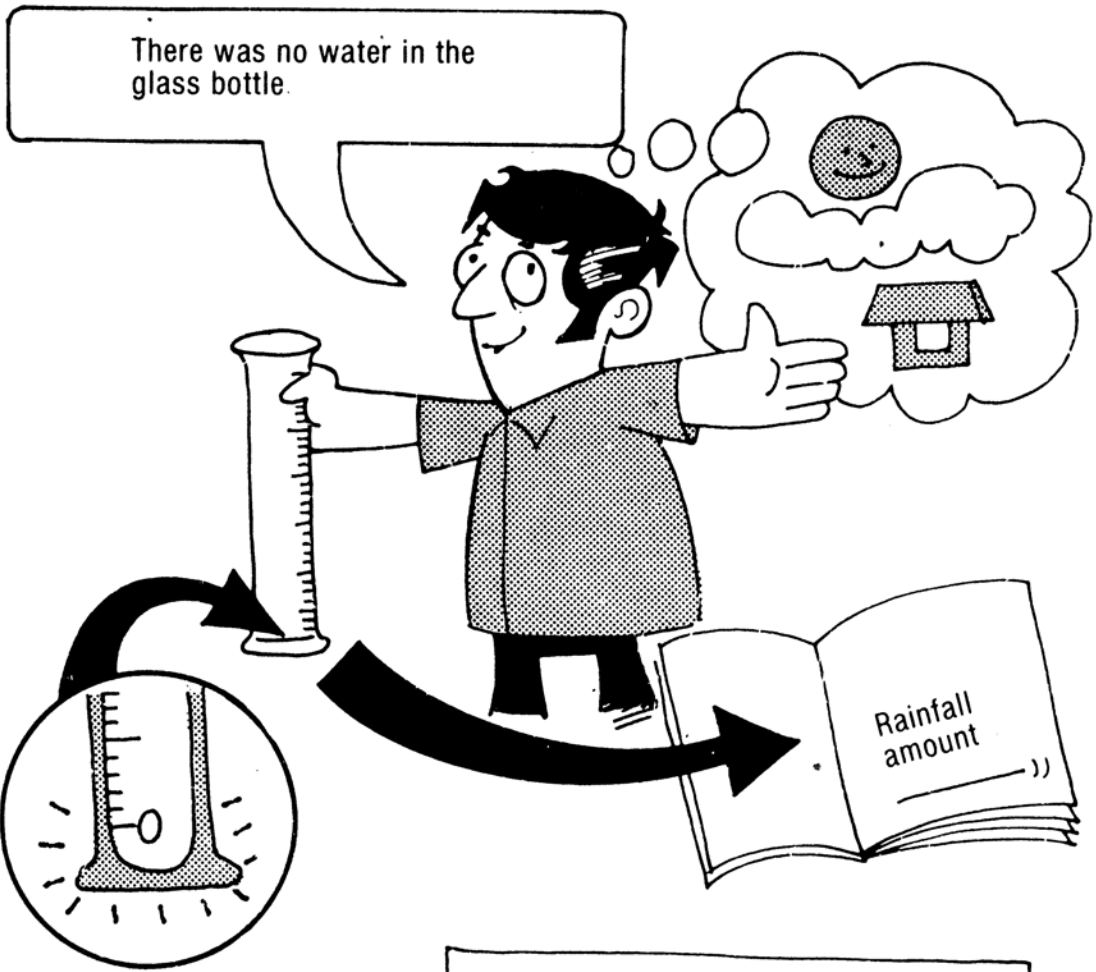
Entries are made in the field notebook according to the actual time schedule for taking out the glass bottle.  
(For example, 9.05 A.M.)



The observation time is the same as the time for taking out the glass bottle.

There seemed to have been rain since the last measurement, but there is less than 0.1 mm in the glass bottle.





When measurements are not made, record this fact accordingly.

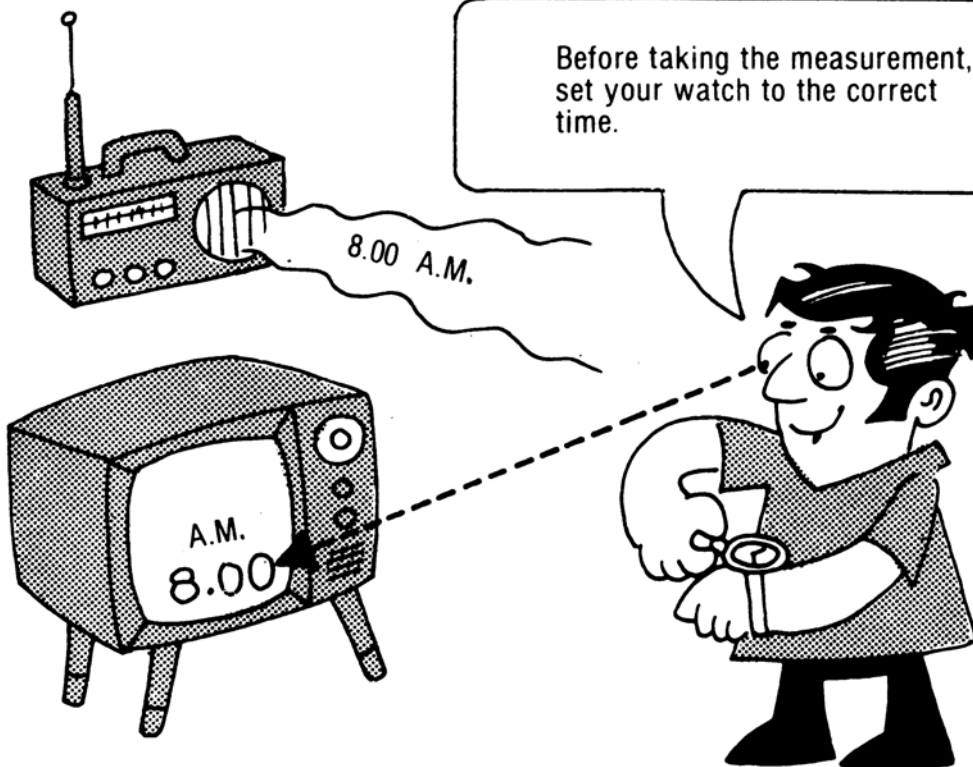
**Cautions**

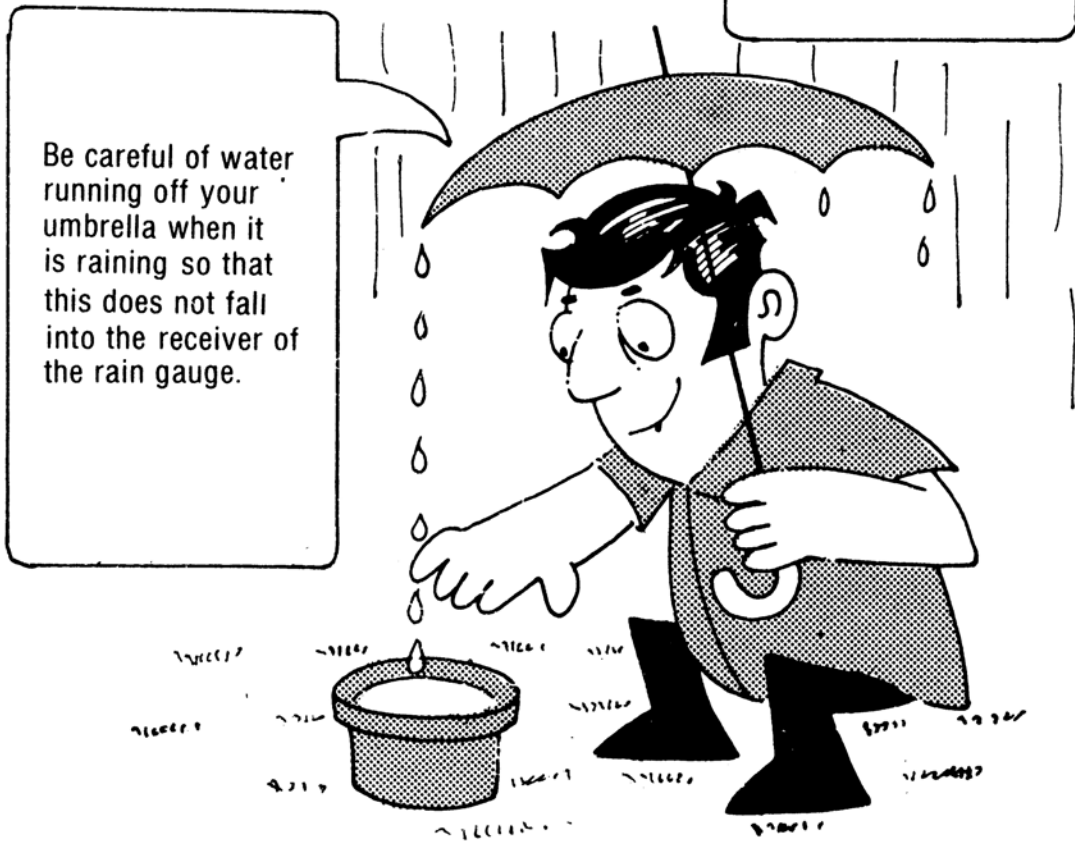
Even if you think no rain has fallen, check the glass bottle every day at the established time (9.00 A.M.).

It may have rained during the night while you were asleep.



Before taking the measurement, set your watch to the correct time.





Do not spill a drop of the rainwater collected in the bottle until it has been measured.

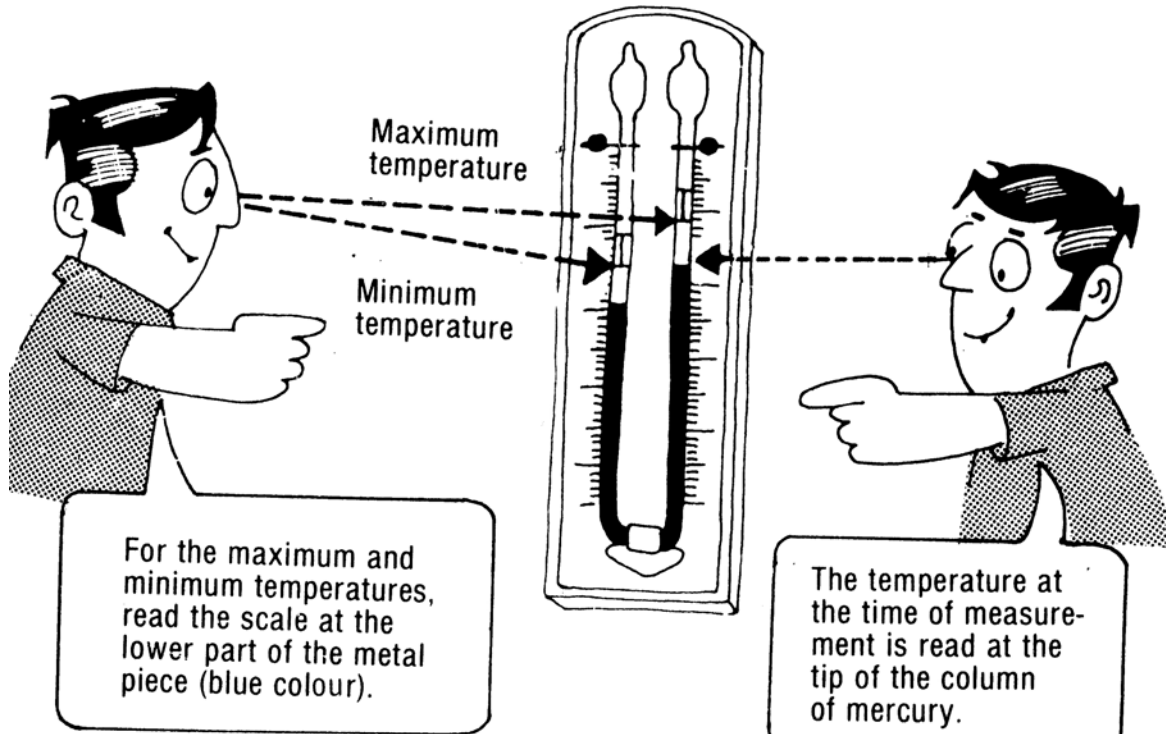


It is necessary when rain is falling at nine o'clock or if the glass bottle splits.

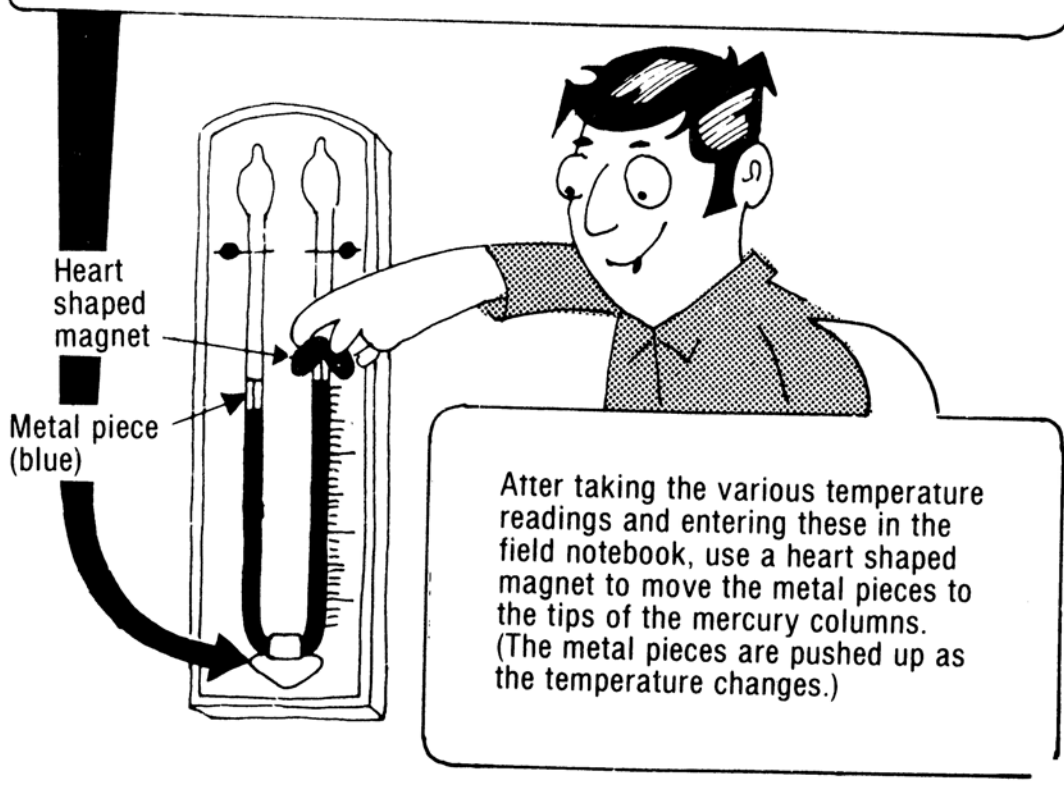


Prepare a spare glass bottle to take with you.

## Temperature measurement

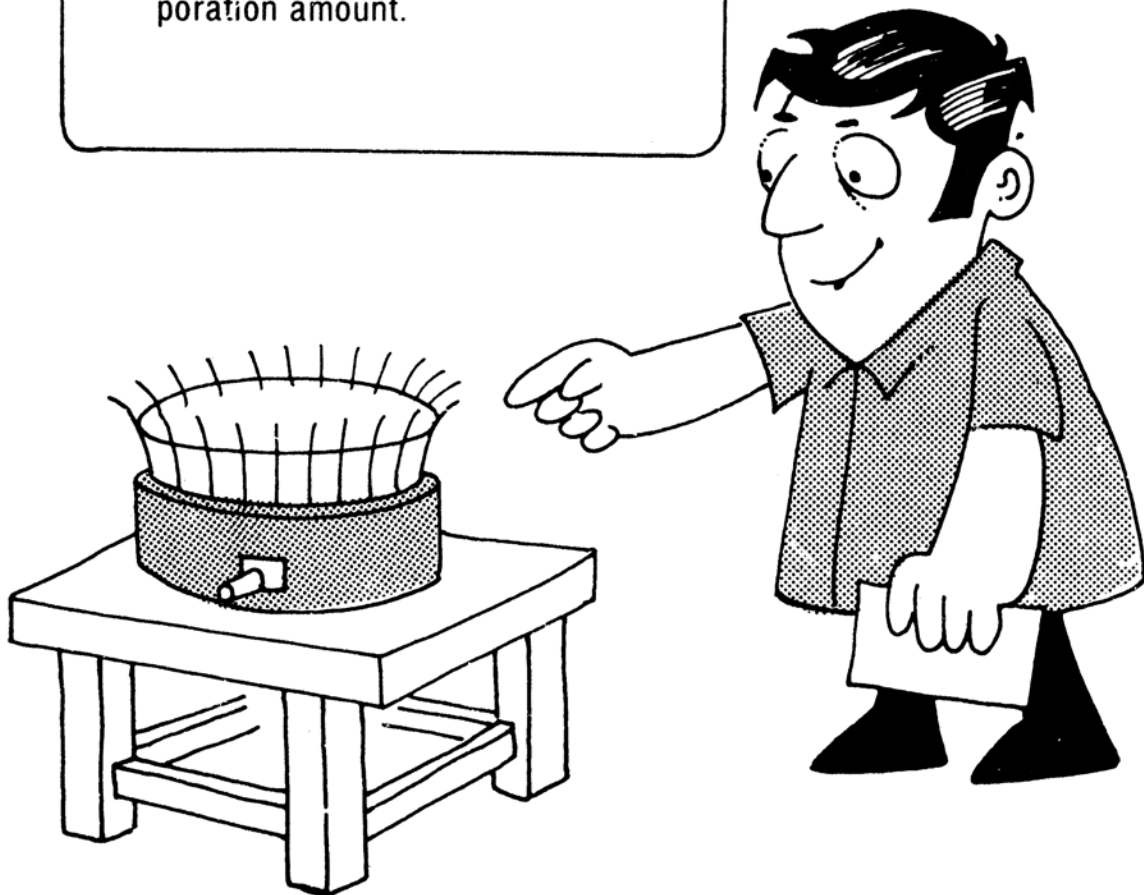


Be sure to place the heart shaped magnet onto the metal hanger (to preserve magnetic force).



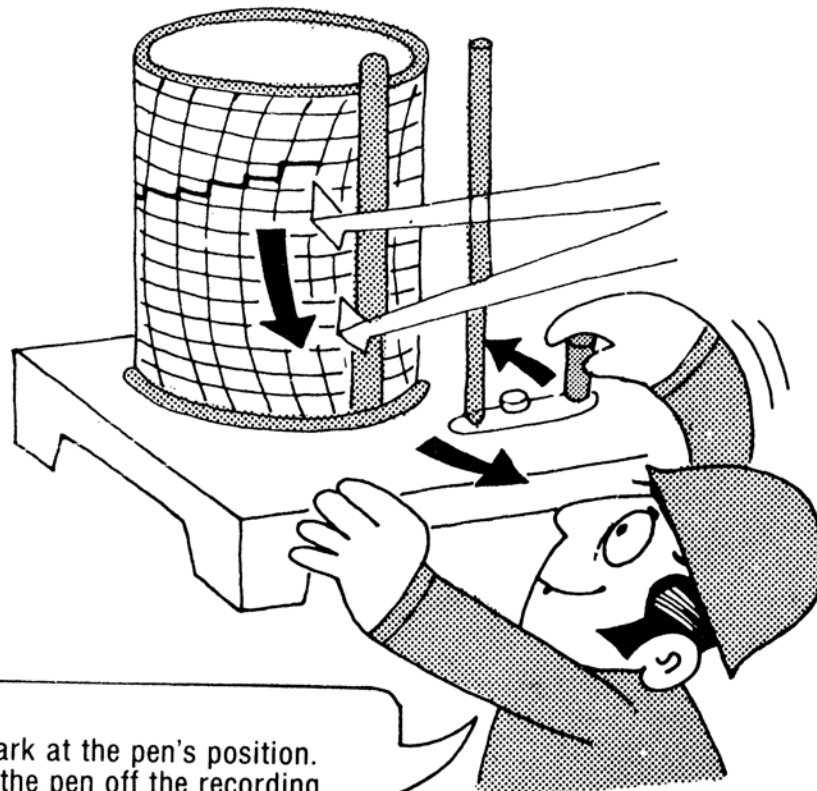
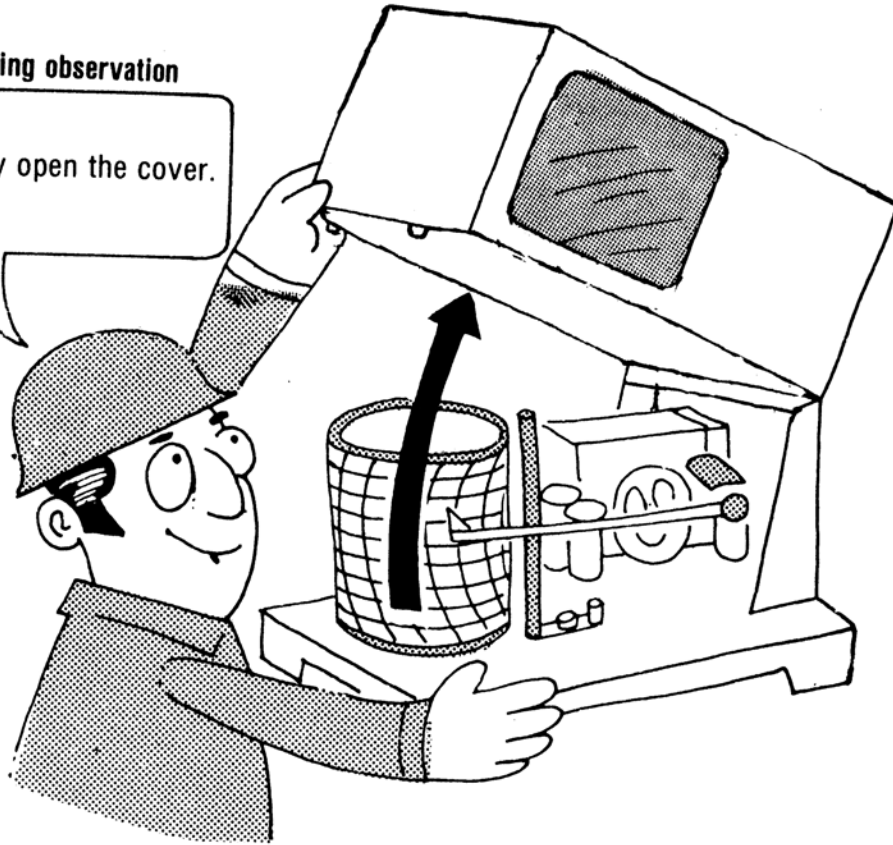
## Observation of evaporation amount

Measure the amount of water placed in the container the day before with a flask in the same way as for rainfall. The amount lost during the day is the evaporation amount.



**2) Recording observation**

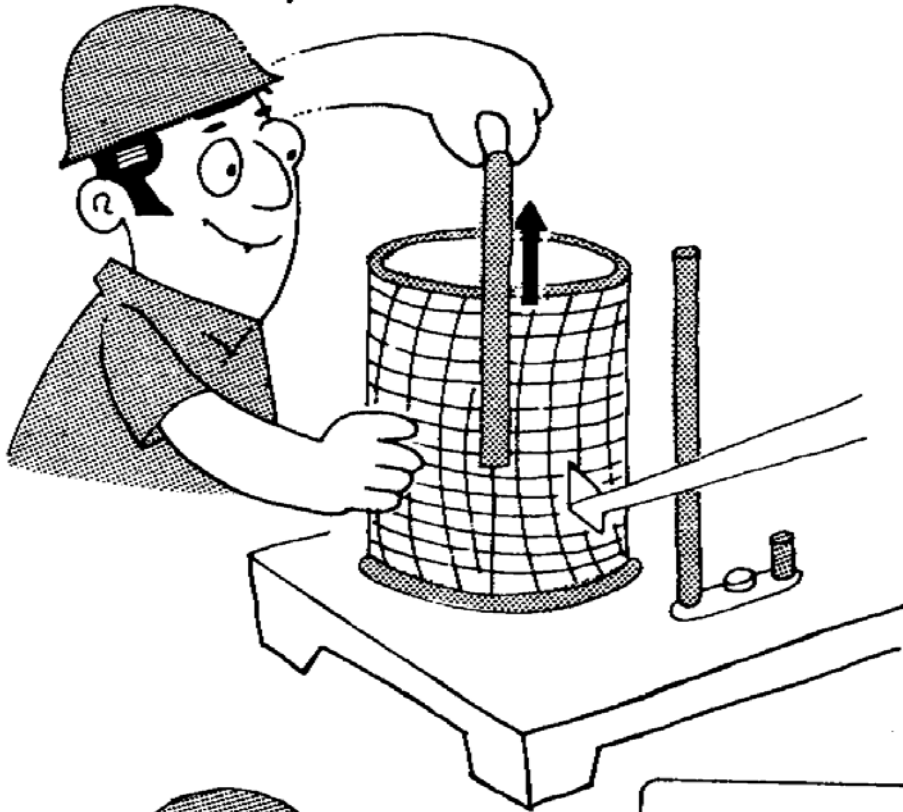
Carefully open the cover.



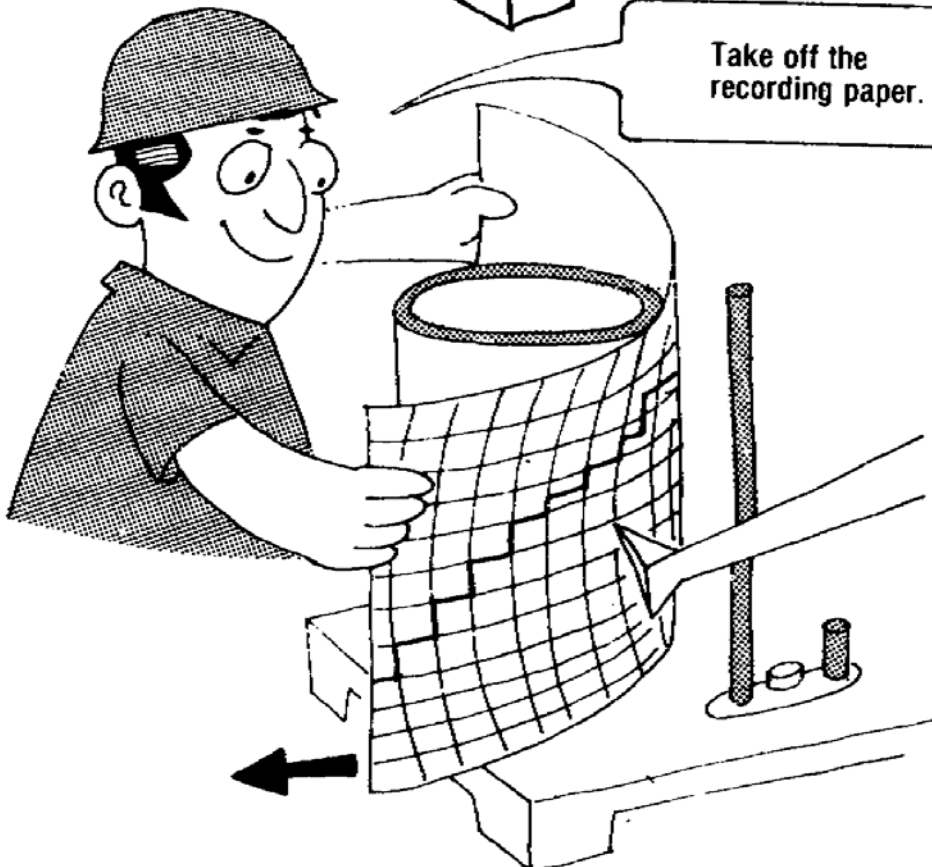
Make a mark at the pen's position.  
Gently lift the pen off the recording  
paper.

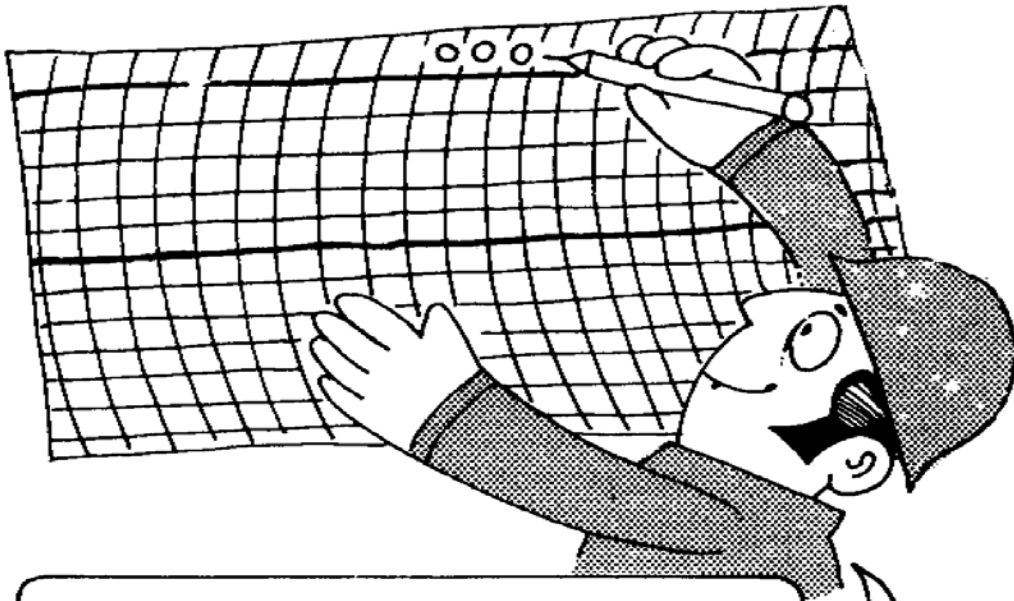


Remove the clasp.



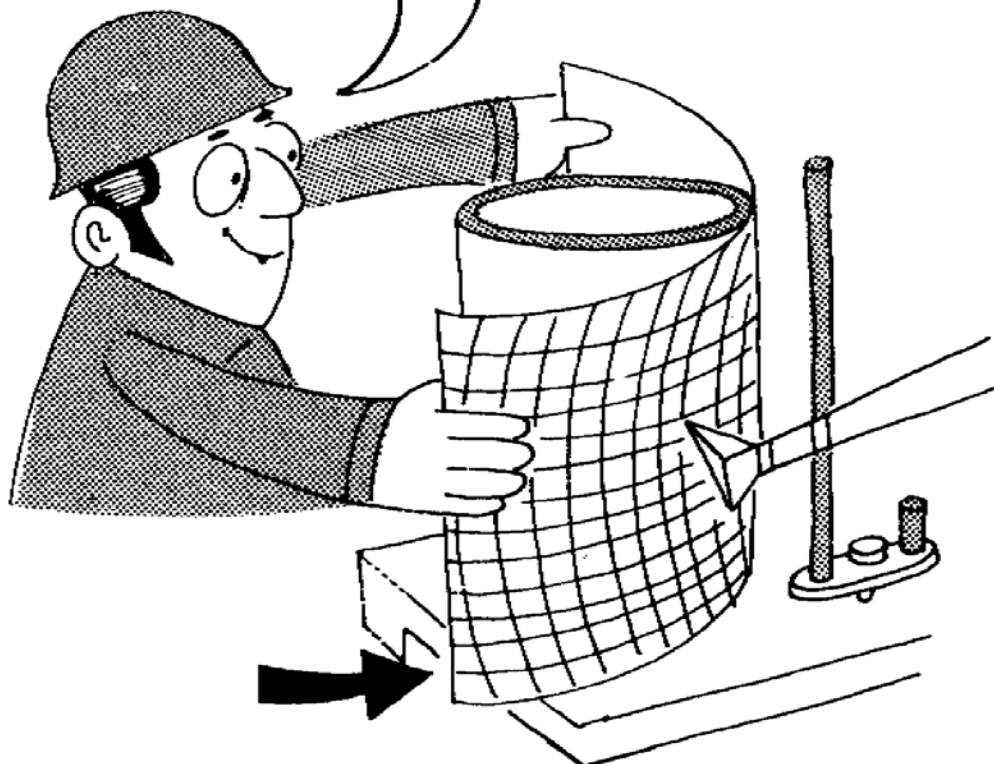
Take off the recording paper.

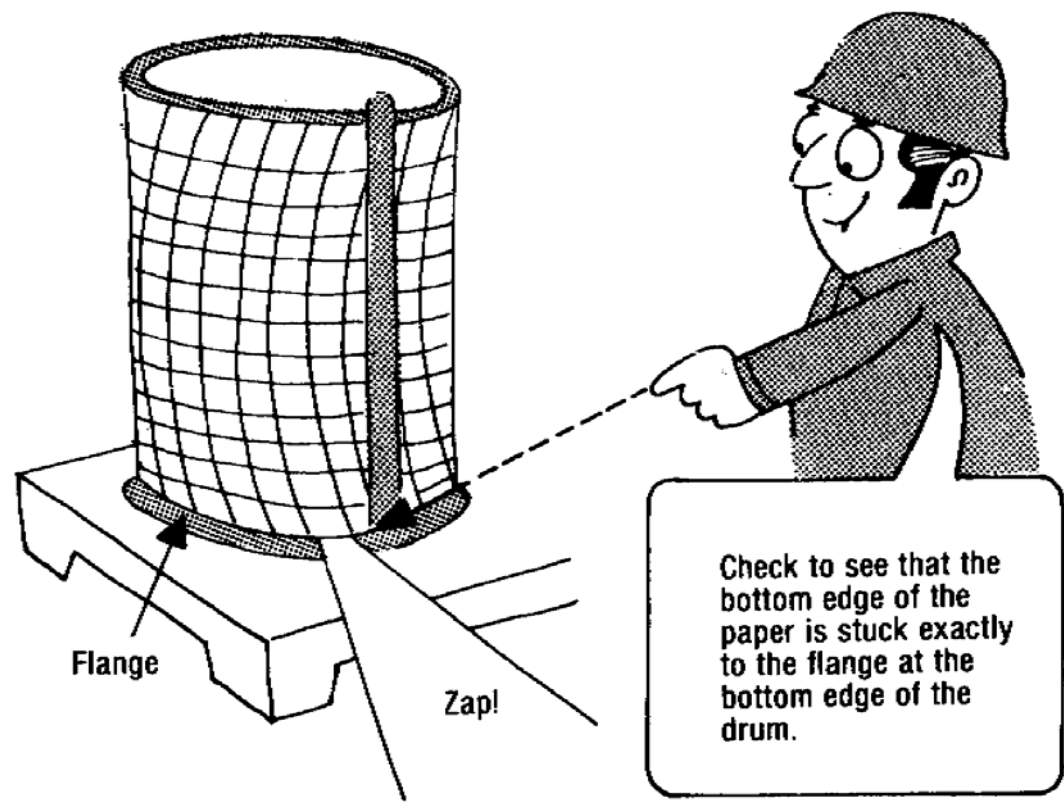
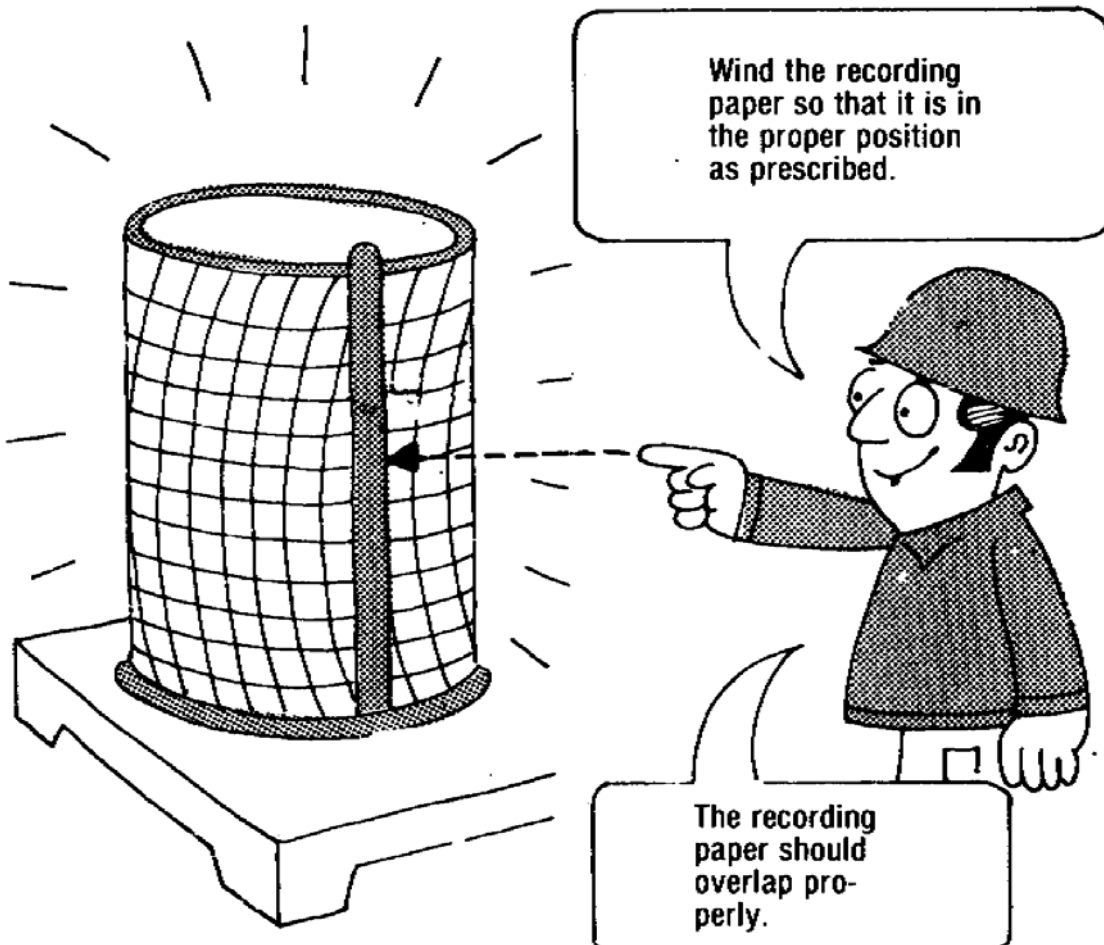




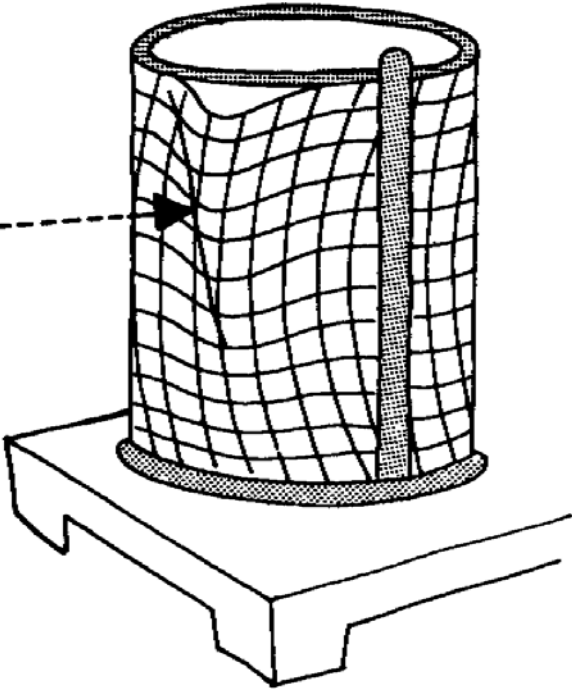
Record the date, time, weather conditions and your name at the point on the recording paper from which the pen was removed.

Put on a new piece of recording paper.

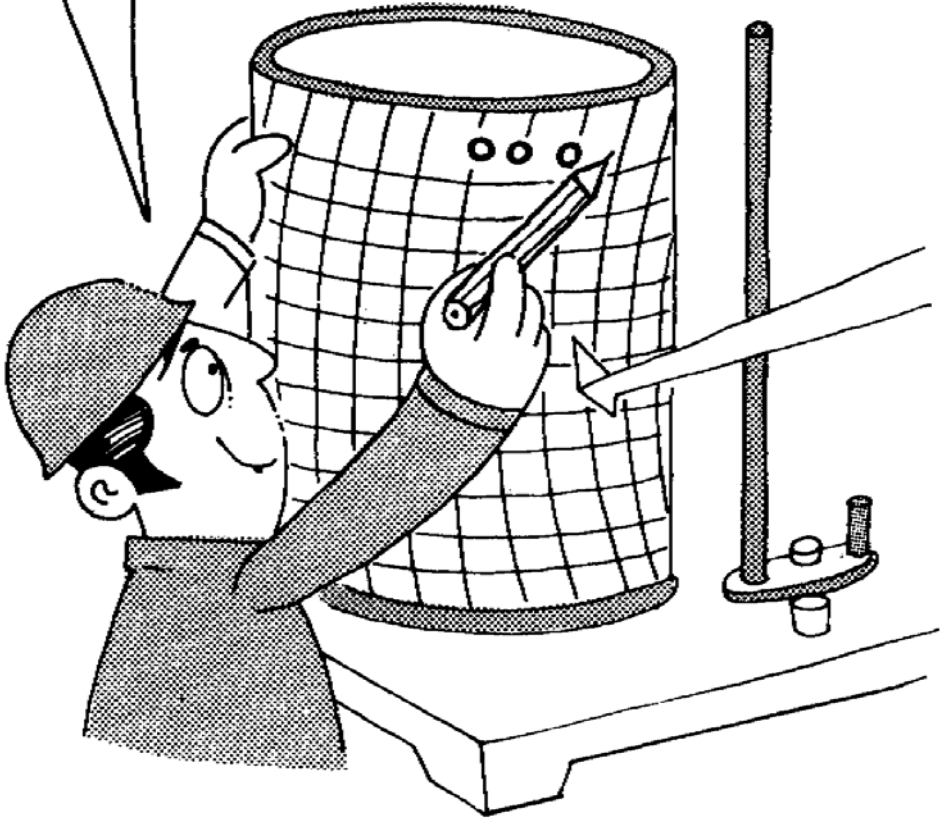


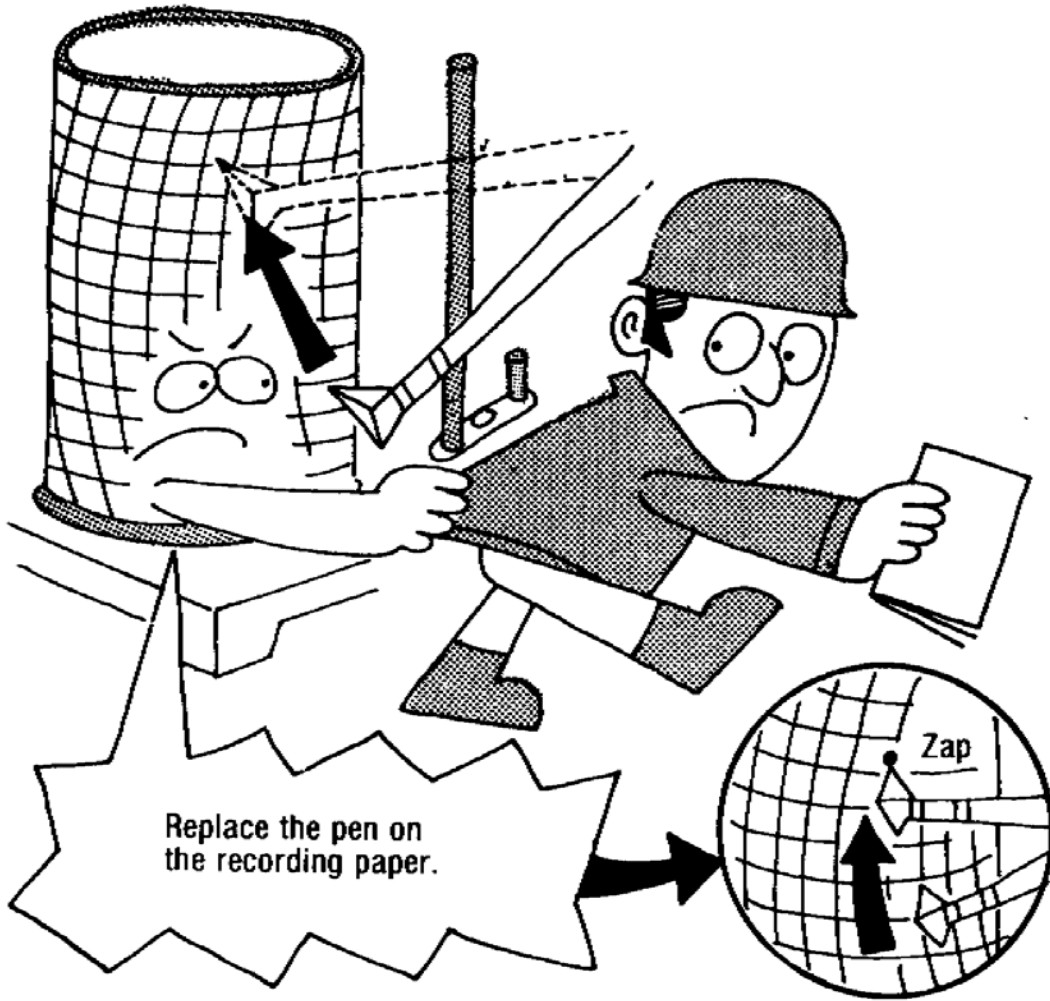


The recording paper should not sag.

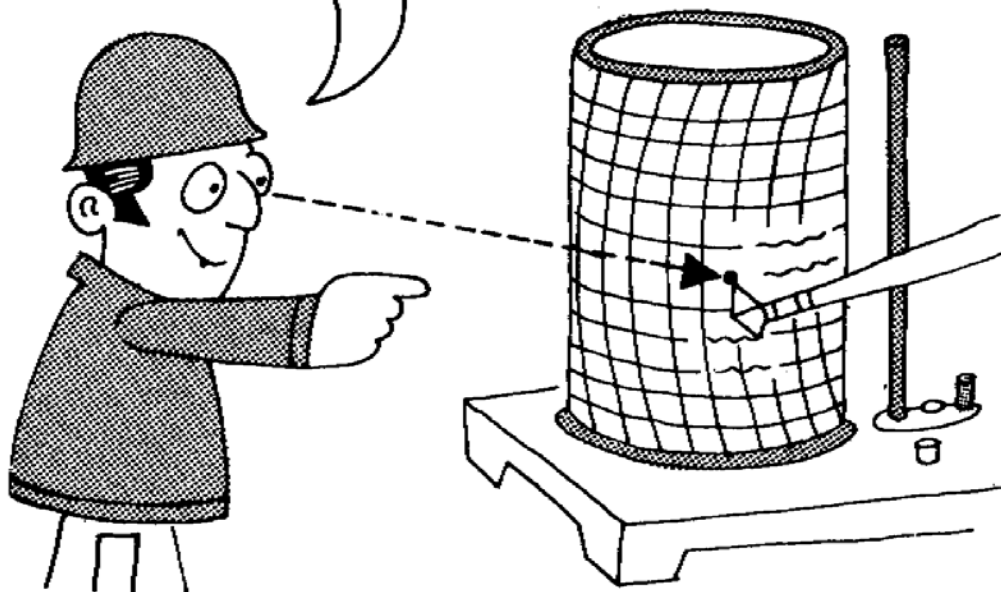


Record the date, time, weather conditions and your name at installation.



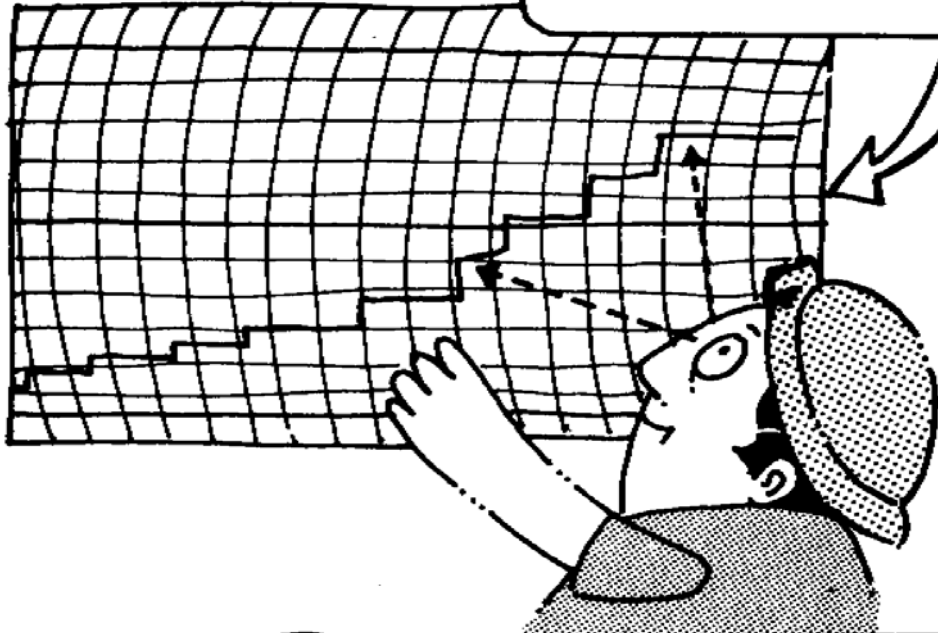


If you have some extra time, wait three to five minutes after the paper has been installed to reconfirm that movement is correct.



**Examination of the recording paper**

Confirm that the paper which has been removed has recorded the measurements properly.

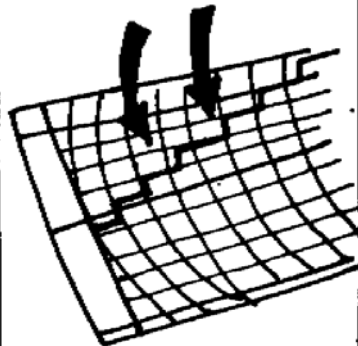


Call the supervising office in these cases:

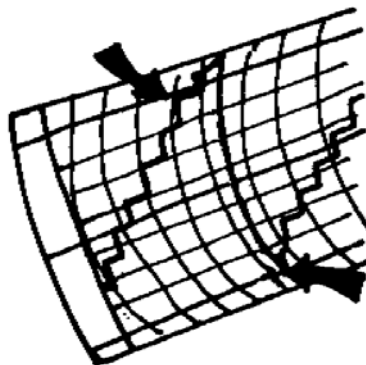
When considerable rainfall is measured by ordinary rain gauge but not by the recording paper.



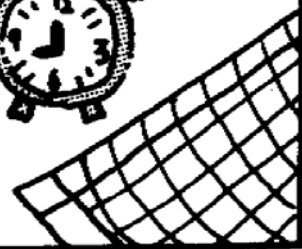
When the line is blurred, blotted or does not connect.



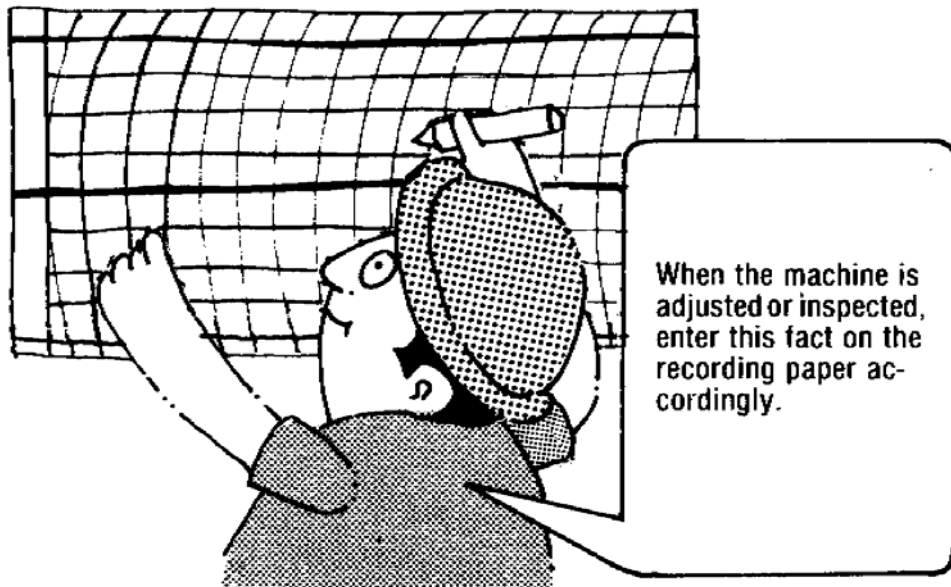
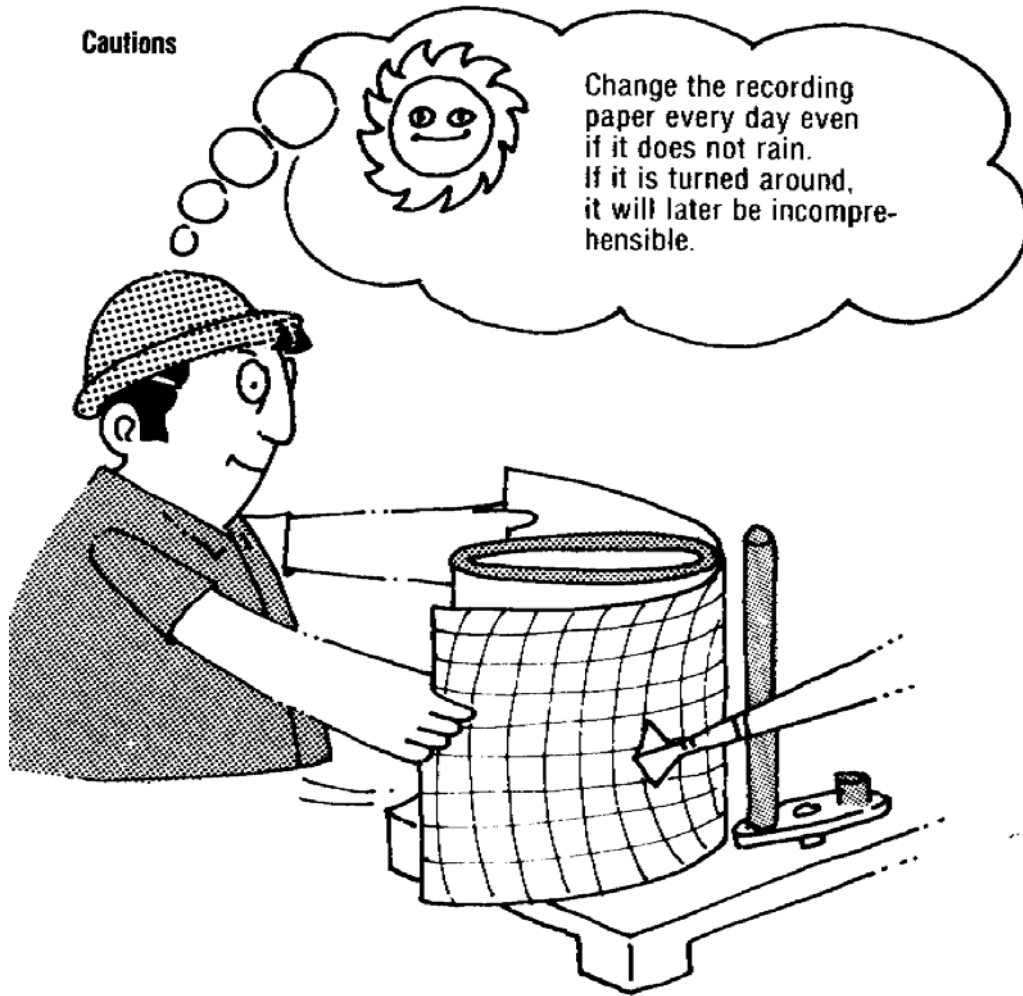
When the scale does not switch from top to bottom.

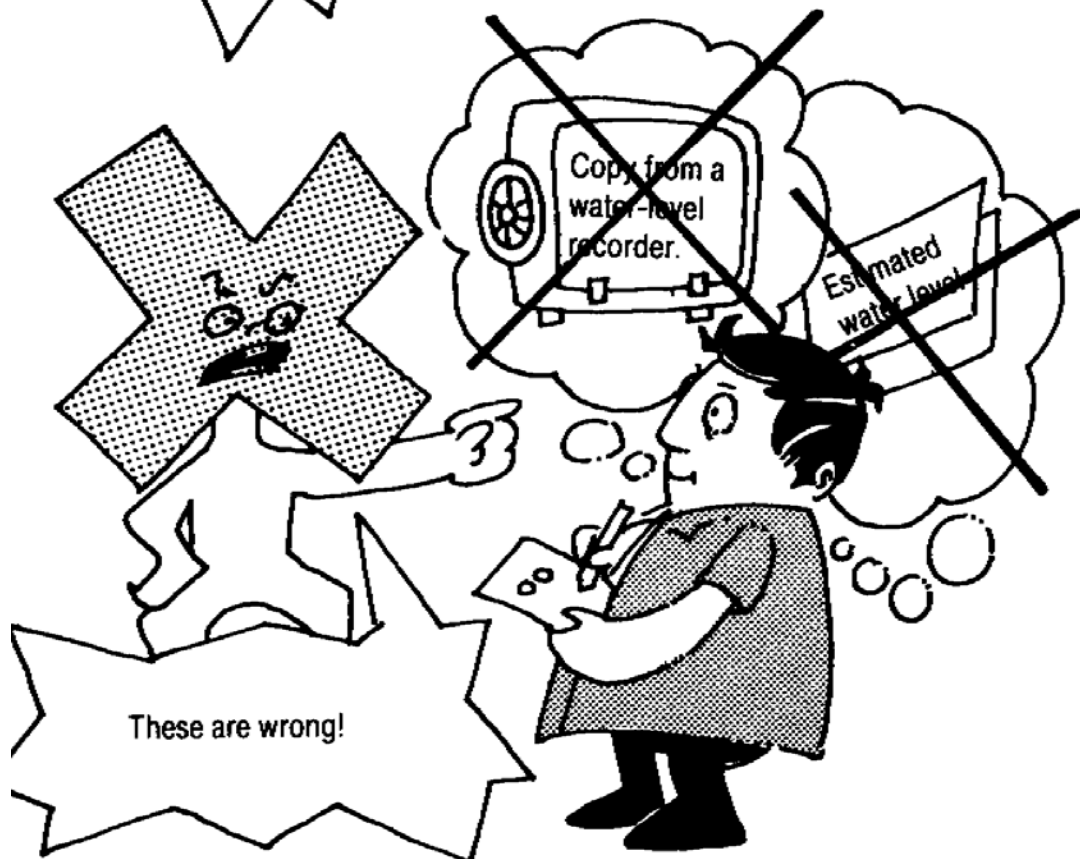
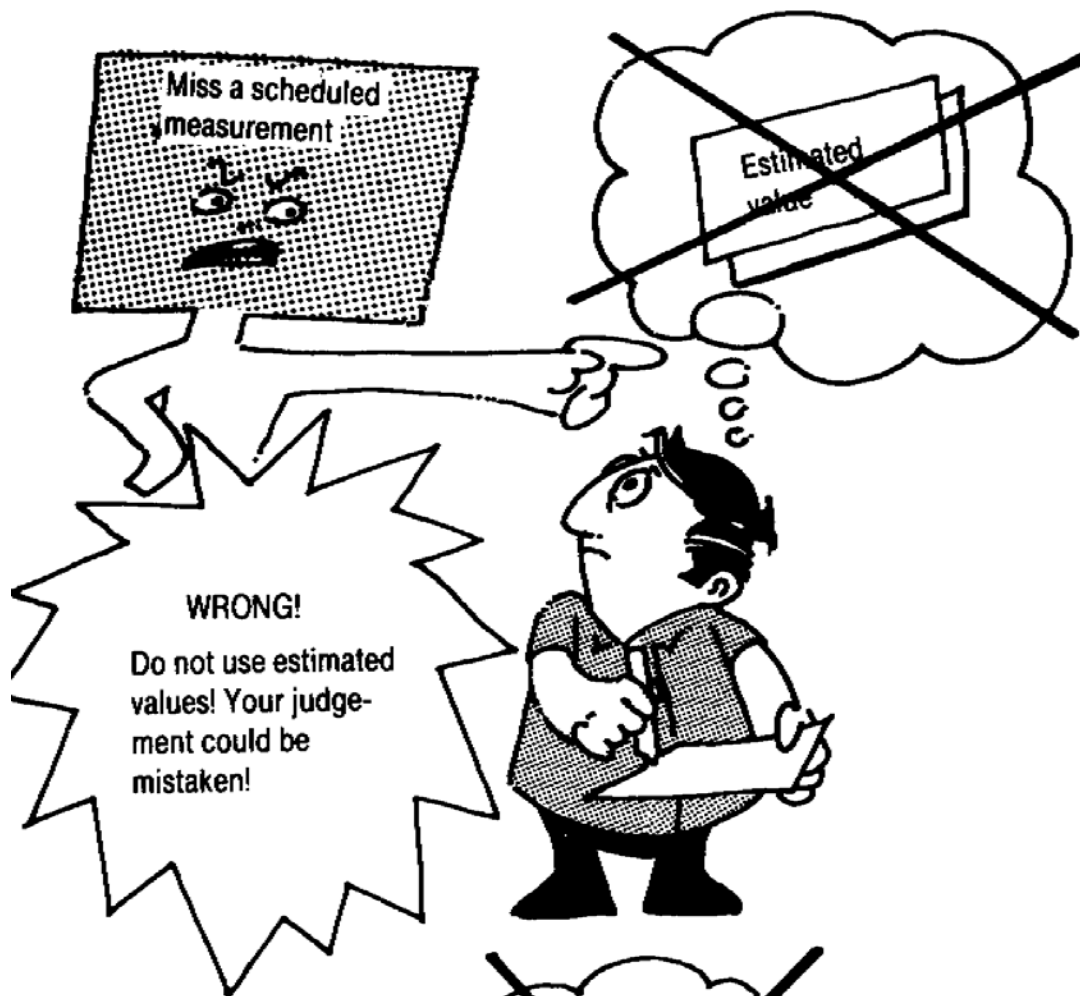


When the time on the recording paper does not agree with standard time.



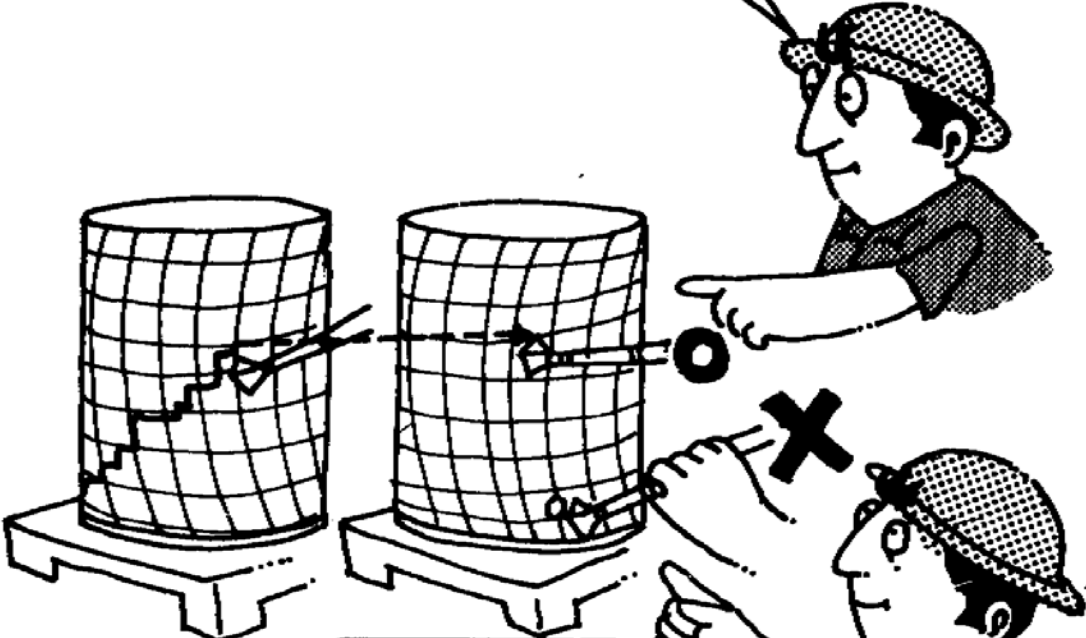
**Cautions**







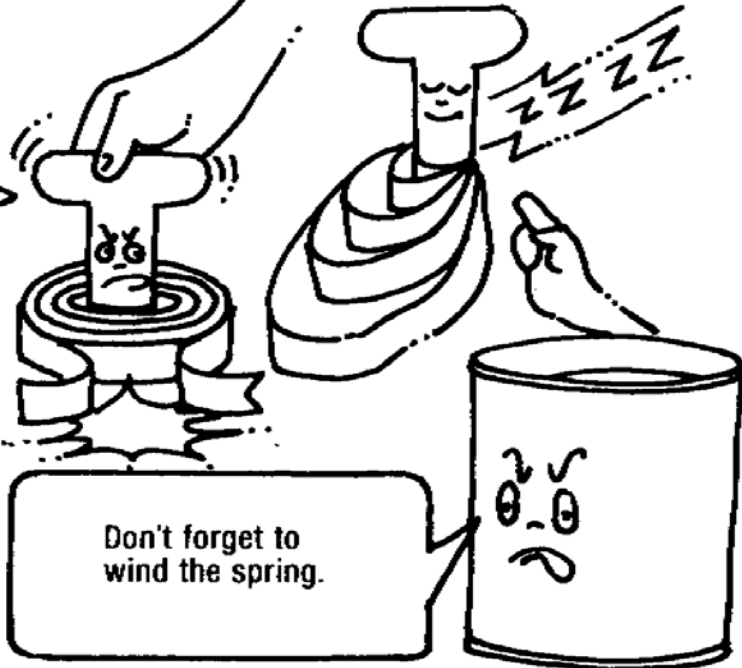
Don't place the pen back to "0" every day. Instead, place it on the mark it last made.



Don't lower the pen to zero!

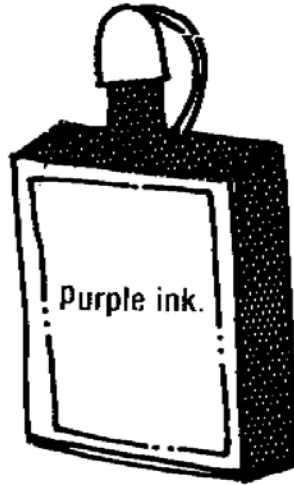
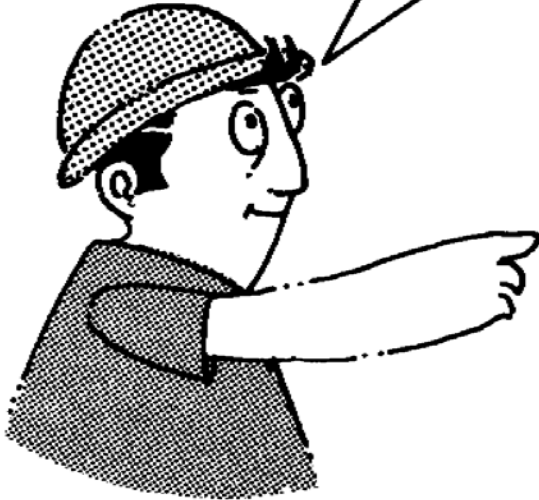


Don't just wind the spring one turn. Give it slightly less than a full wind. Slightly less than a full wind is the secret to long spring life.

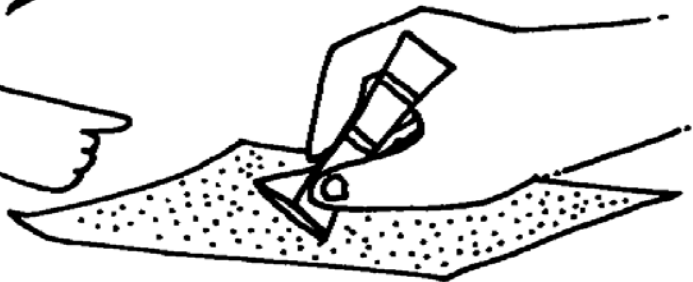
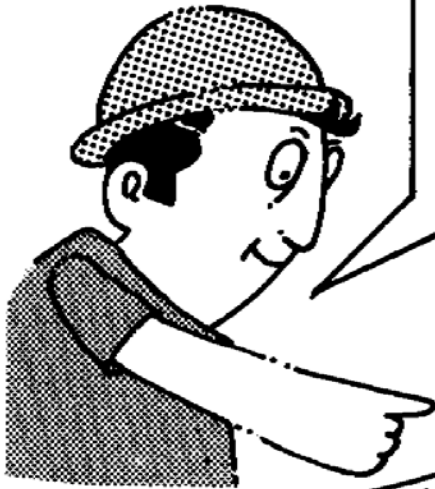


Don't forget to wind the spring.

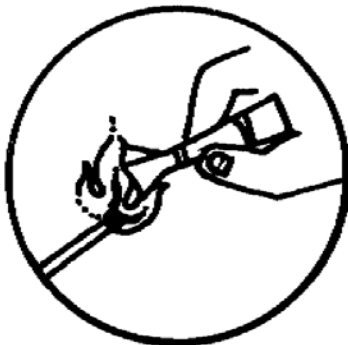
Use a prescribed type of ink with the recording paper. Triangular pens normally use purple ink.



When using a new triangular pen, rub the tip slightly and the ink will flow easily.



To remove oil, burn with a match

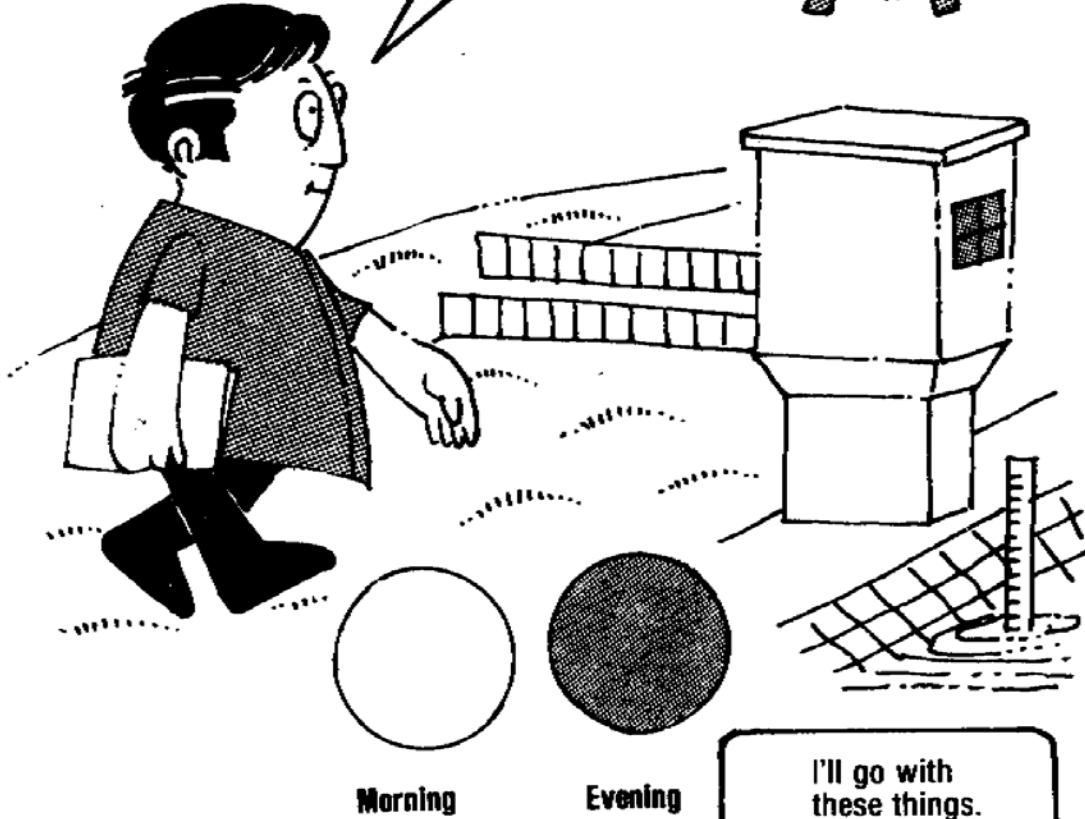


After checking the ink, make an ink trail in the direction of the tip with a toothpick.

## 2. Water Level Observation

### 1) Ordinary observation

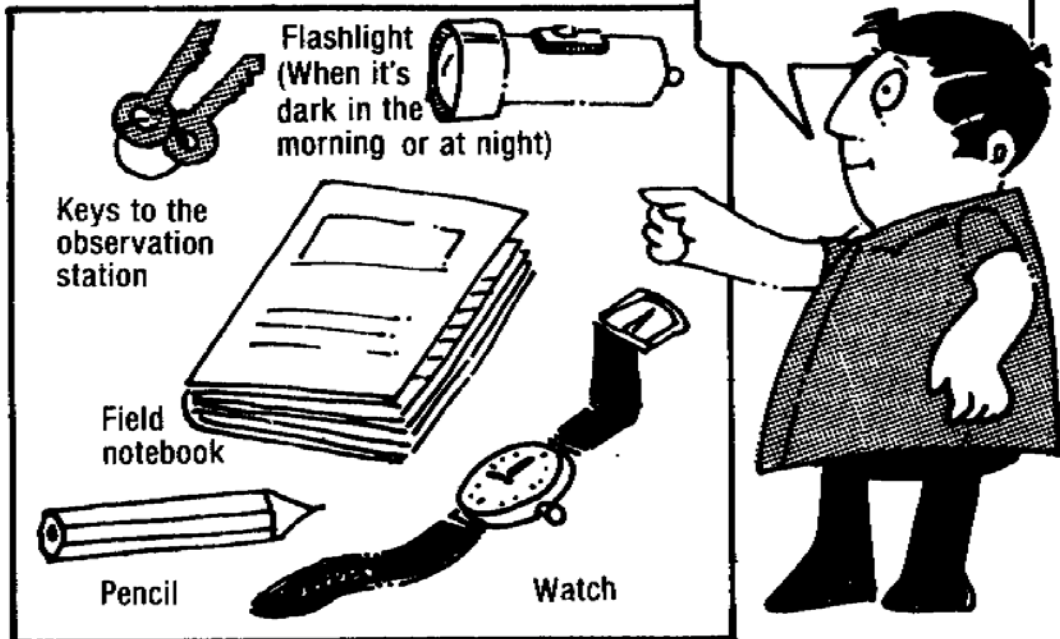
Go to the observation station a little before six o'clock in the morning and the evening.



Morning

Evening

I'll go with these things.



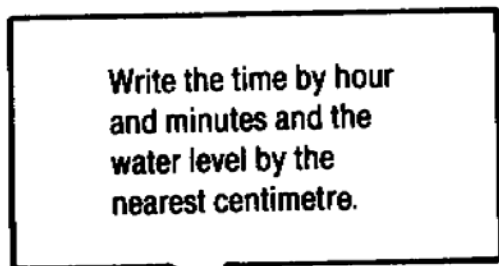
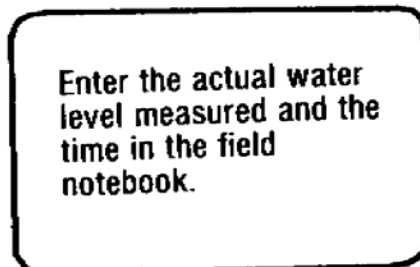
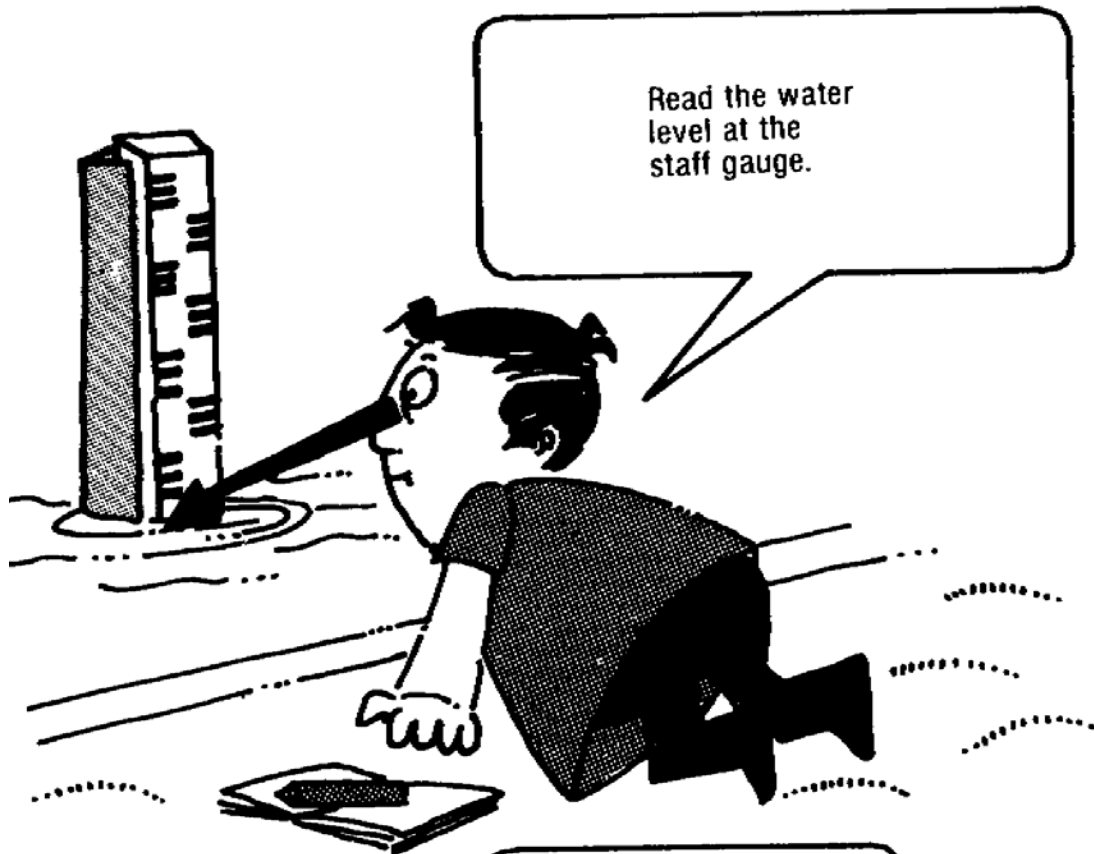
Flashlight  
(When it's dark in the morning or at night)

Keys to the observation station

Field notebook

Pencil

Watch

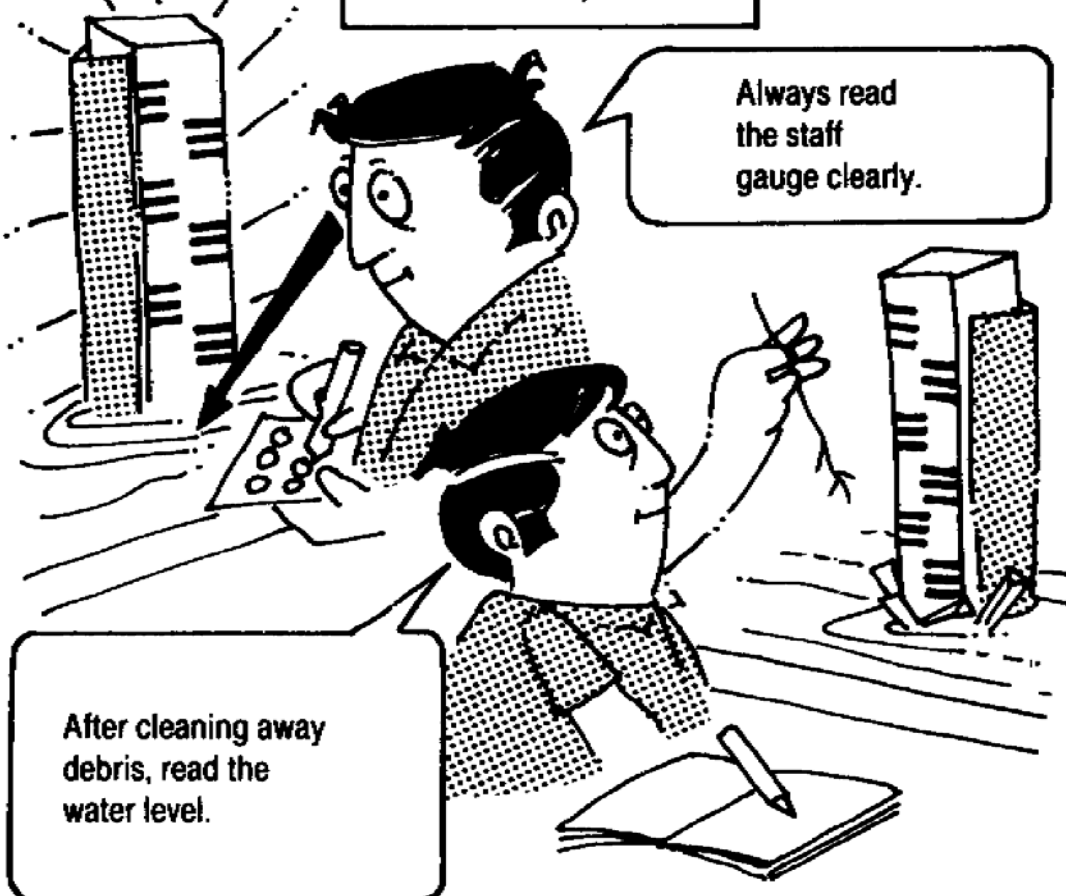


After recording the entry in the field notebook, confirm its accuracy again by reading the water level at the staff gauge.

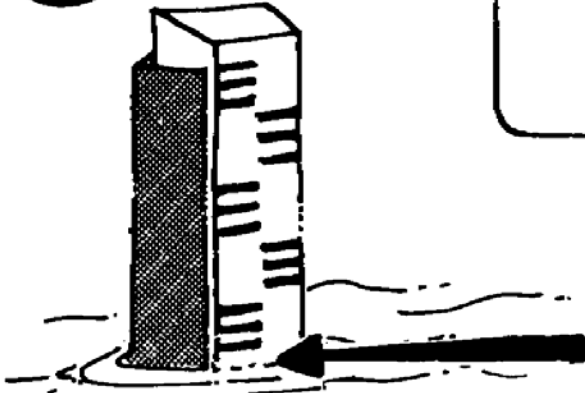


Be sure the reading is correct at the time!  
(Afterwards it cannot be reconfirmed)

Always read the staff gauge clearly.



After cleaning away debris, read the water level.

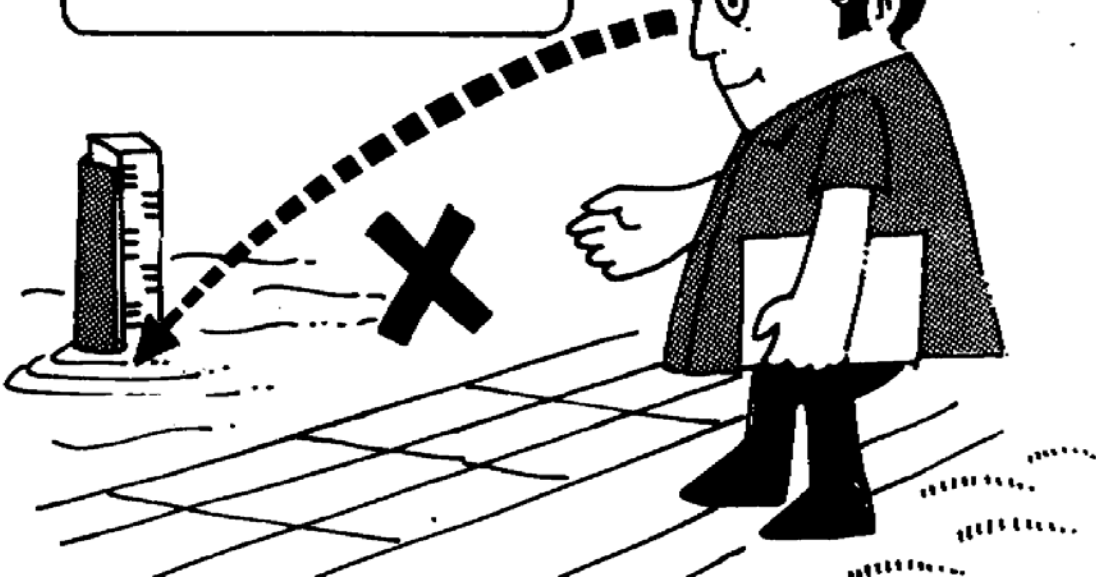


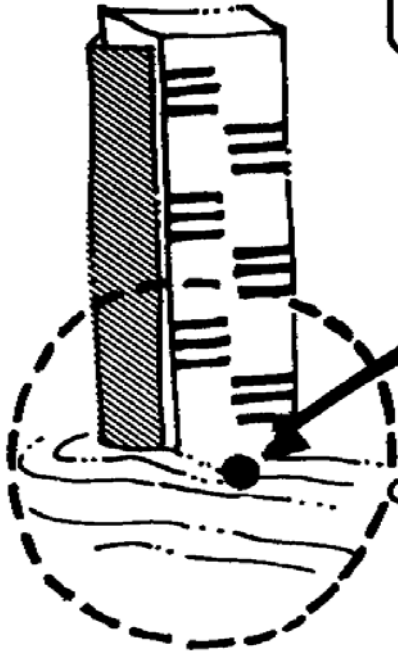
Be sure to read the water level from a position near the mark where it can be easily seen.

Read from a horizontal position.

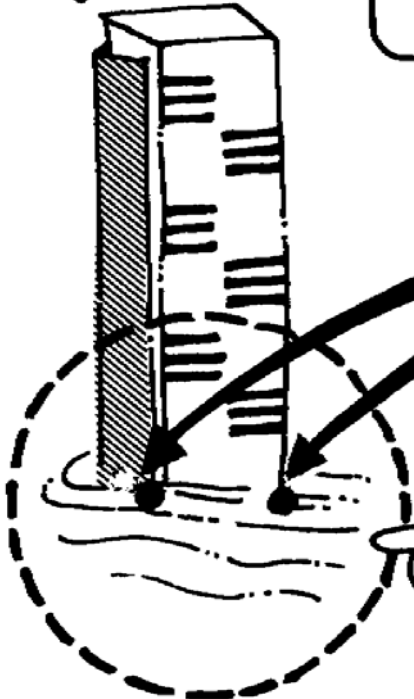
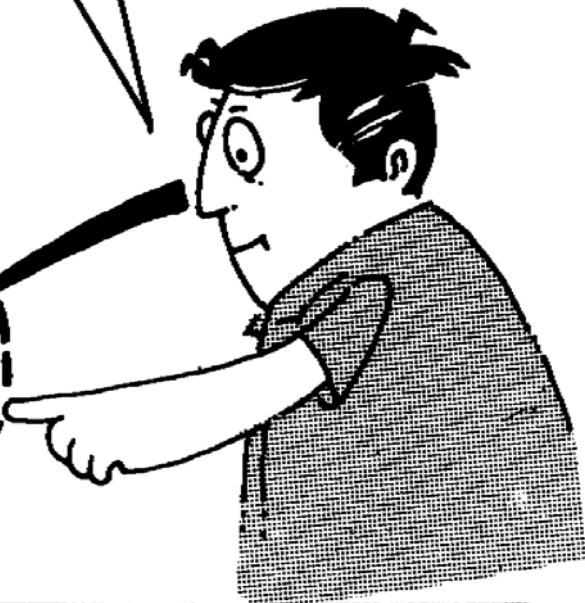


The water level cannot be correctly read from a distance.

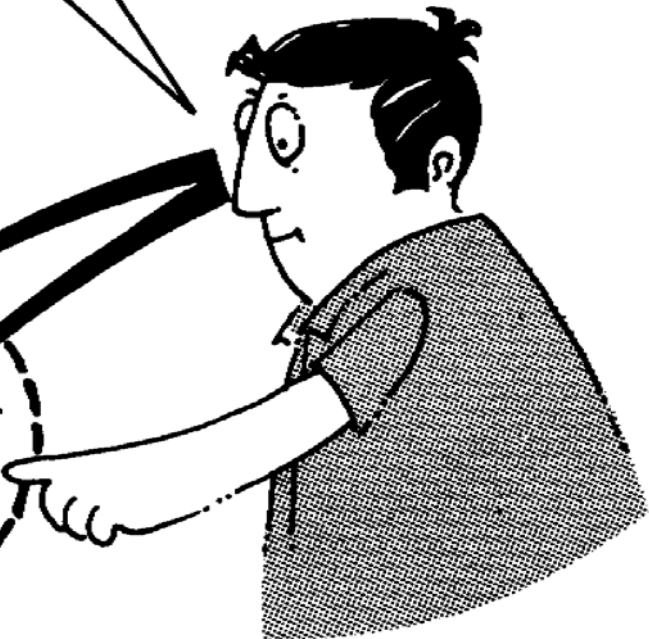


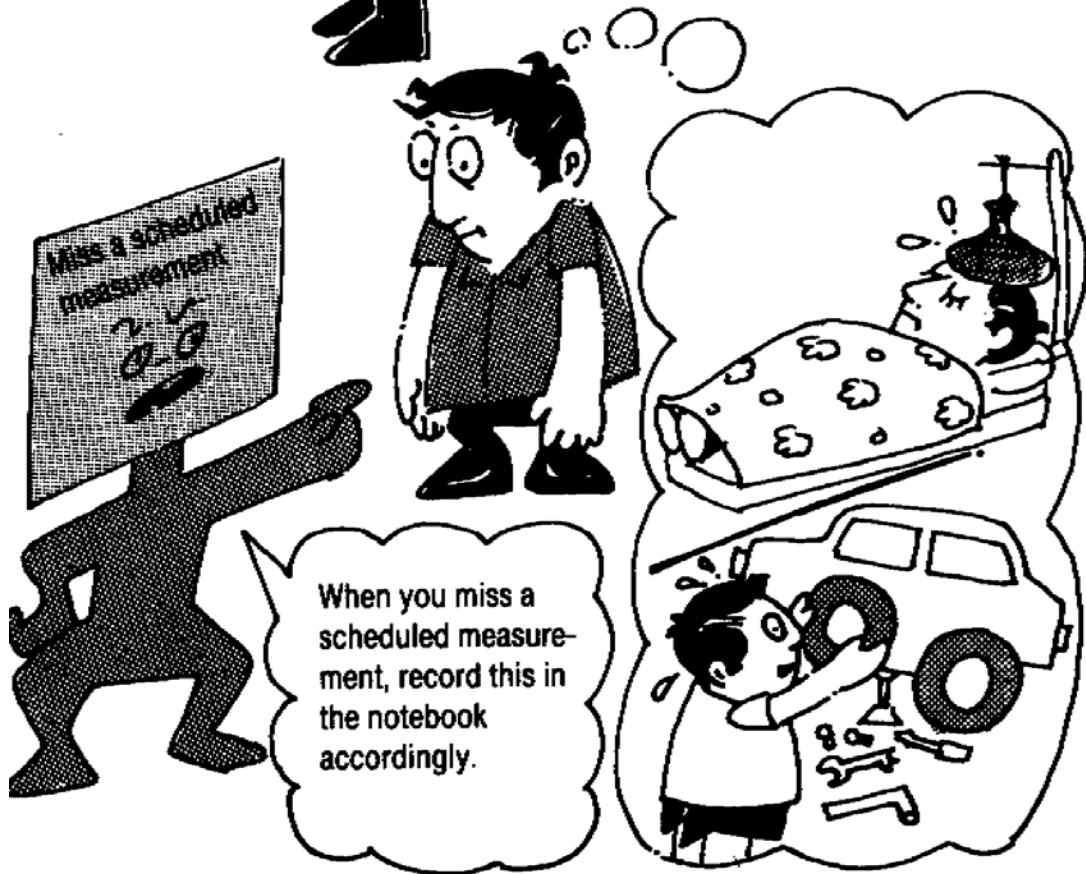


Read the water level from the exact middle of the water mark.

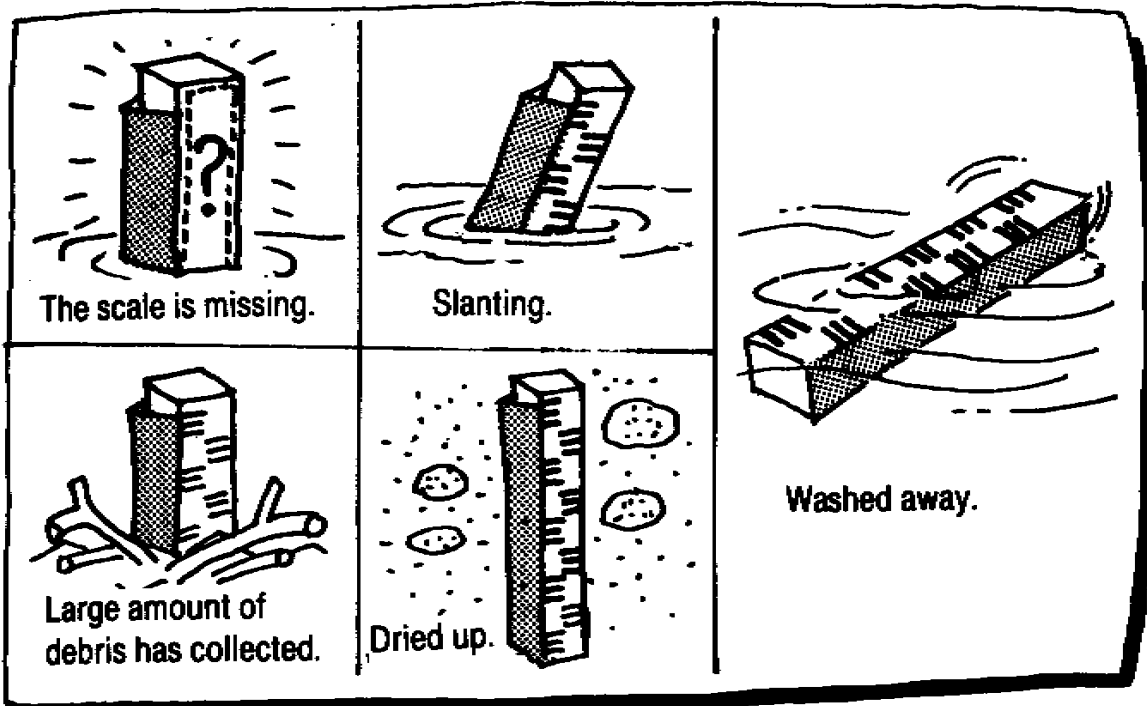


Reading the water level values at these points is wrong!









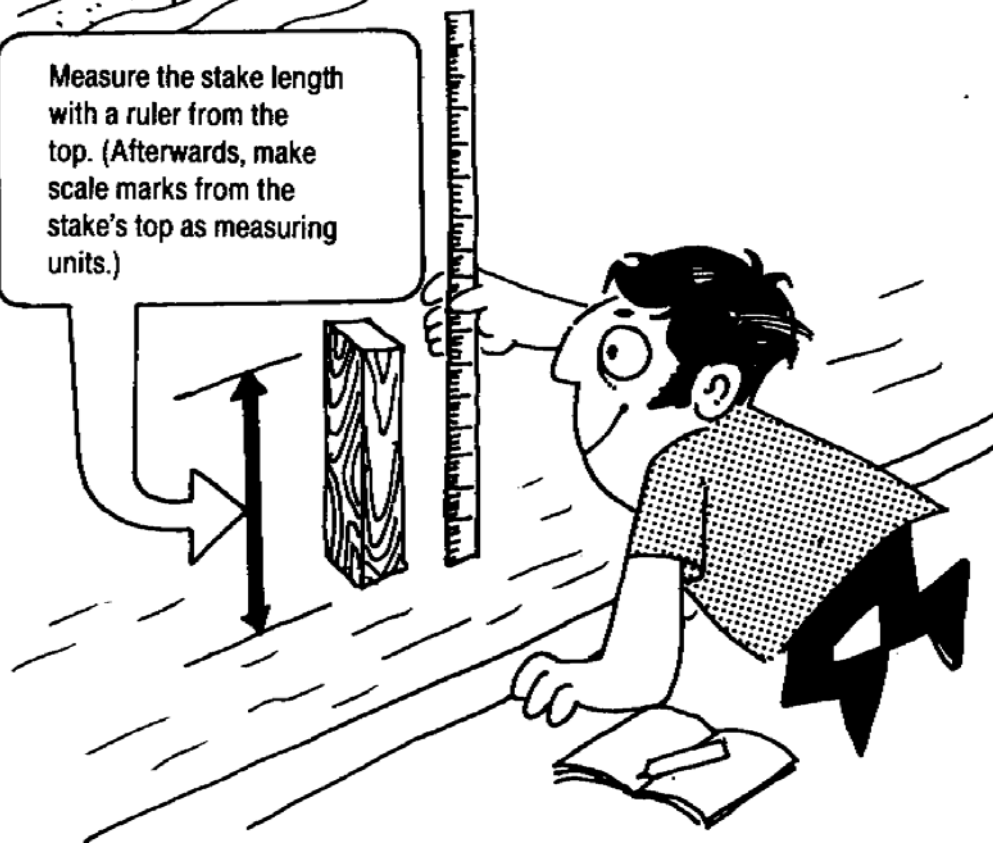
**Immediately contact the office in charge in any of the following circumstances.**

**Temporary measures**

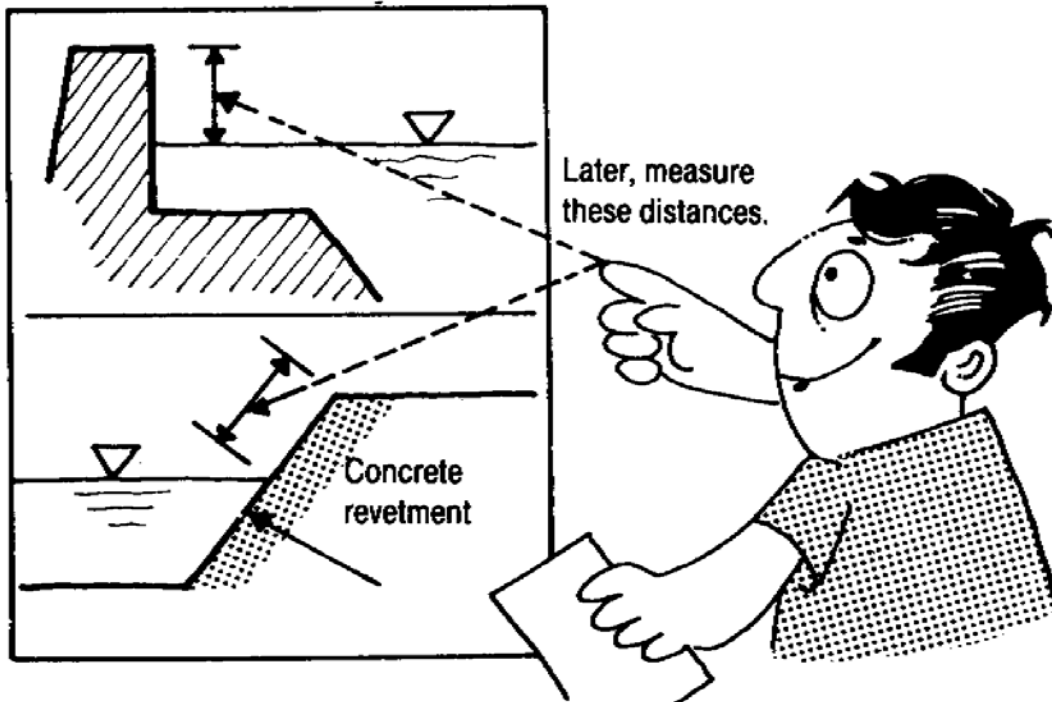
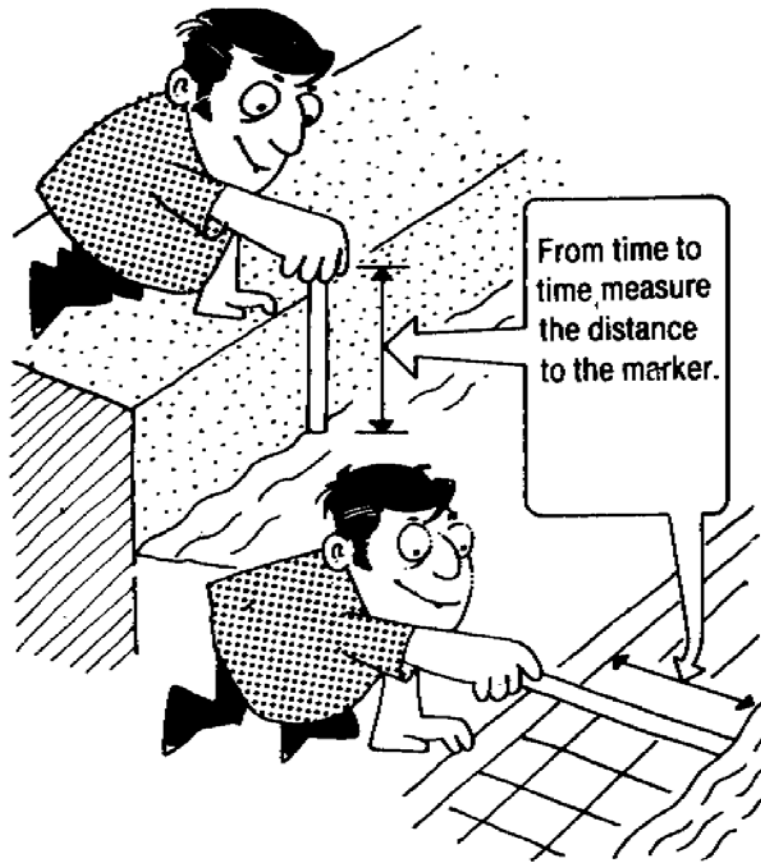


When the water level has sunk below the staff gauge, pound in a stake temporarily and the level can be measured from the stake's top.

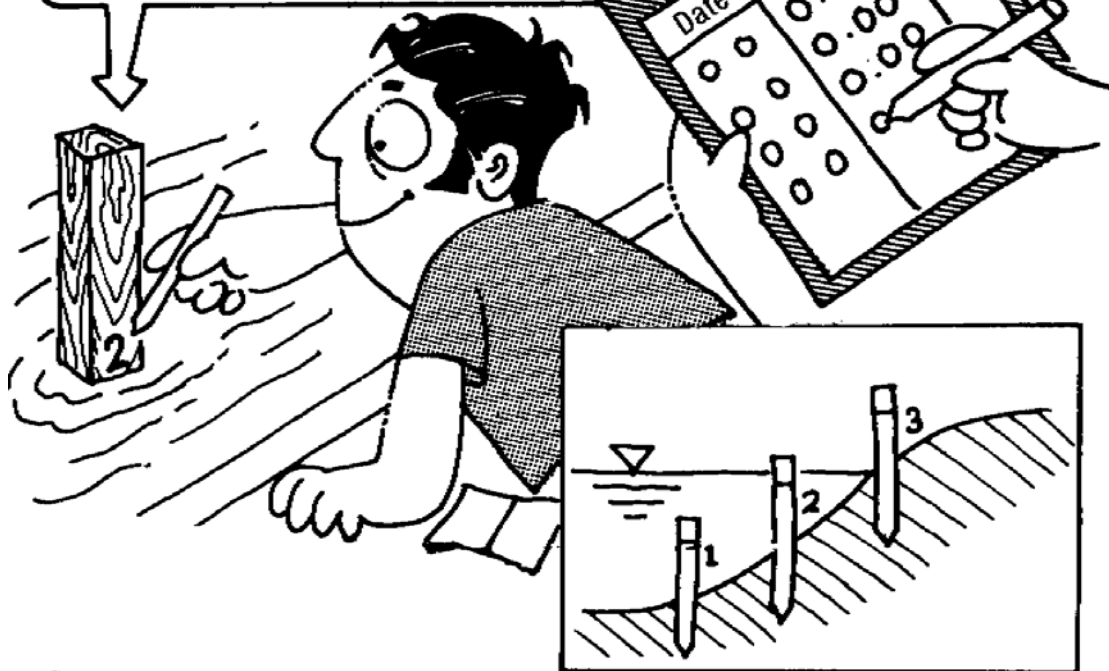
Measure the stake length with a ruler from the top. (Afterwards, make scale marks from the stake's top as measuring units.)



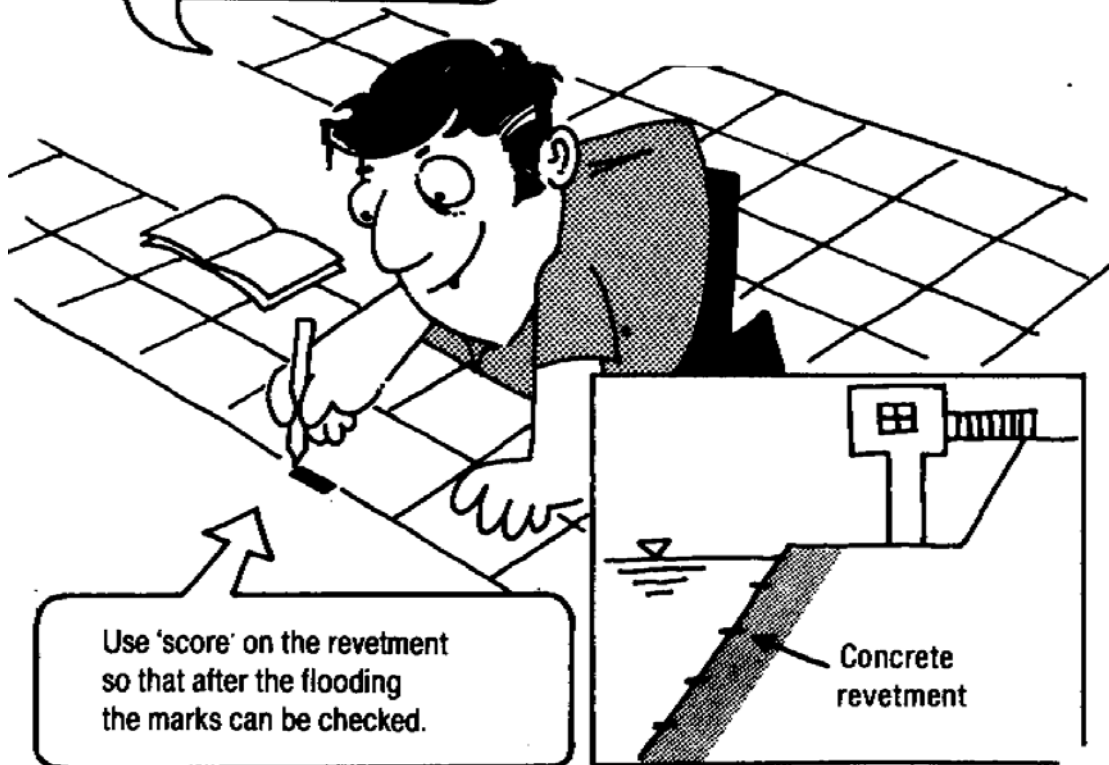
**Flooding time (When flooding)**

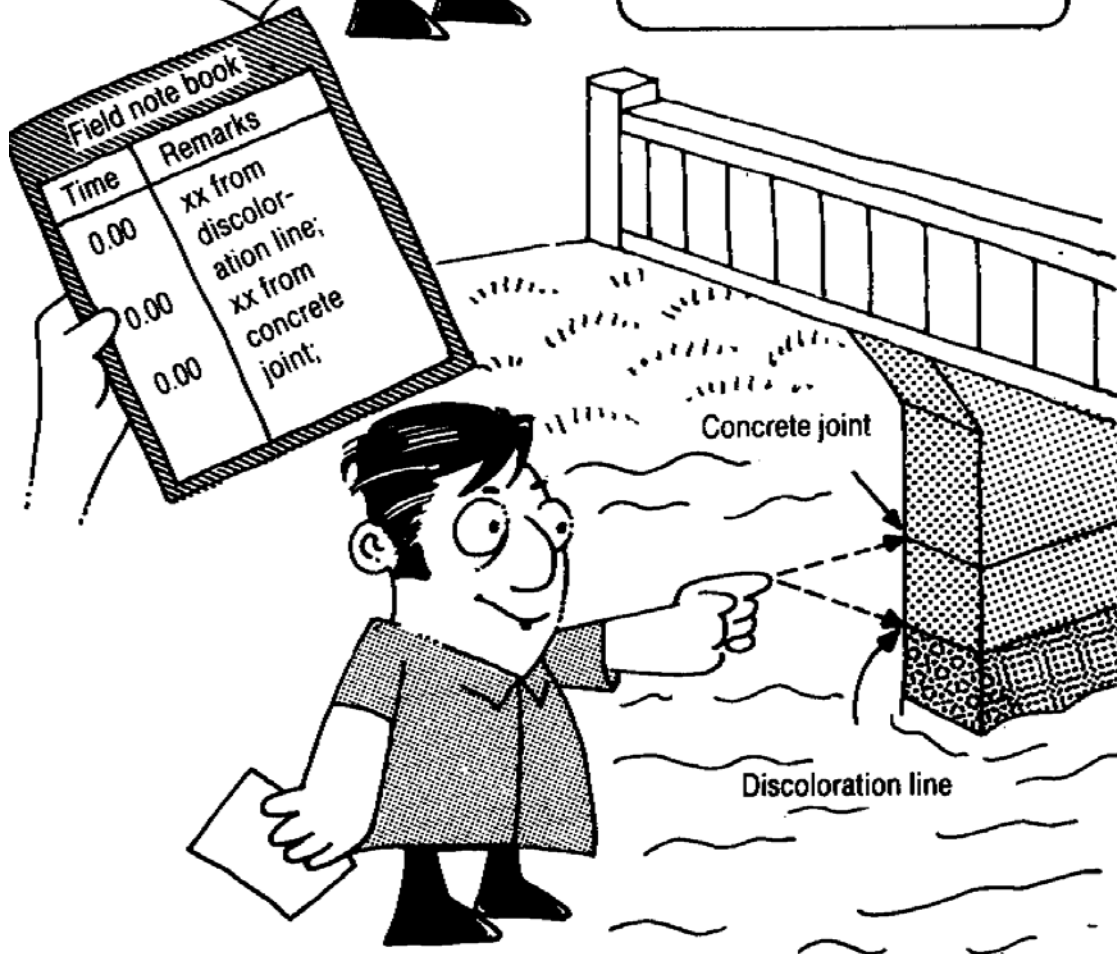
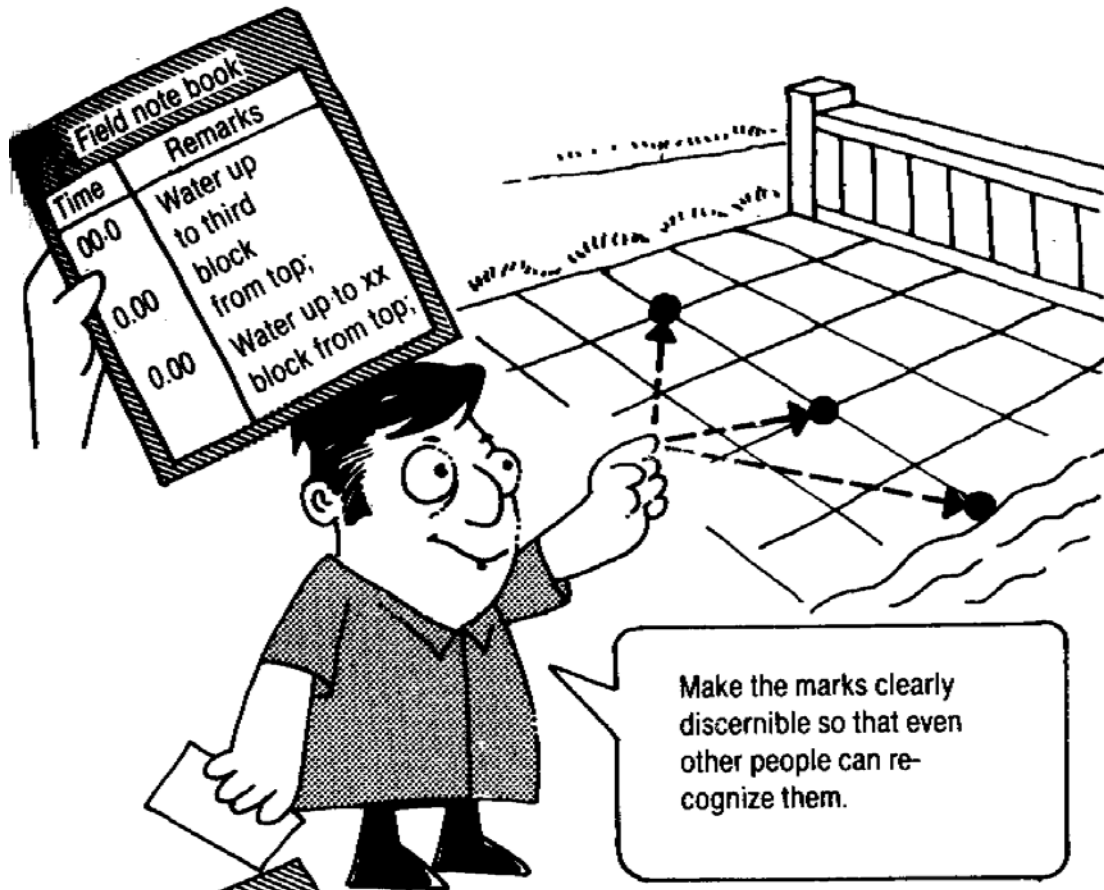


Temporarily pound in a pole and add marks (numbers) on it so that readings can be made on time.



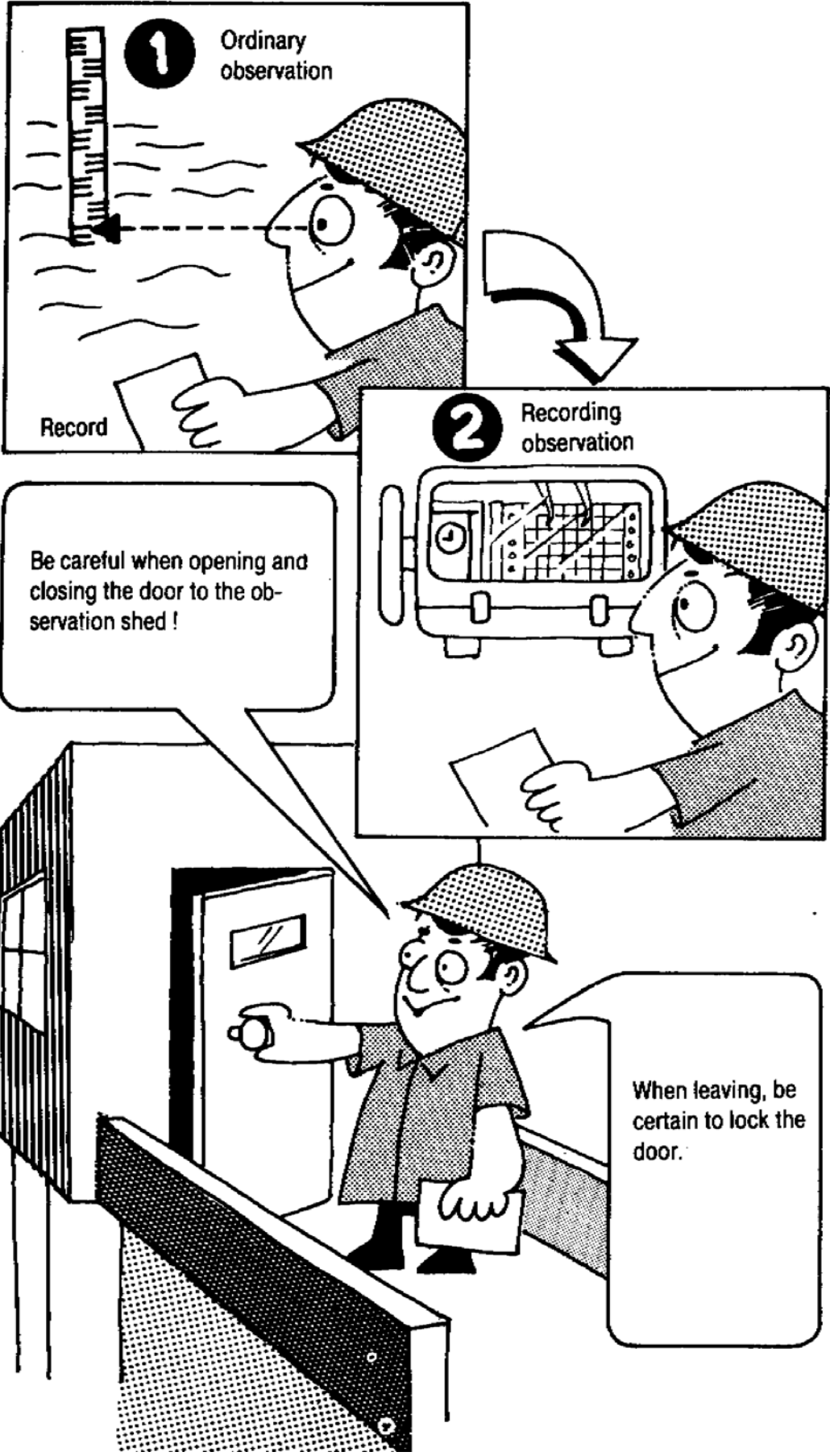
Make a mark on the revetment and record the time.

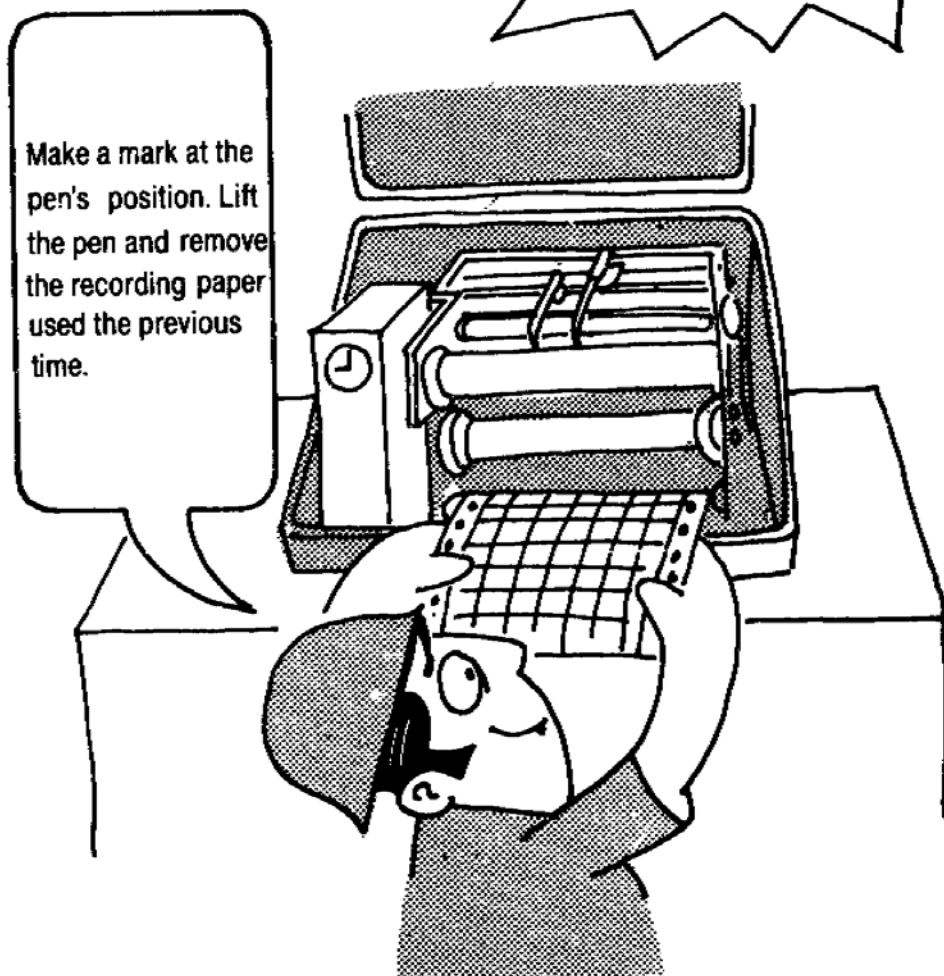
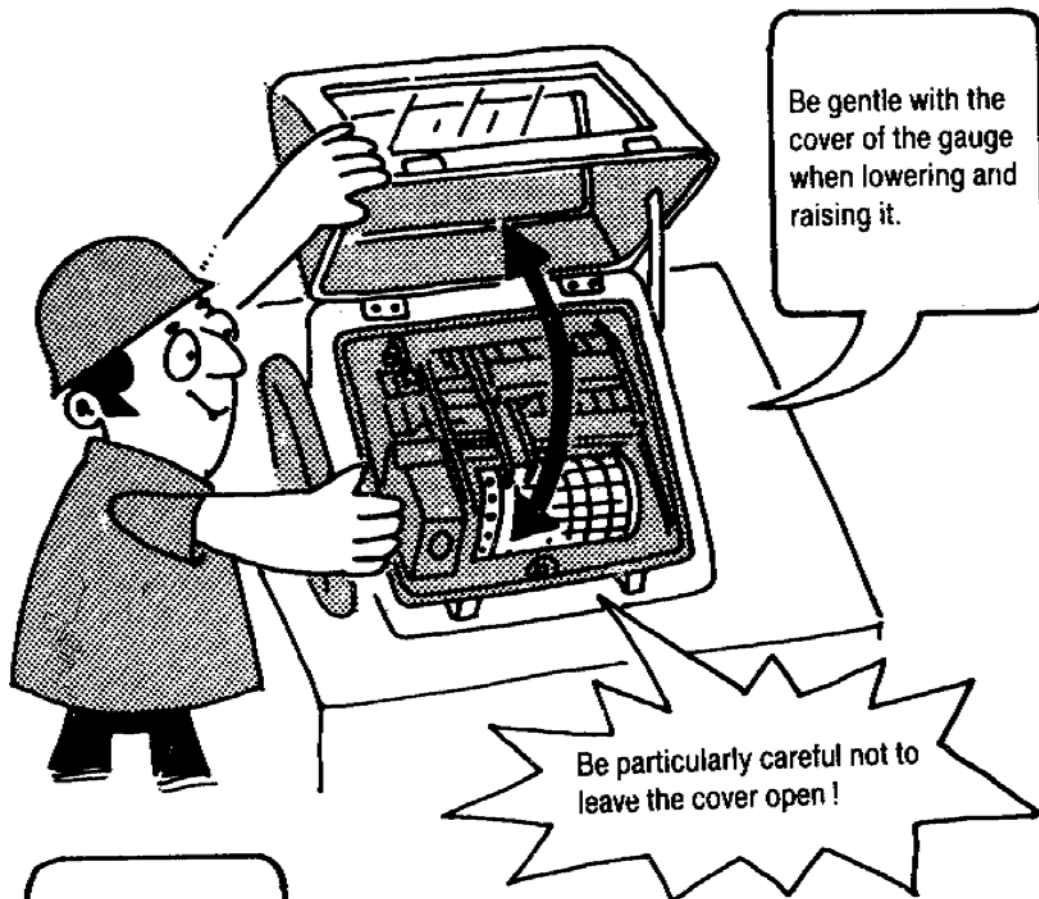


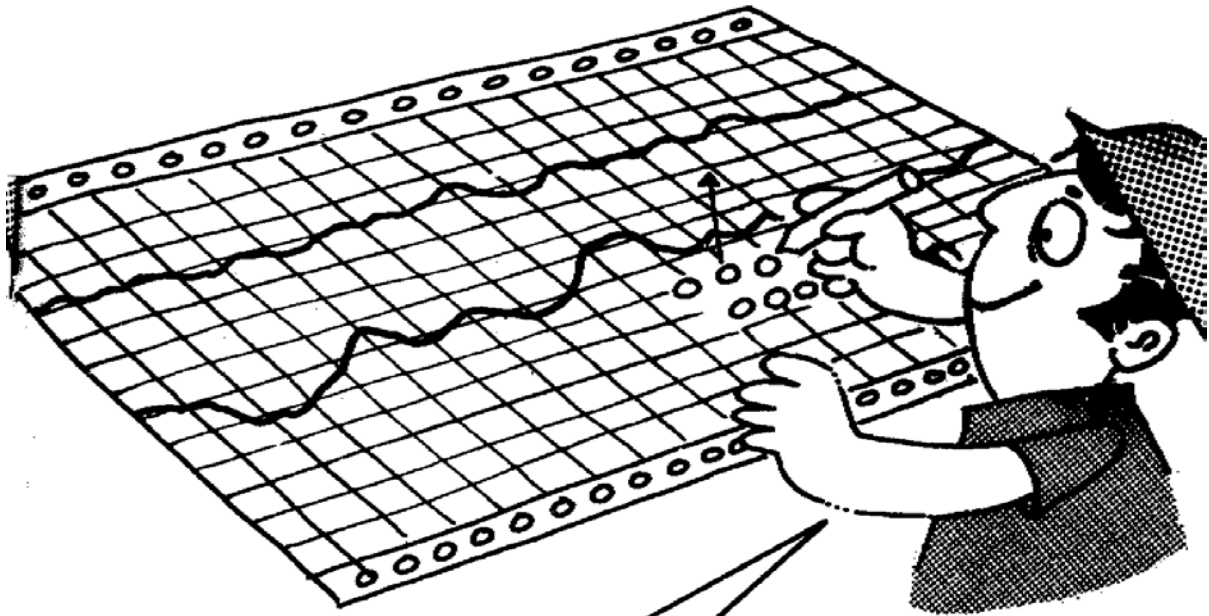


2) Recording observation

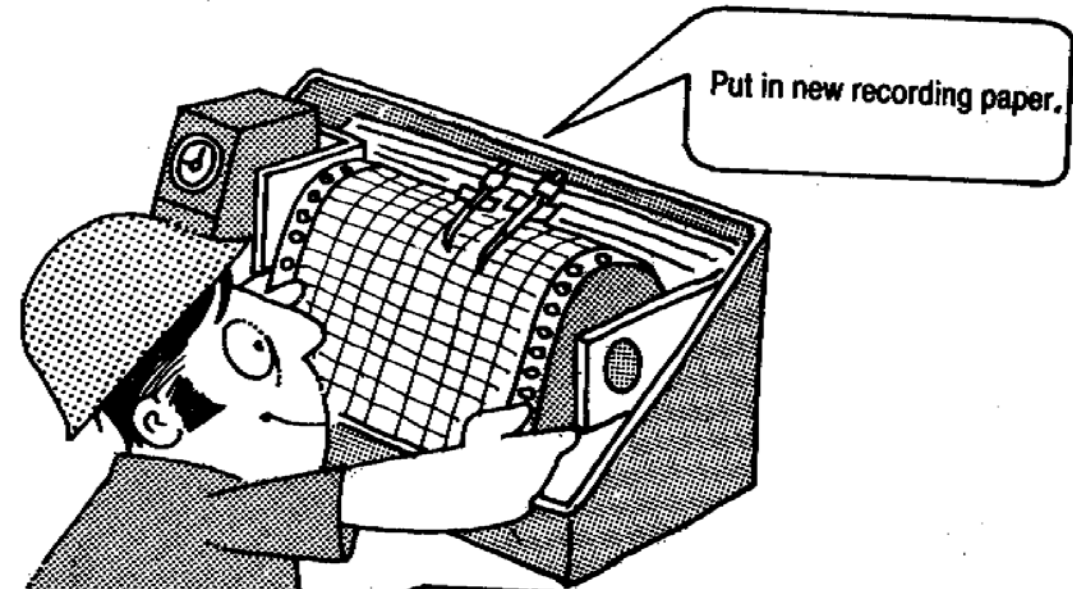
Observation procedure







Record the date, time, your name and water level and normal staff gauge when the paper is removed.

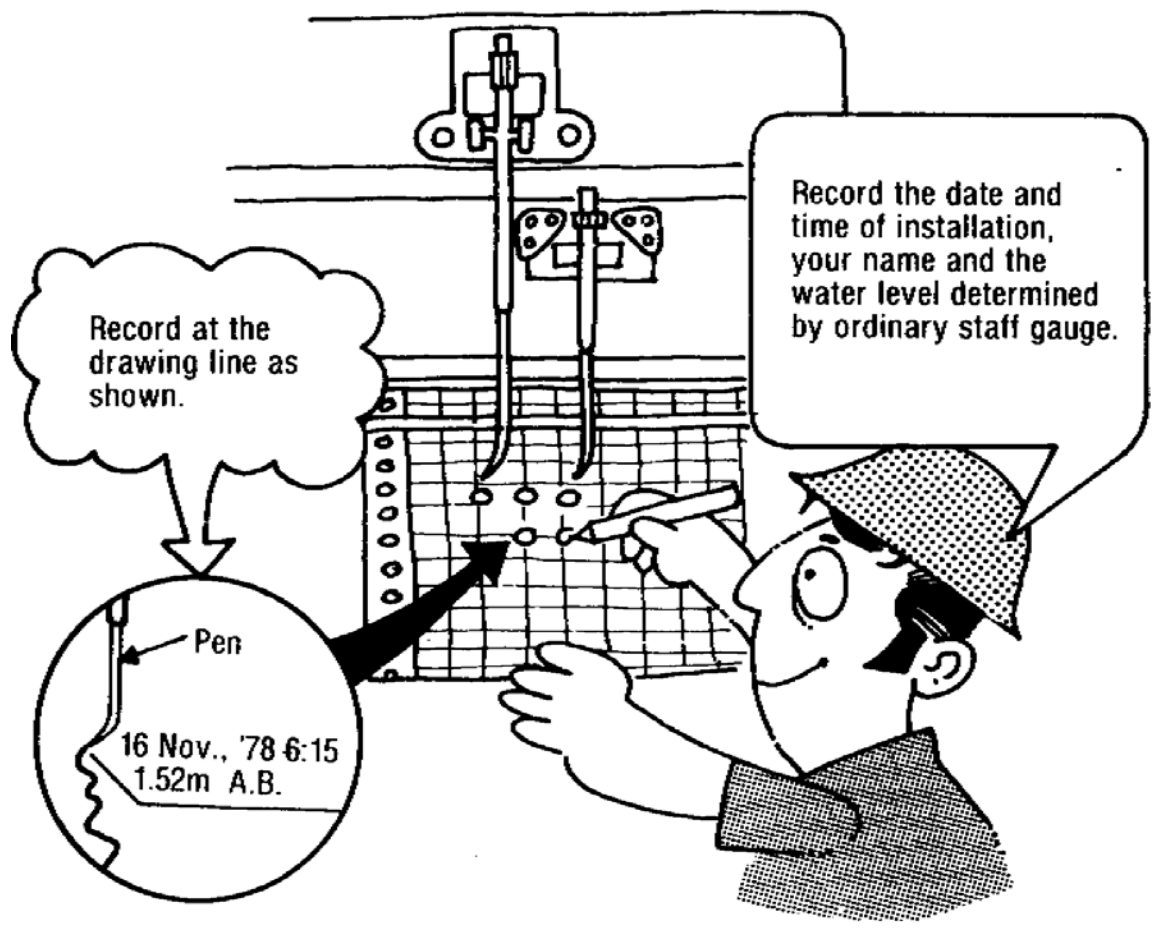
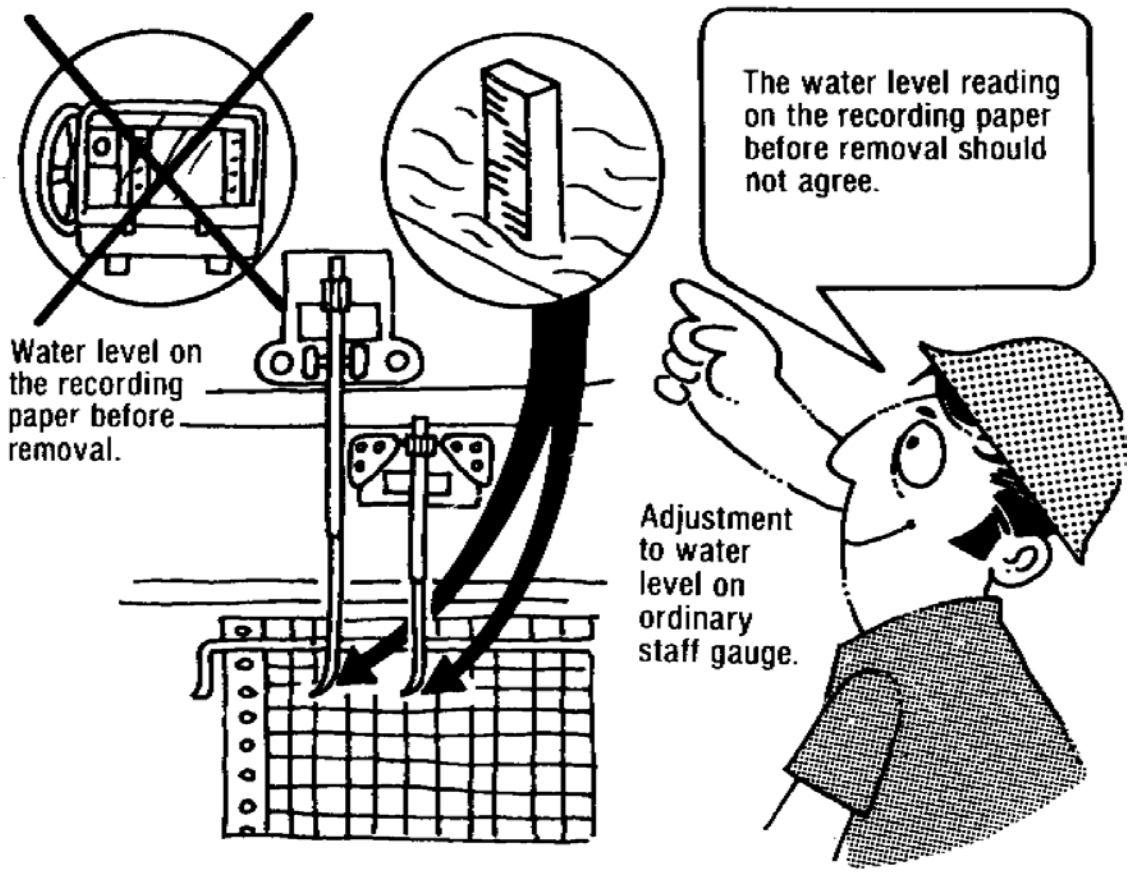


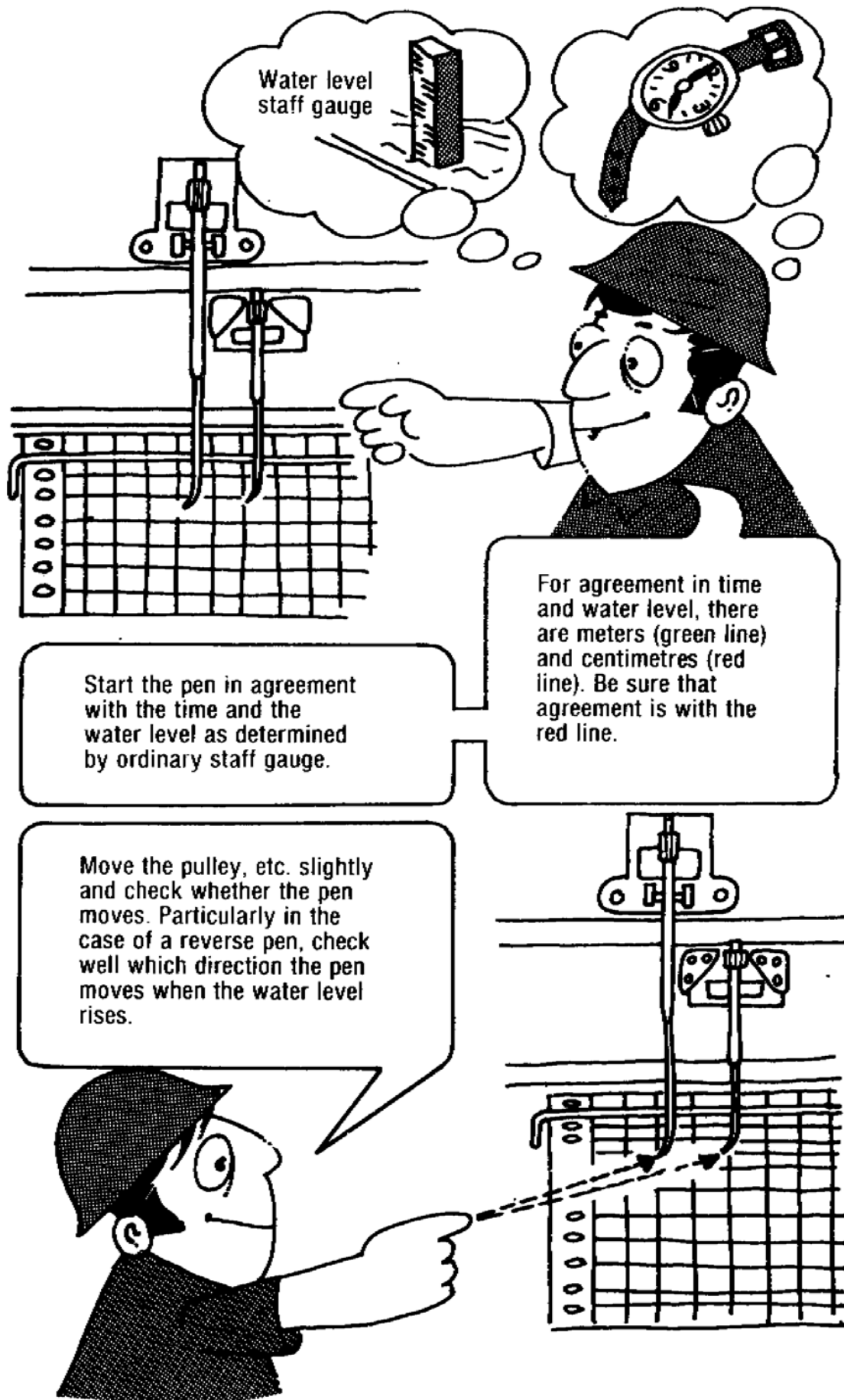
Put in new recording paper.

**Precautions when installing:**

- ⊗ Does it enter the sprocket well?
- ⊗ Are there any sags?





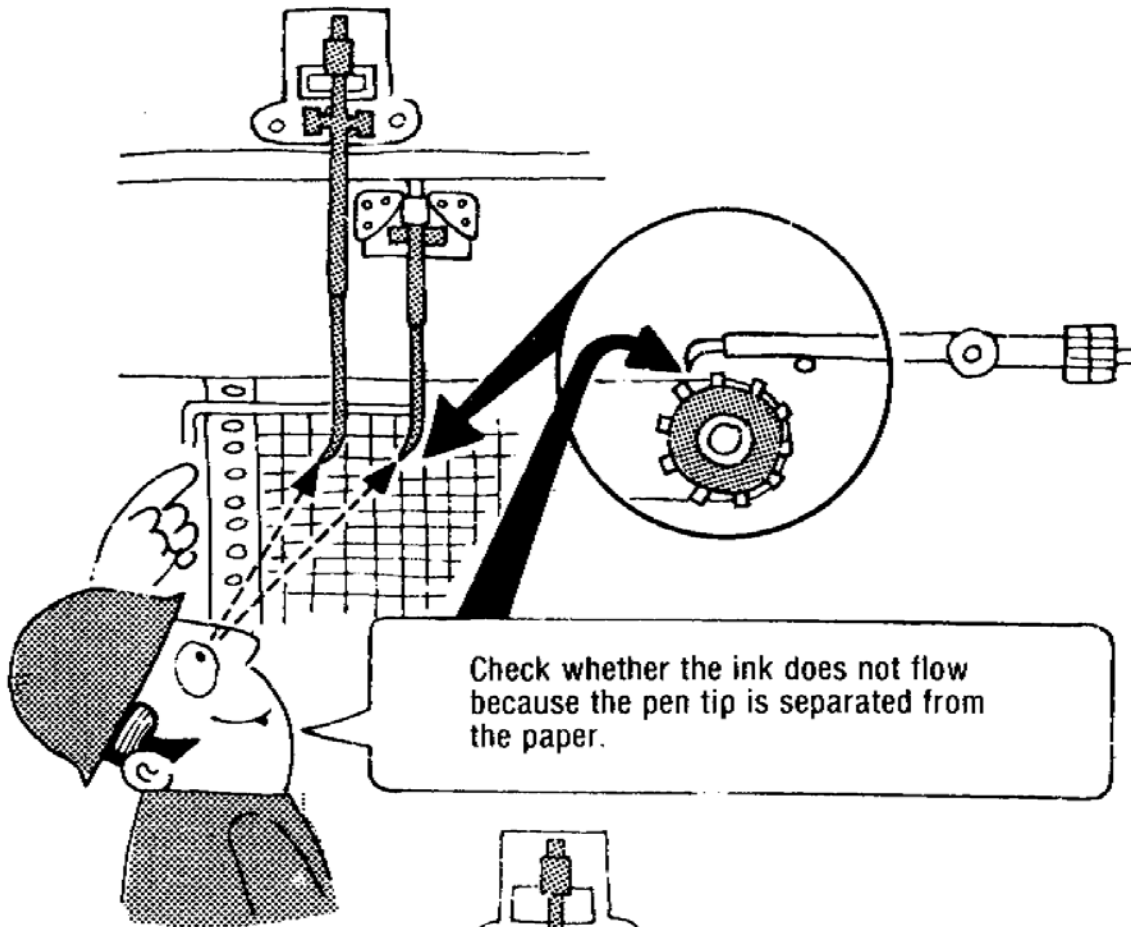


Water level staff gauge

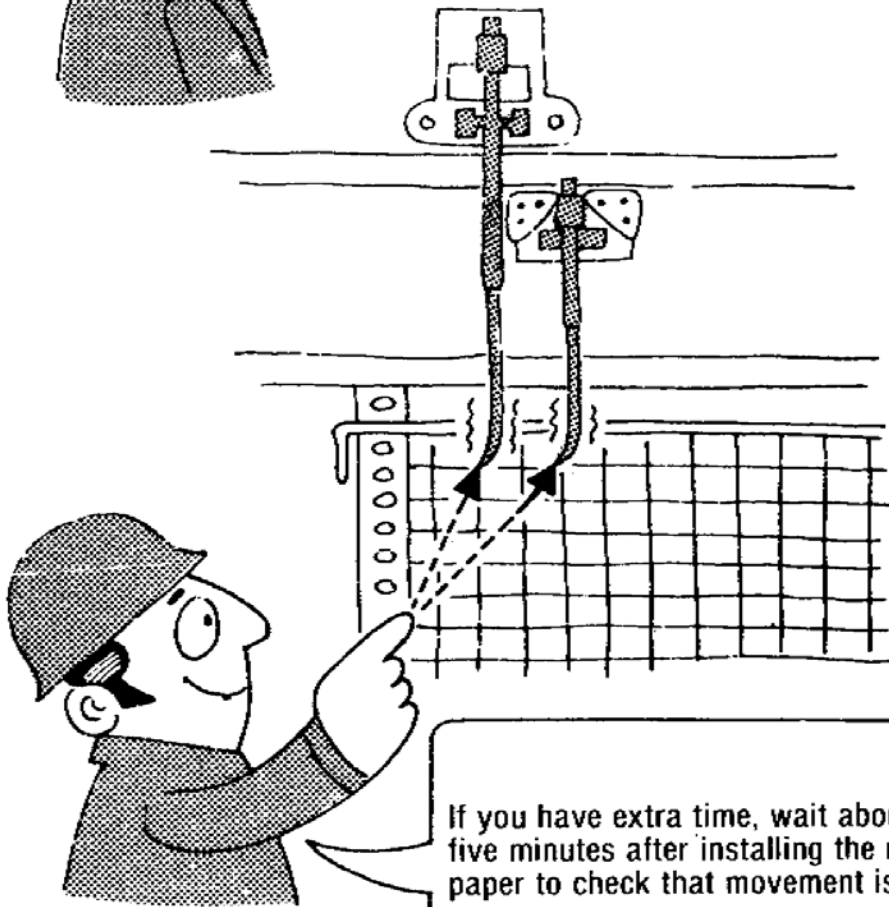
Start the pen in agreement with the time and the water level as determined by ordinary staff gauge.

For agreement in time and water level, there are meters (green line) and centimetres (red line). Be sure that agreement is with the red line.

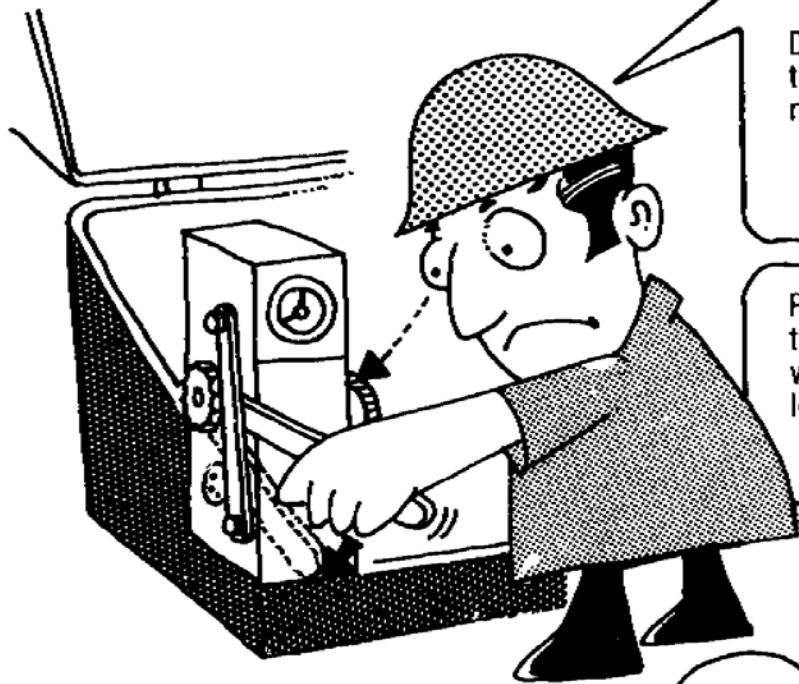
Move the pulley, etc. slightly and check whether the pen moves. Particularly in the case of a reverse pen, check well which direction the pen moves when the water level rises.



Check whether the ink does not flow because the pen tip is separated from the paper.

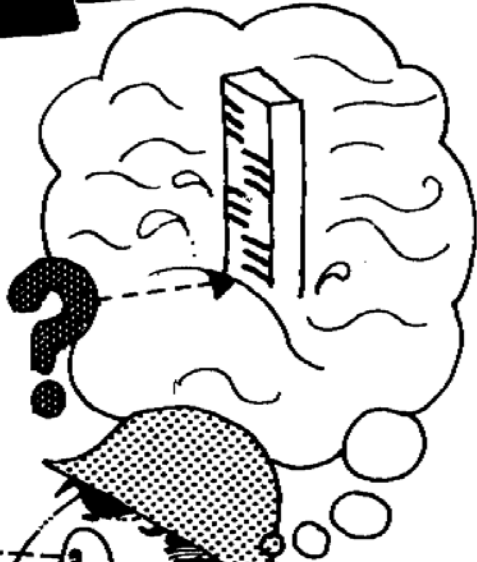
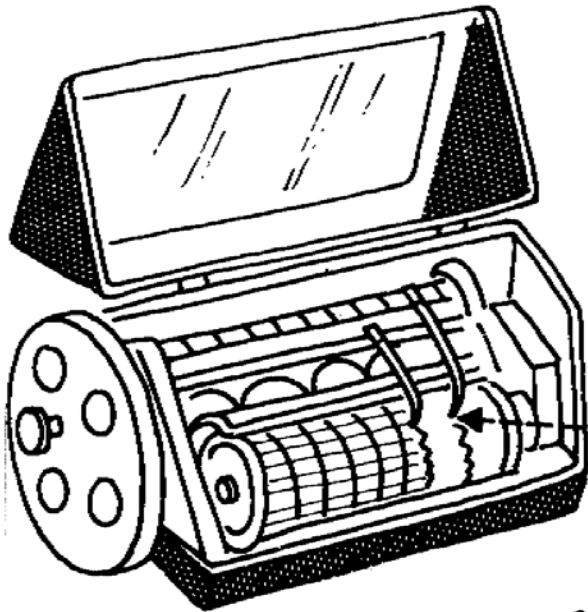


If you have extra time, wait about three to five minutes after installing the recording paper to check that movement is correct.



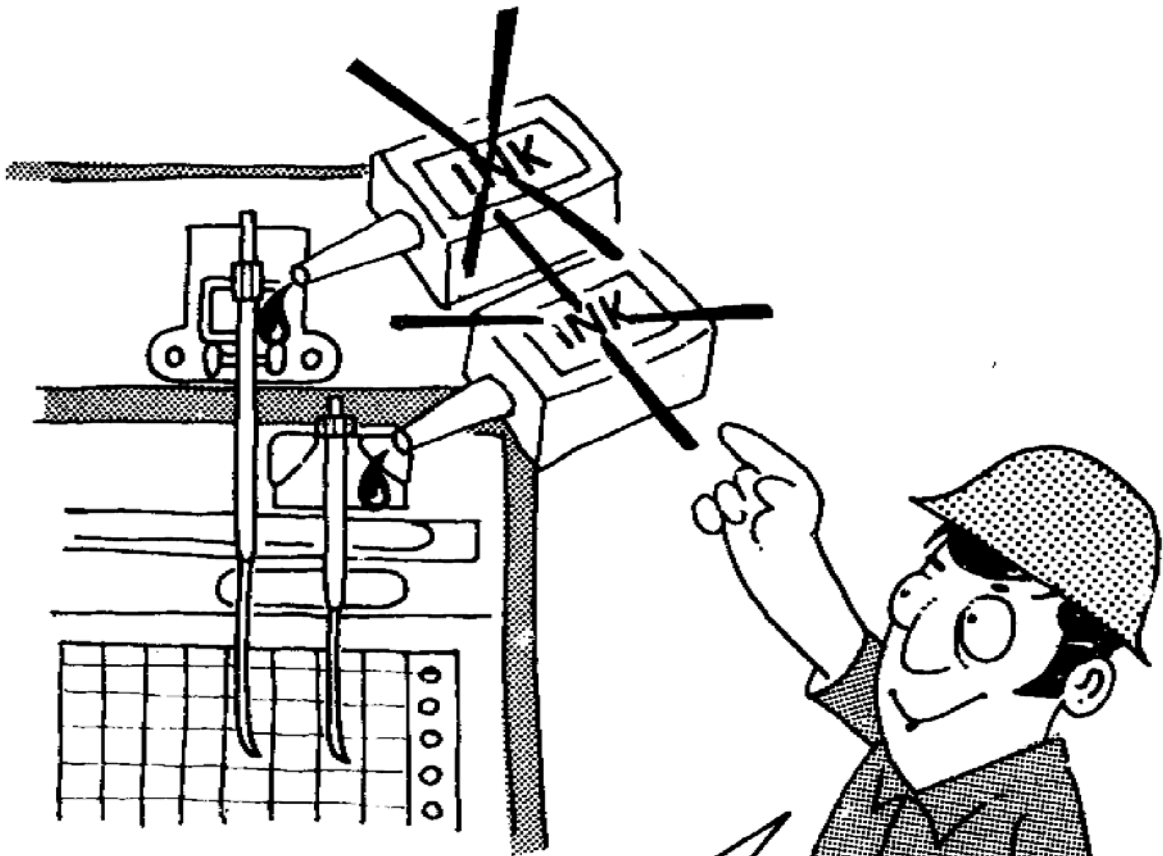
Don't forget to wind the spring, but do not wind it too much.

Pay attention to the scale and wind slightly less than fully.



When there is a small difference at the flooding reading with the ordinary staff gauge, do not adjust the water-gauge.

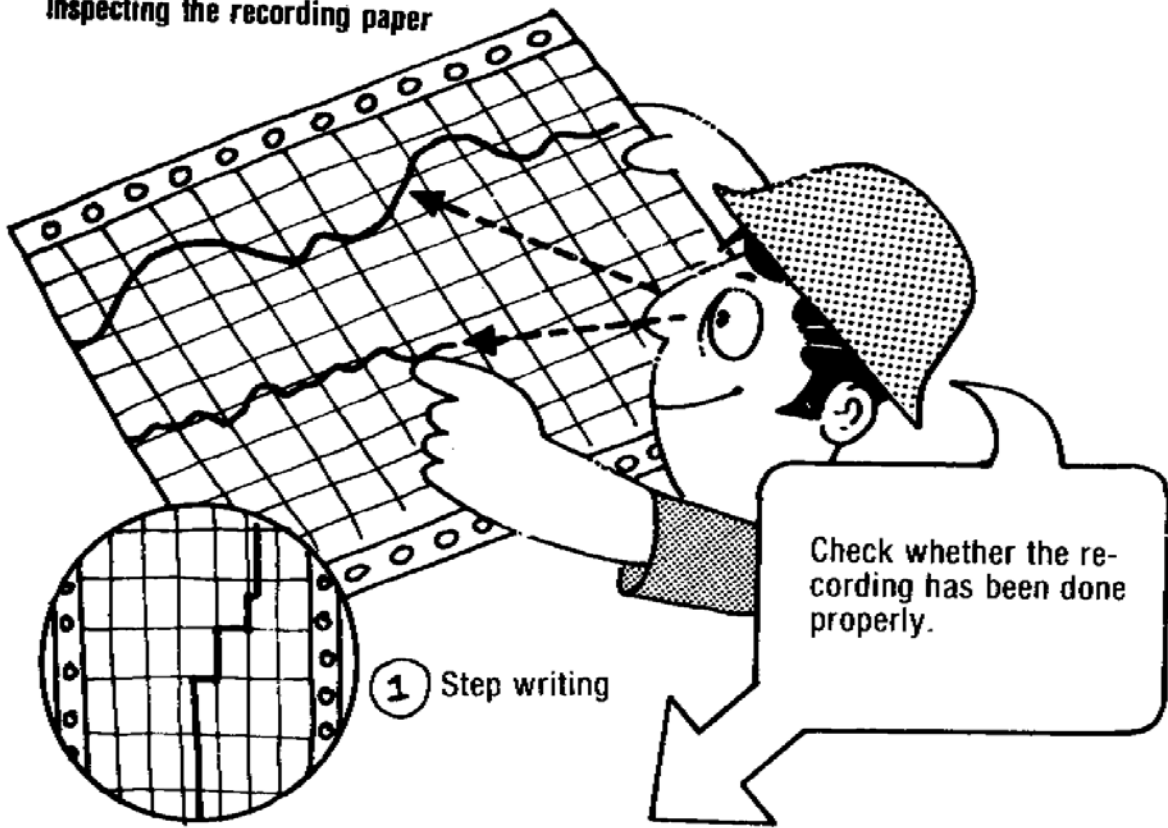




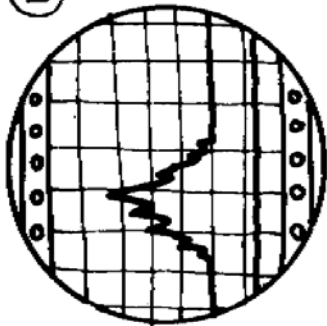
Do not pour in more ink.  
Replace the whole unit.  
The ink is sticky and pro-  
duces a bad effect.

Take out remaining ink  
and clean the ink con-  
tainer. Refill the green  
and red ink supplies  
slightly less than fully.

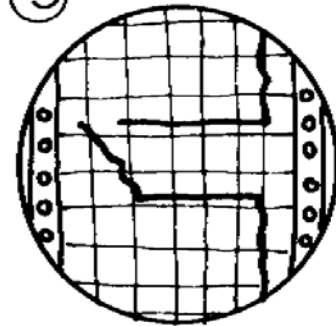
# Inspecting the recording paper



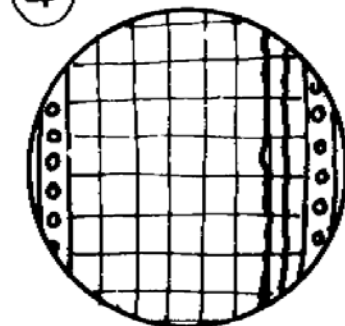
② Fuzzy



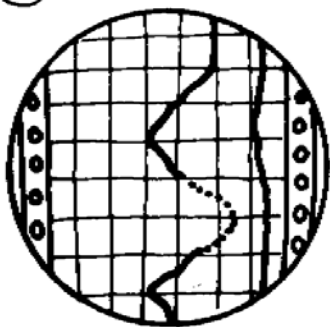
③ Water level suddenly rises or falls



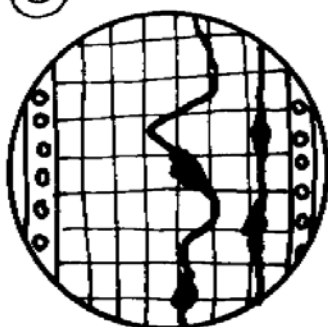
④ Water level does not rise even when it rains



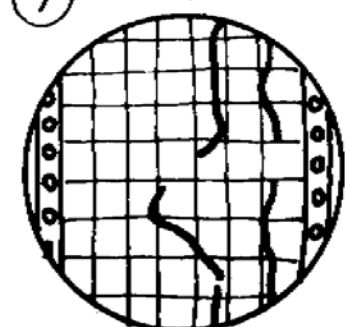
⑤ Blur

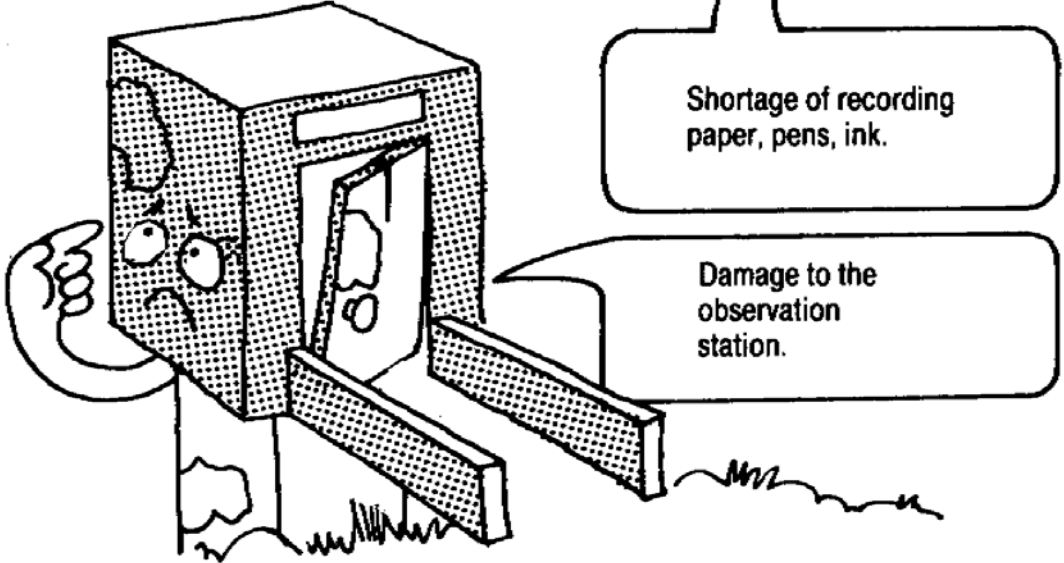
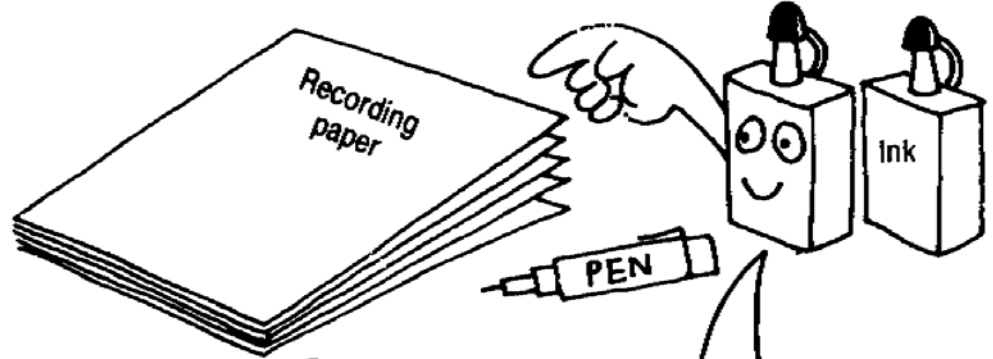
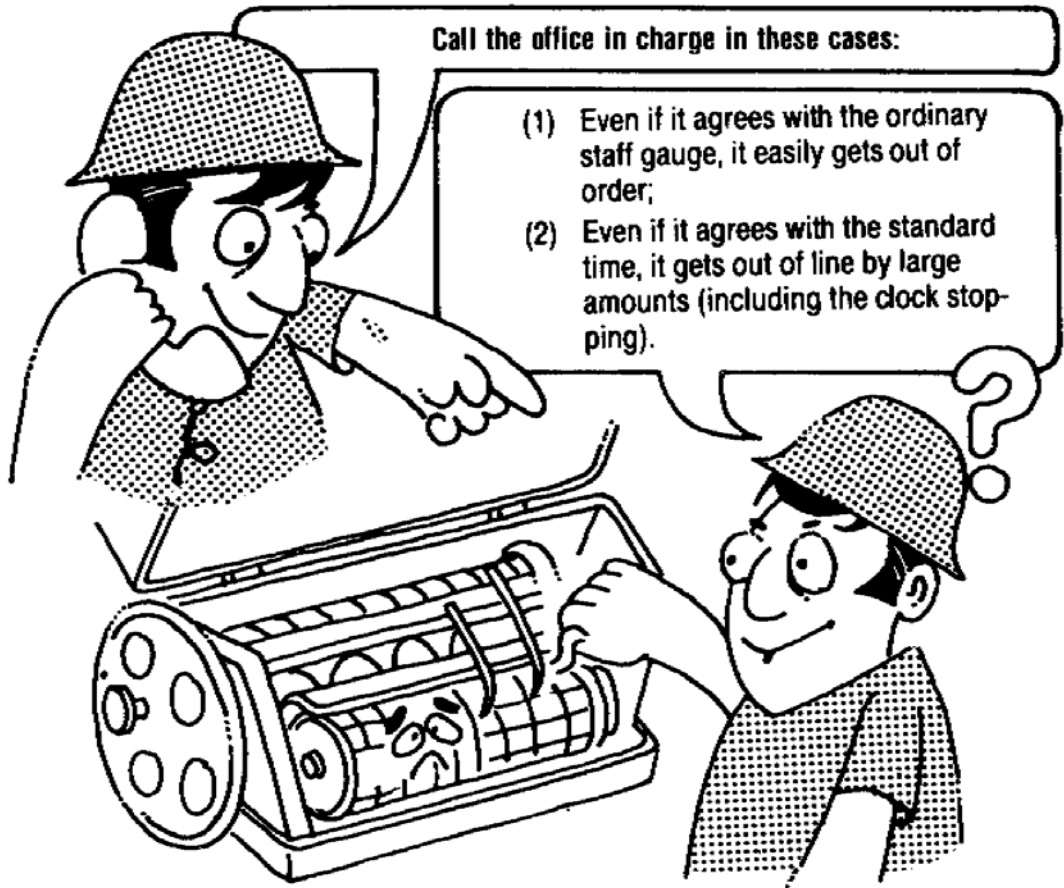


⑥ Blotch



⑦ Interruption



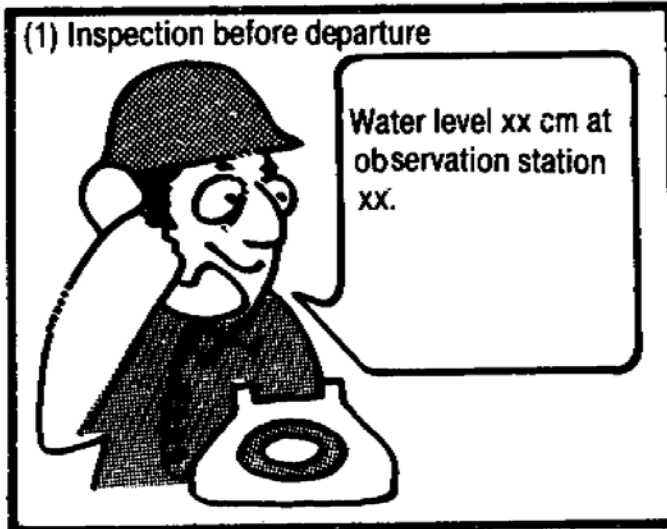


### 3) Discharge Observation

#### 1) Observation with Price current meter

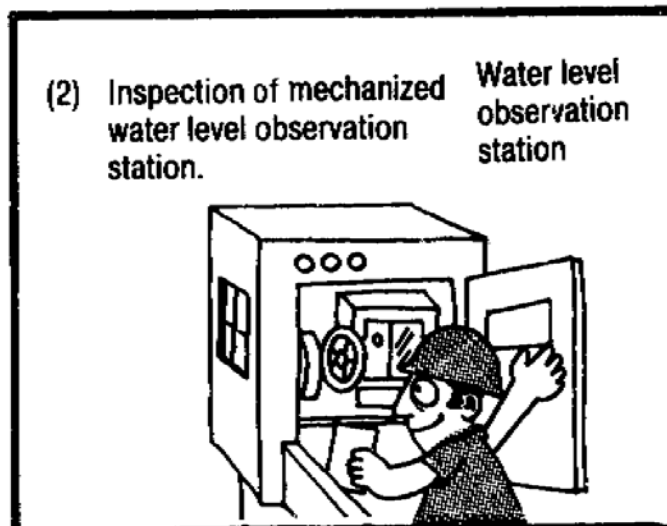
Measurement procedure

(1) Inspection before departure

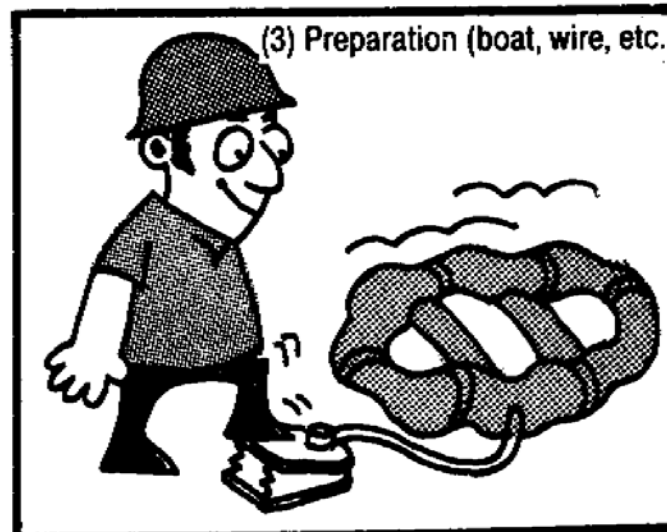


(2) Inspection of mechanized water level observation station.

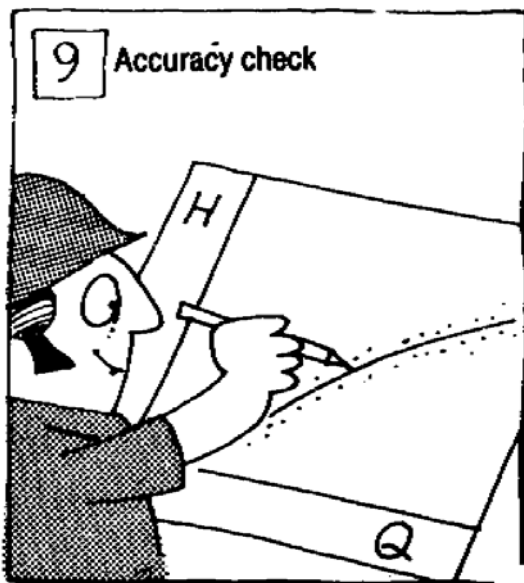
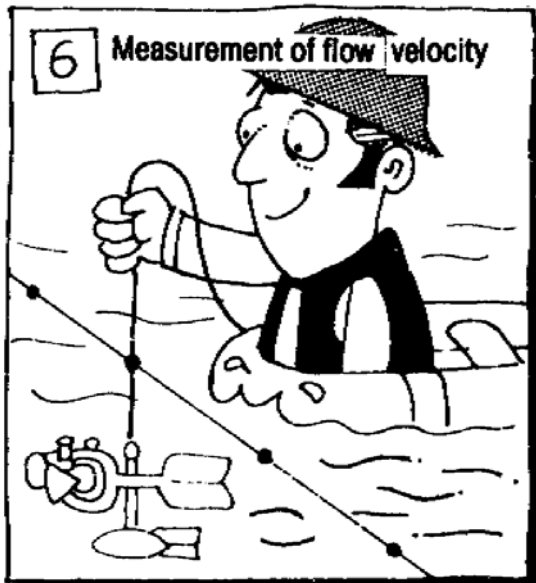
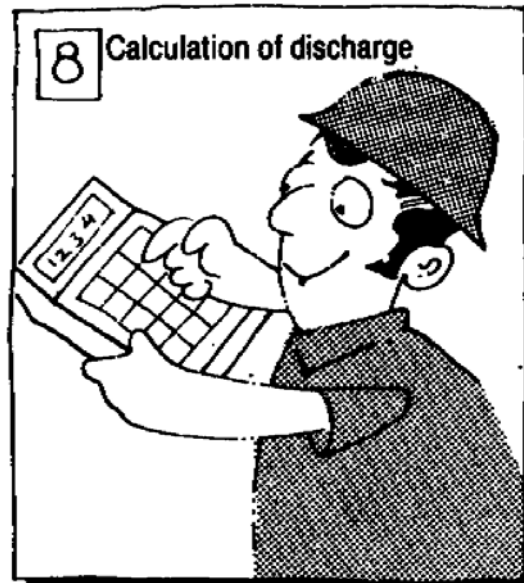
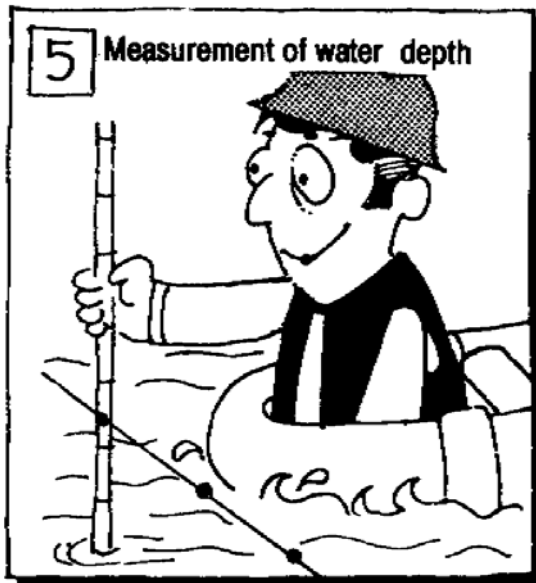
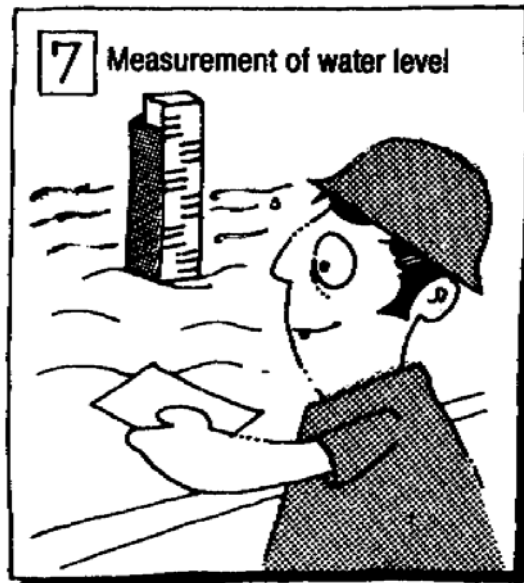
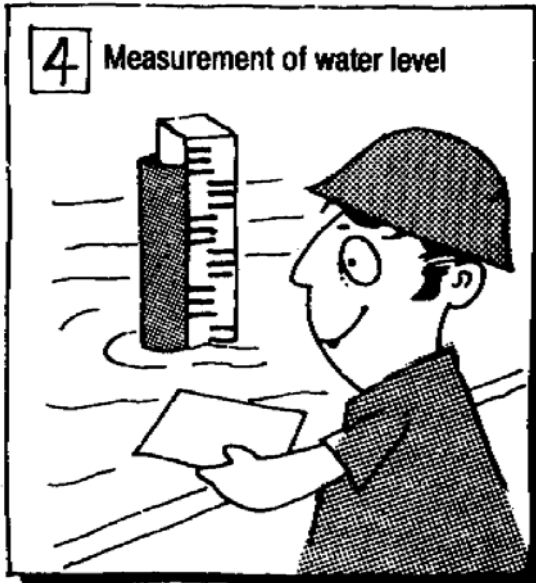
Water level observation station



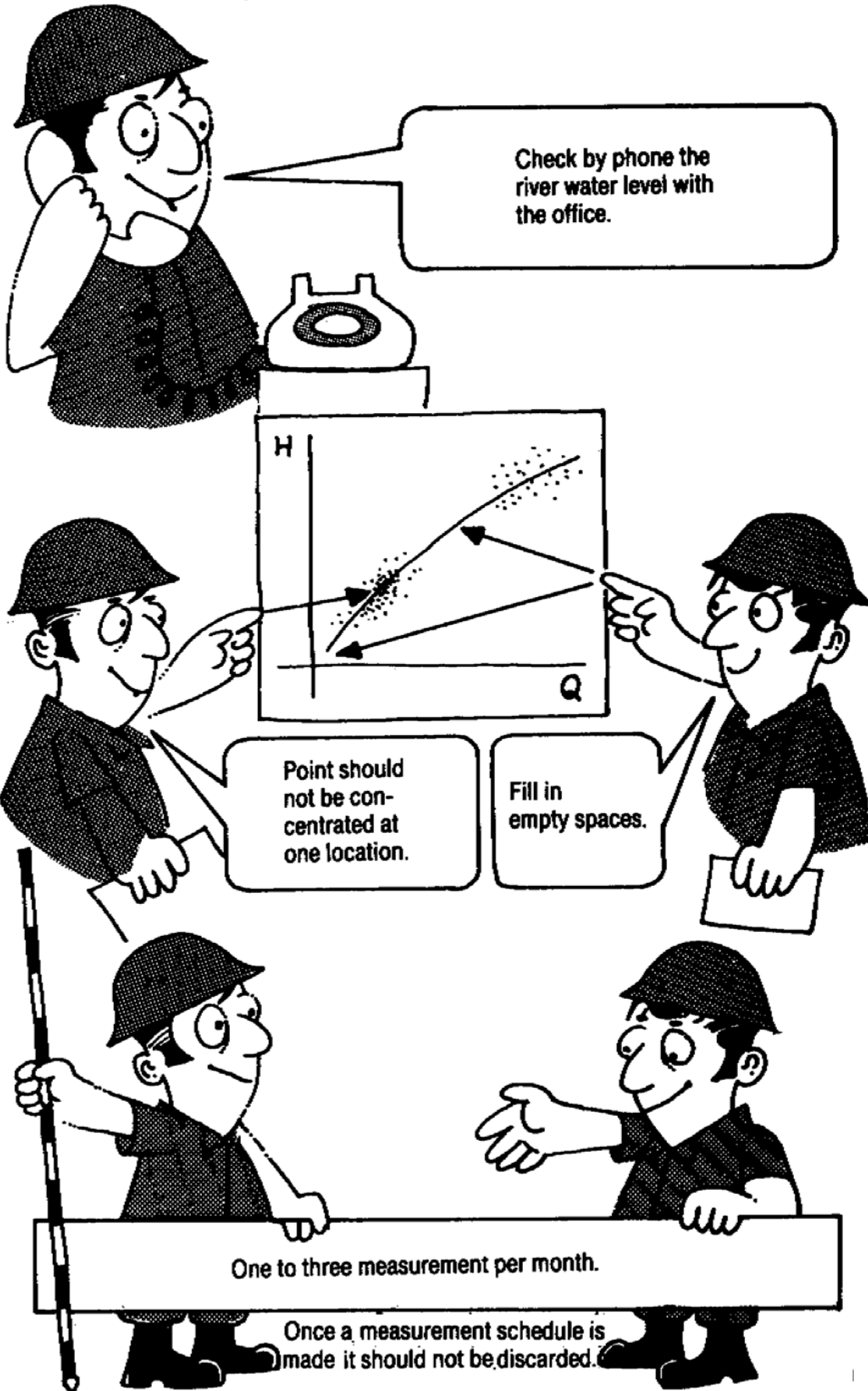
(3) Preparation (boat, wire, etc.)



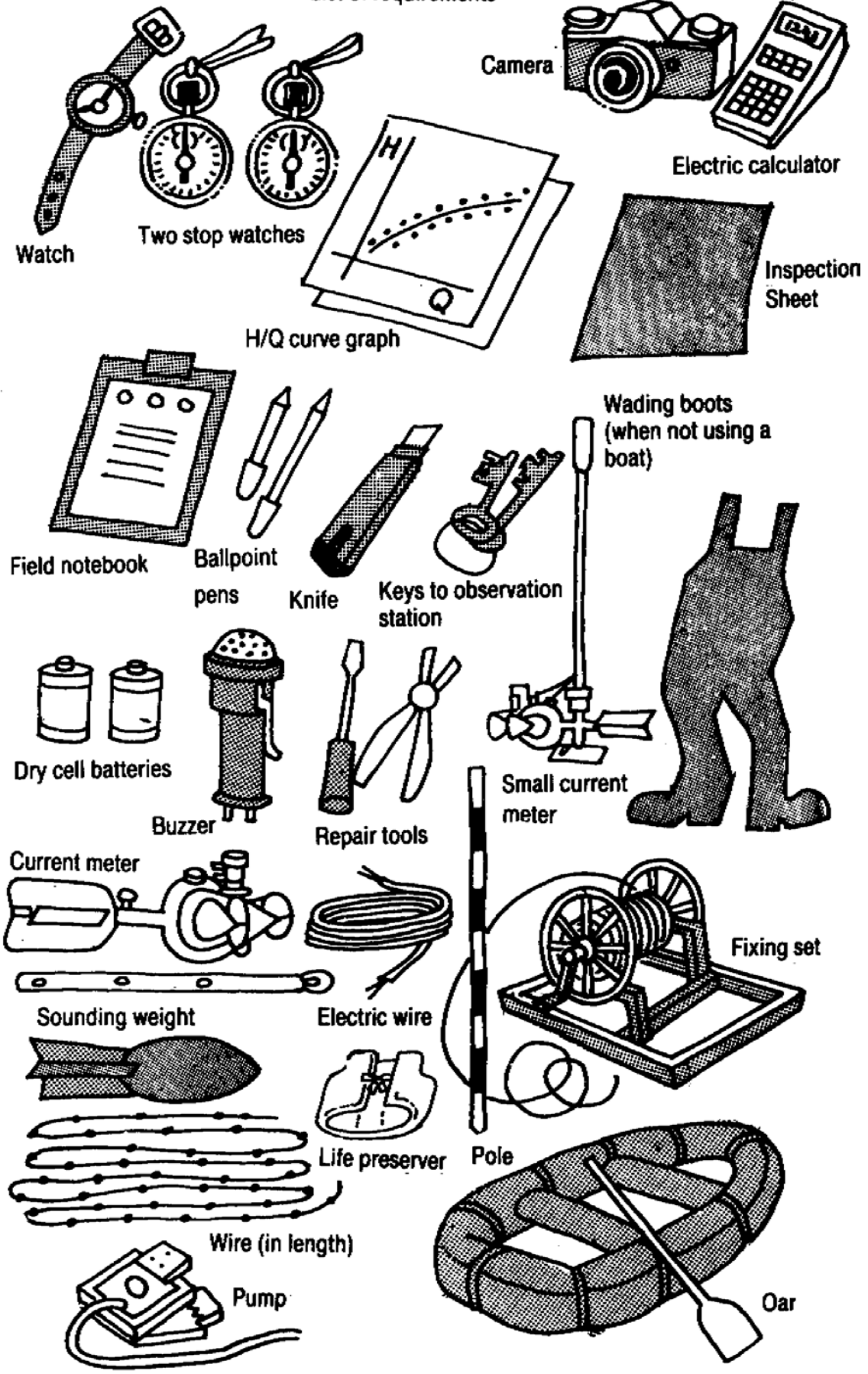




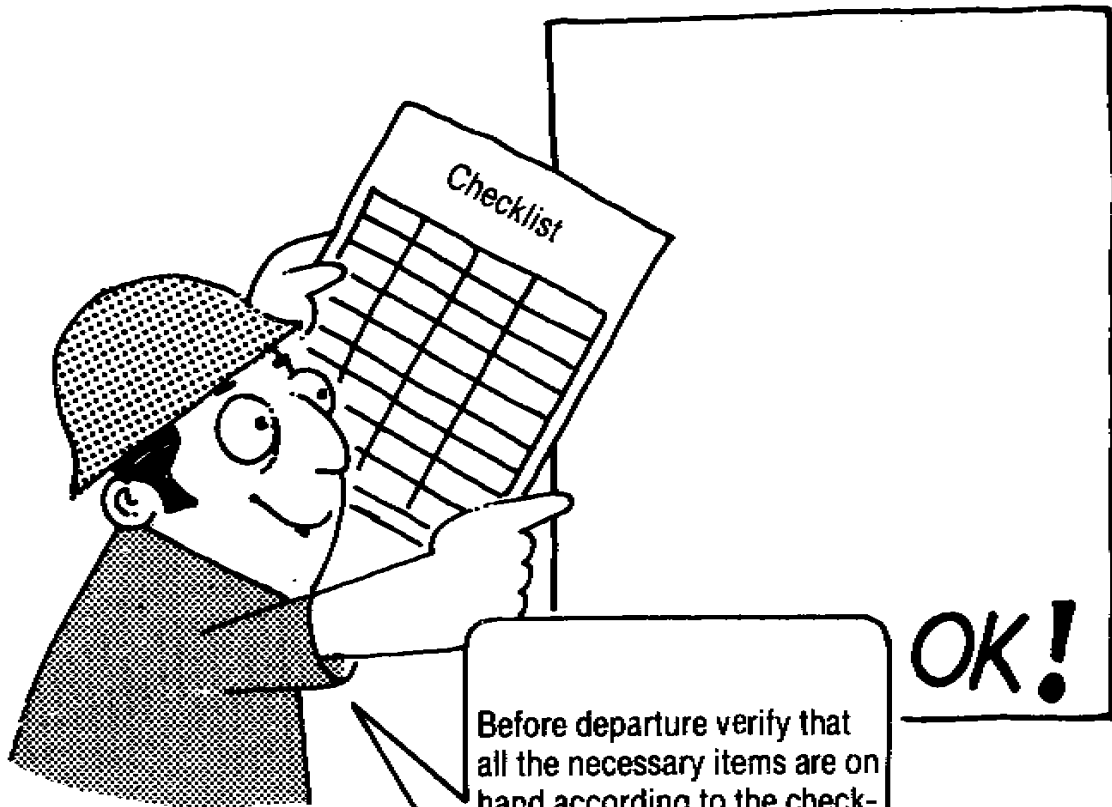
### Cautions in measuring water level



List of requirements

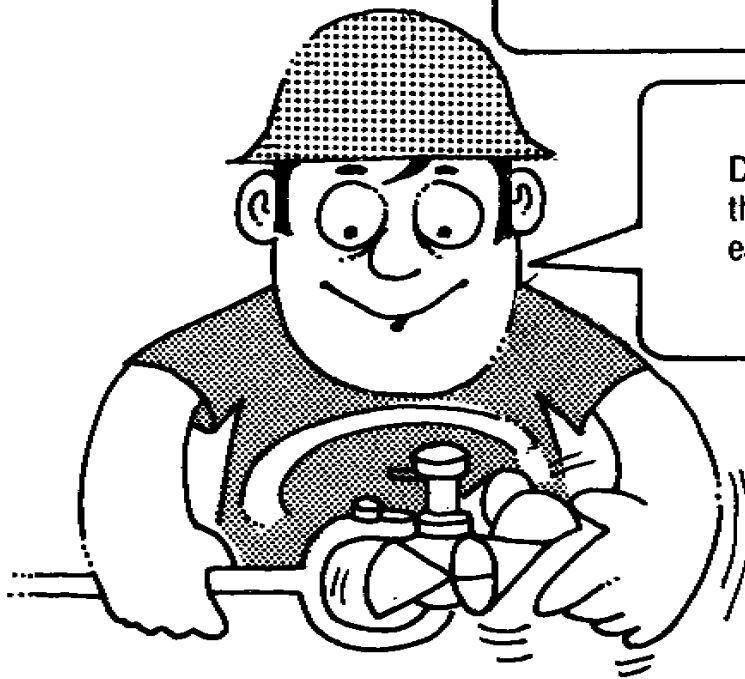


Inspection before departure

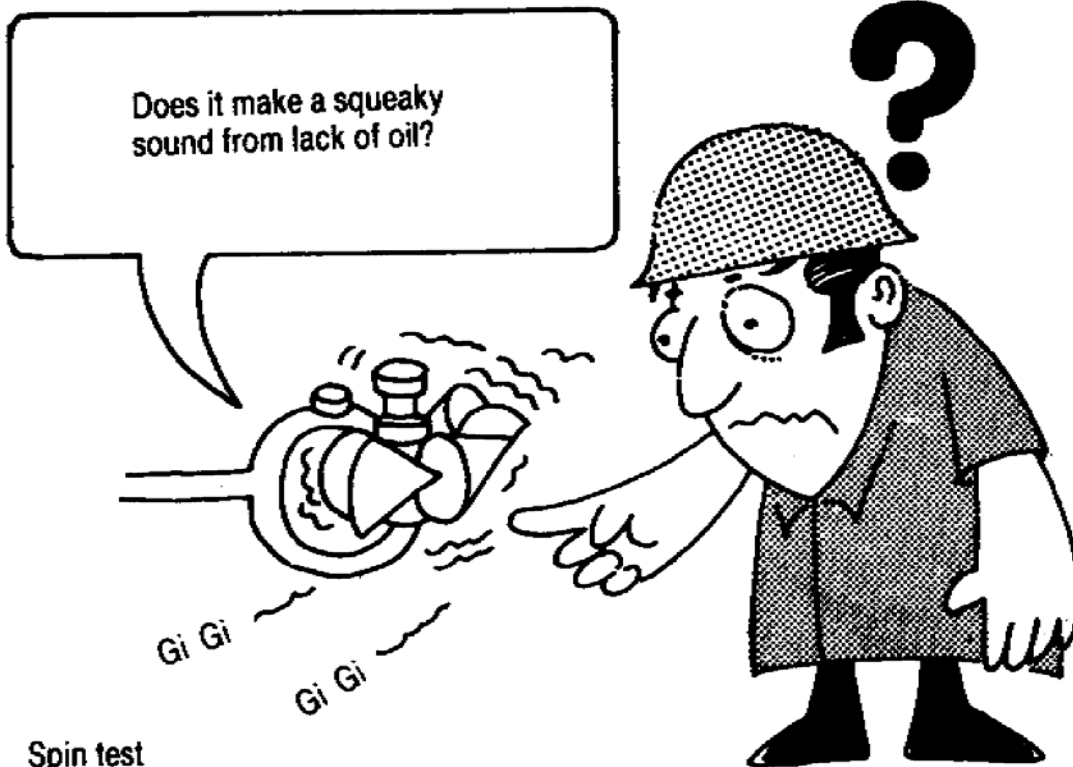


Before departure verify that all the necessary items are on hand according to the checklist. Also, prepare spare items for those that will get damaged or lost easily.

**OK!**



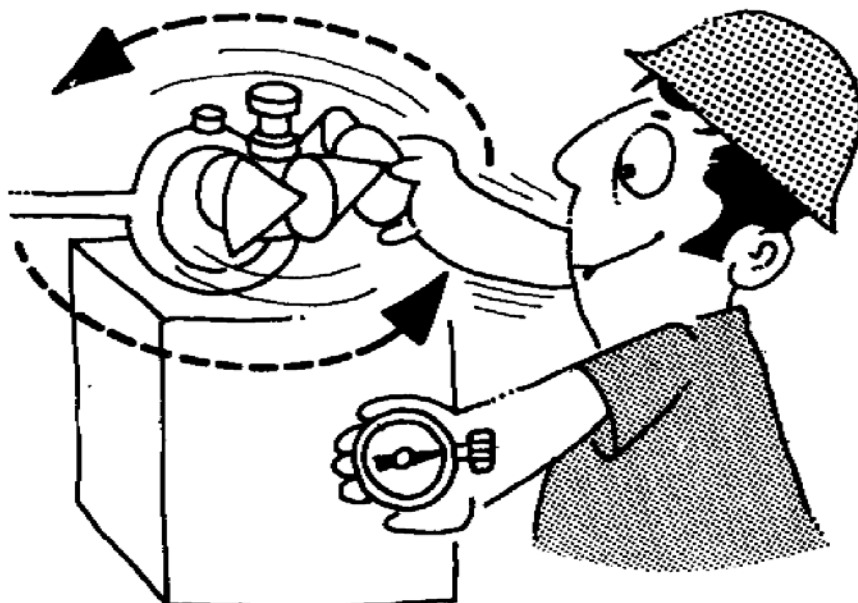
Does the revolving part on the current meter turn easily with your finger?



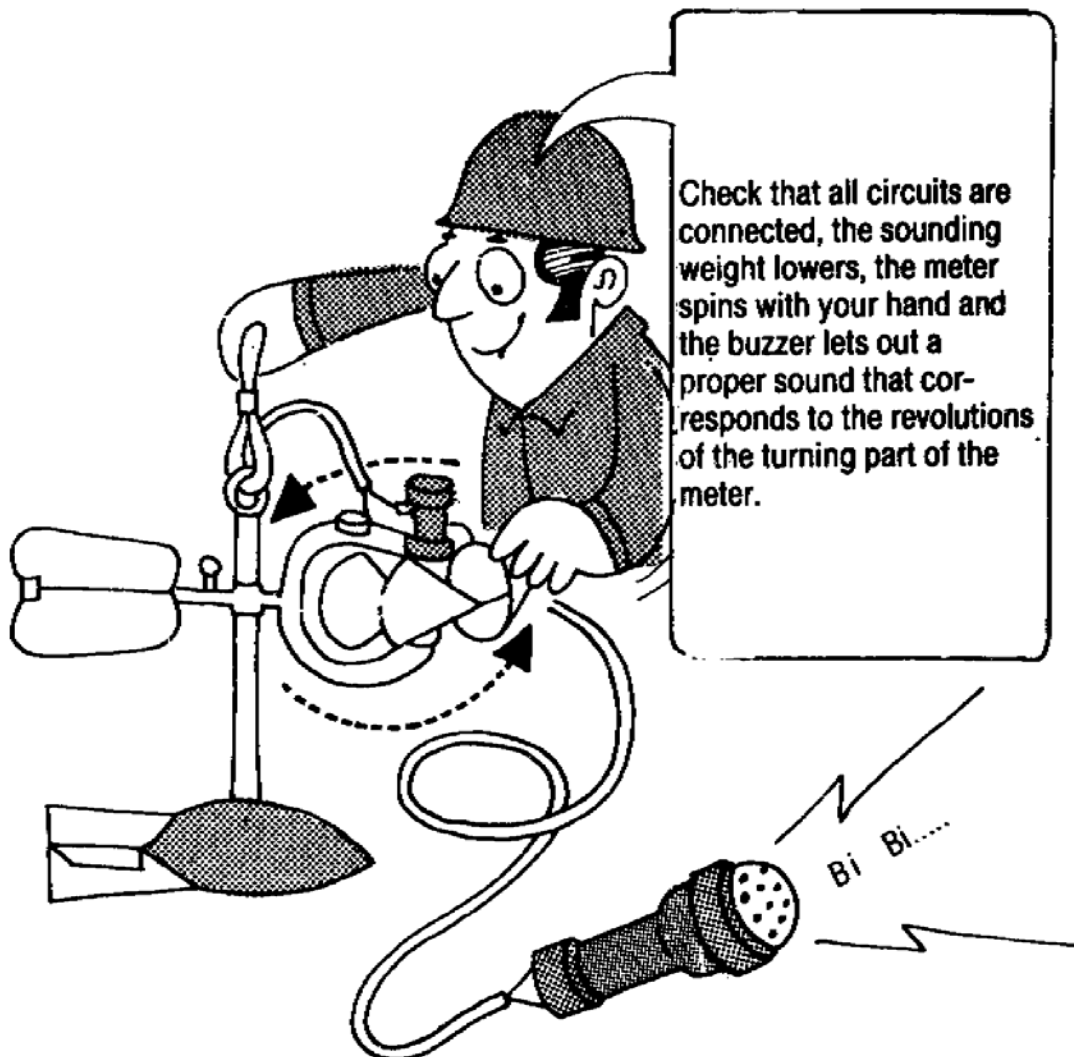
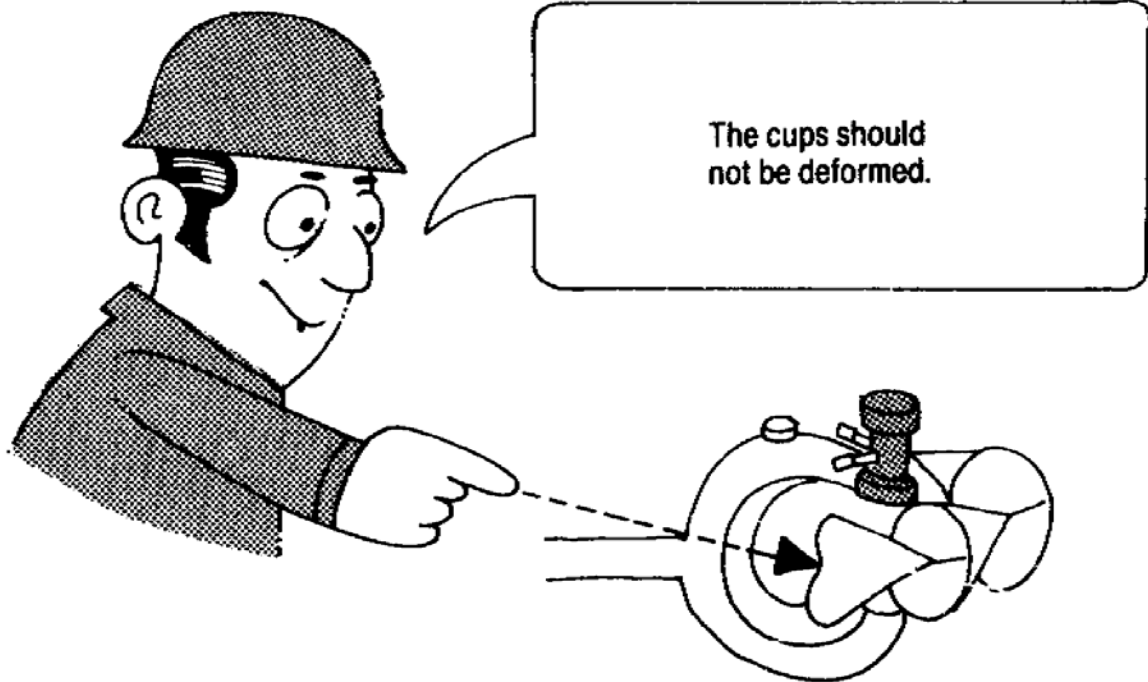
**Spin test**

Fix the current meter in a horizontal position on a stand and test to find how long the cups spin before stopping after a quick spin with your hand.

If there is a substantial difference in the spin time after performing this test several times from the same position, do not use this current meter.

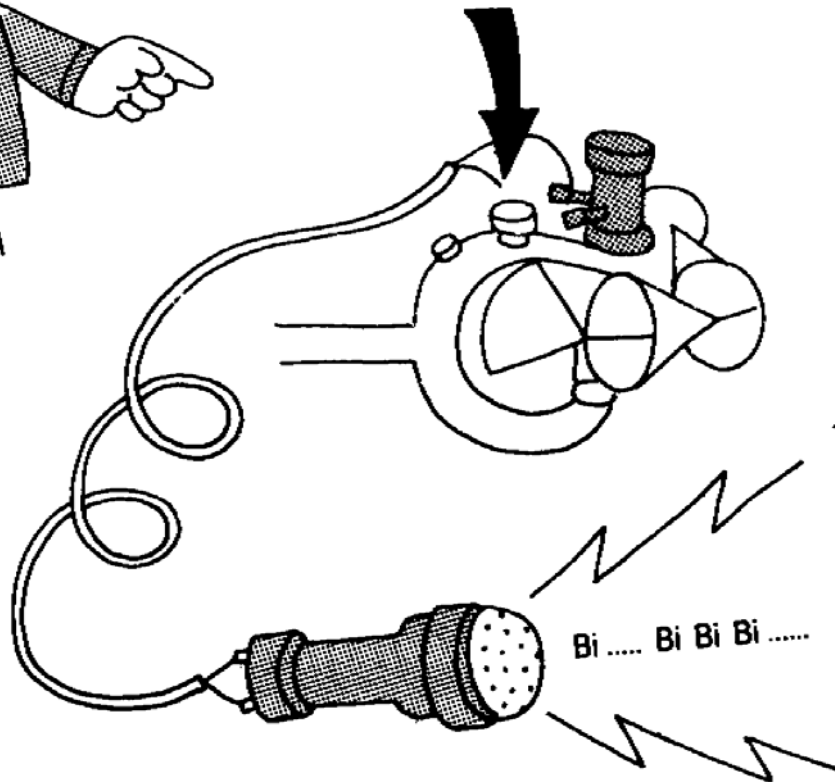


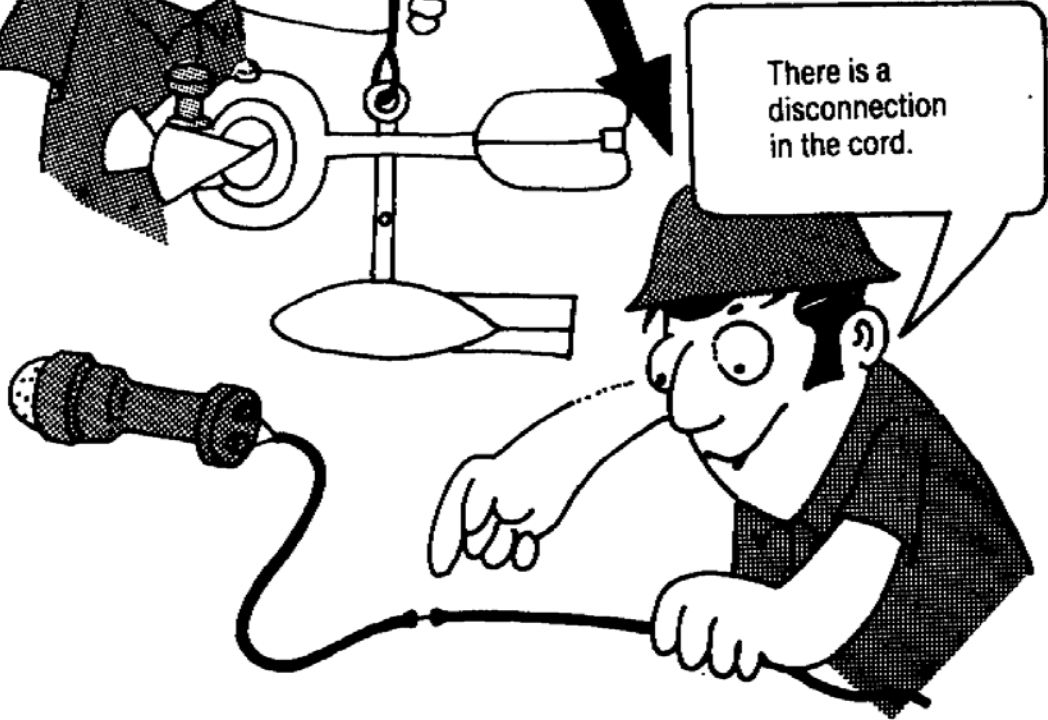
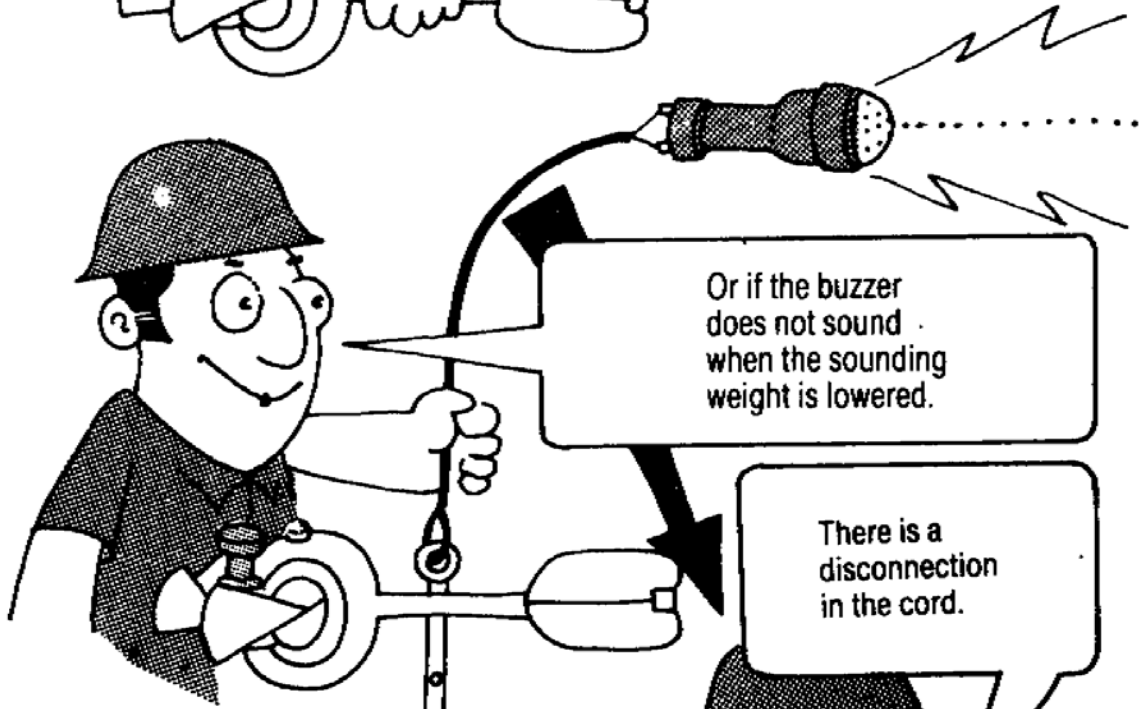
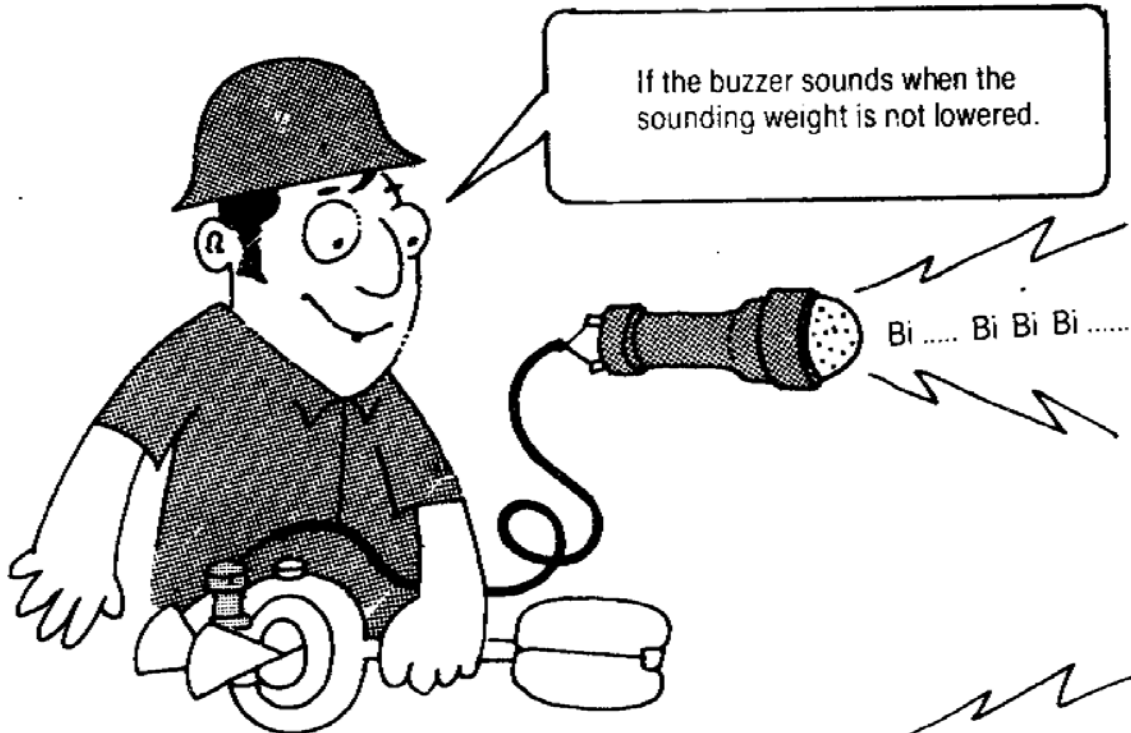
## Inspection of current meter



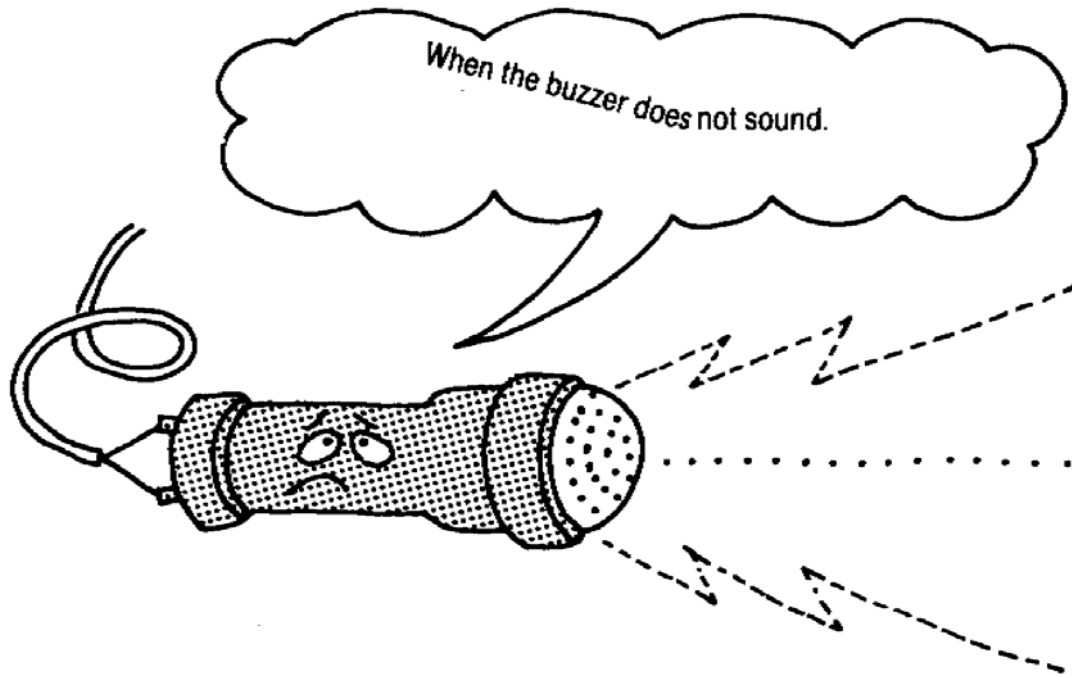


Connections are not good if the sound is interrupted or does not correspond to the revolutions.

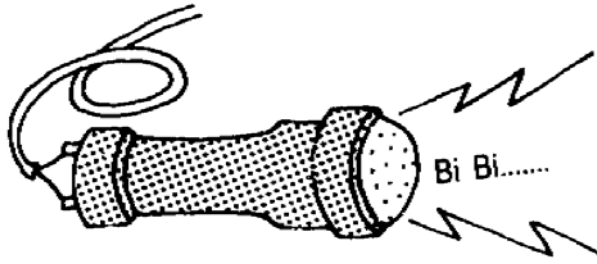








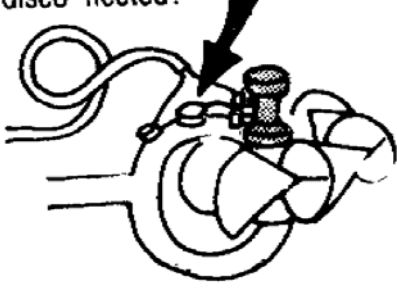
<p>Has the cord become disconnected from the machine?</p>	<p>Current meter axle Do the points of contact touch?</p>
<p>Is there a disconnection inside the cord insulation?</p>	<p>Have the batteries gone dead?</p>



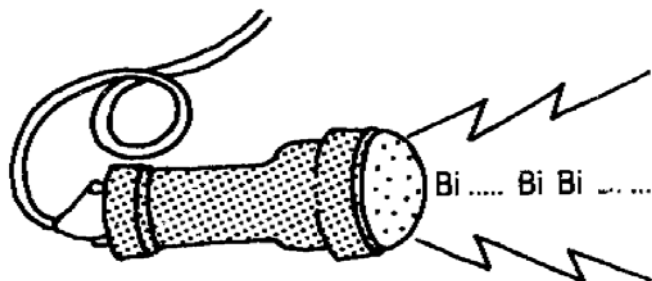
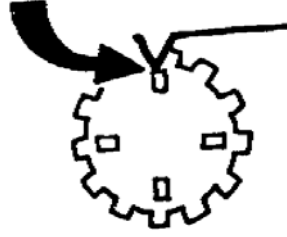
When the buzzer continues to sound.



Has the bare end of the cord become disconnected?



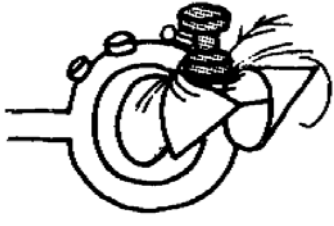
Is the point of contact too strong?



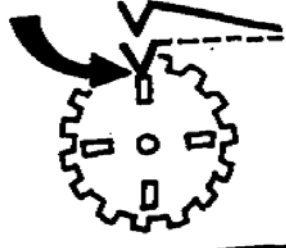
When the buzzer sound is irregular.



Is the shaft jammed with grass or straw?

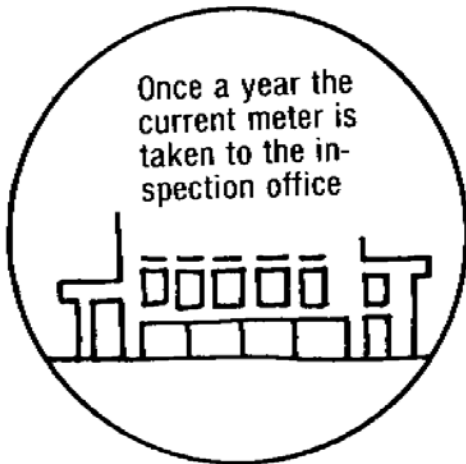


Is the point of contact made and then broken?

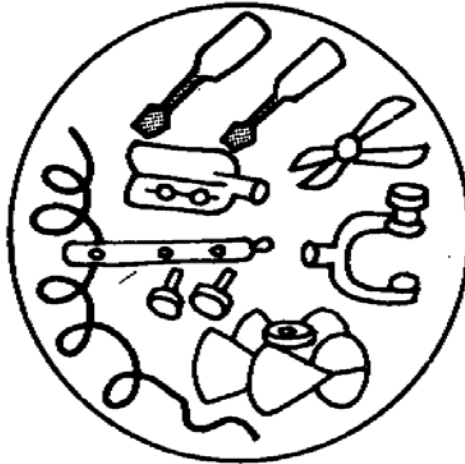


## Inspection of the current meter

- Regularly



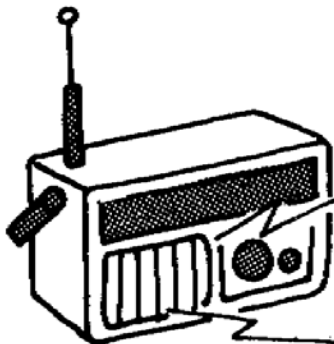
- When it is damaged or needs repair



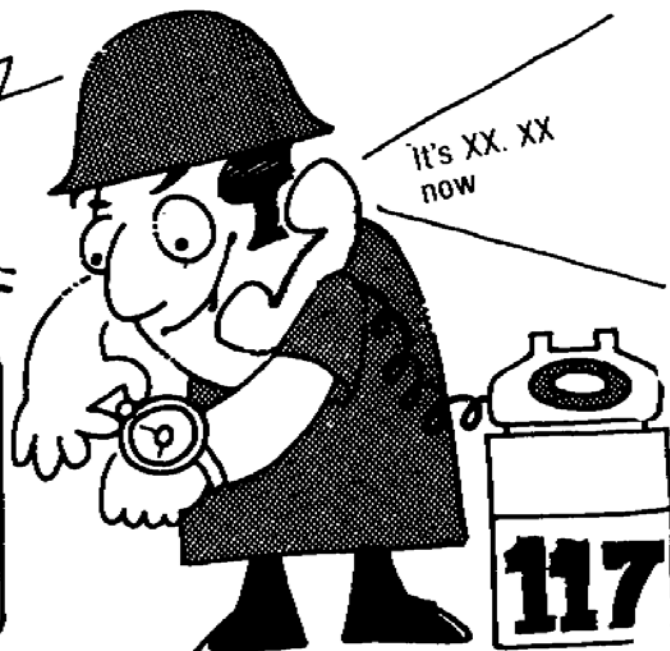
- When there is some reason for concern



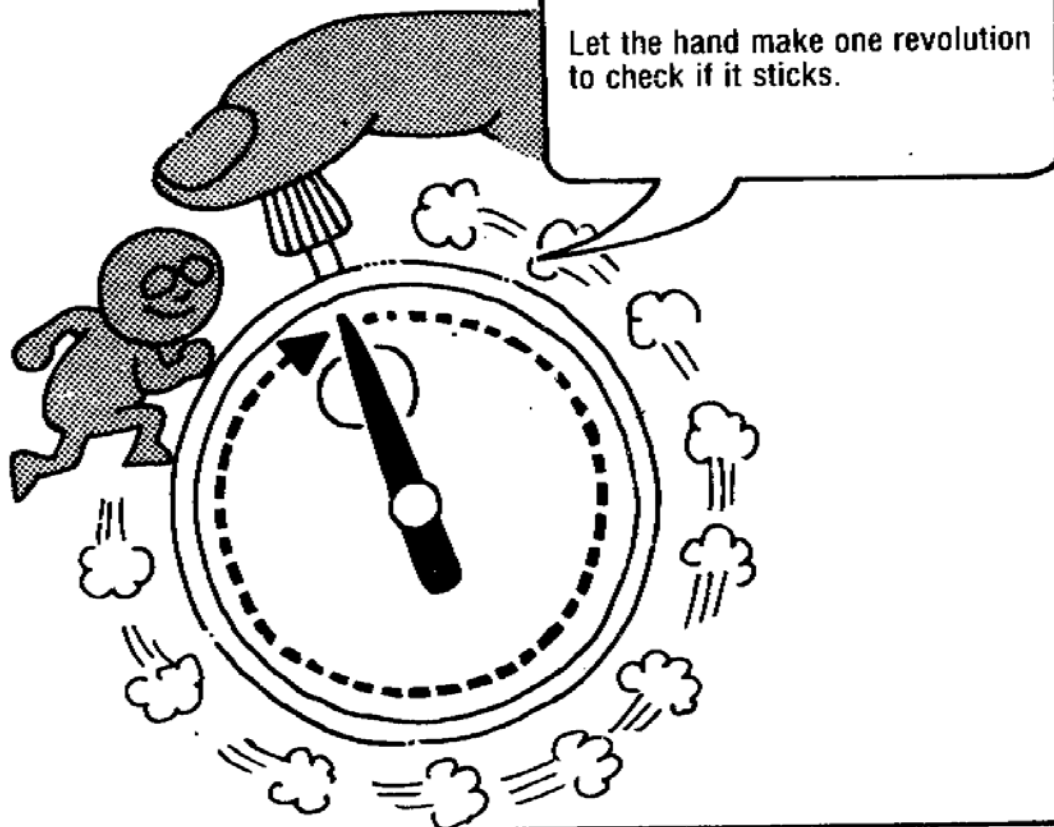
### Time synchronization



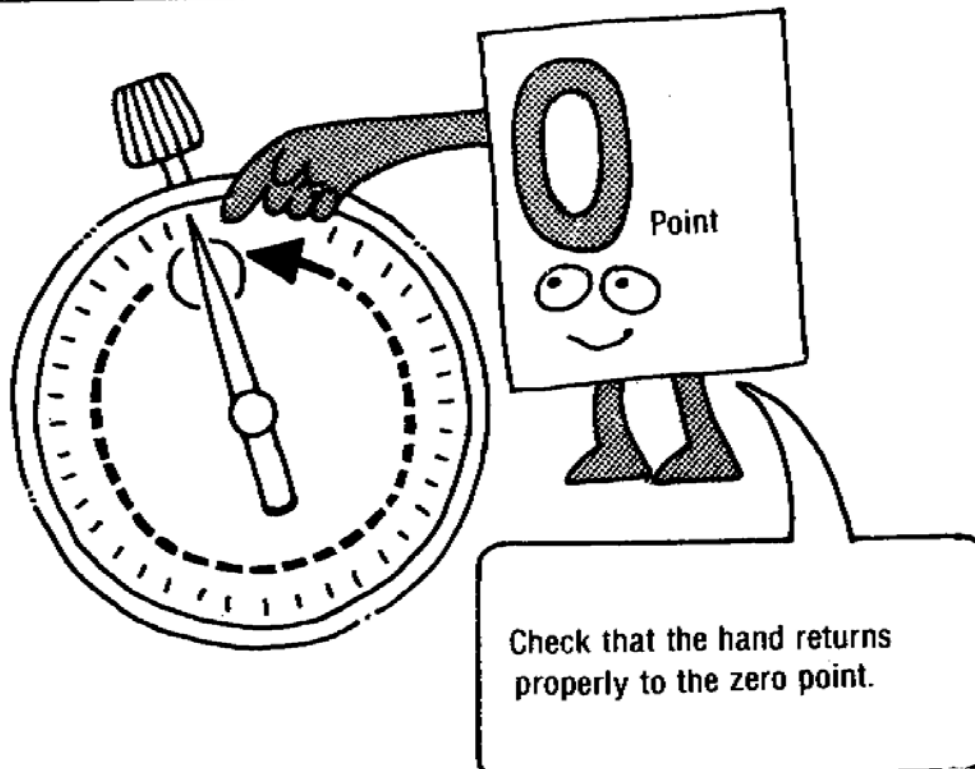
Set the correct time in accordance with the time signal of a radio or television.



## Stopwatch examination

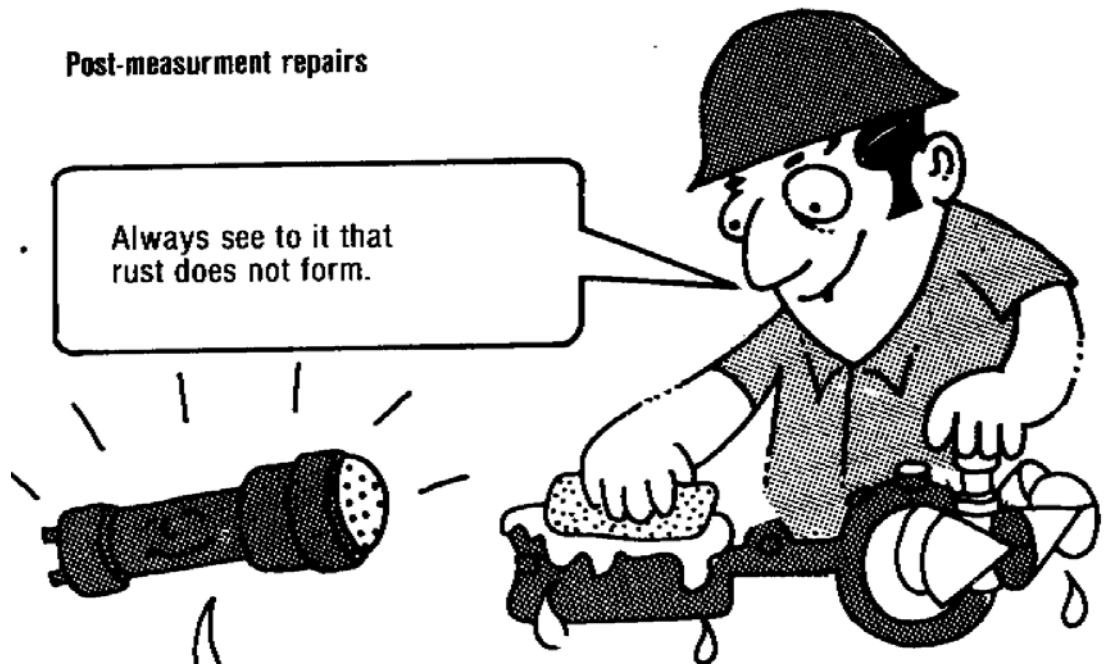


If there is damage or reason for concern, take it in for a cleaning and examination.



Post-measurment repairs

Always see to it that rust does not form.

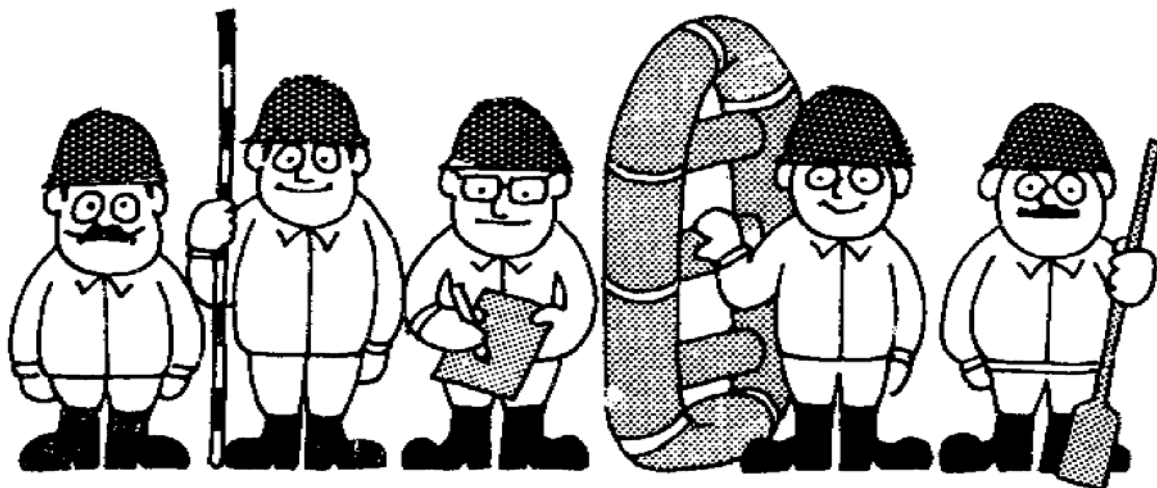


Always clean after use.

Inspect, clean and oil the equipment. Afterwards, give it an extra examination.



## Composition of squad



Group  
leader

Sounding  
man

Recorder

Boat position  
securer

Boatsman

## Allocation of Duties

### Group leader

Controls the overall activities related to measurement; Determines the position of the line of measurement; Directs squad members to the positions for taking each measurement.

### Sounding man

Reads the water depth with a pole, etc.

### Current meter maintenance man

Keeps the current meter at the prescribed position and depth.

### Recorder

Records the distance of the water depth measurement line from shore and the readings of the sounding man

### Current measurement of recorder

Records the distance from shore of the water current measurement line; Listens to the sound emitted to record the depth by the current meter, measures the required time and records all this information.

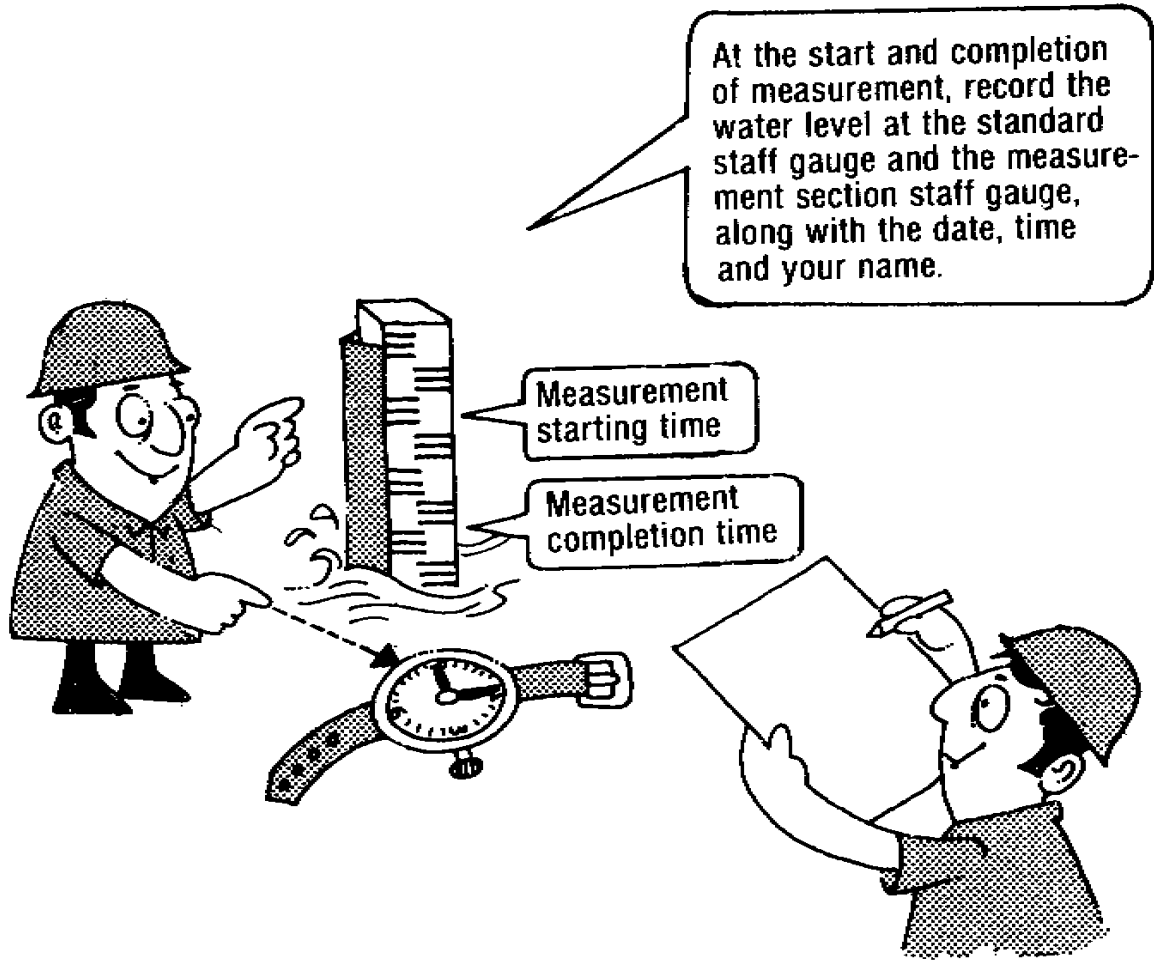
### Boat position securer

Using a wire, this person correctly keeps the boat in the necessary position according to an interval scale and the direction of the group leader. He is located in the bow of the boat.

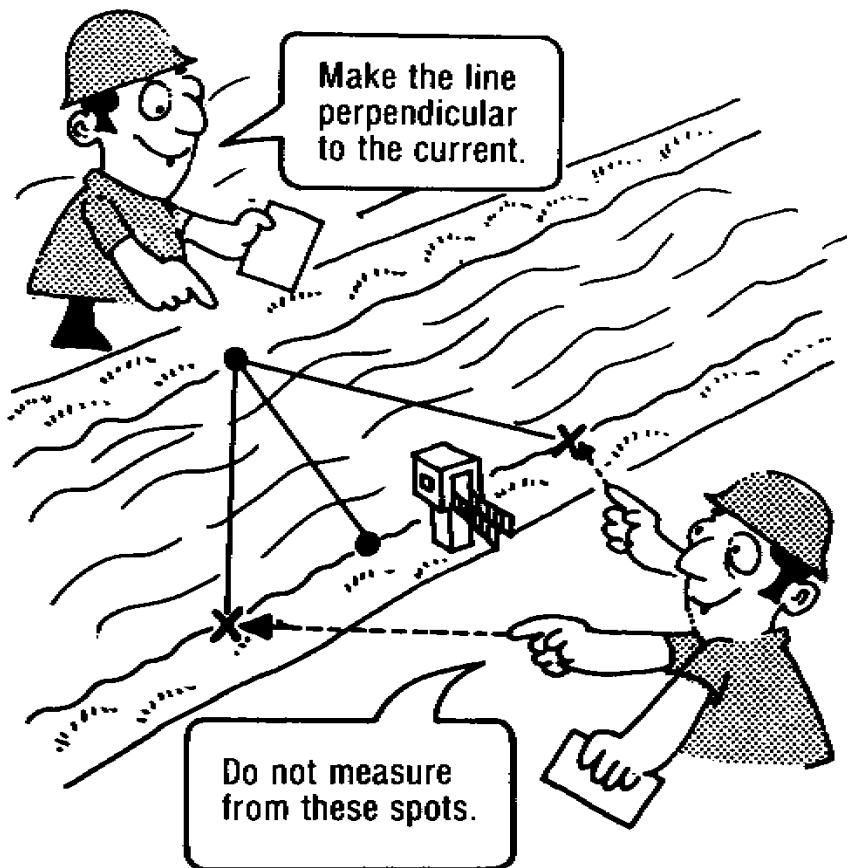
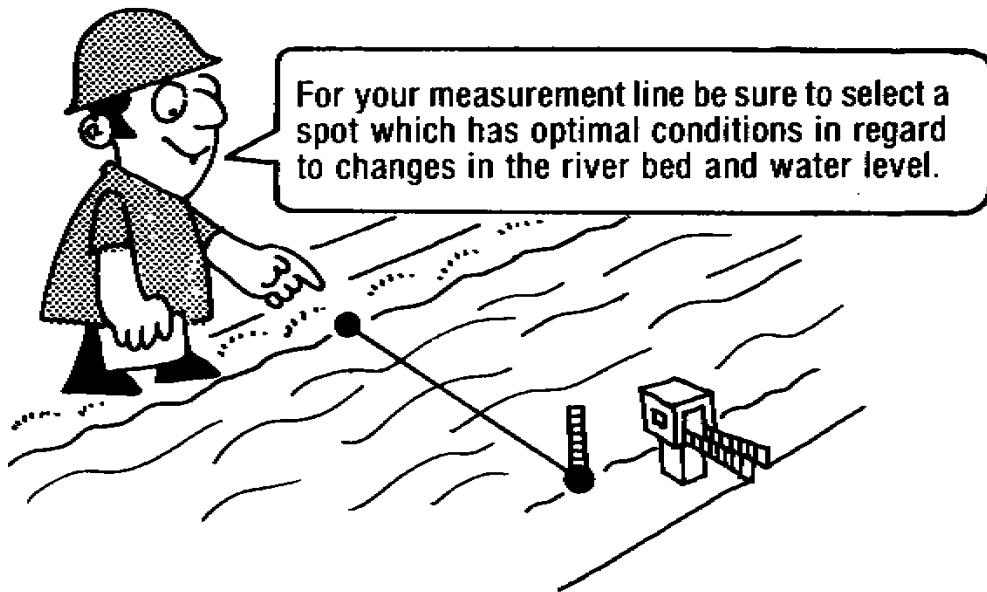
### Boatsman

Along with moving the boat, this person keeps the boat in proper position against the current while measurement is taking place.

## Measurement of water level



**measurement lines**



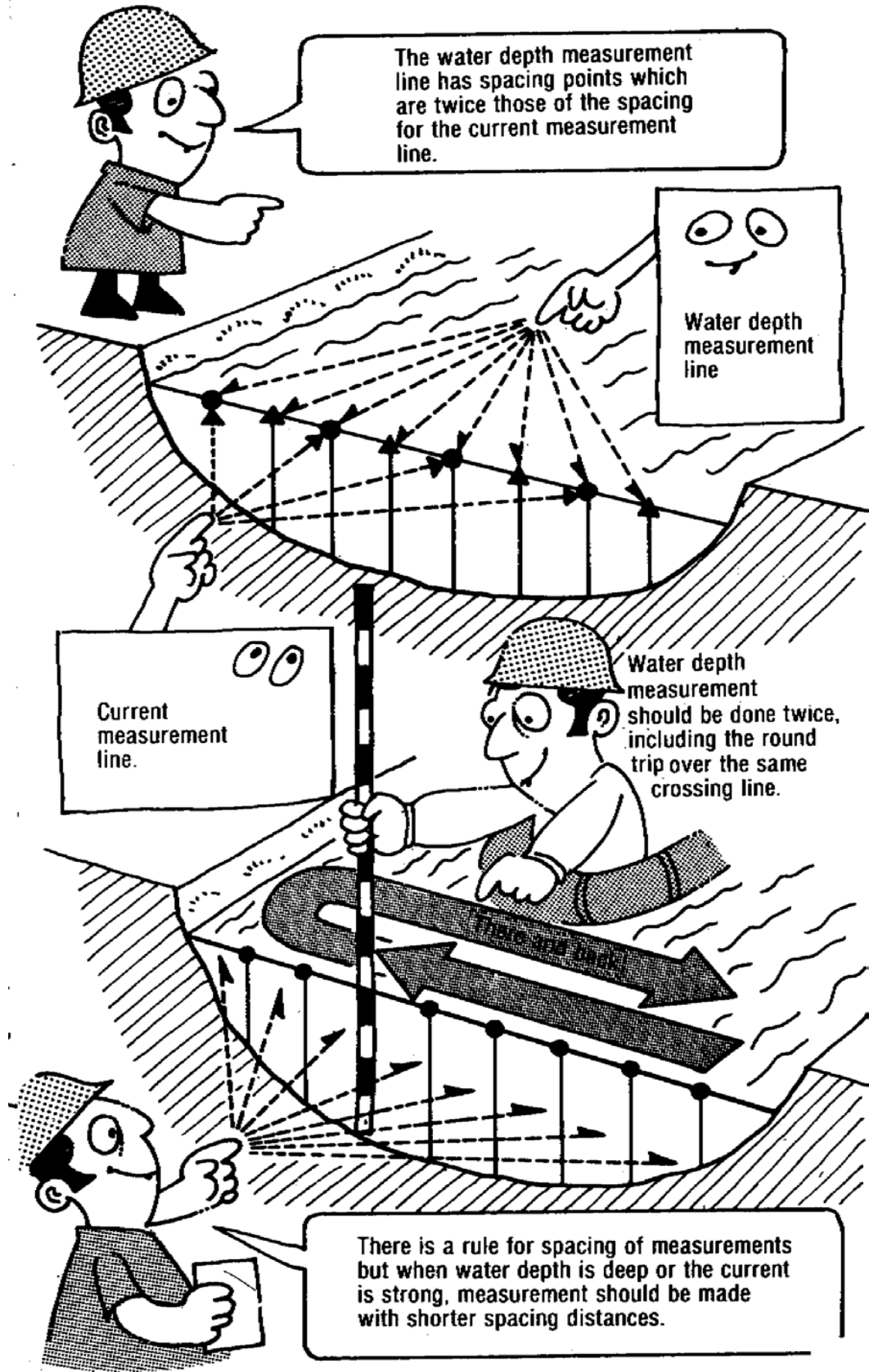


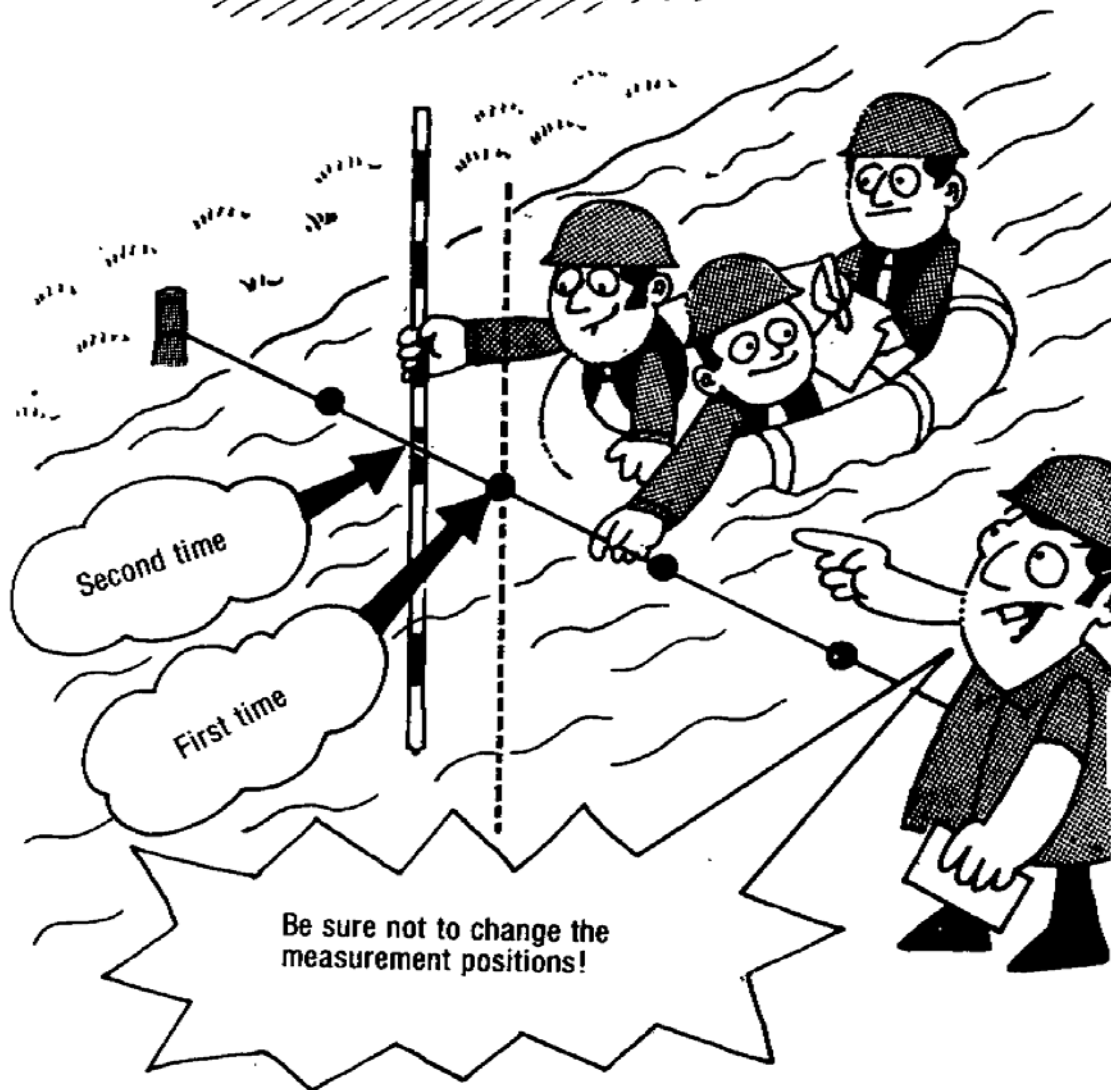
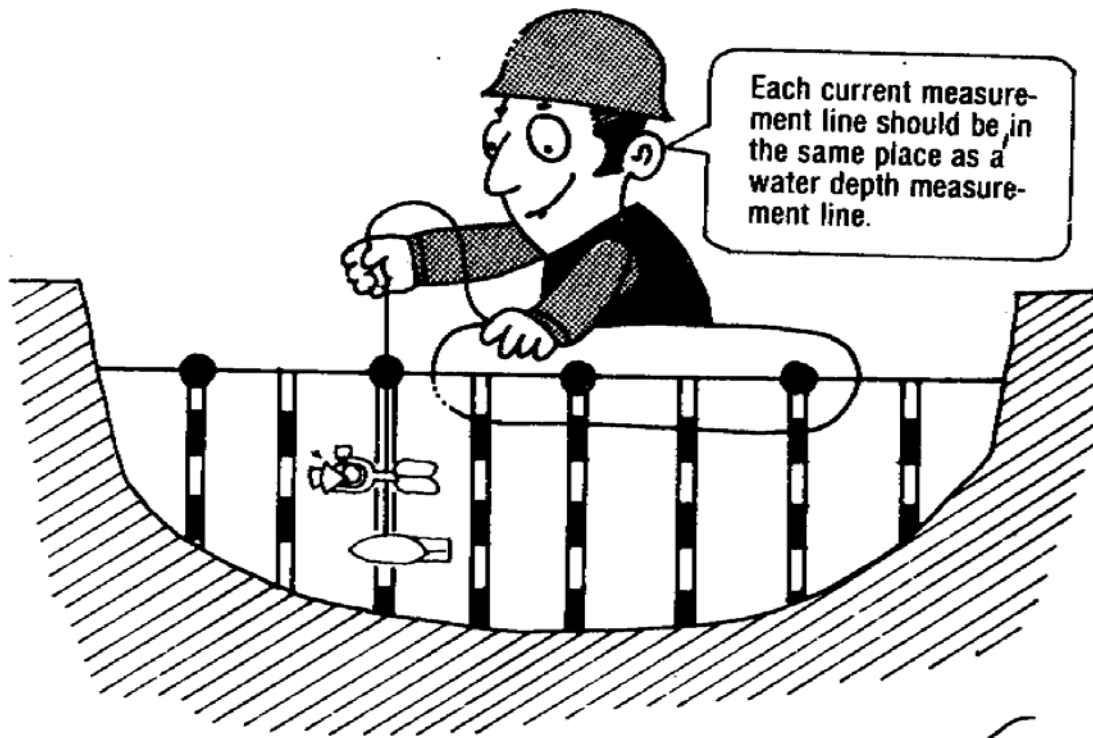
### Number of times and measurement points

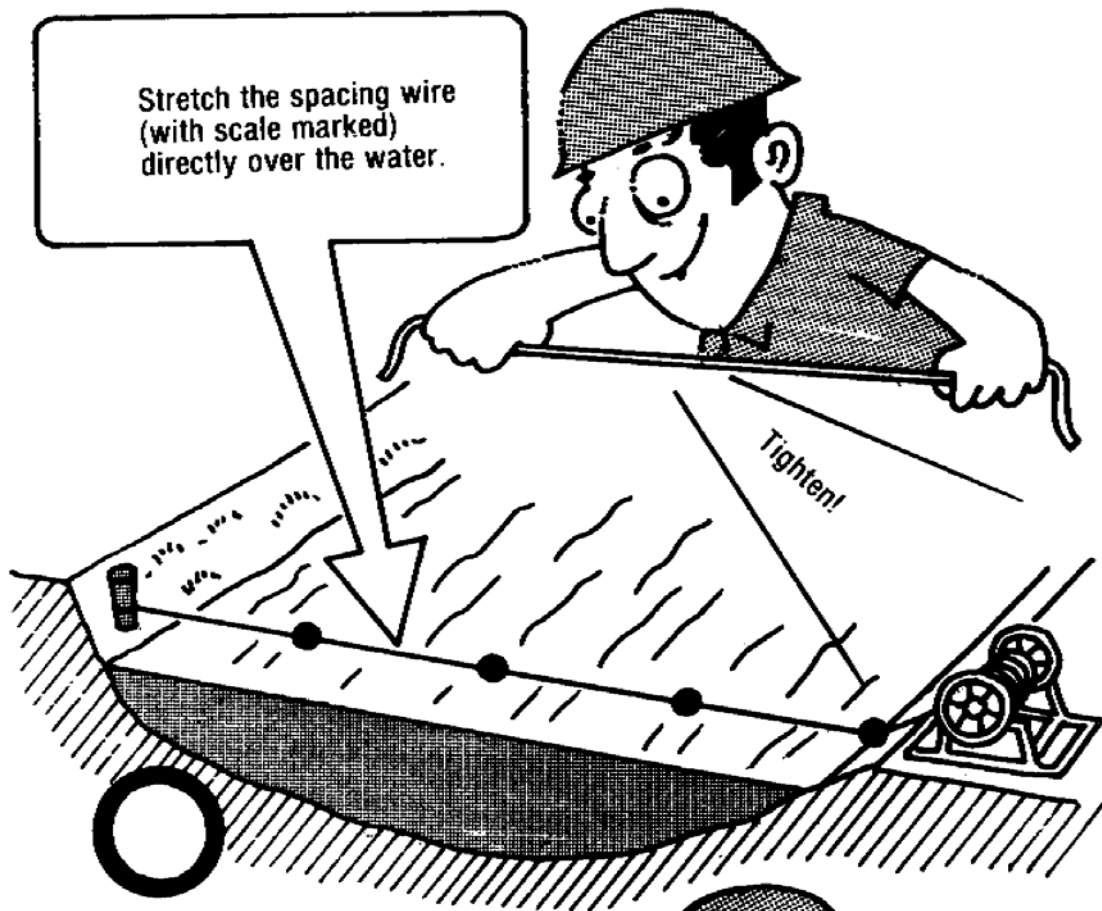
1. For the number of times measurements are made as a rule two passes are made in a round trip over the same crossing line in measuring water depth and two current measurements are thereby taken as well at each measurement point. When there is a flood, for example, and there are great changes in water level and current, these limits do not apply.
2. The current measuring lines, as a rule, are to be selected at even intervals in the direction of the crossing line on a vertical plane including the crossing line. Generally, the standard proportion of water surface width to the spaces in the current measuring line is given in the following table. However, when the shape of the cross section or the current range is complicated, the distance of the measuring lines can be reduced. When precision measurement is required, the distance of the measurement lines in the following table can be cut in half:

Water surface width (B) m.	Distance of water depth measurement (M) m.	Distance of current measurement (N) m.
10 Less than	Percentage of 10 – 15% water surface width	N=2M
10 20	1	2
20 40	2	4
40 60	3	6
60 80	4	8
80 100	5	10
100 150	6	12
150 200	10	20
200 More than	15	30

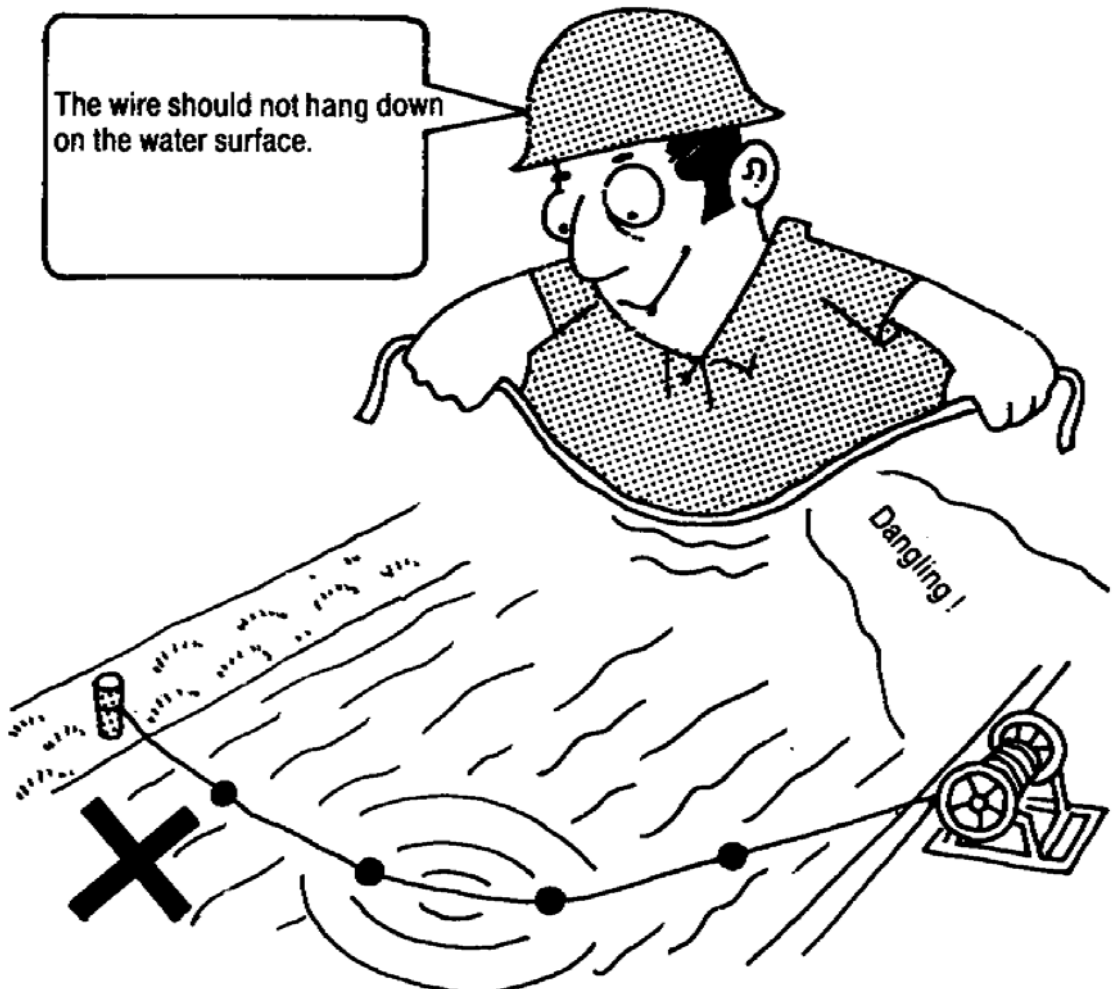
3. Current measurement takes place at selected points which are 20 percent and 80 percent of the water depth in the vertical current measurement line. When water depth is shallow, rather than selecting on the basis of water surface, the measurement point can be set at 60 percent of water depth. When precision measurement is necessary, as a rule points can be selected every 20 cm.
4. The water depth measurement line is established both over the current measurement line, which is within the boat direction surface and includes the crossing line, and is in the center of the two current measurement lines. On both shorelines, one of the water depth measurement lines are established at each of the respective outer sides of the current measurement line.



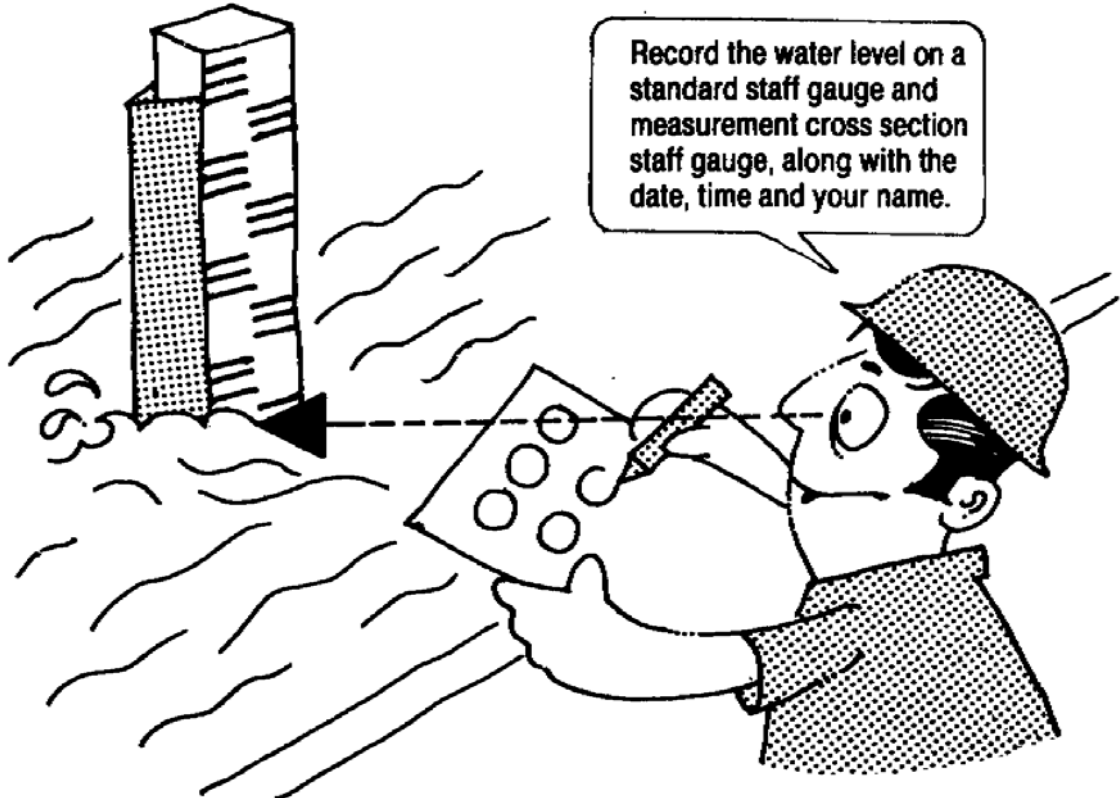




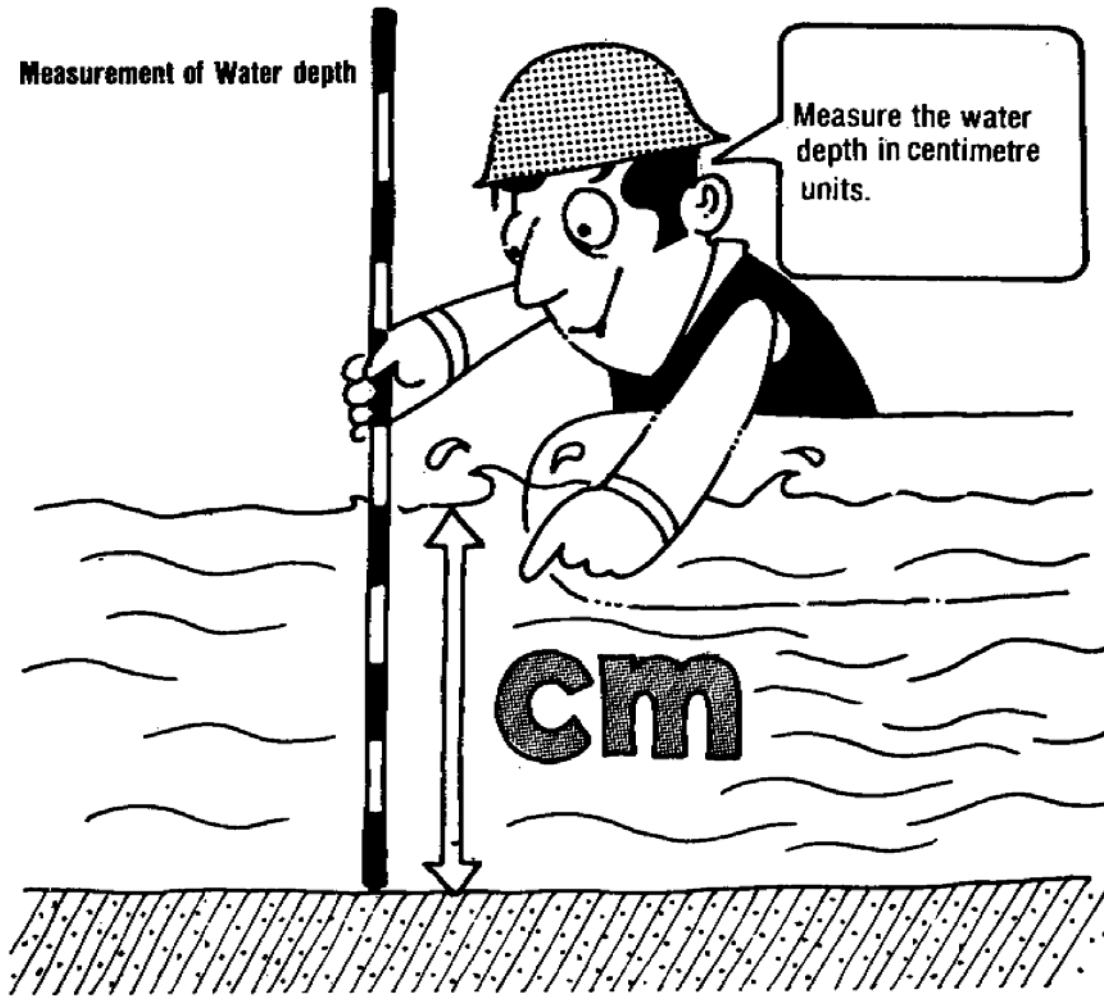
The wire should not hang down on the water surface.



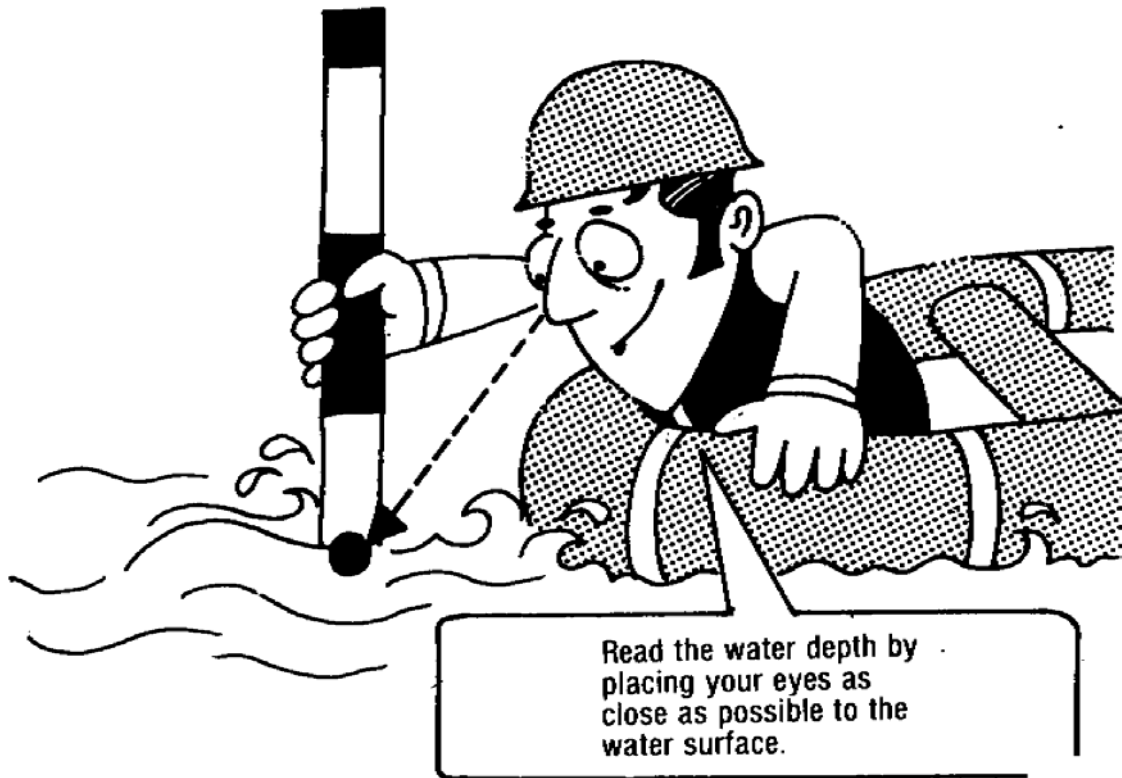
Record the water level on a standard staff gauge and measurement cross section staff gauge, along with the date, time and your name.



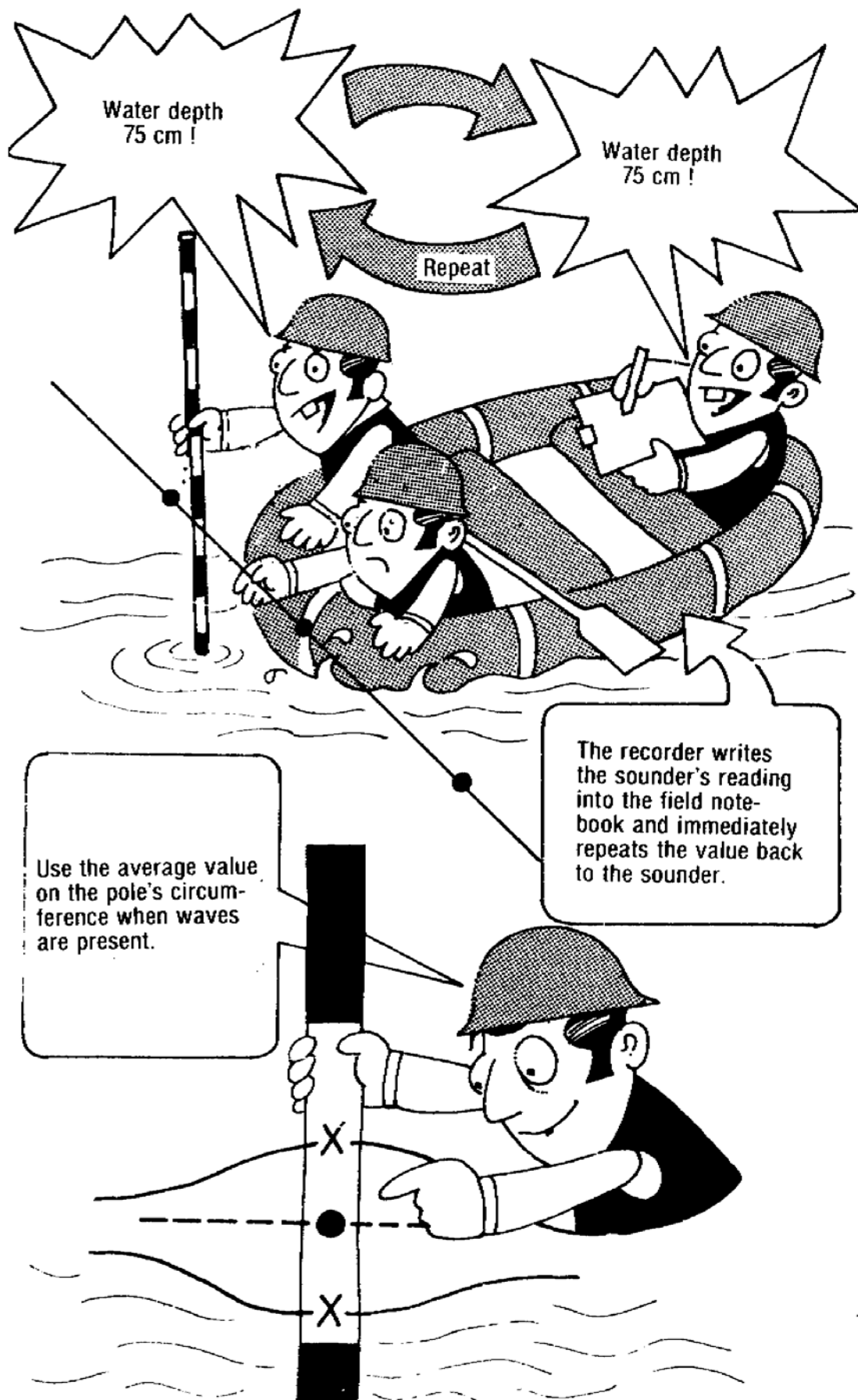
**Measurement of Water depth**

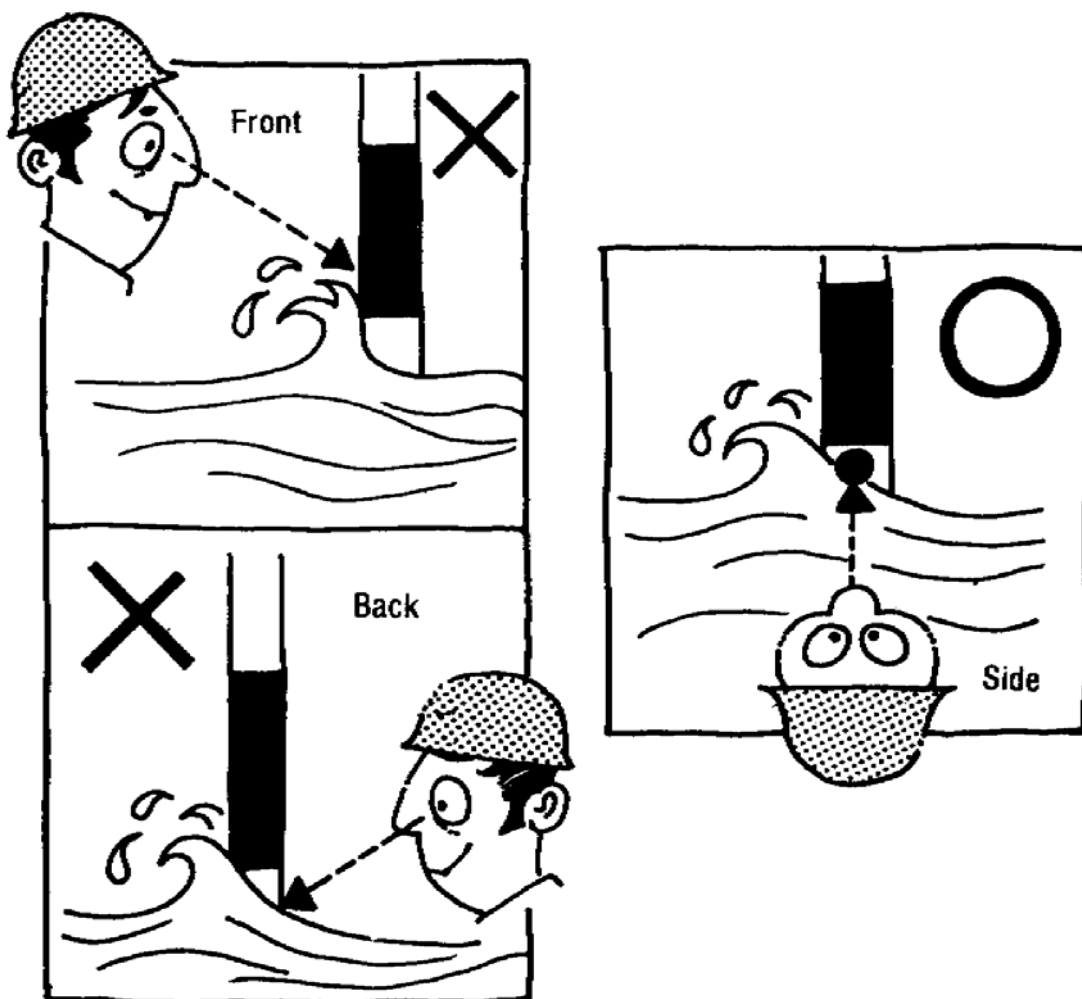
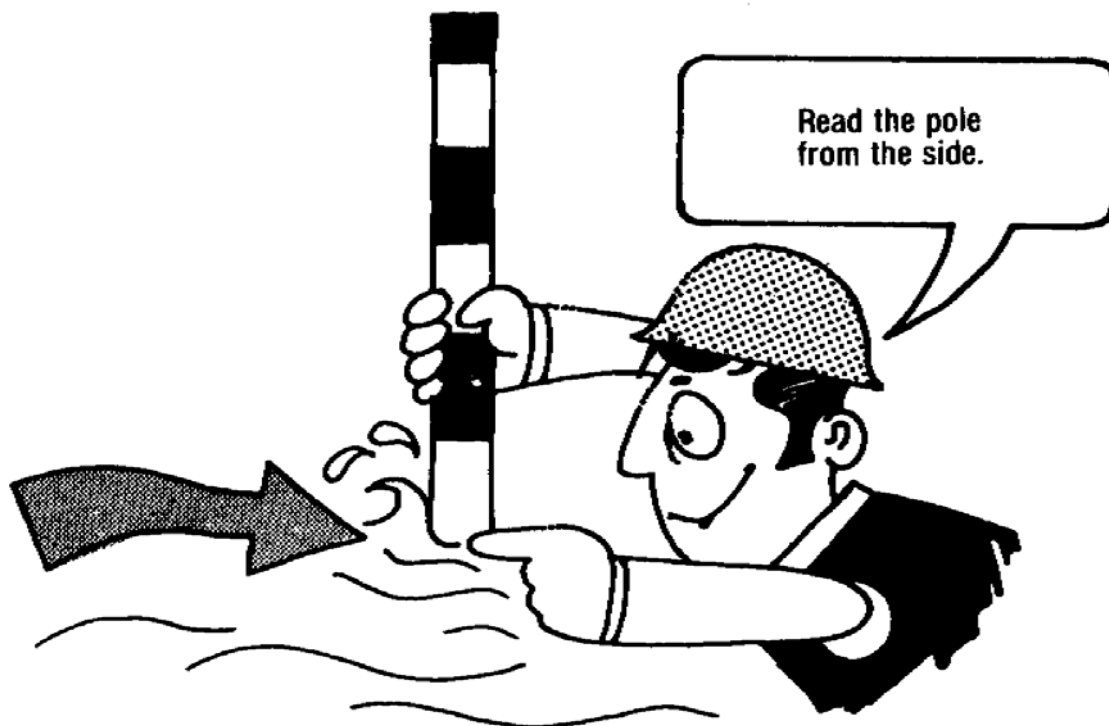


Measure the water depth in centimetre units.

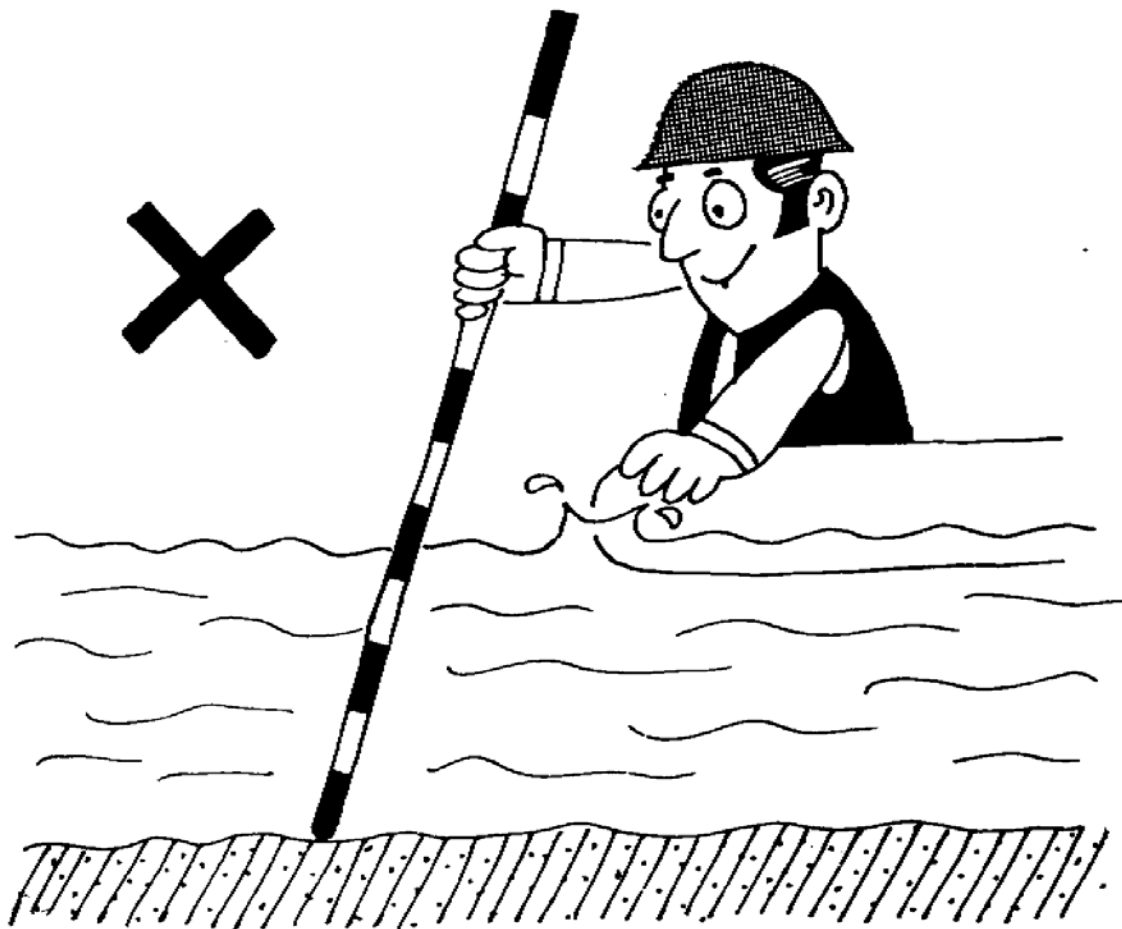
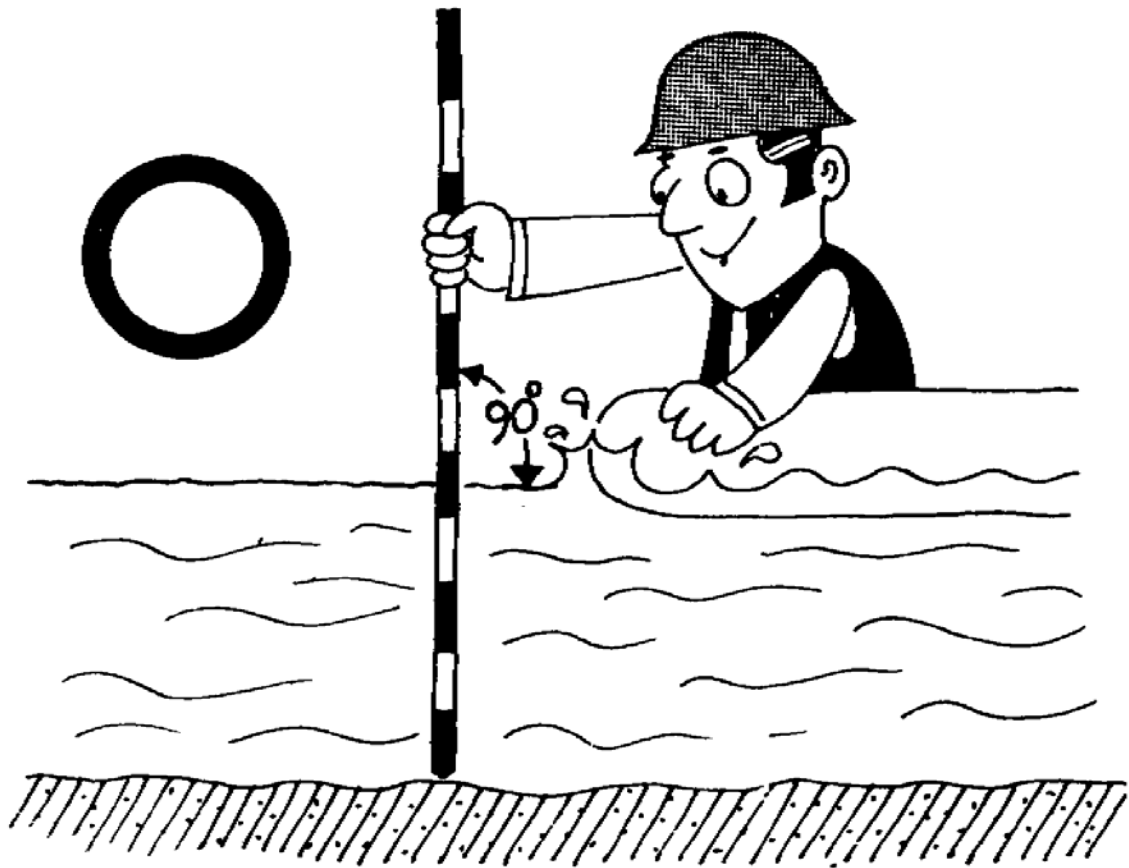


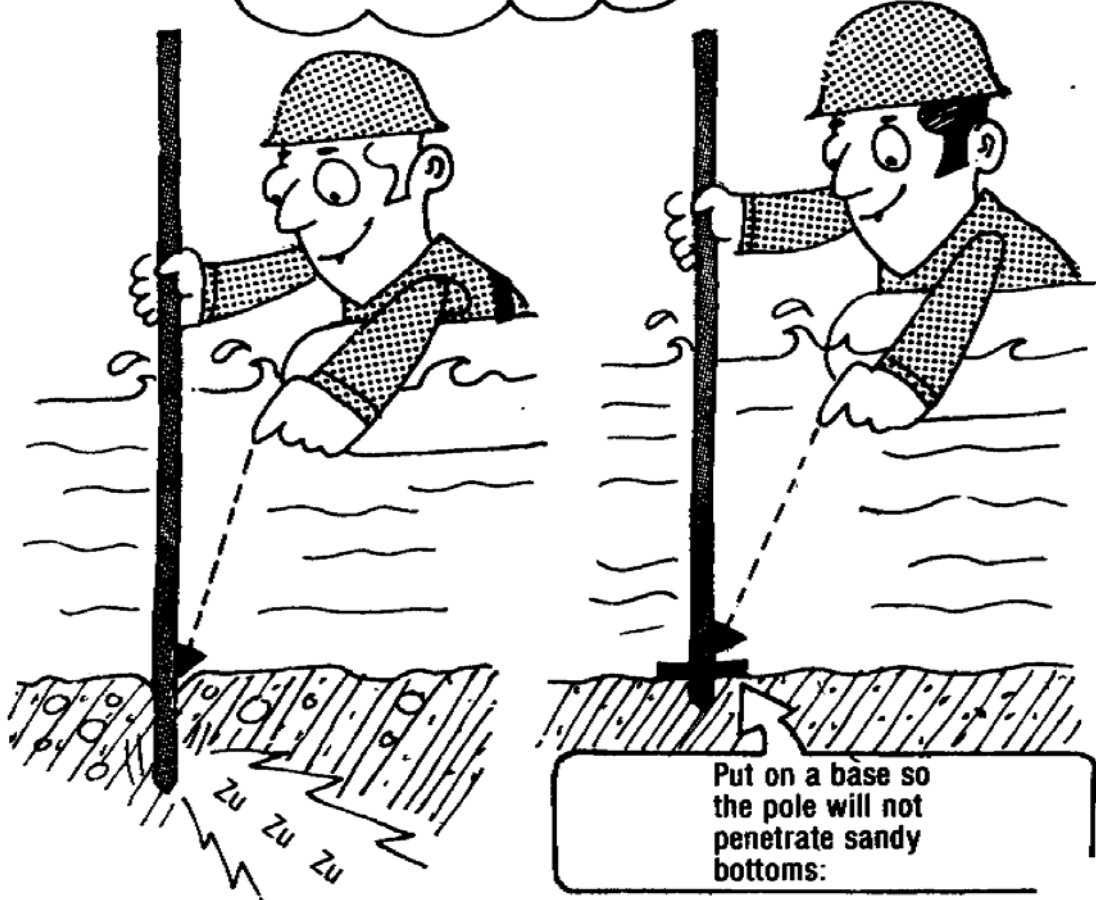
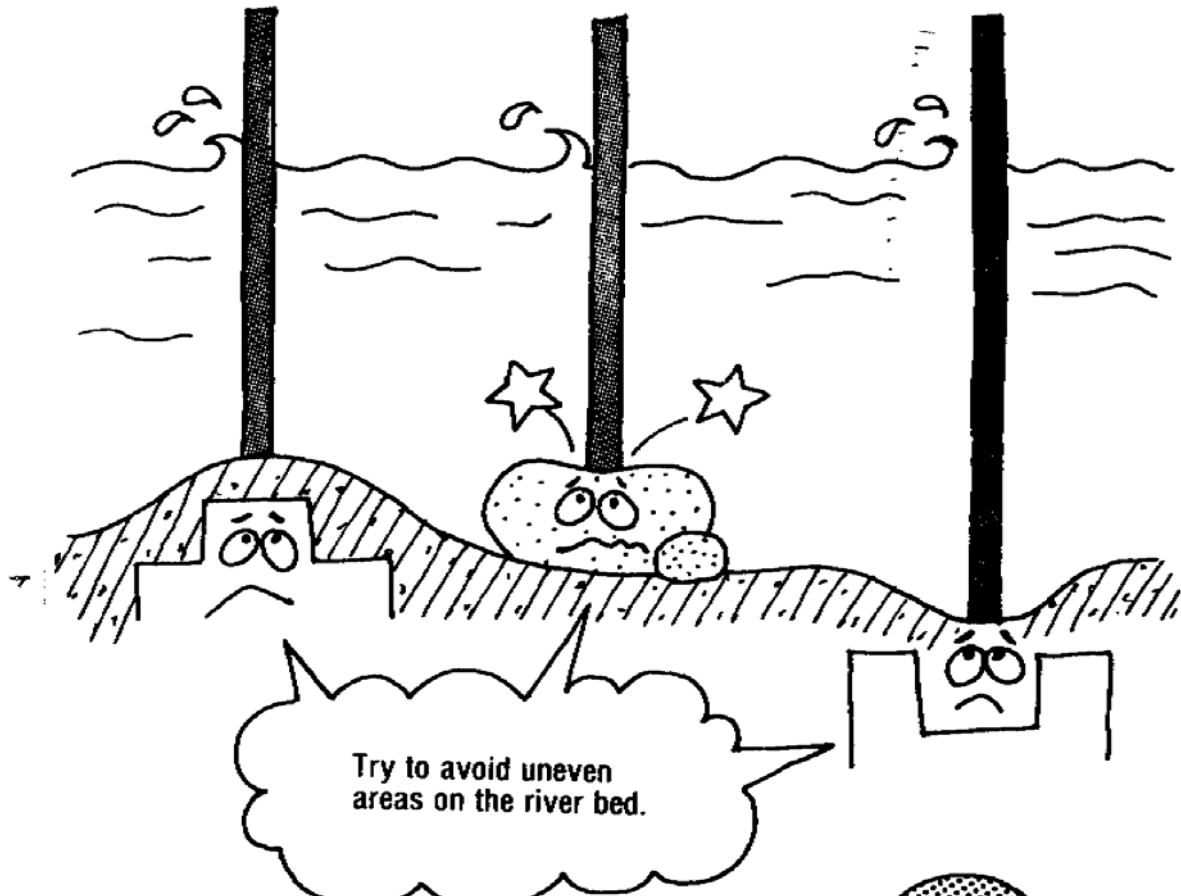
Read the water depth by placing your eyes as close as possible to the water surface.











### Current measurement

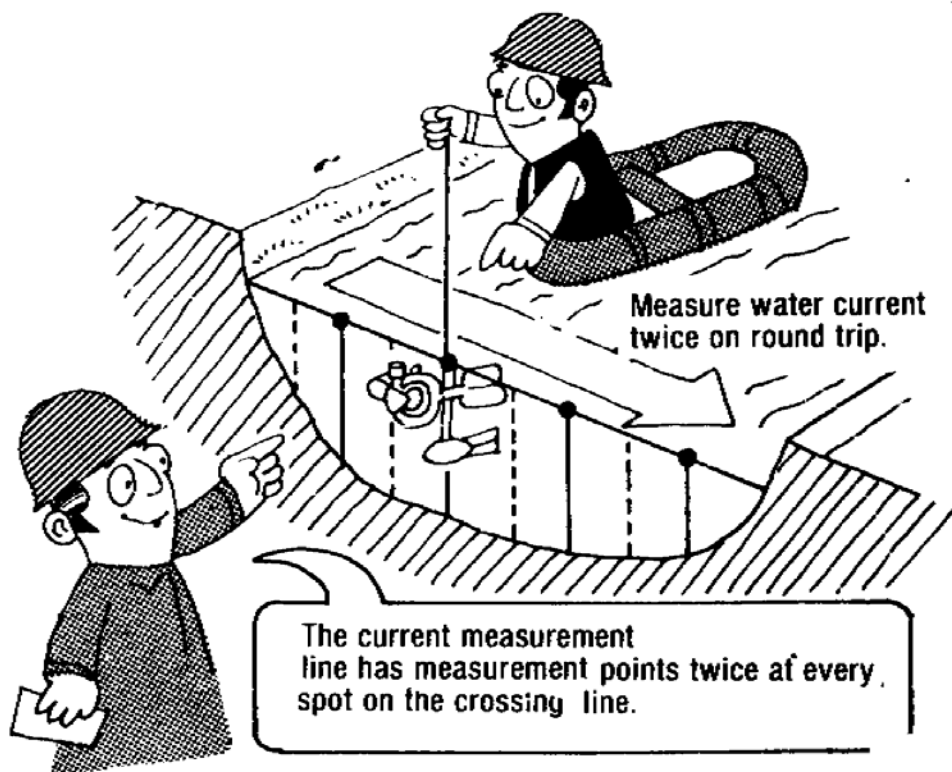
Measurement with a current meter is done according to the following procedure:

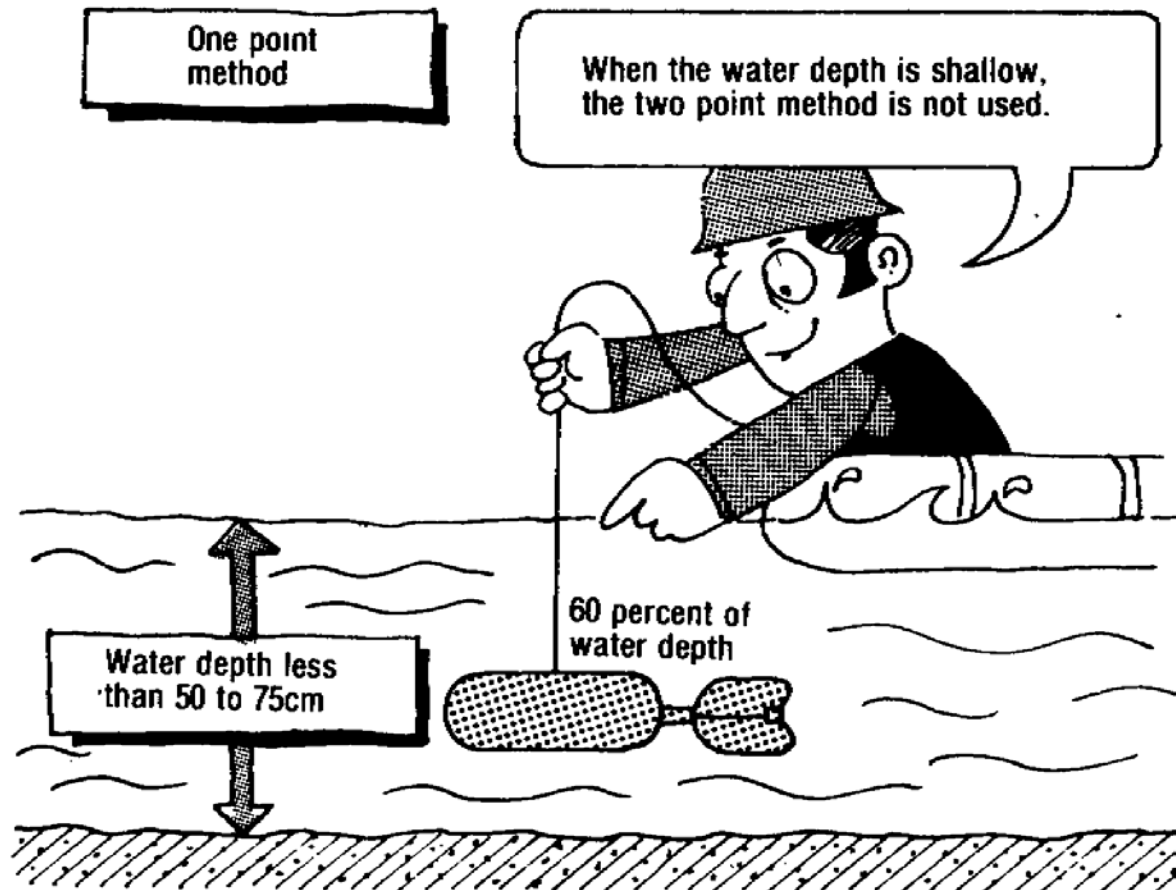
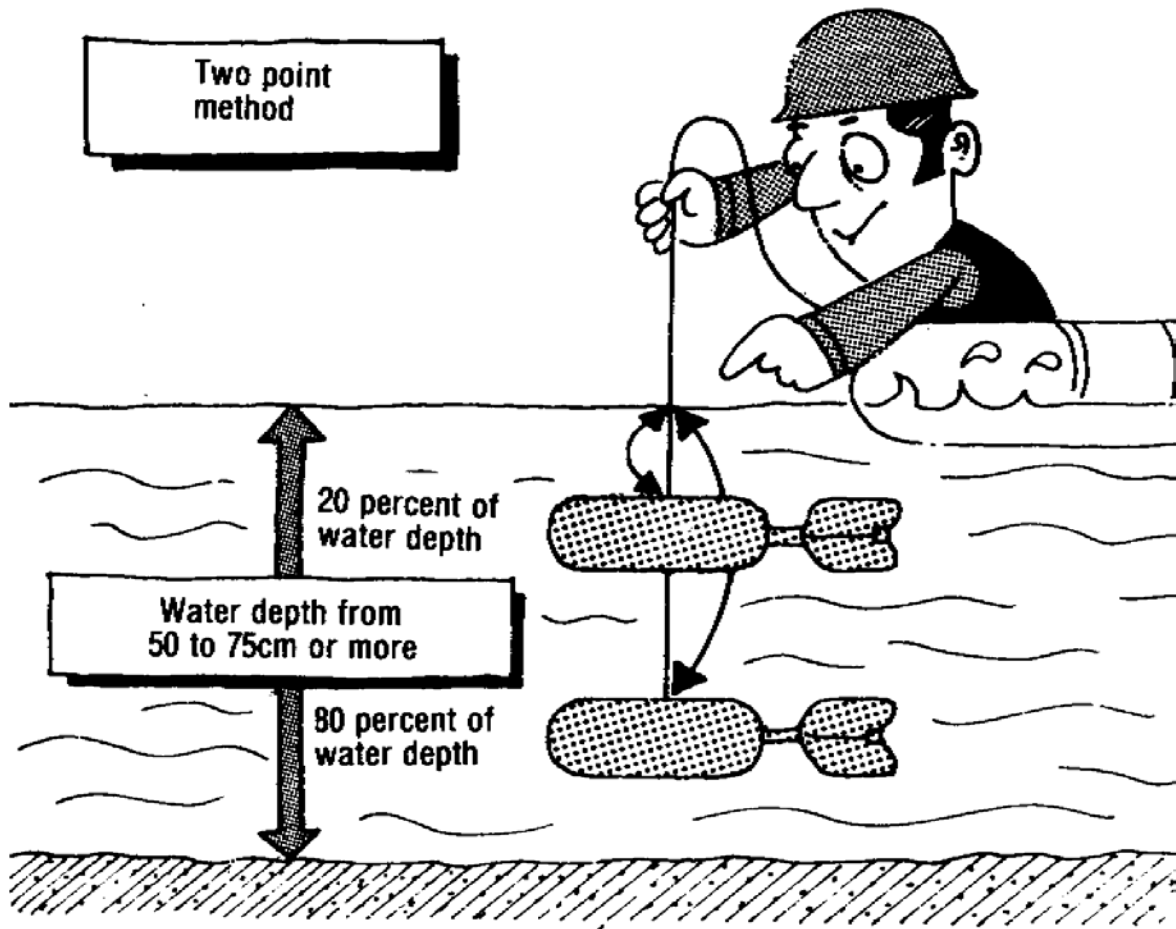
1. Maintain the current meter at the proper operating depth.
2. Let the rotor get used to the current and then begin measurement.
3. With the electric sound or audio method, begin time measurement as soon as the signal sound has stopped. Use one-tenth of a second as the measurement unit.
4. One measurement time should be a minimum of 20 seconds. Then repeat the measurement a second time. With precision measurement, the first measurement time should be a minimum of 60 seconds and then this should be repeated. With a direct reading meter, read when the needle is stable.
5. Measure the water depth before starting and after completing current measurement.

### Precision measurement

Whenever water level is low, the water flow observation station may undertake precision measurements in order to preserve the accuracy of measurements to as a great an extent as possible. Precision measurement is particularly necessary to determine water flow at places with stratified density such as tidal rivers, river estuaries by salt water inlets.

With the precision method, values obtained must be compared to flow values determined using other methods at the same time by being recorded on separate annual discharge charts and discharge rating curve .





**Depth of current meter**

**20% of water depth table**

	.00	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	
0.															0.15	0.16	0.17	0.18	0.19	0.	
1.	0.20	0.21	0.22	0.23	0.24	0.25	0.26	0.27	0.28	0.29	0.30	0.31	0.32	0.33	0.34	0.35	0.36	0.37	0.38	0.39	1.
2.	0.40	0.41	0.42	0.43	0.44	0.45	0.46	0.47	0.48	0.49	0.50	0.51	0.52	0.53	0.54	0.55	0.56	0.57	0.58	0.59	2.
3.	0.60	0.61	0.62	0.63	0.64	0.65	0.66	0.67	0.68	0.69	0.70	0.71	0.72	0.73	0.74	0.75	0.76	0.77	0.78	0.79	3.
4.	0.80	0.81	0.82	0.83	0.84	0.85	0.86	0.87	0.88	0.89	0.90	0.91	0.92	0.93	0.94	0.95	0.96	0.97	0.98	0.99	4.
5.	1.00	1.01	1.02	1.03	1.04	1.05	1.06	1.07	1.08	1.09	1.10	1.11	1.12	1.13	1.14	1.15	1.16	1.17	1.18	1.19	5.

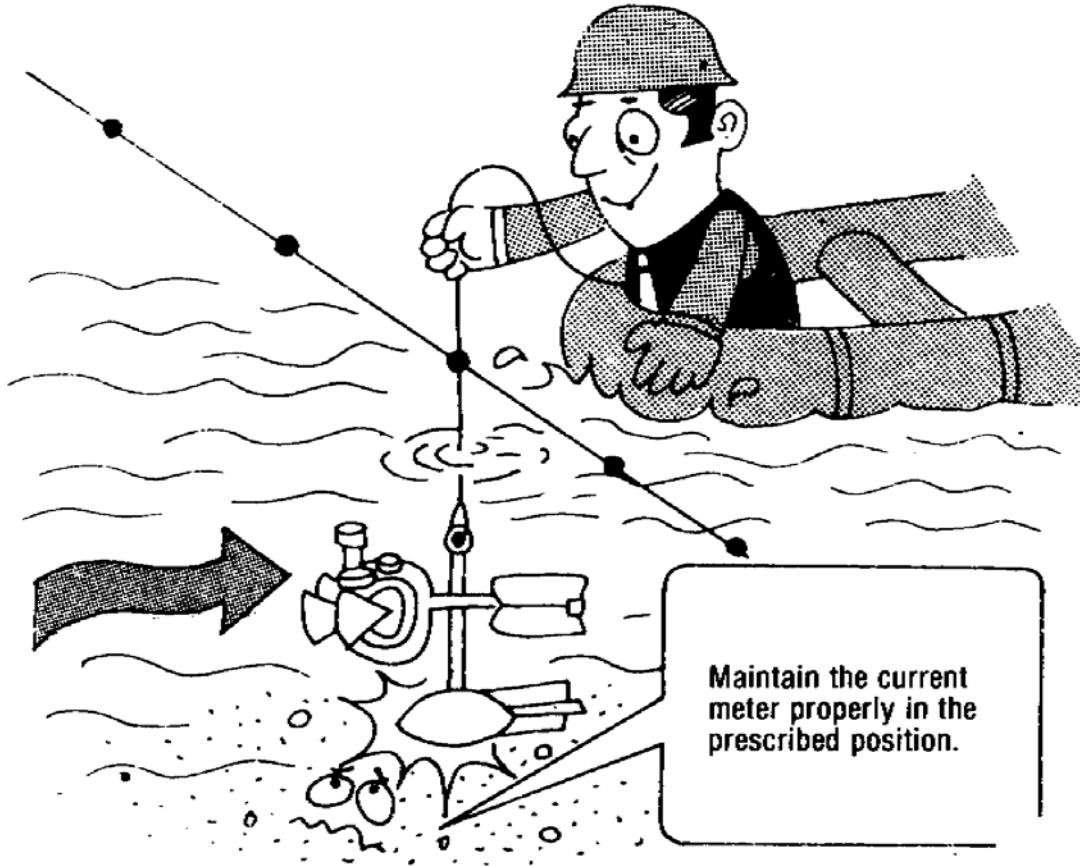
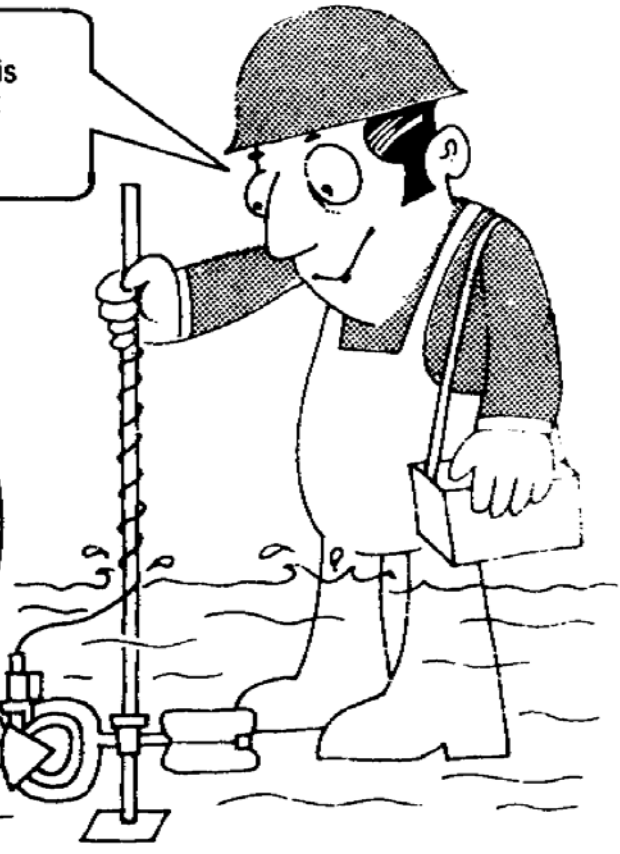
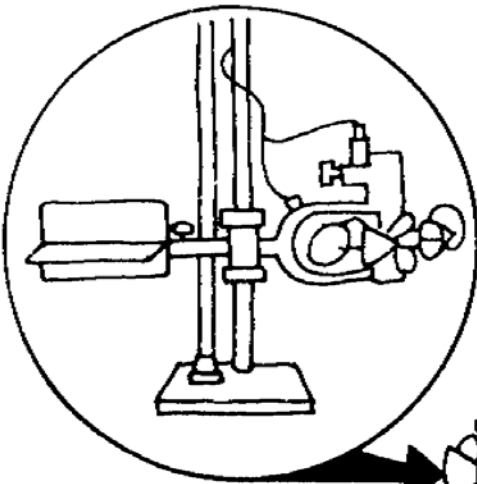
**60% of water depth table**

0.	0.0	0.5	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70						0.
		0.03	0.06	0.12	0.15	0.18	0.21	0.24	0.27	0.30	0.33	0.36	0.39	0.42							

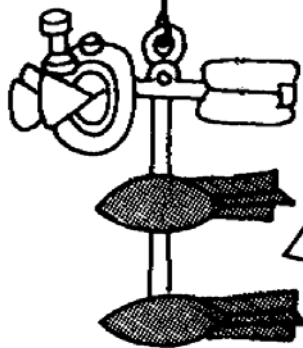
**80% of water depth table**

0.	0.0	0.5	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.60	0.64	0.68	0.72	0.76	0.
1.	0.80	0.84	0.88	0.92	0.96	1.00	1.04	1.08	1.12	1.16	1.20	1.24	1.28	1.32	1.36	1.40	1.44	1.48	1.52	1.56	1.
2.	1.60	1.64	1.68	1.72	1.76	1.80	1.84	1.88	1.92	1.96	2.00	2.04	2.08	2.12	2.16	2.20	2.24	2.28	2.32	2.36	2.
3.	2.40	2.44	2.48	2.52	2.56	2.60	2.64	2.68	2.72	2.76	2.80	2.84	2.88	2.92	2.96	3.00	3.04	3.08	3.12	3.16	3.
4.	3.20	3.24	3.28	3.32	3.36	3.40	3.44	3.48	3.52	3.56	3.60	3.64	3.68	3.72	3.76	3.80	3.84	3.88	3.92	3.96	4.
5.	4.00	4.04	4.08	4.12	4.16	4.20	4.24	4.28	4.32	4.36	4.40	4.44	4.48	4.52	4.56	4.60	4.64	4.68	4.72	4.76	5.

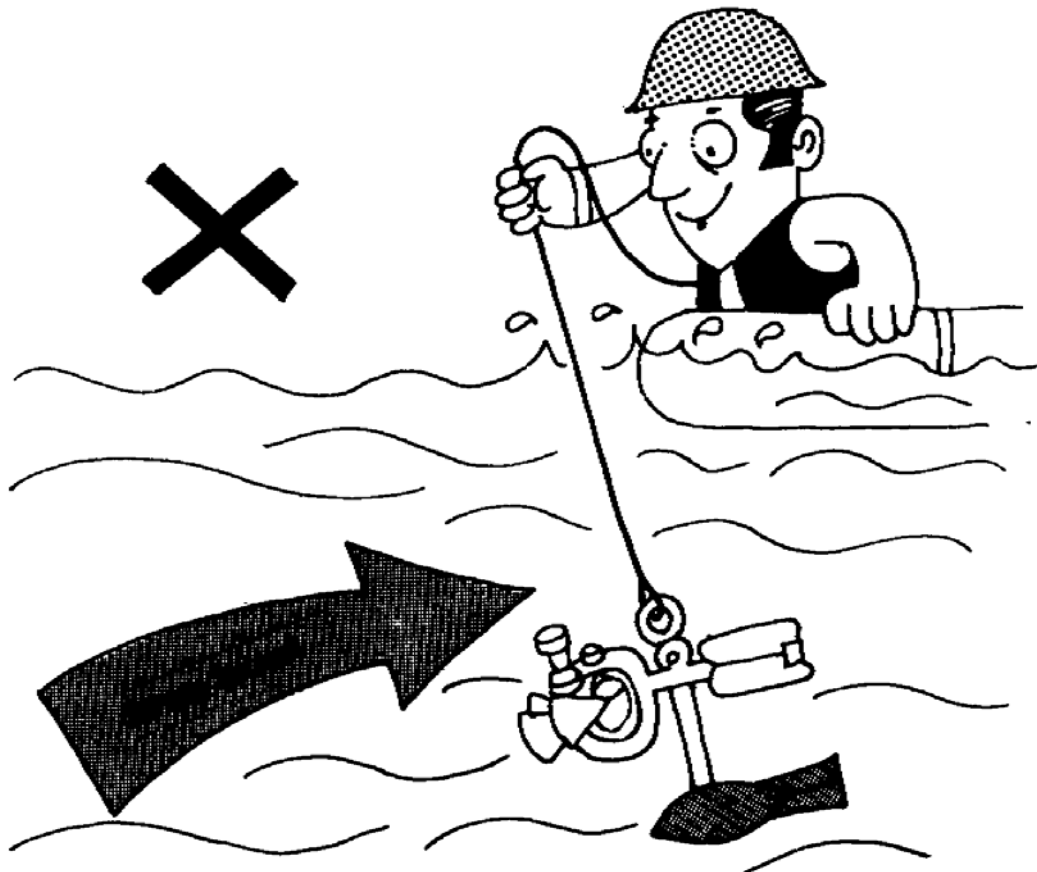
When water depth or current is low, use a small price current meter.

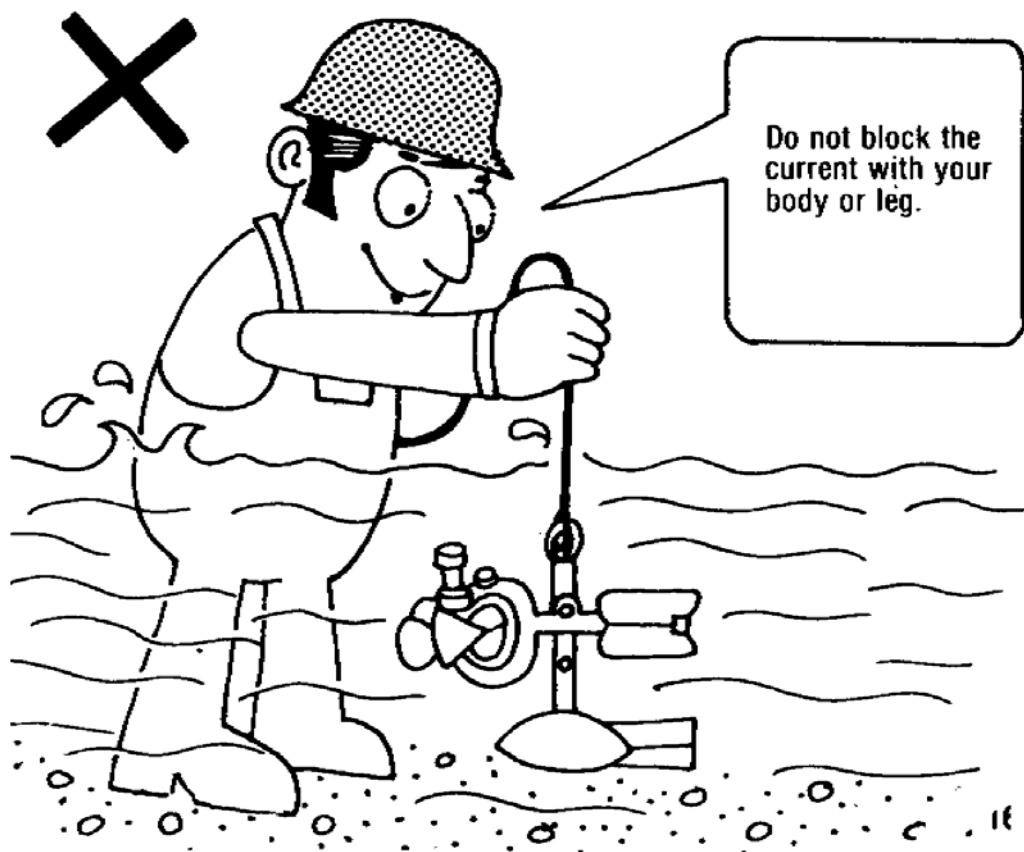
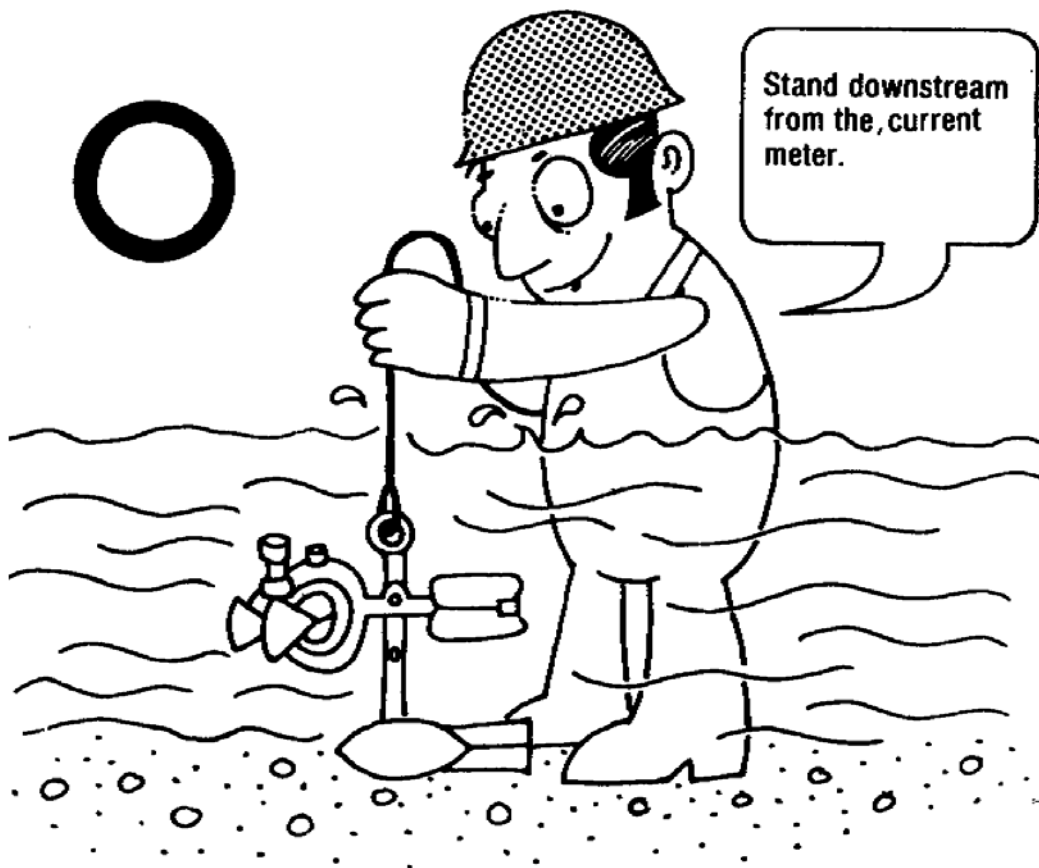


Maintain the current meter properly in the prescribed position.



When the current is strong, increase the sounding weight in order to maintain the prescribed current meter depth.







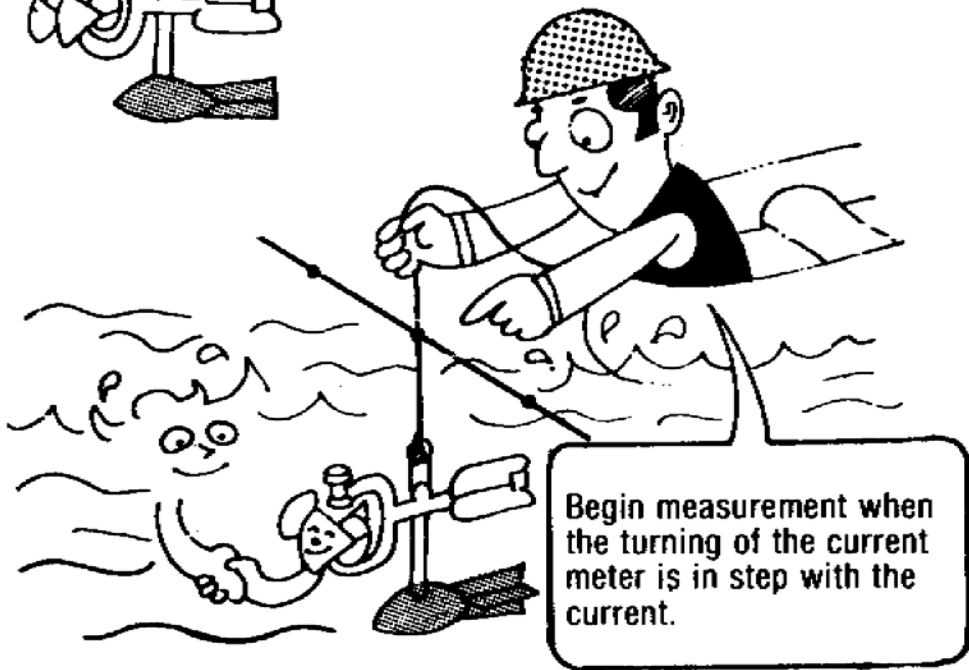
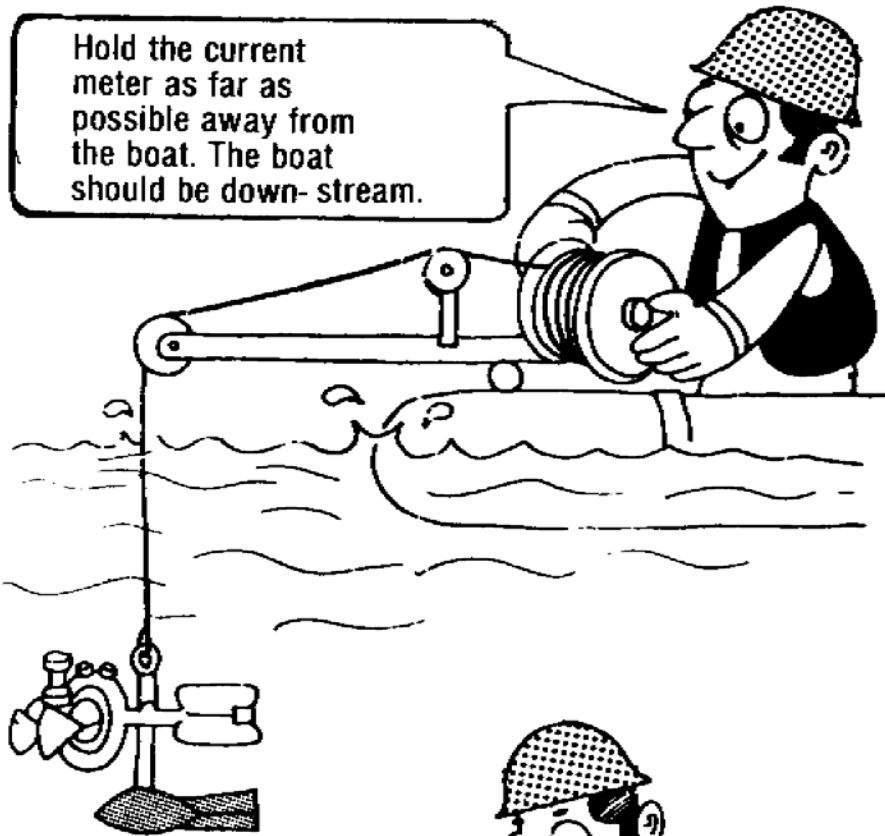
Cease measurement when it appears dangerous.



Be sure to wear a life vest.

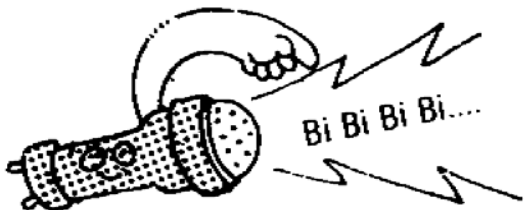


Hold the current meter as far as possible away from the boat. The boat should be down-stream.

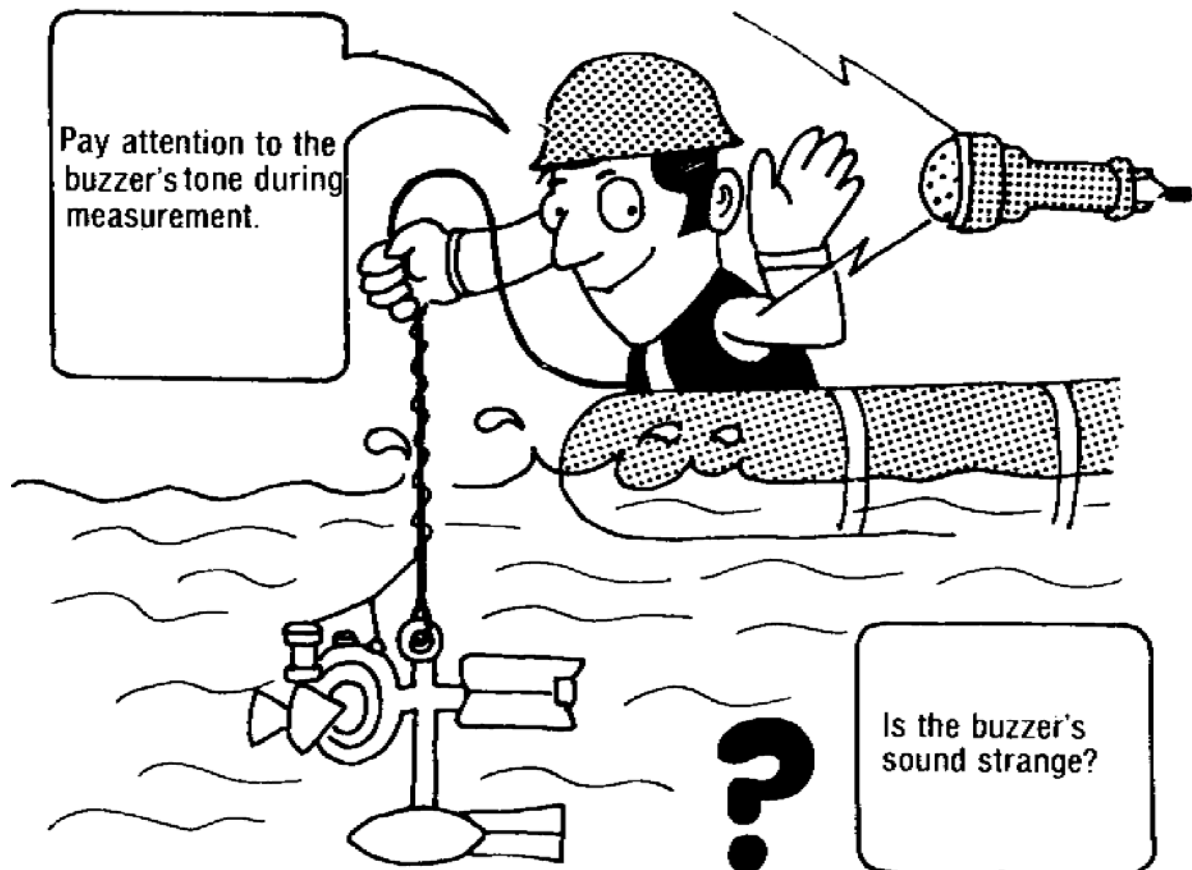


Begin measurement when the turning of the current meter is in step with the current.

Wait till the buzzer sounds stably.

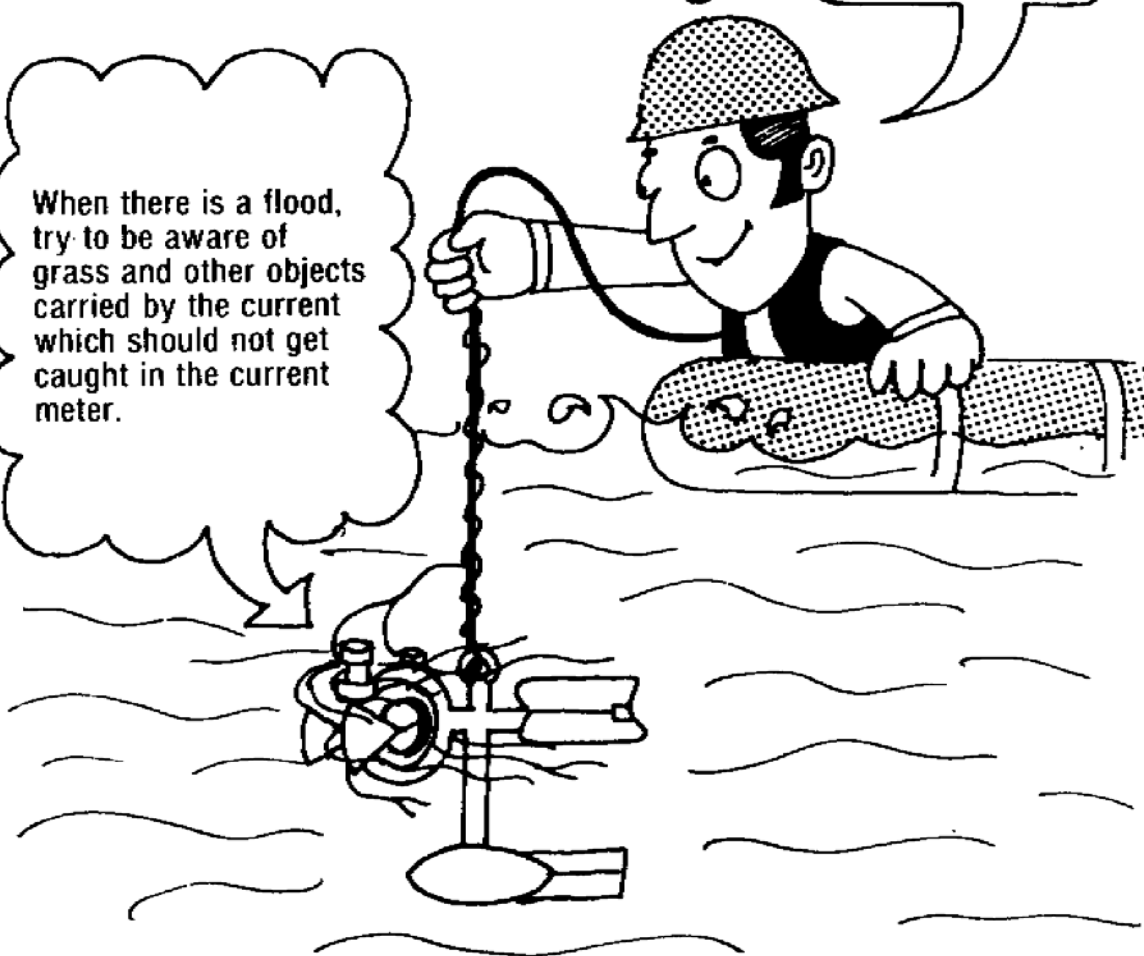


Pay attention to the buzzer's tone during measurement.

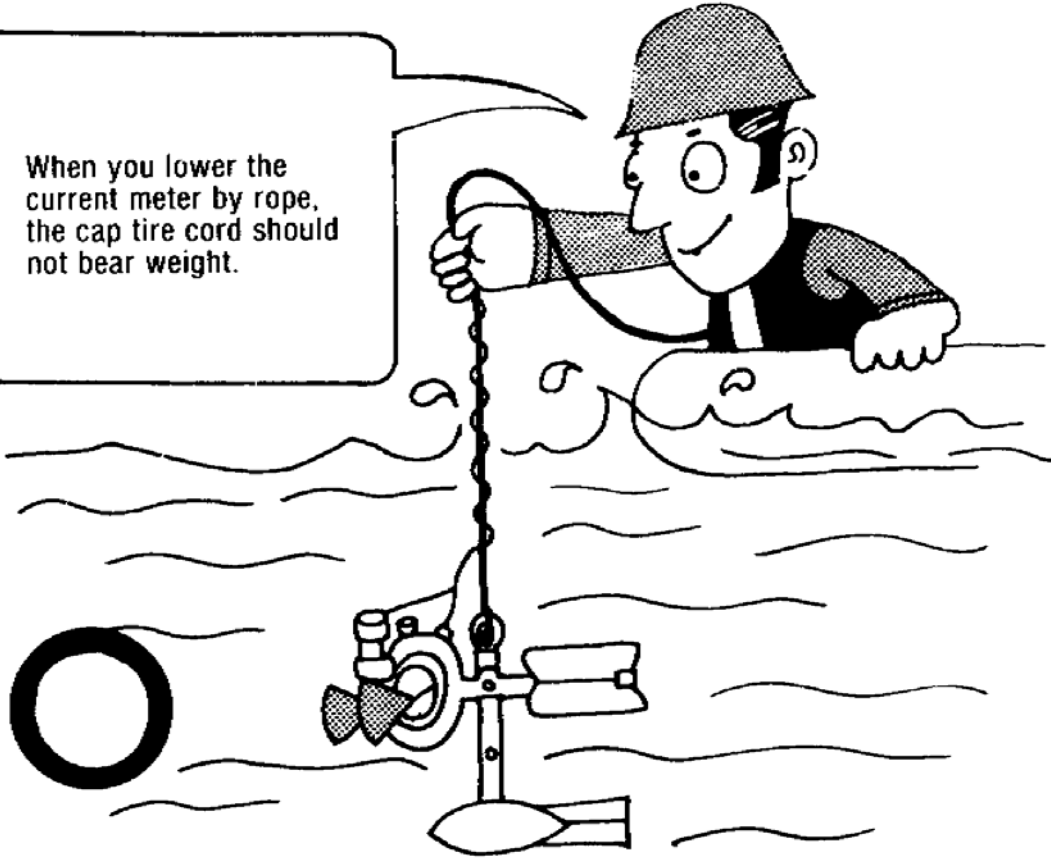


Is the buzzer's sound strange?

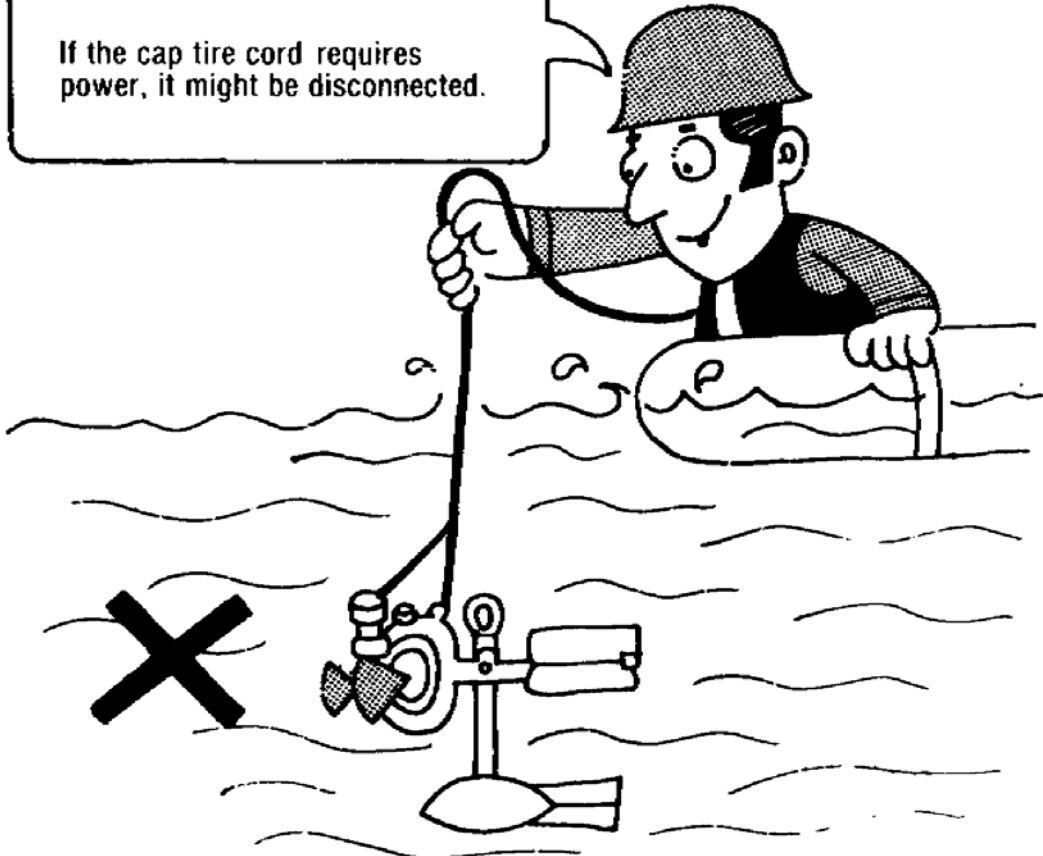
When there is a flood, try to be aware of grass and other objects carried by the current which should not get caught in the current meter.

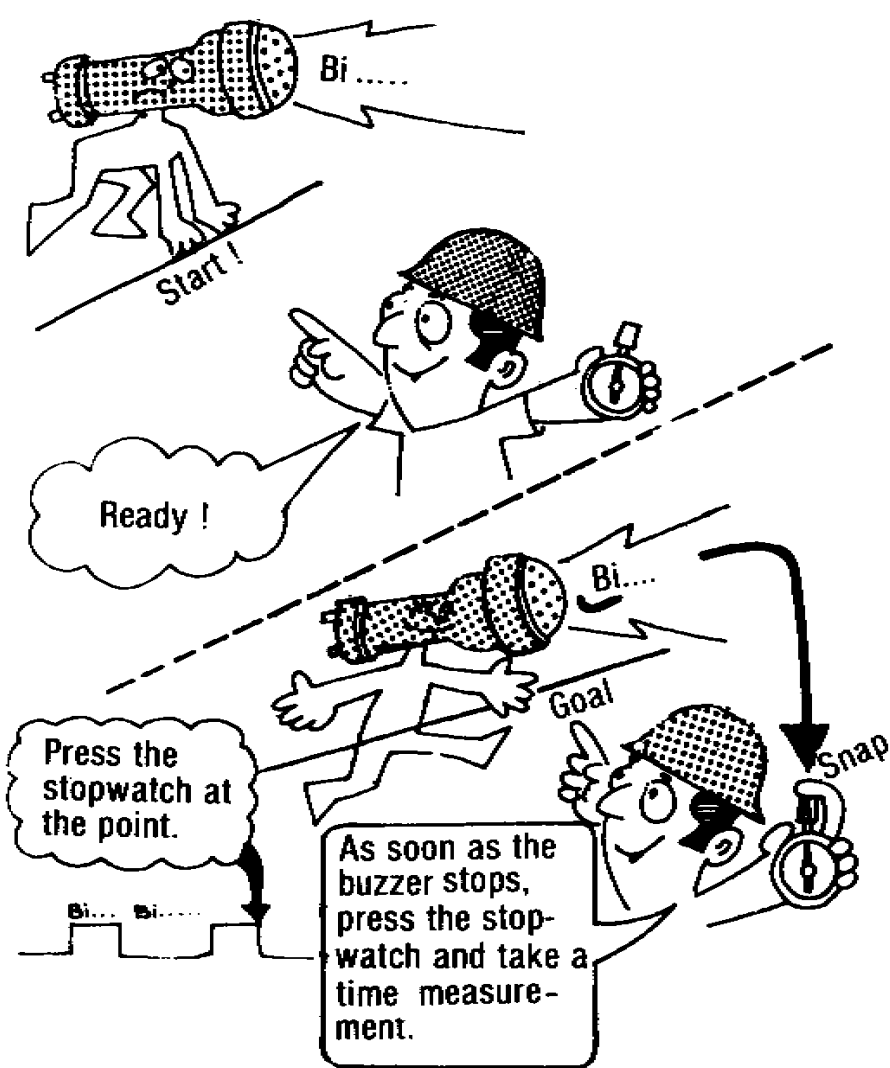
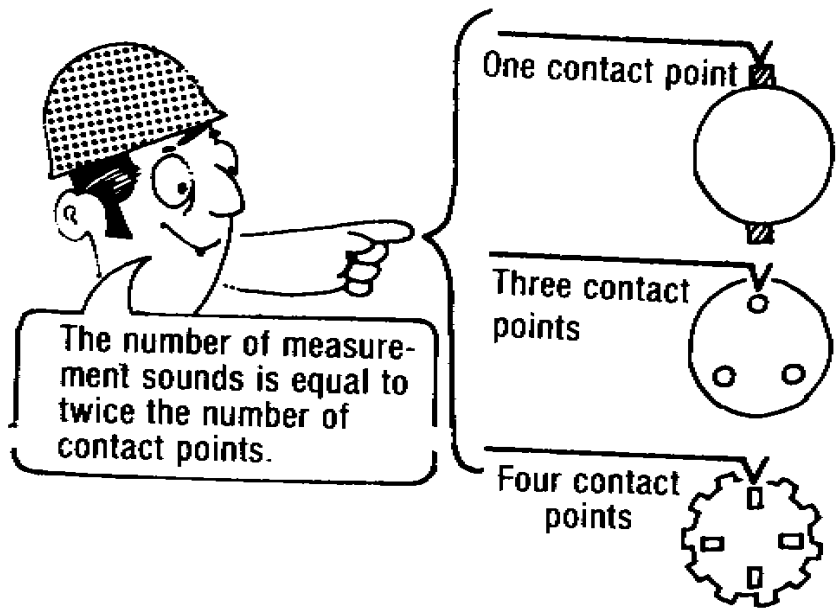


When you lower the current meter by rope, the cap tire cord should not bear weight.

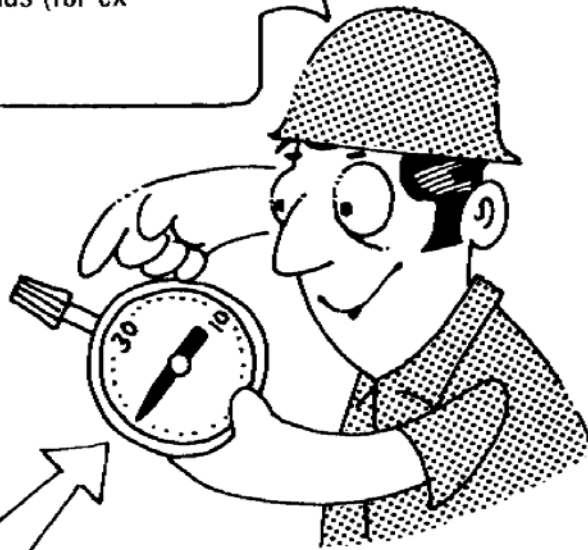


If the cap tire cord requires power, it might be disconnected.

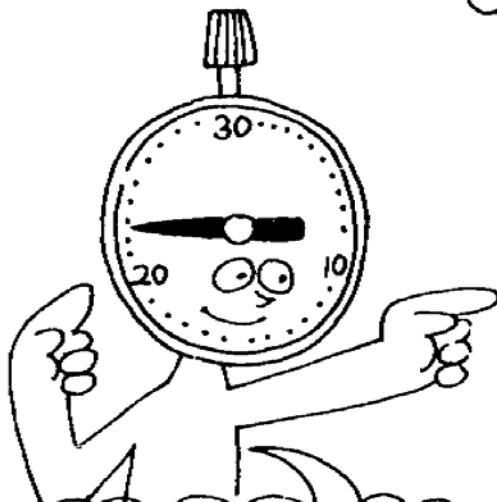




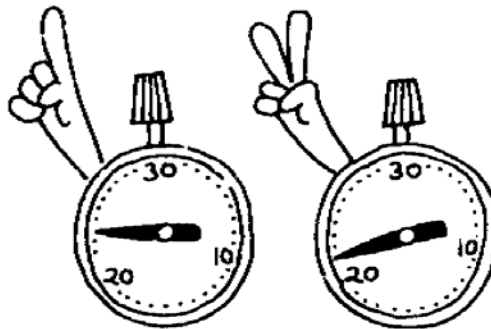
The stopwatch reading is done in tenths of seconds (for example 24.3 sec.)



One-tenth of a second units



The first measurement should be at least 20 seconds and then repeat the measurement a second time. When using a direct readout current meter, wait until the needle is stable and then read the value.



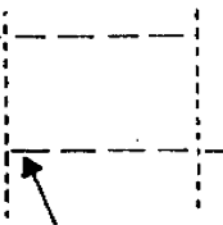
First

Second

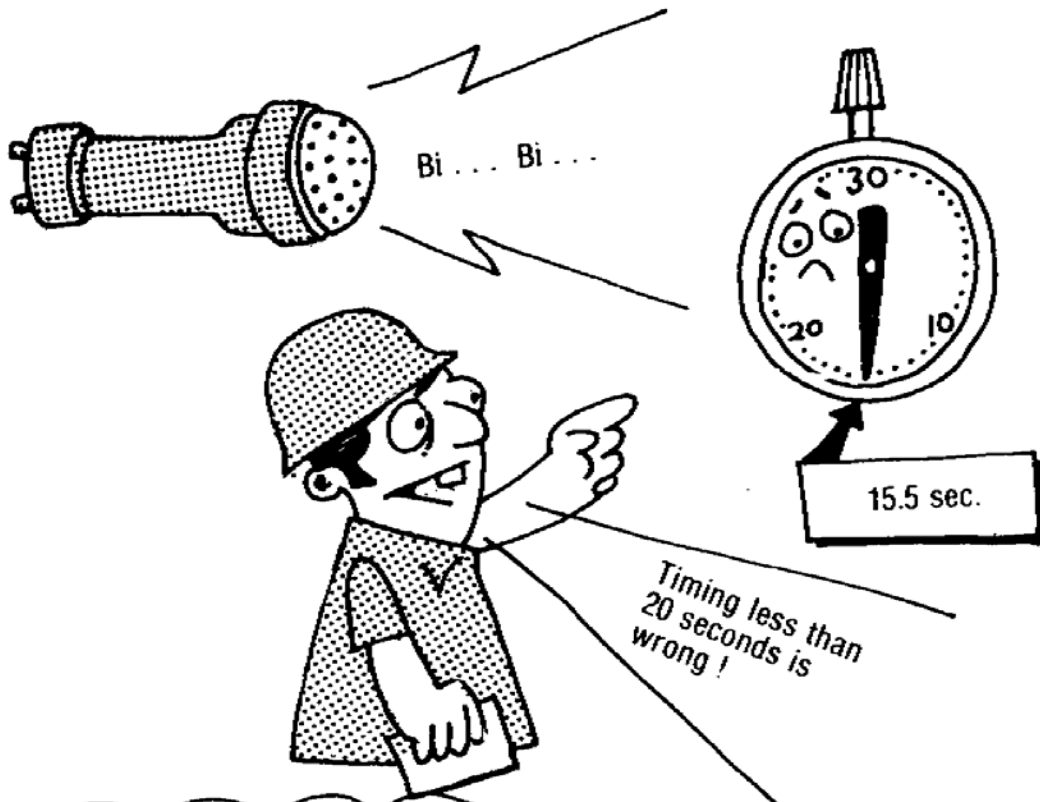
Watch measurement method

(A) Watch

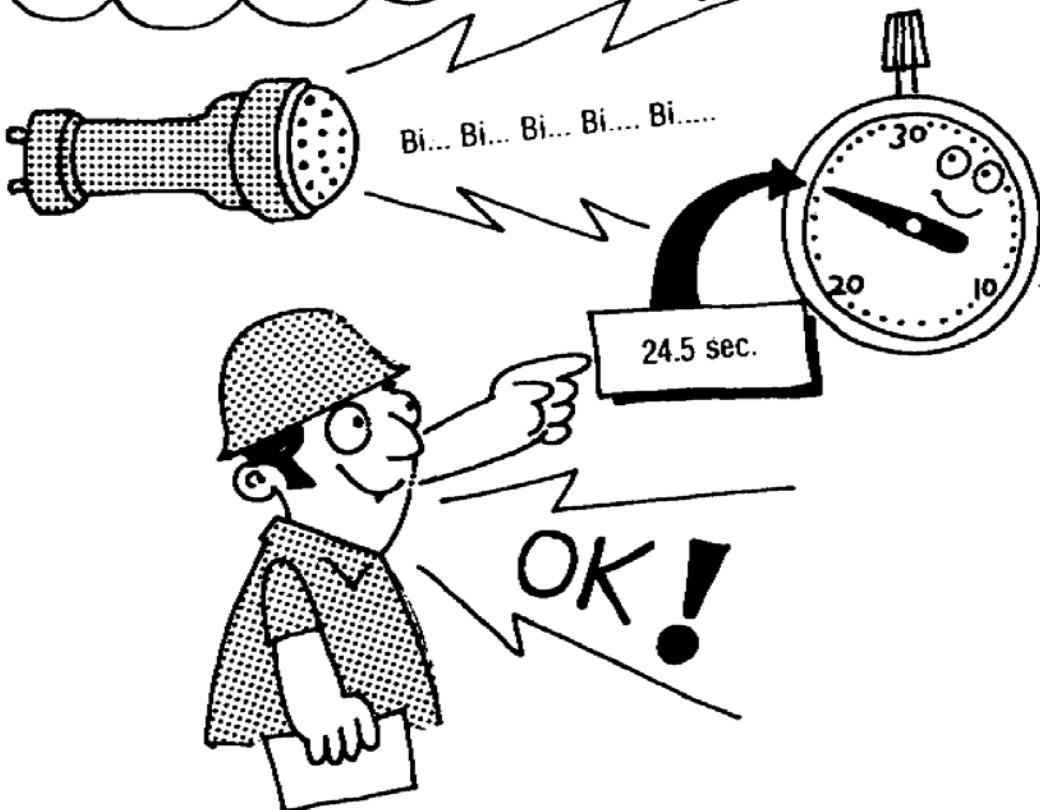
(B) Watch

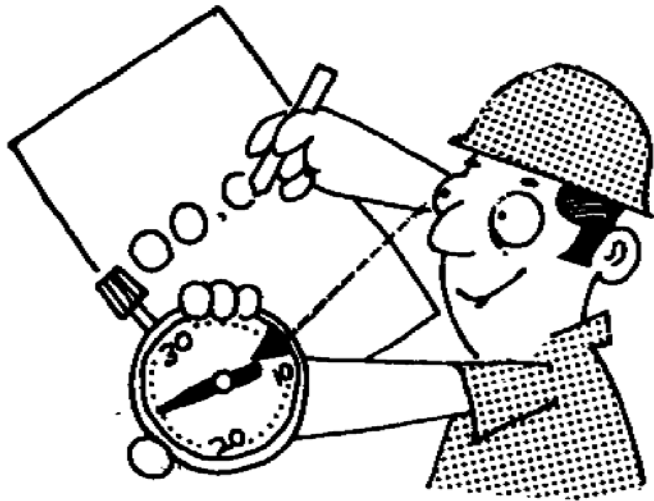


Late by one unit

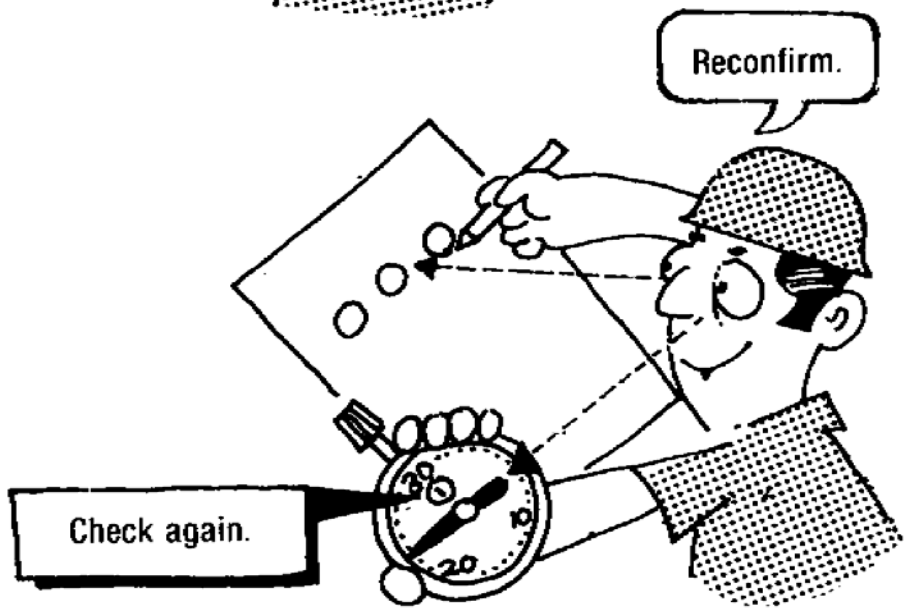


Count the number of sound for 20 seconds or more at each measurement.





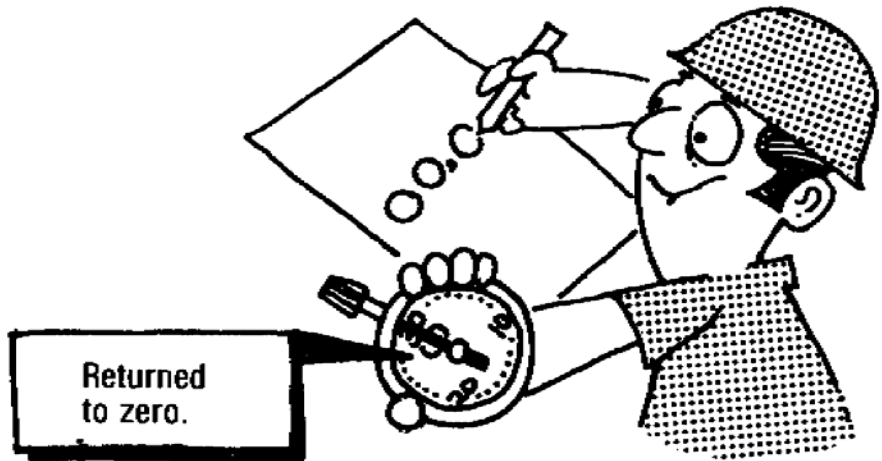
Enter the number of seconds on the stopwatch in the field notebook.



Reconfirm.

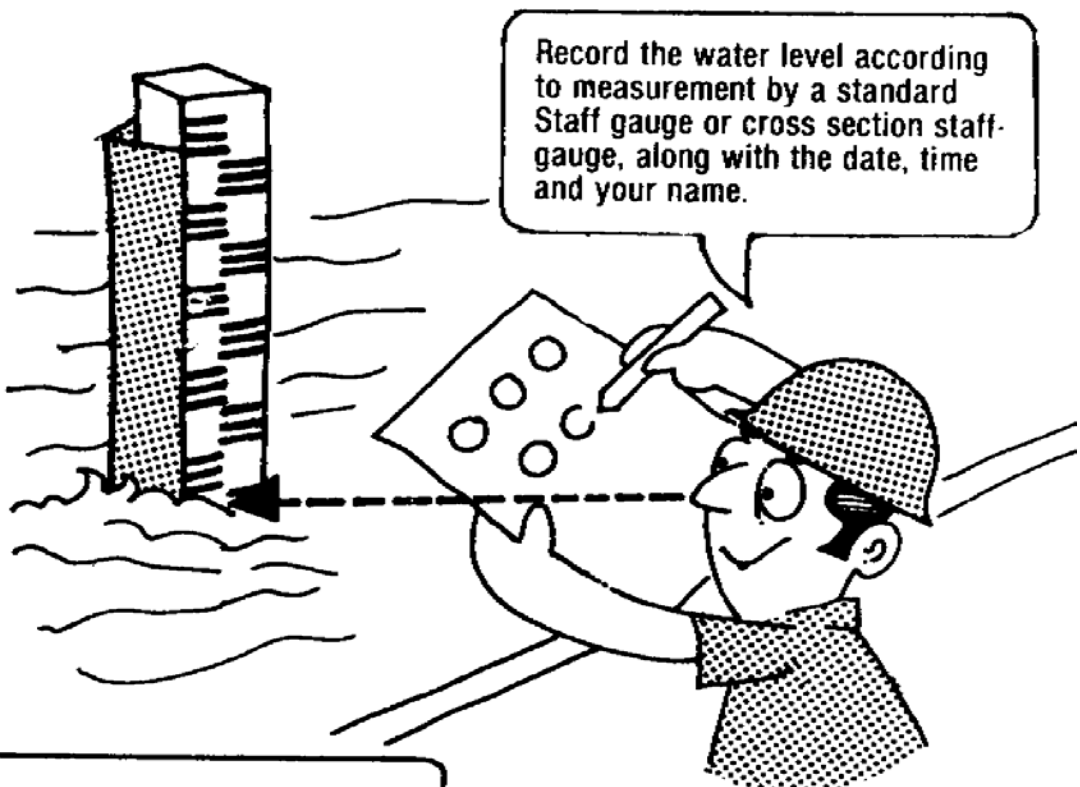
Check again.

After reconfirmation, return the hand to zero

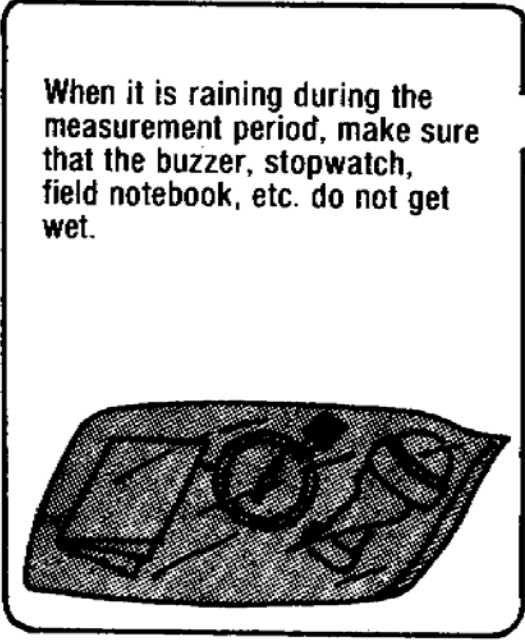


Returned to zero.

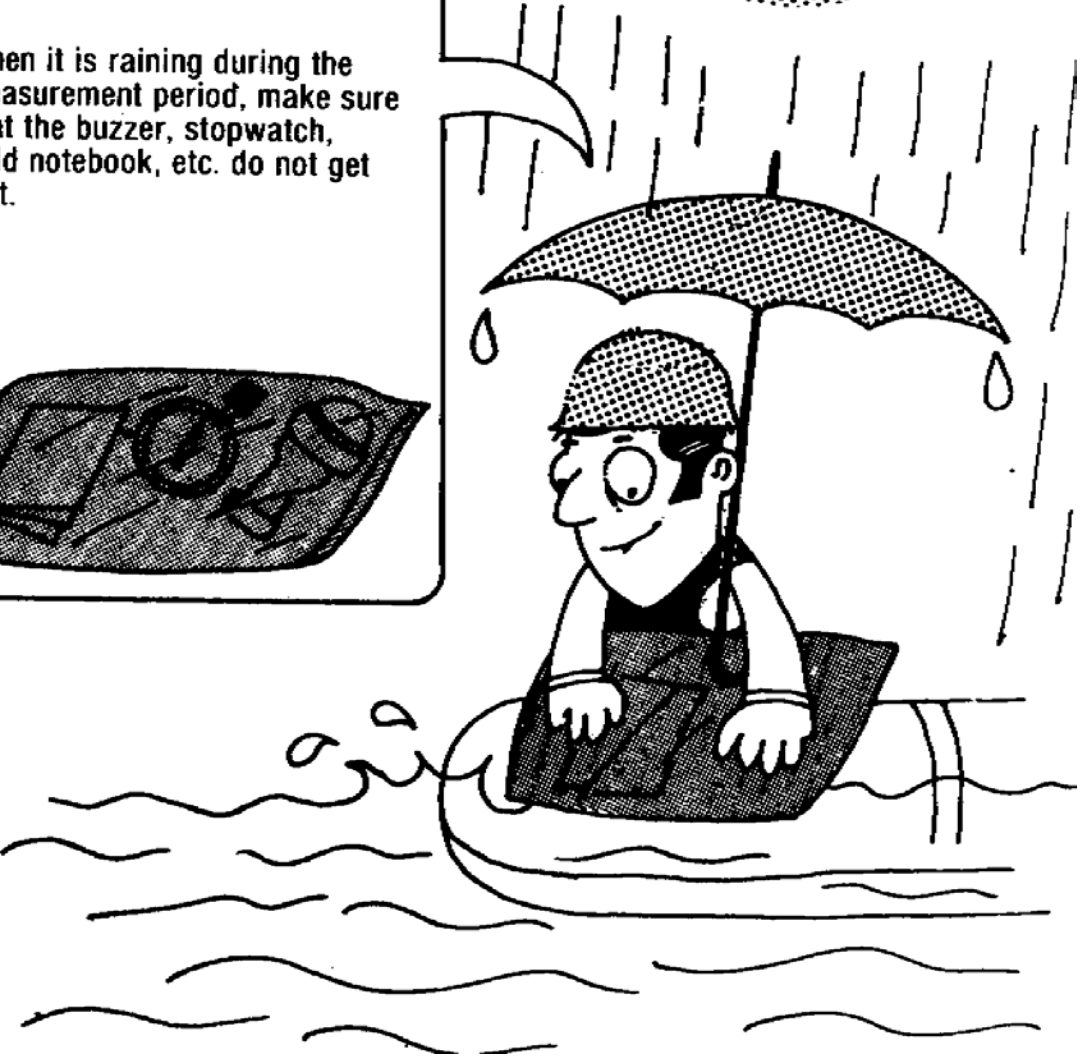




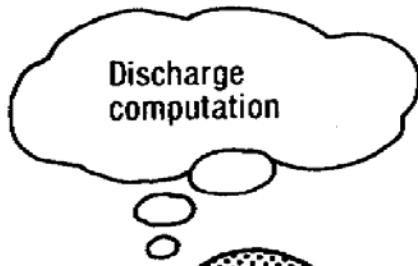
Record the water level according to measurement by a standard Staff gauge or cross section staff-gauge, along with the date, time and your name.



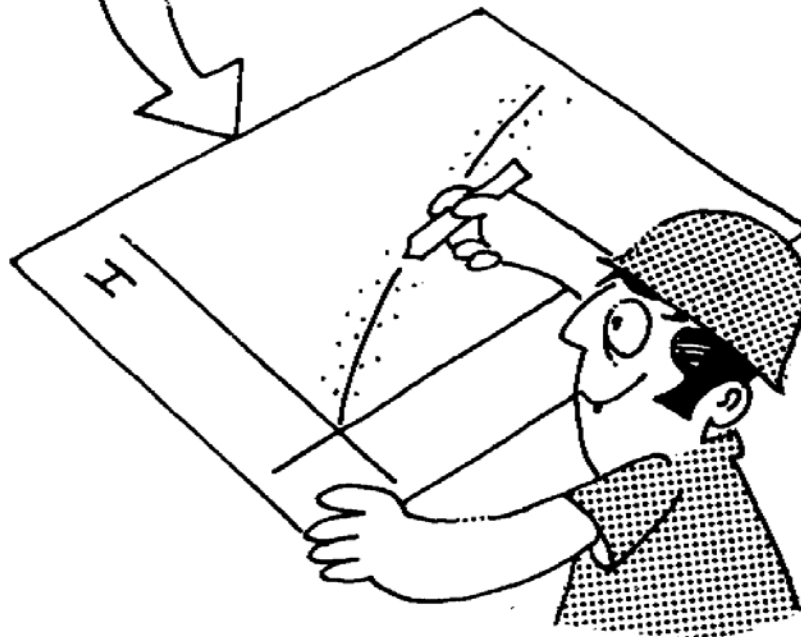
When it is raining during the measurement period, make sure that the buzzer, stopwatch, field notebook, etc. do not get wet.



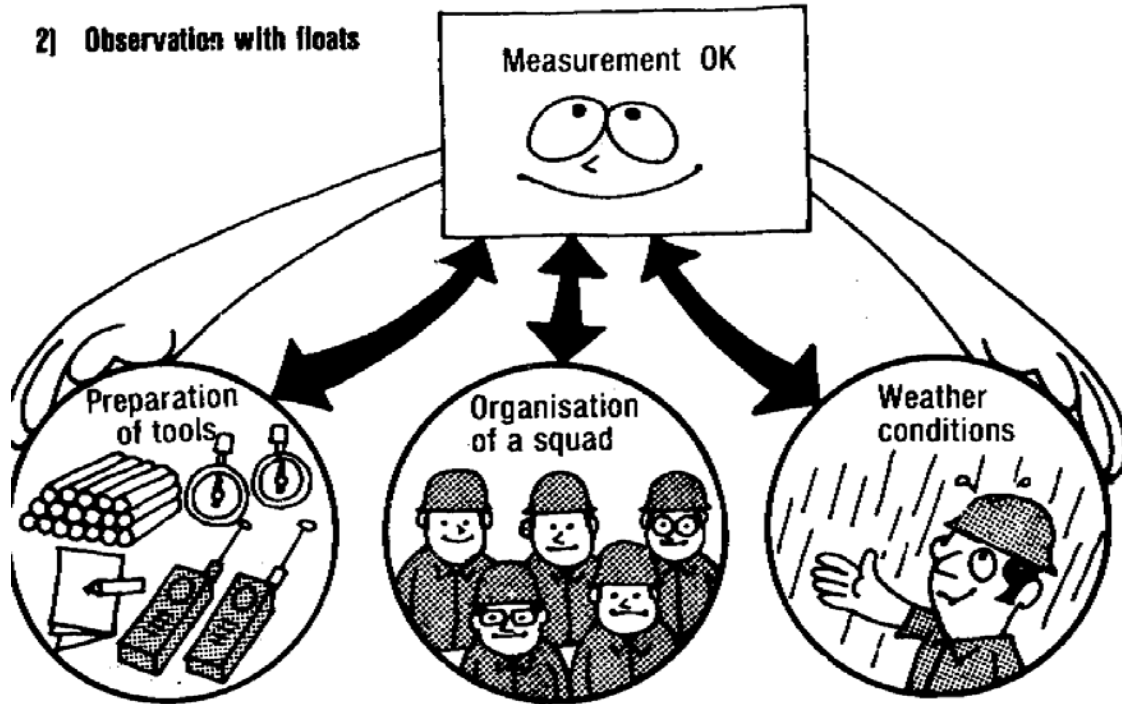
## Confirmation of accuracy



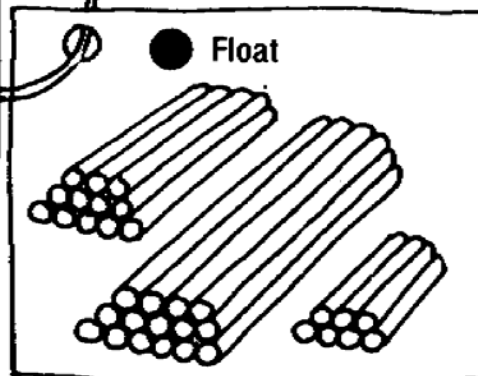
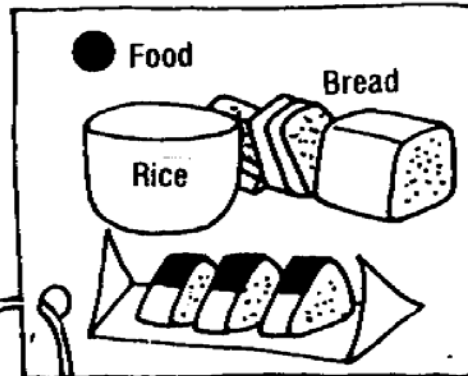
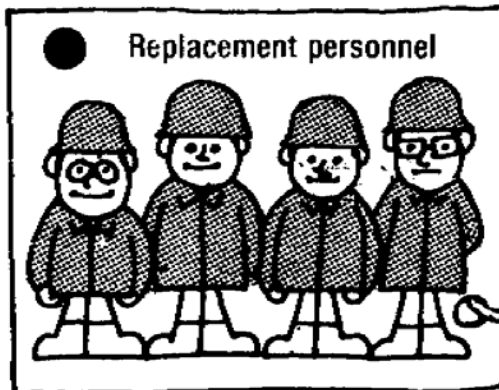
After measurement, compute the discharge and plot it on an stage-discharge chart to confirm accuracy. If there is some large discrepancy, carry out the measurements once again.



## 2) Observation with floats

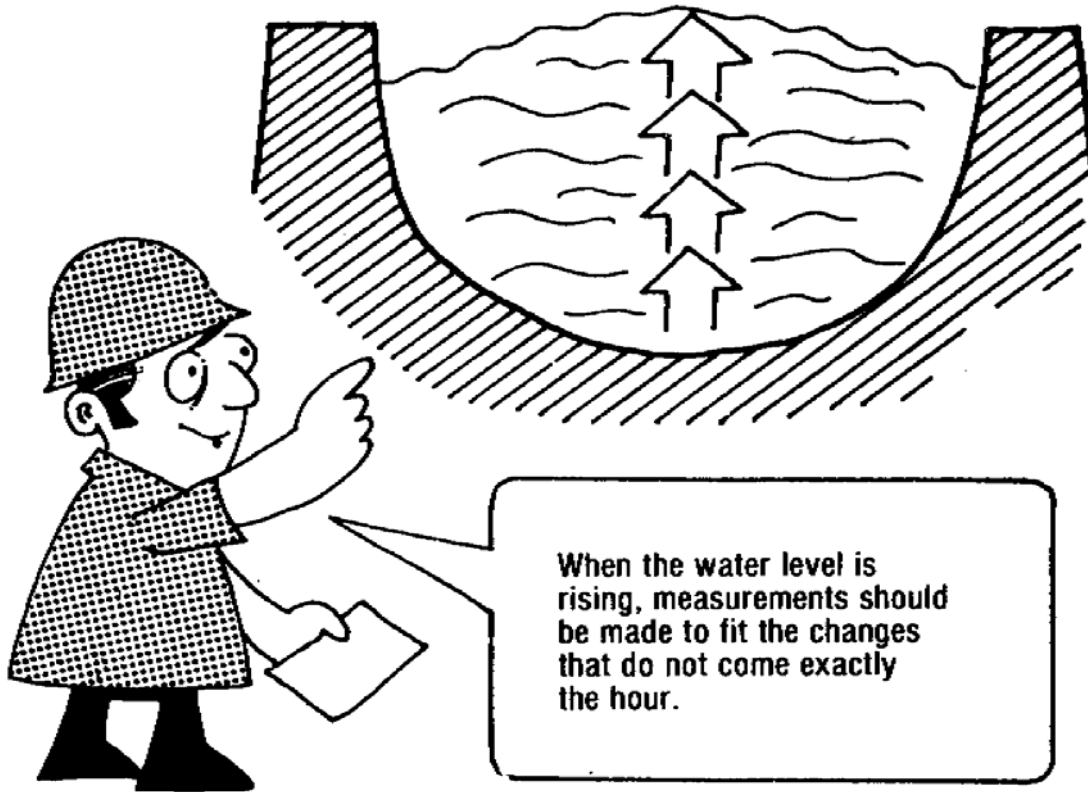


Measurement can always be carried out with:

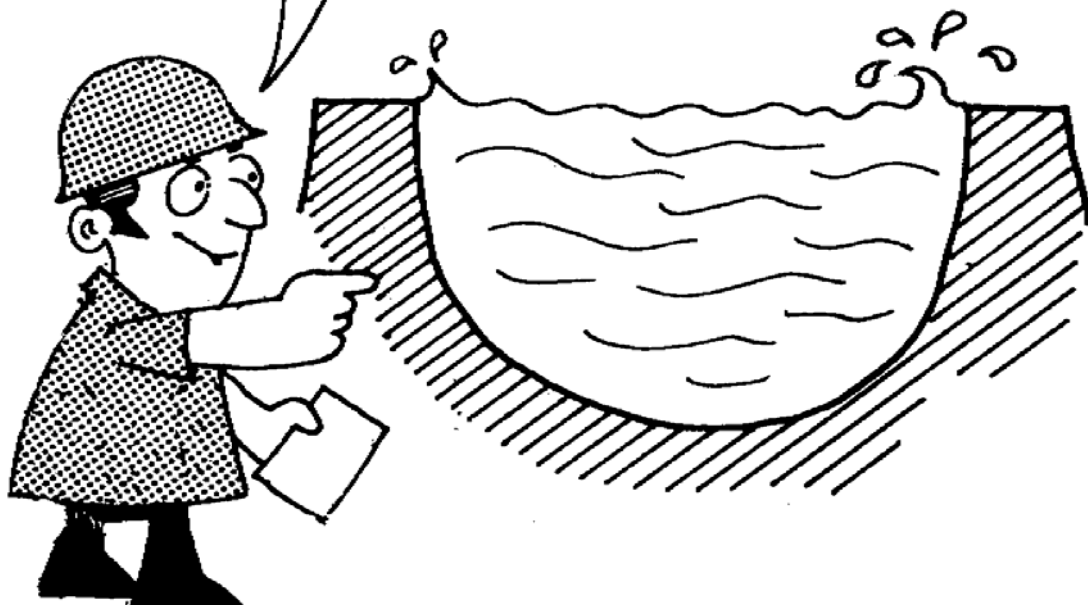


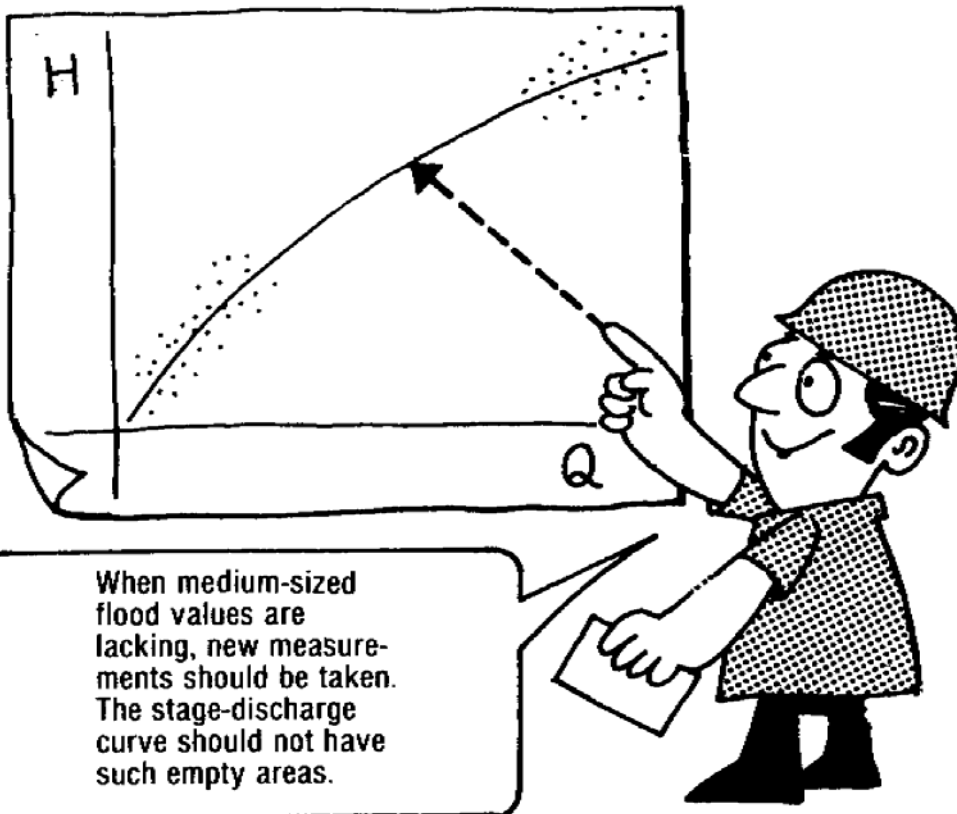
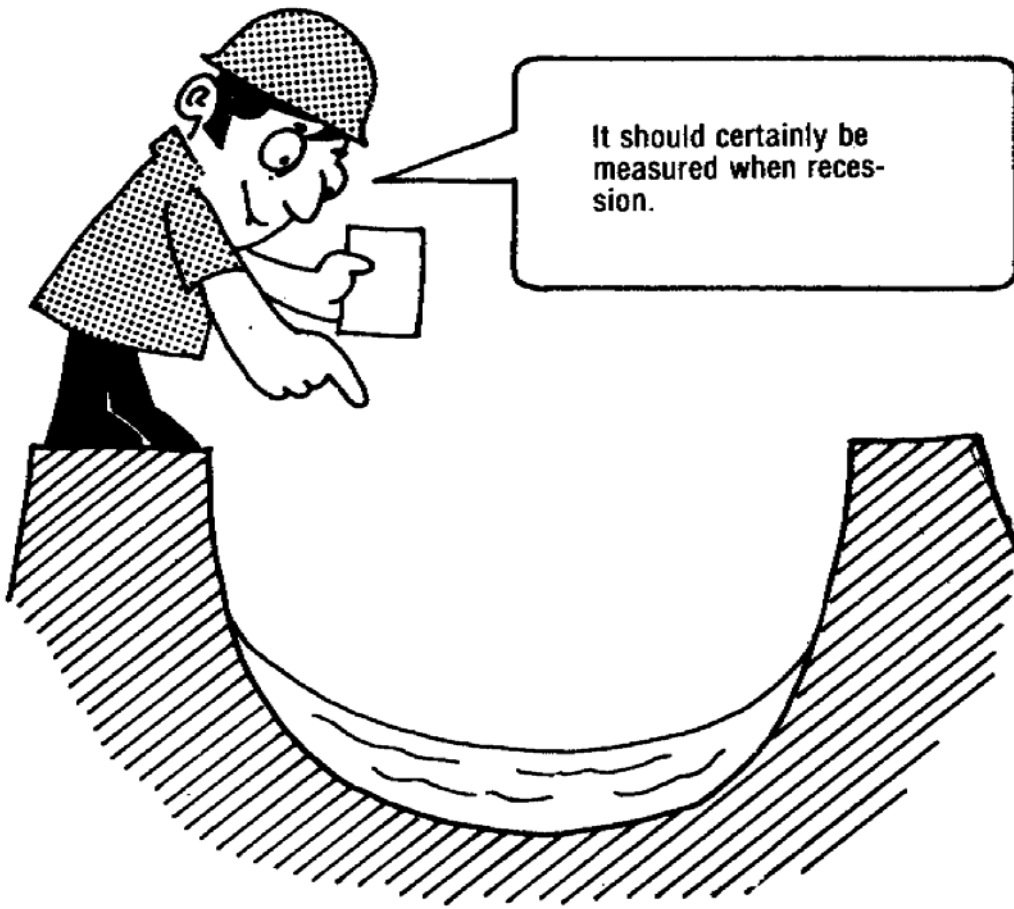
These should also be prepared if the measurement is expected to require a long time.

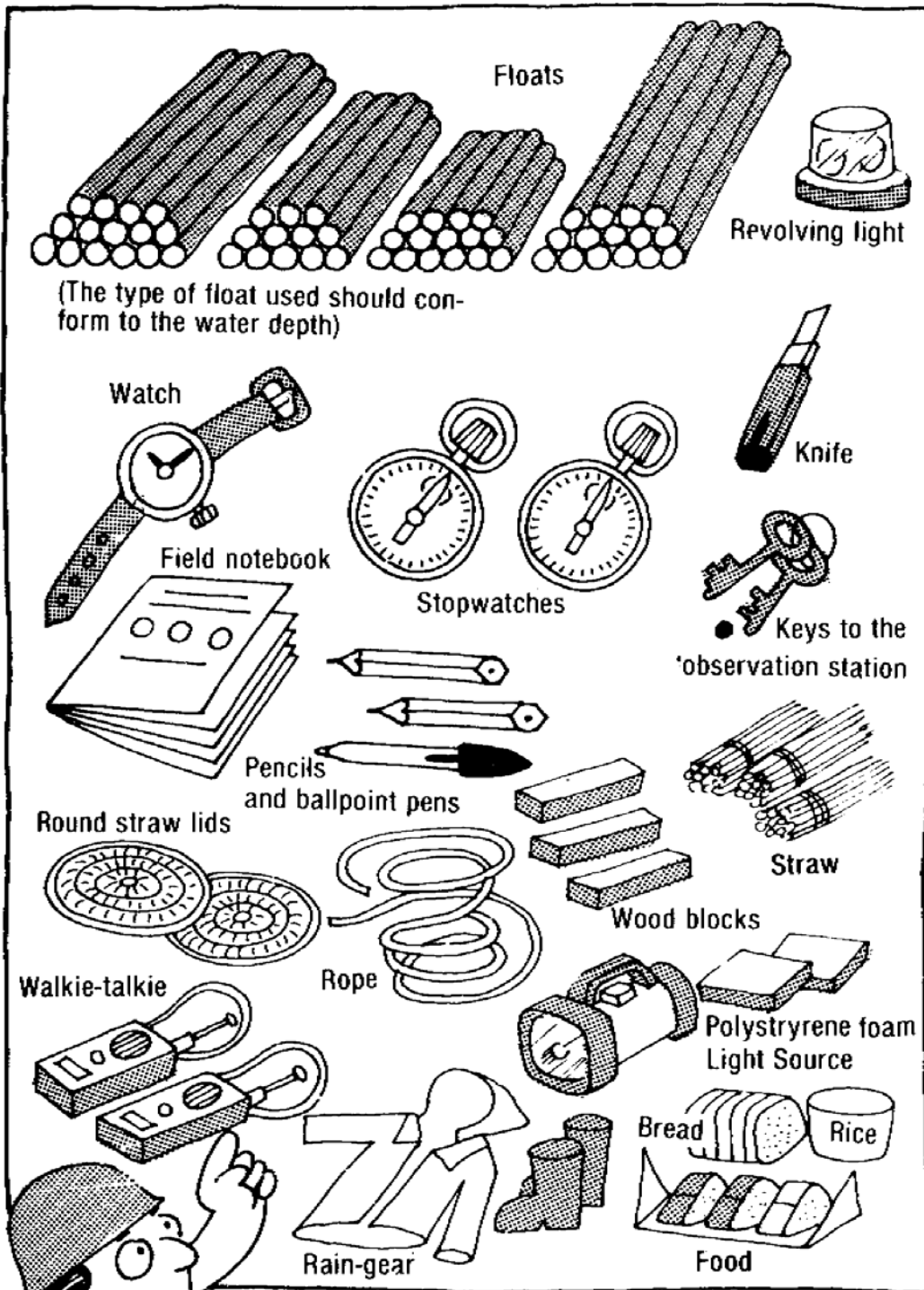
**Measurement time**



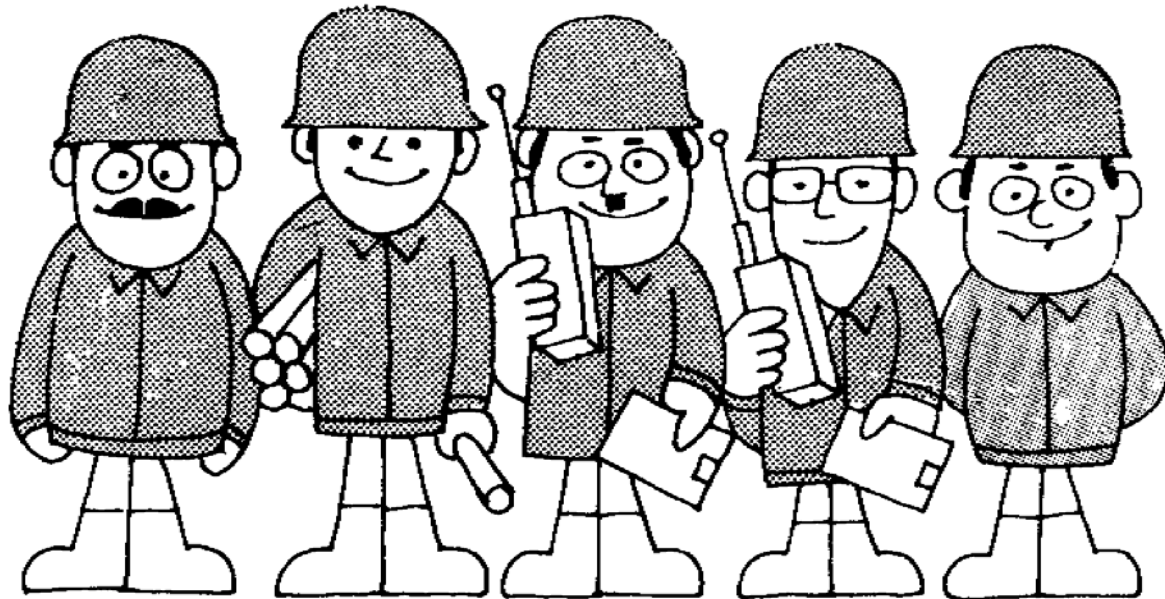
Discharge observation should not miss the peak flow.







I will take these things.



Group leader

Float man

First observer

Second observer

Water level man

### Allocation of duties

#### Group leader

Directs general affairs concerning the measurement, makes contact with the office and determines the observation time; He is responsible for safety.

#### Float man

Lowers floats into water at prescribed places; observes flowing condition.

#### First observer

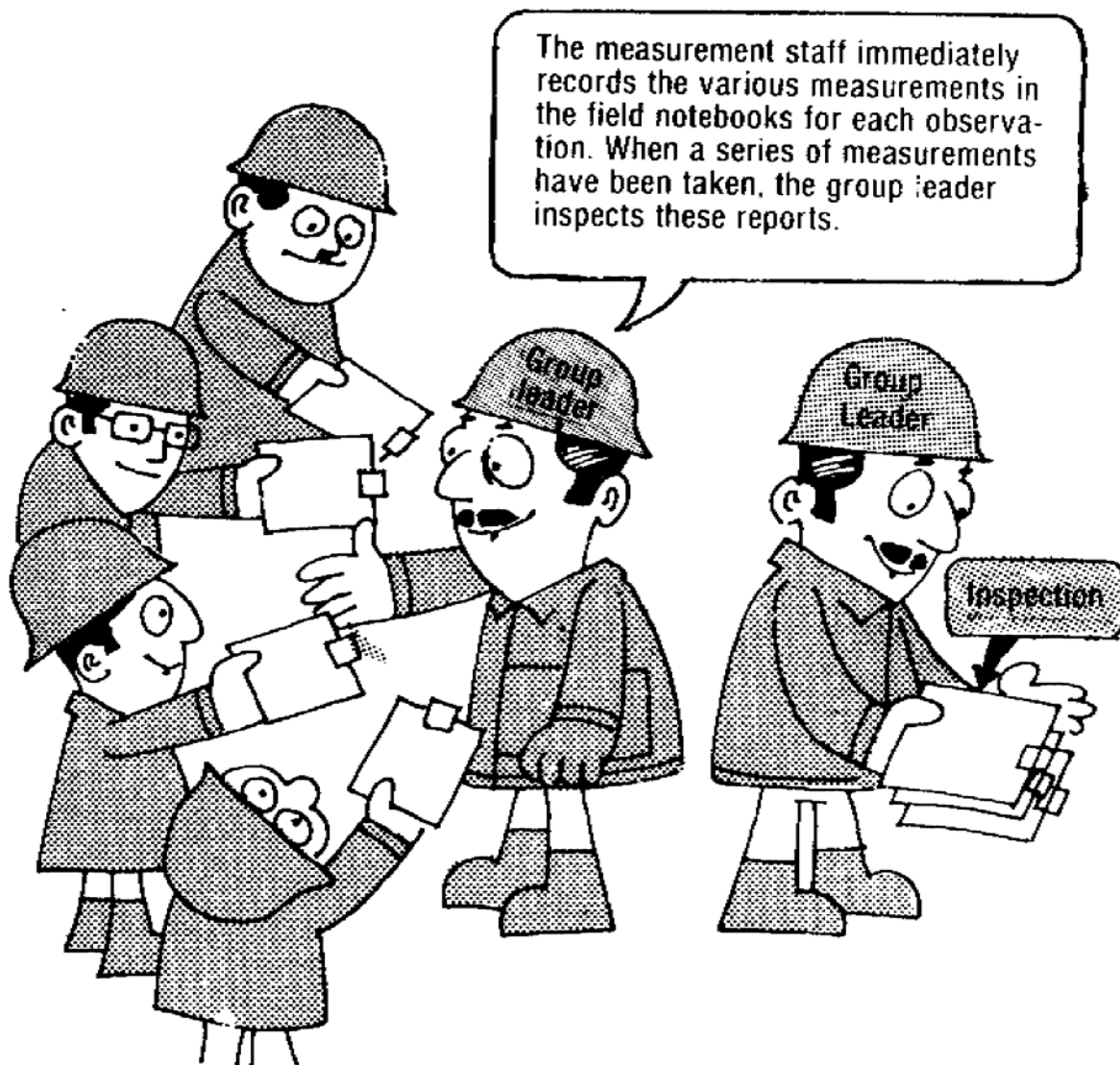
Signals to the second observer when the floats pass the first observation line.

#### Second observer

Measures the time it takes for the floats to pass from the first observation line to the second observation line.

#### Water level man

Measures the water level at the standard staff gauge and the first and second observation line staff gauge during measurement periods and on a regular basis.



**Allocation of field notebook entries**

Staff member \ Allocation	Date of measurement	Number of time	Weather	Measurement time	No. of measurement line	Number	Free board	Time of lowering	Passed time	Flowing time	Flowing conditions	Water level
Group leader	●	●	●								●	
Floatman	●	●		●	●	●	●	●			●	
Observer	●	●		●	●				●	●	●	
Water level man	●	●		●								●

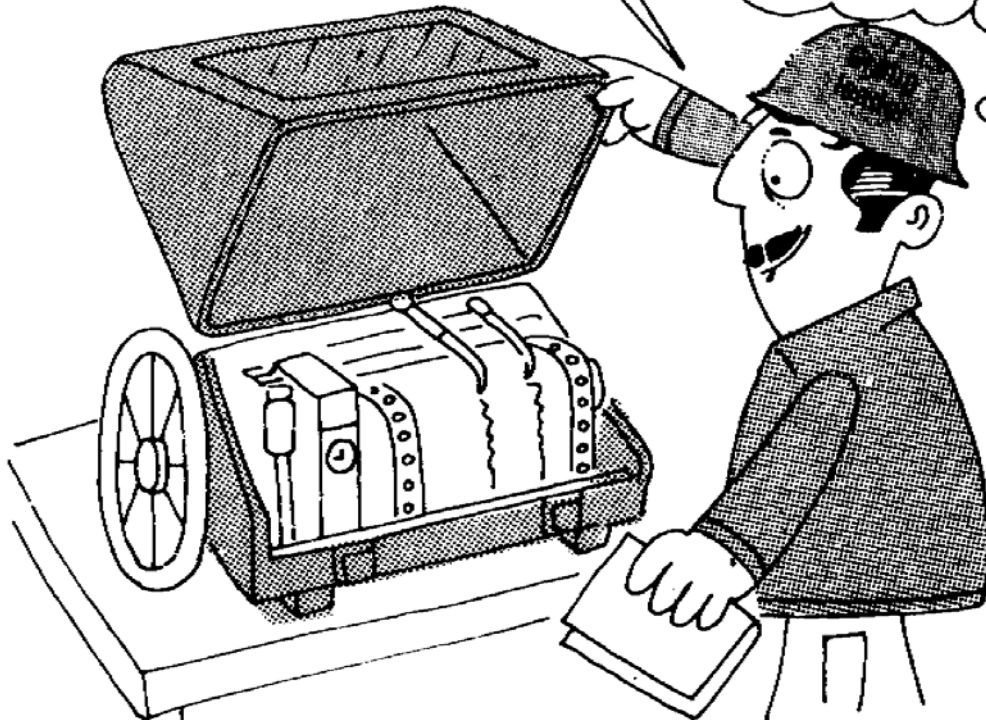


Measurement takes place after the group leader has recorded in the field notebook the premeasurement details such as the date, weather conditions, his name, the river system and river name and the observation station name.

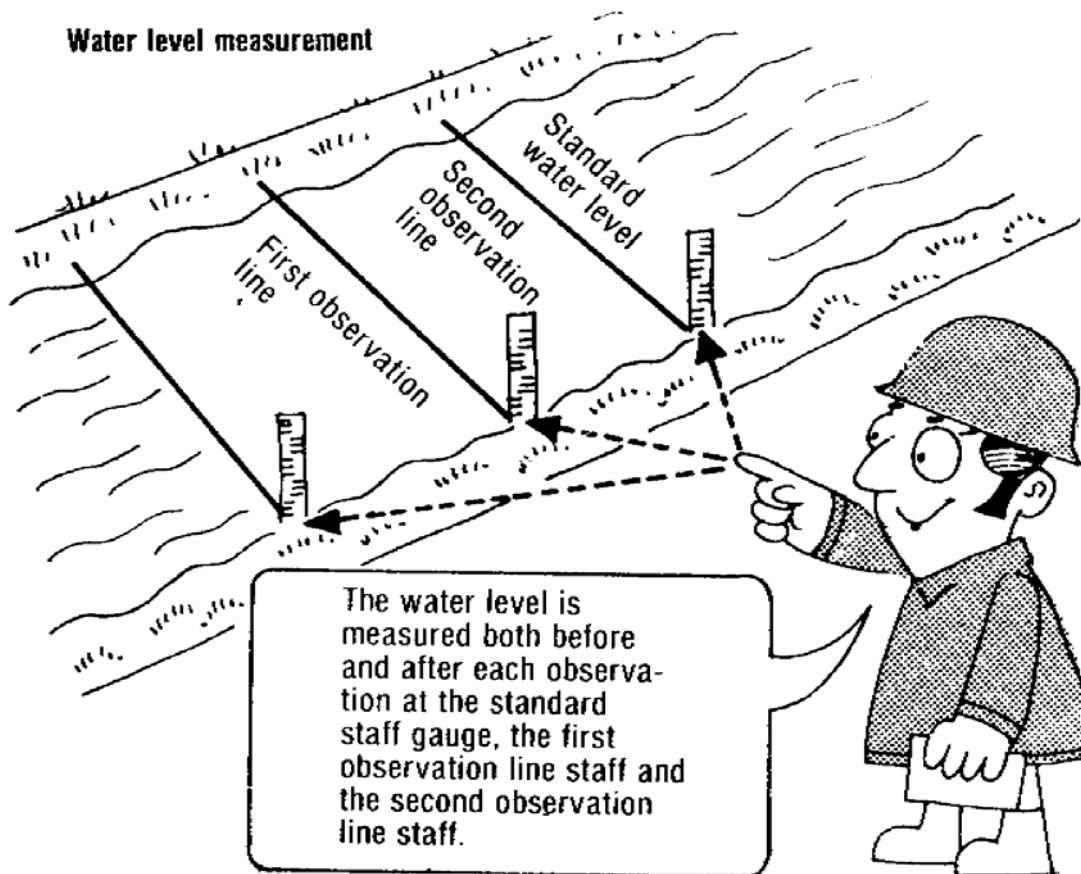


The water level should be found from a review of the recording paper at the observation station.

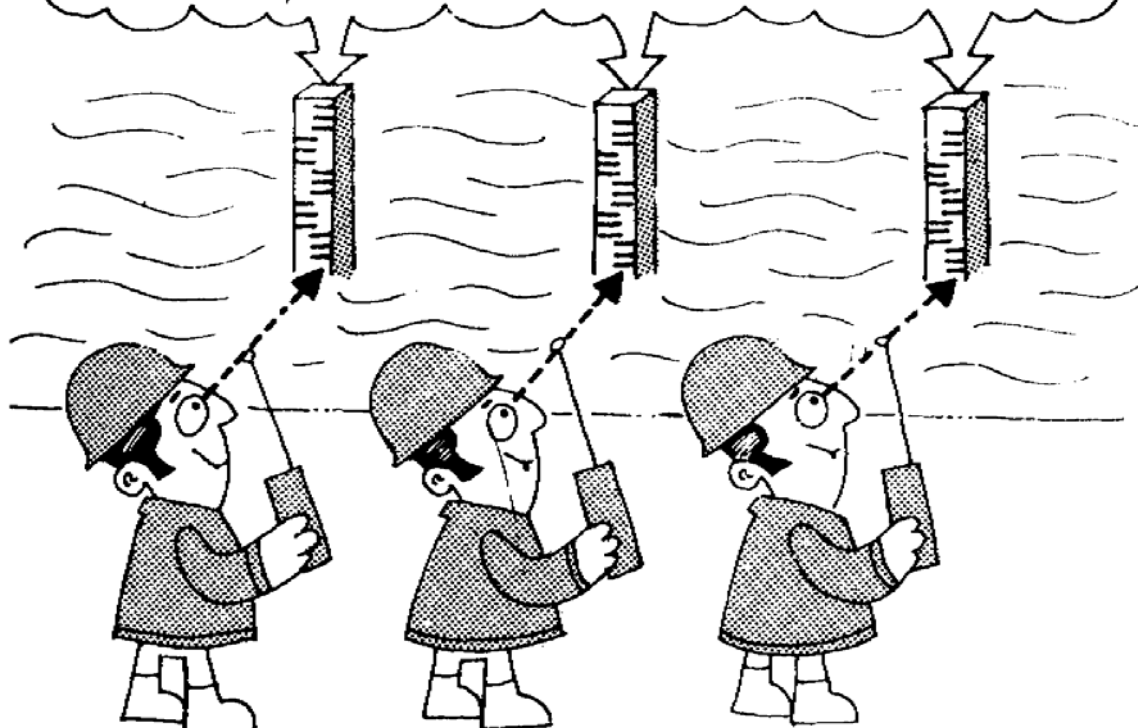
Is the water level rising or receding. ??



## Water level measurement



Water surface slope is determined by the simultaneous measurement of the staff gauges i.e. the standard, first and second staff gauges. (When there is a great change in the water level, perform the measurement by unifying the timing so that the water level changes with a small time difference.)



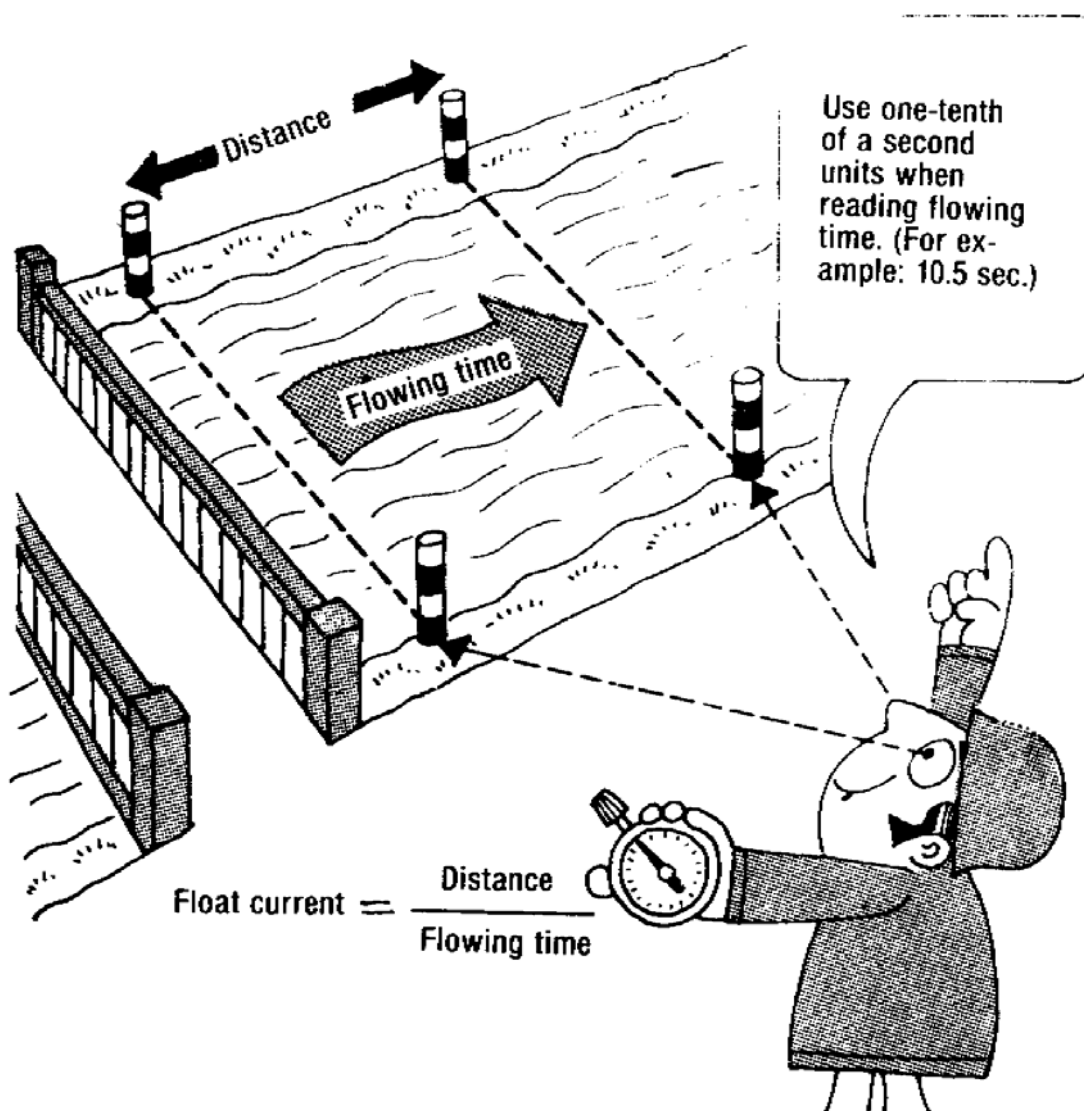
### Current measurement lines

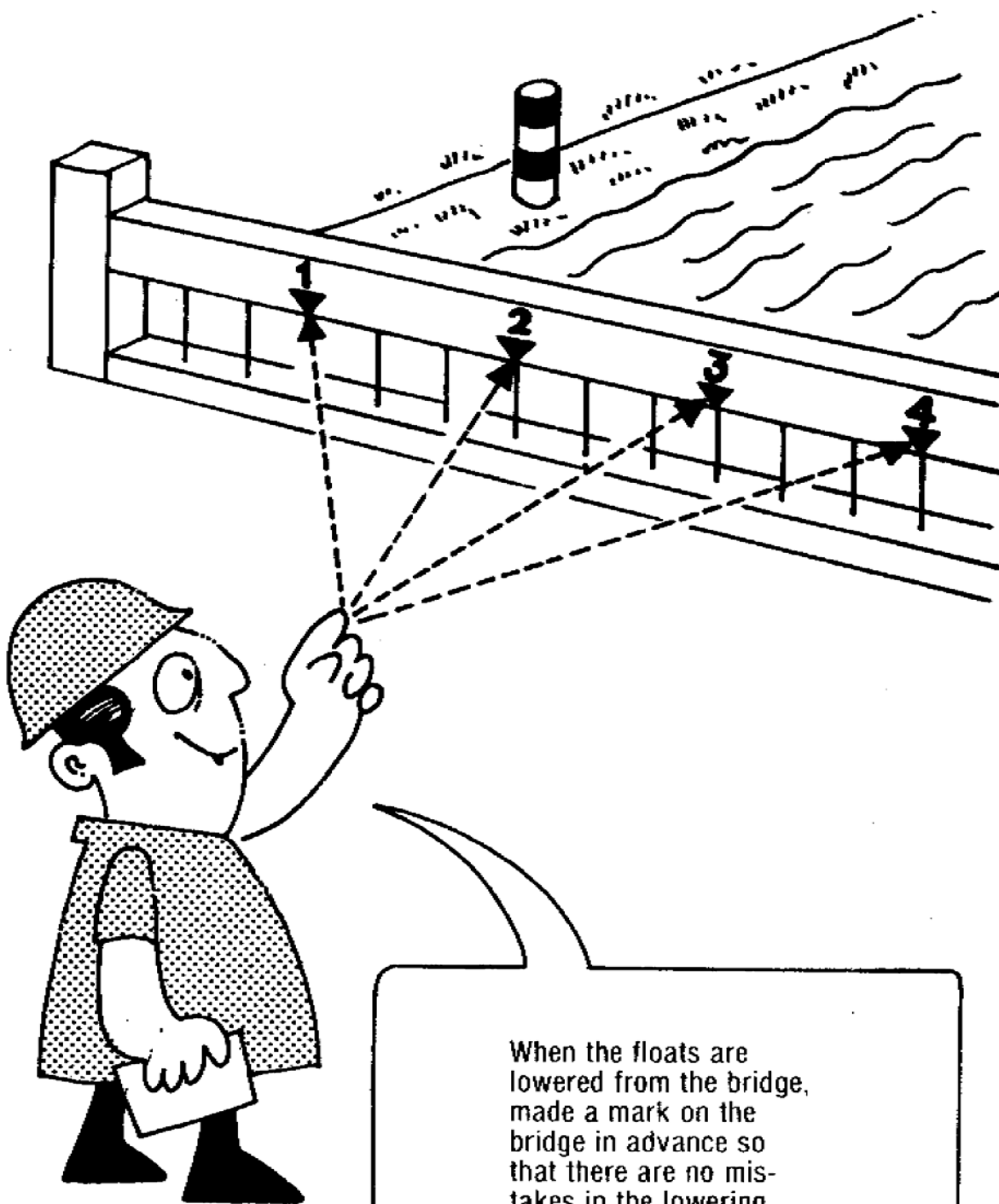
The current measurement line is set up along the current of the first cross section. For the first cross section, as a rule, the standard proportion of water surface width to the distance of the float current measurement line.

Water surface width	20m Less than	20 ~ 100m	100 ~ 200m	200m More than
Number of float Current measurement line	5	10	15	20

During flood periods, etc. when measurement of flow amount is urgent, use the following table.

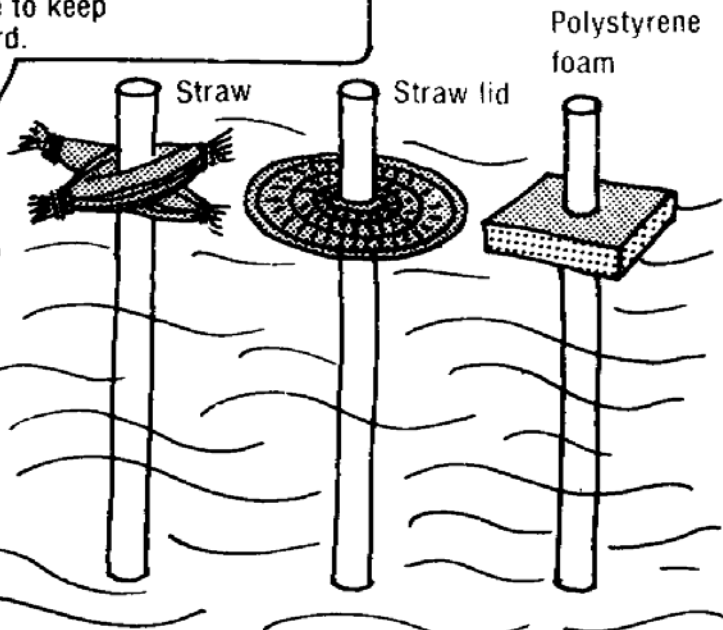
Water surface width	50m Less than	50 ~ 100m	100 ~ 200m	200 ~ 400m	400 ~ 800m	800m More than
Number of float current measurement line	3	4	5	6	7	8



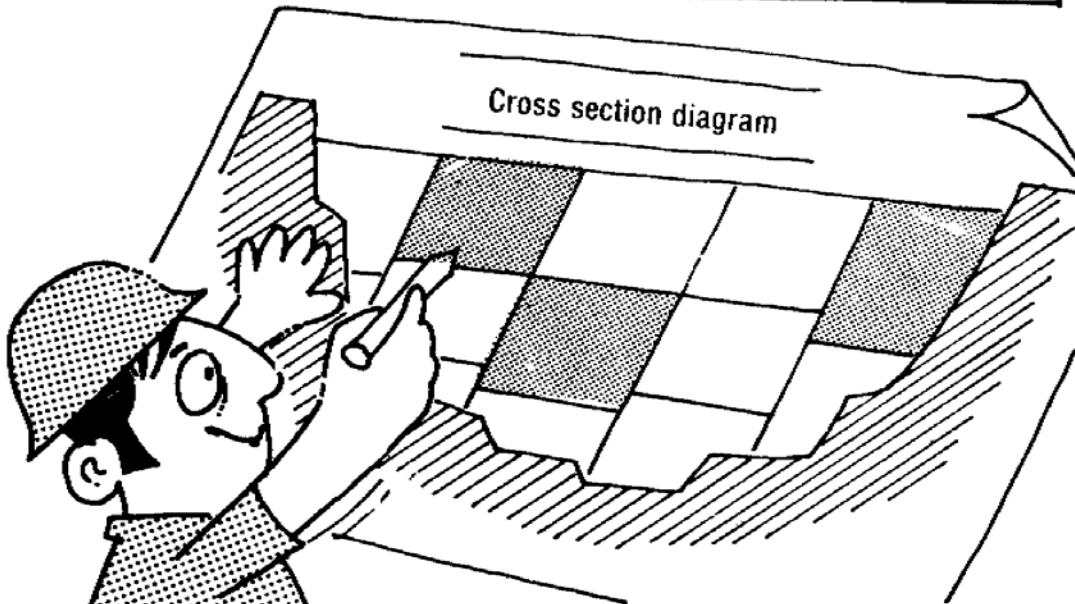


When the floats are lowered from the bridge, made a mark on the bridge in advance so that there are no mistakes in the lowering positions

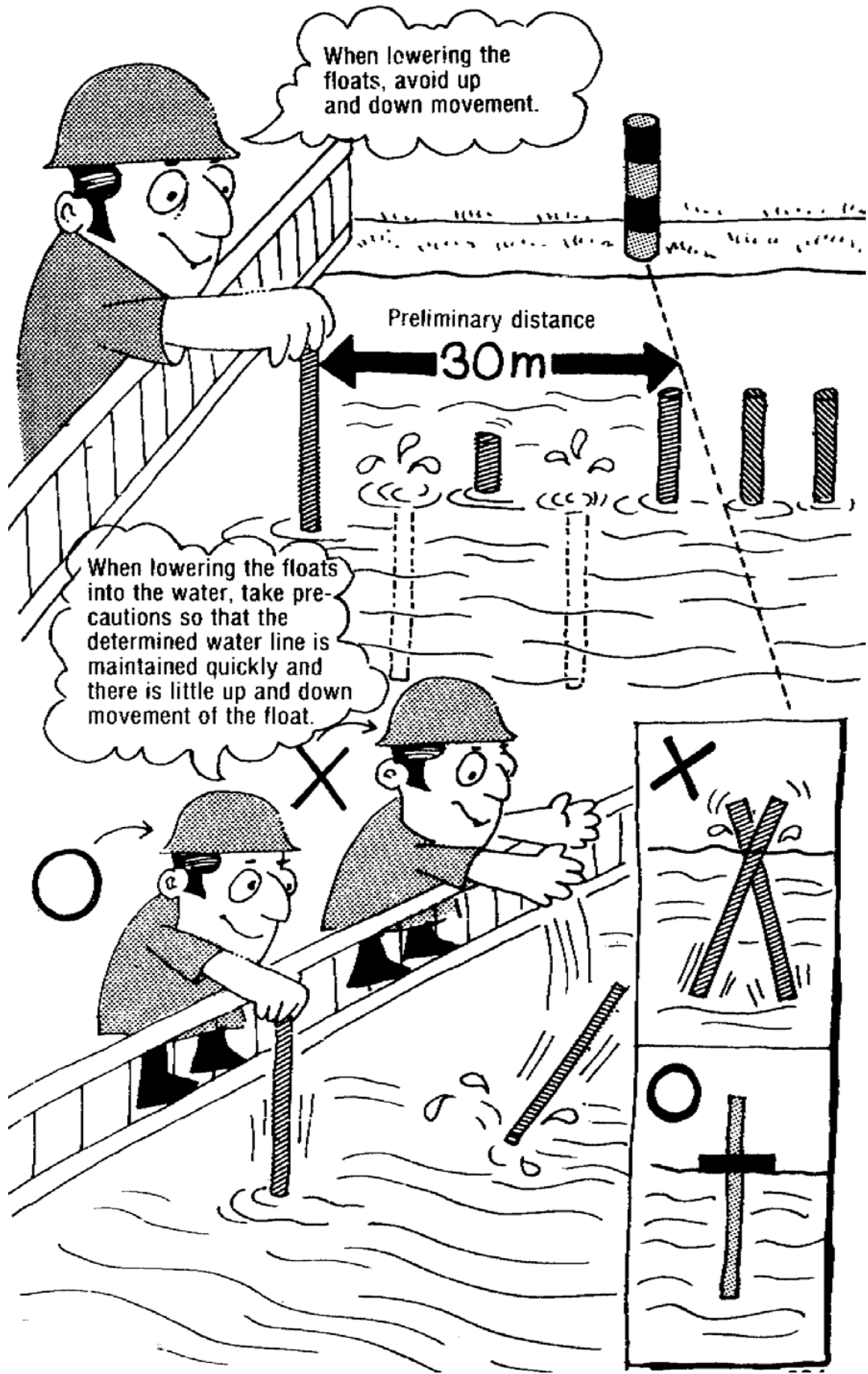
Make preparations in advance to keep a free board.



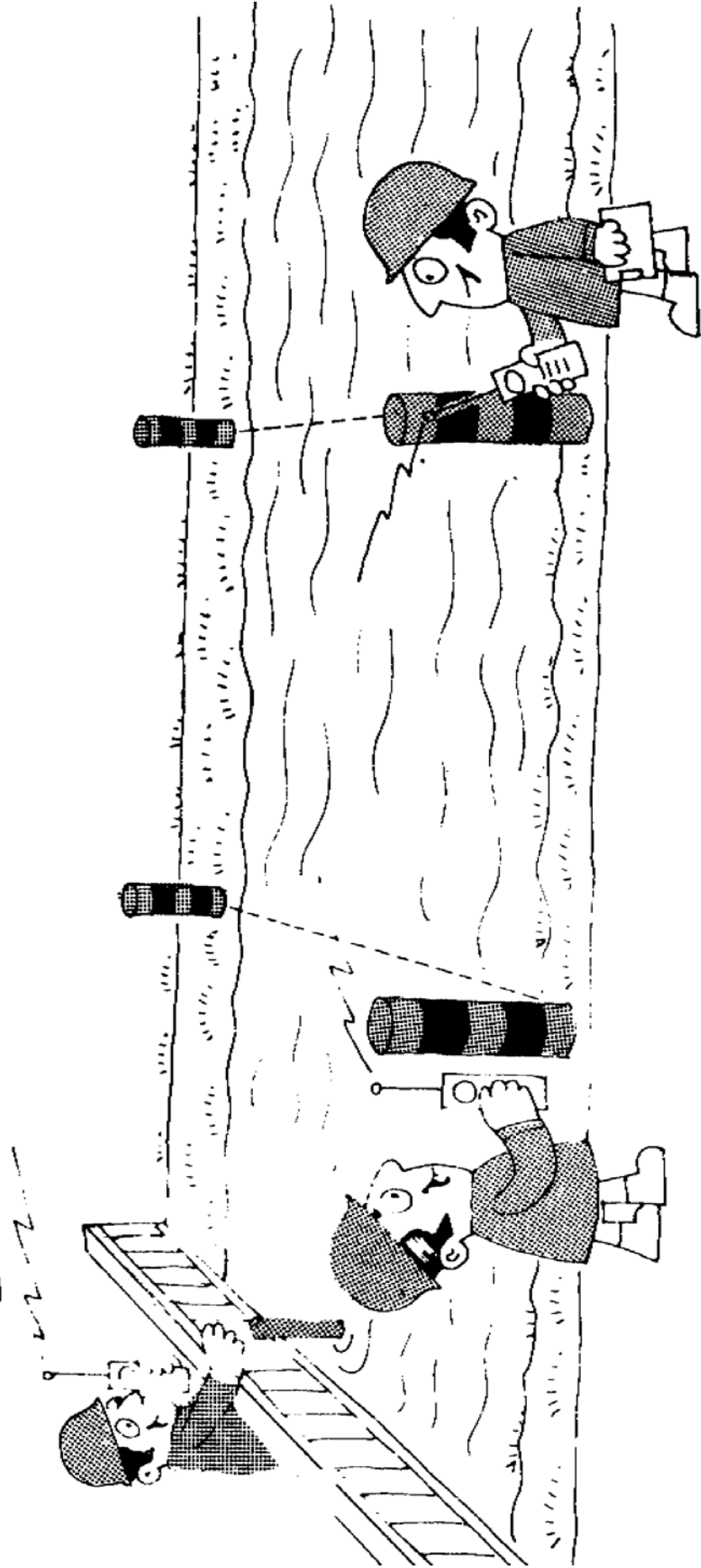
Float number	1	2	3	4	5
Water depth (m)	0.7	0.7 - 1.3	1.3 - 2.6	2.6 - 5.2	5.2
Free board (m)	Less than Surface float	0.5	1.0	2.0	More than 4.0
Adjustment coefficient	0.85	0.88	0.91	0.94	0.96



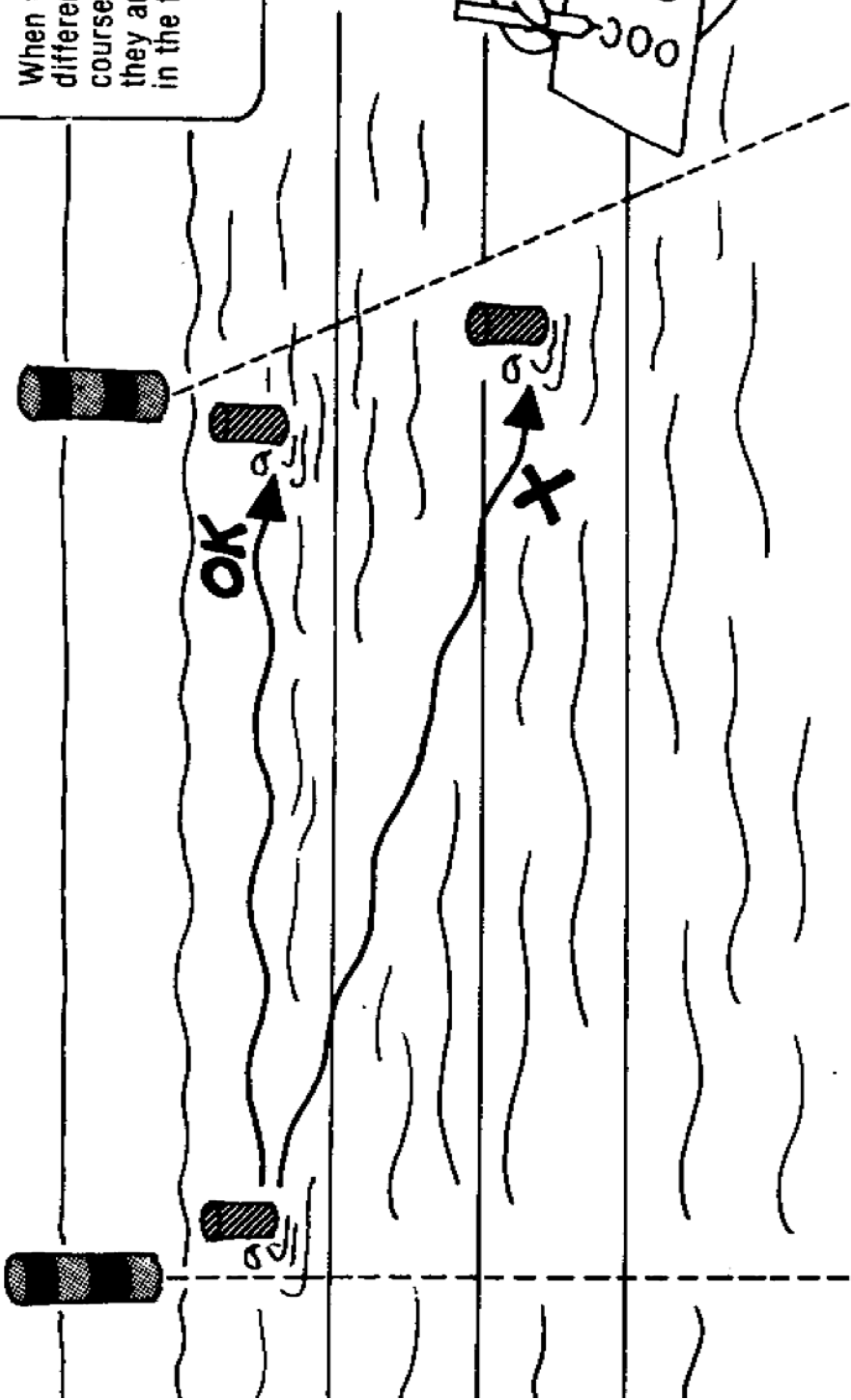
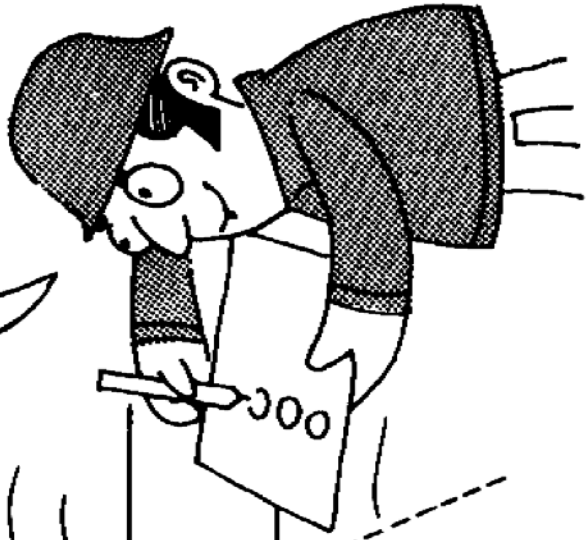
Make a cross section diagram with colour coding so that floats can be easily selected to fit the water level. Be sure to use the predetermined floats.



Use a walkie-talkie to notify that the first and second floats have been lowered.

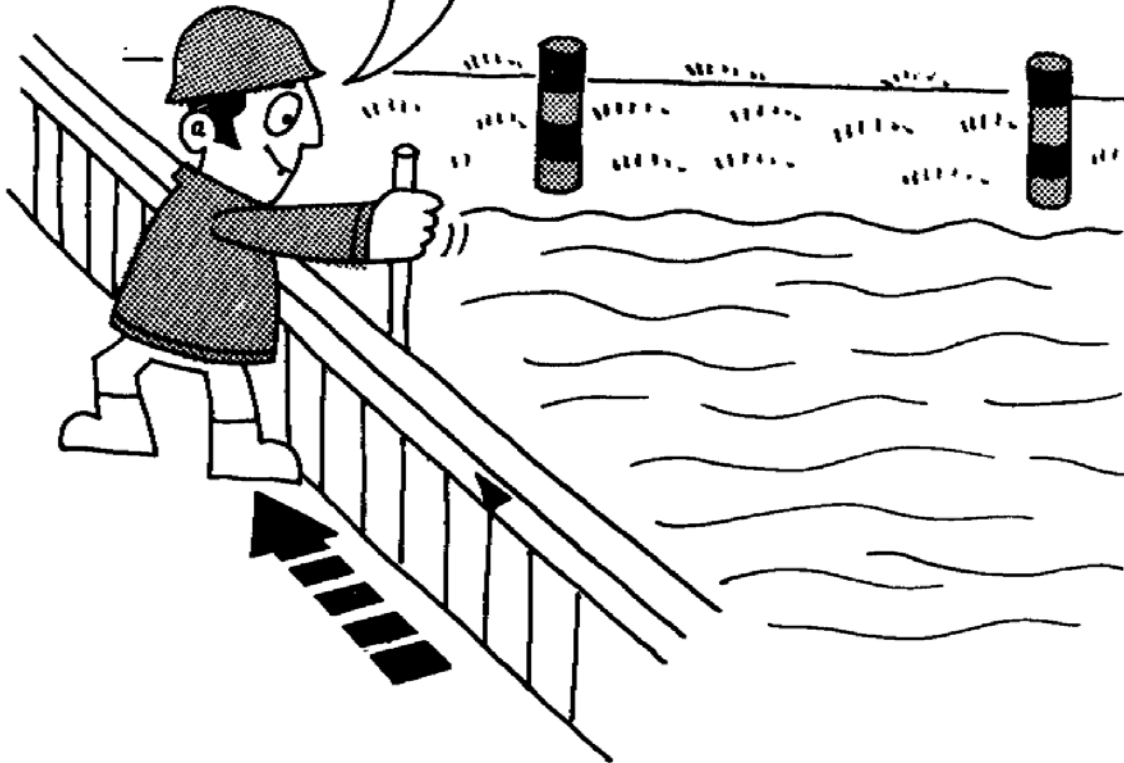


When there is a considerable difference between the flowing courses of the floats from what they are expected, record this in the field notebook.



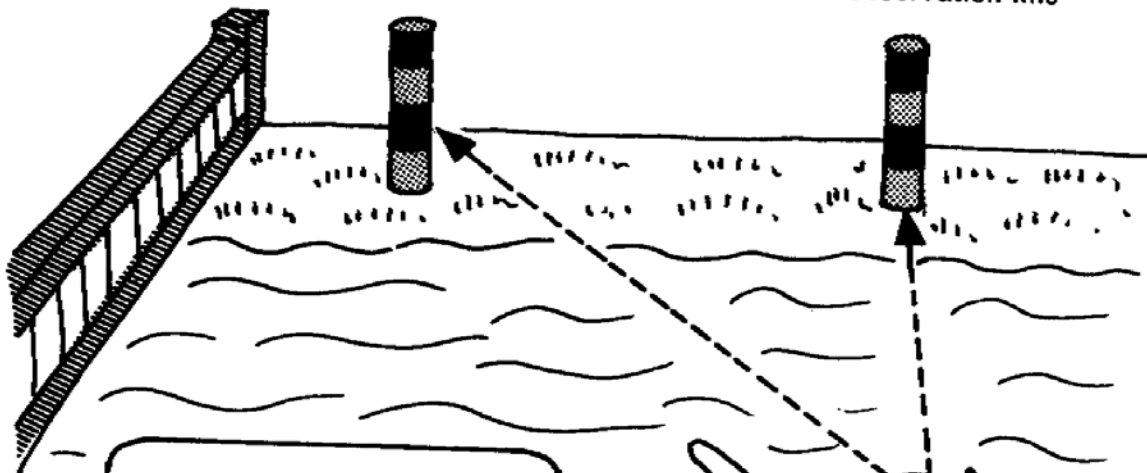


When it is possible to make a correct measurement from a different lowering position, etc., carry out another measurement.



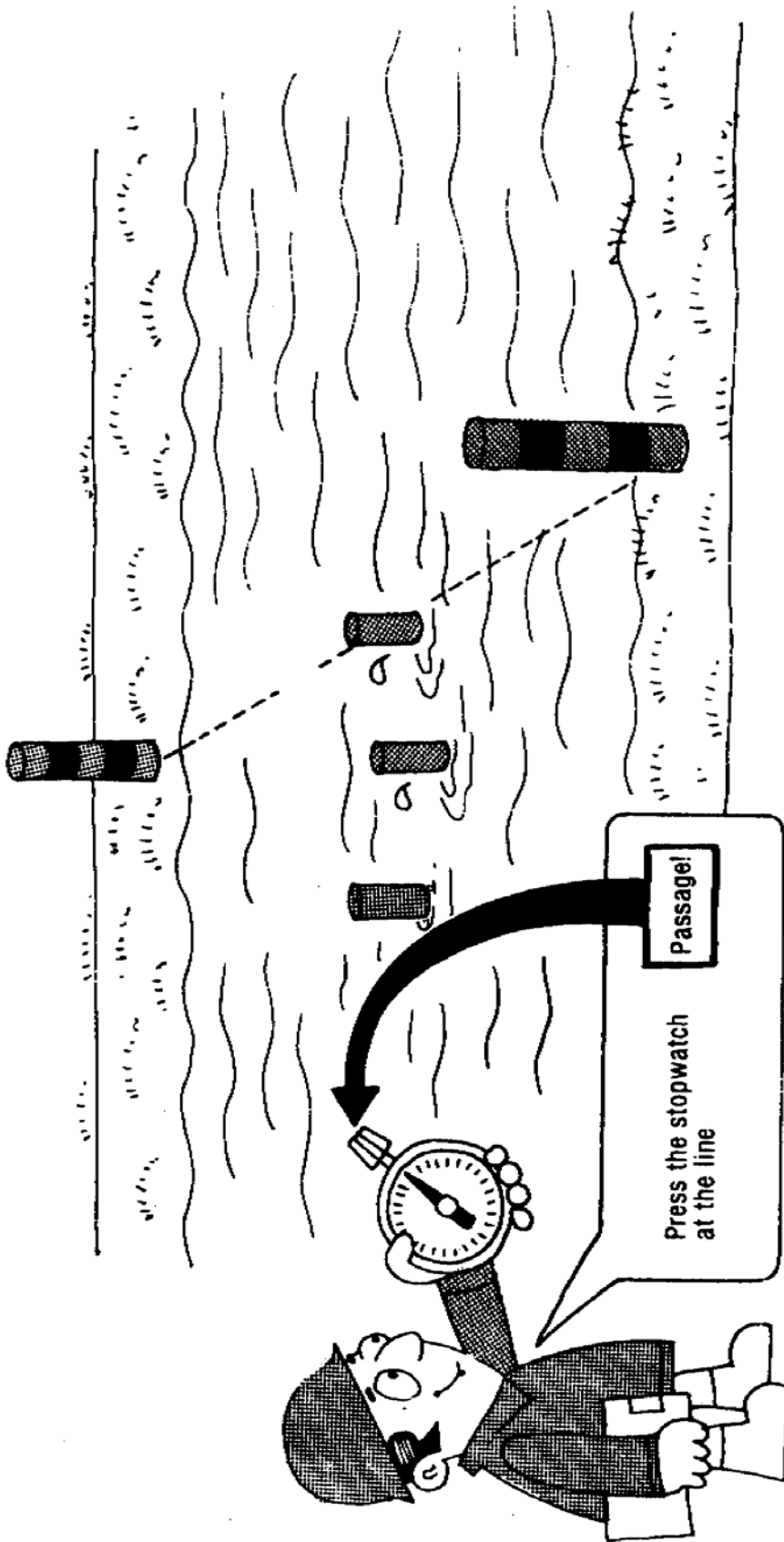
First observation line

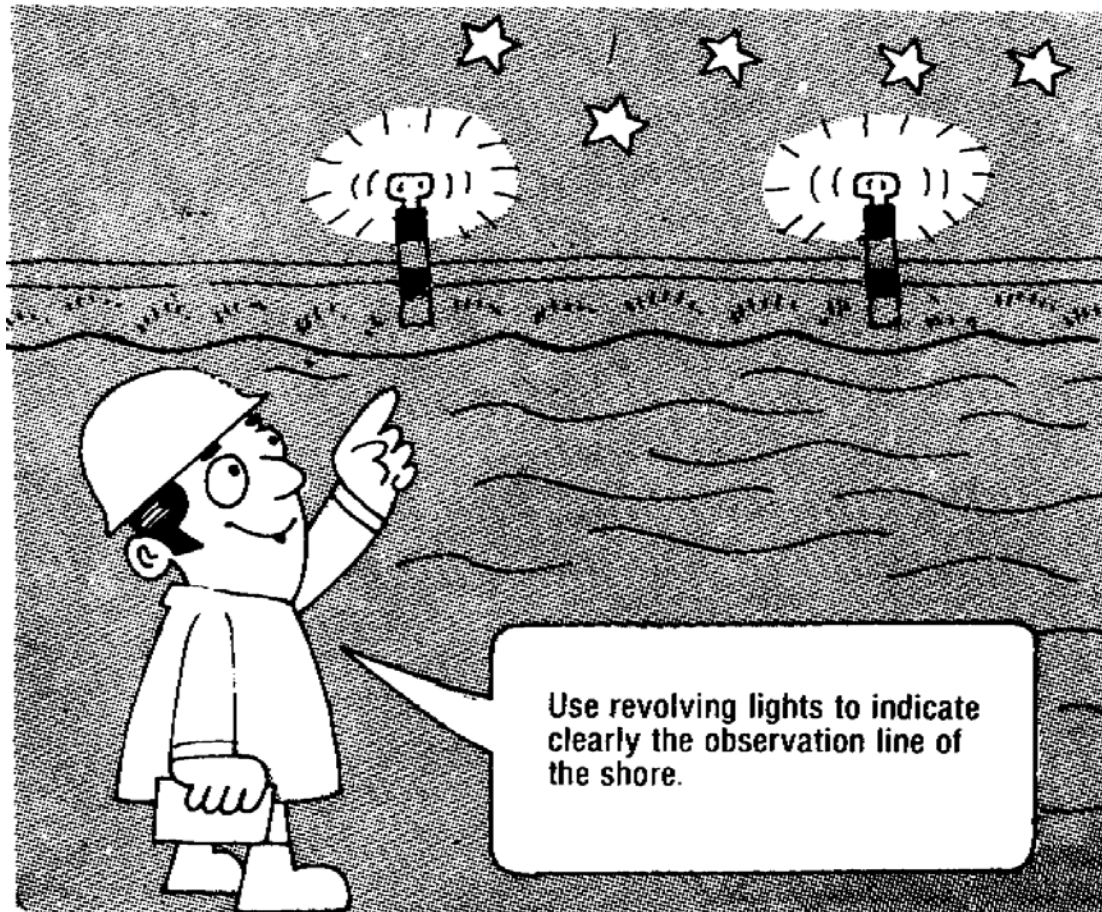
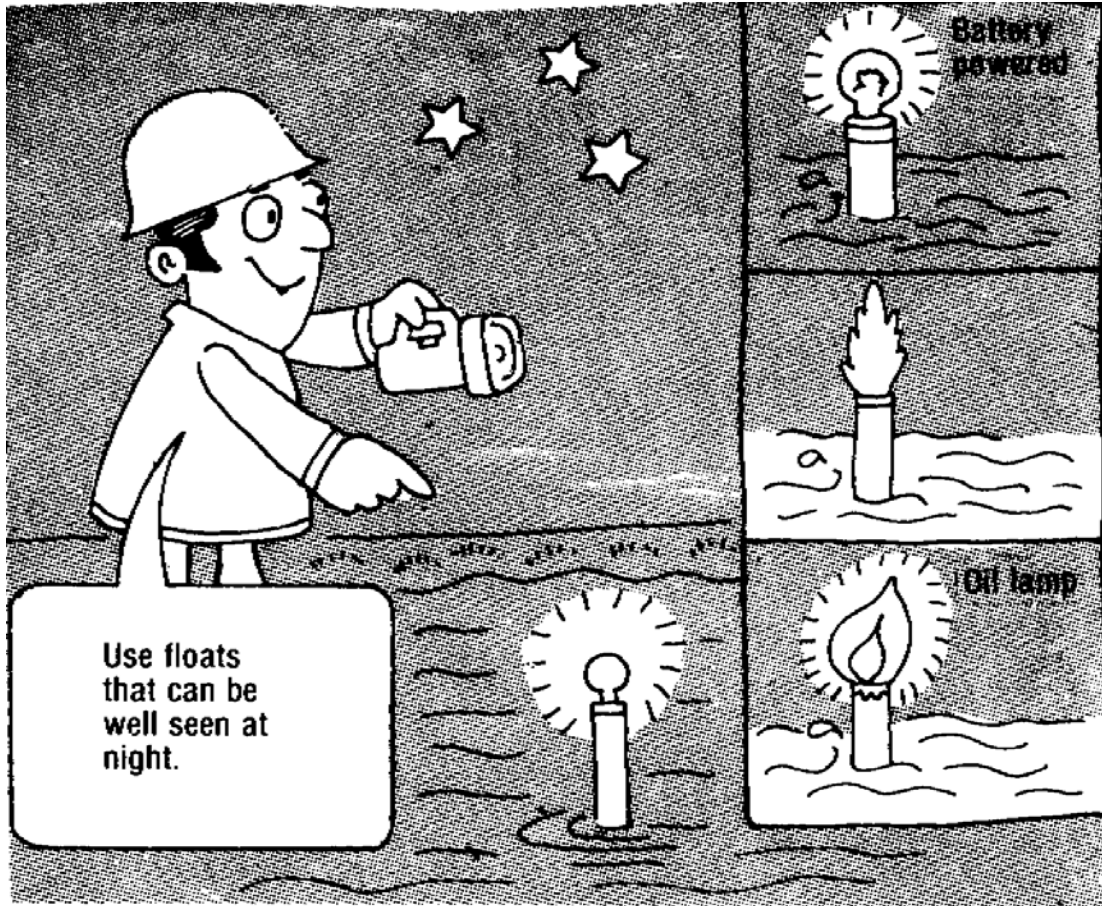
Second observation line

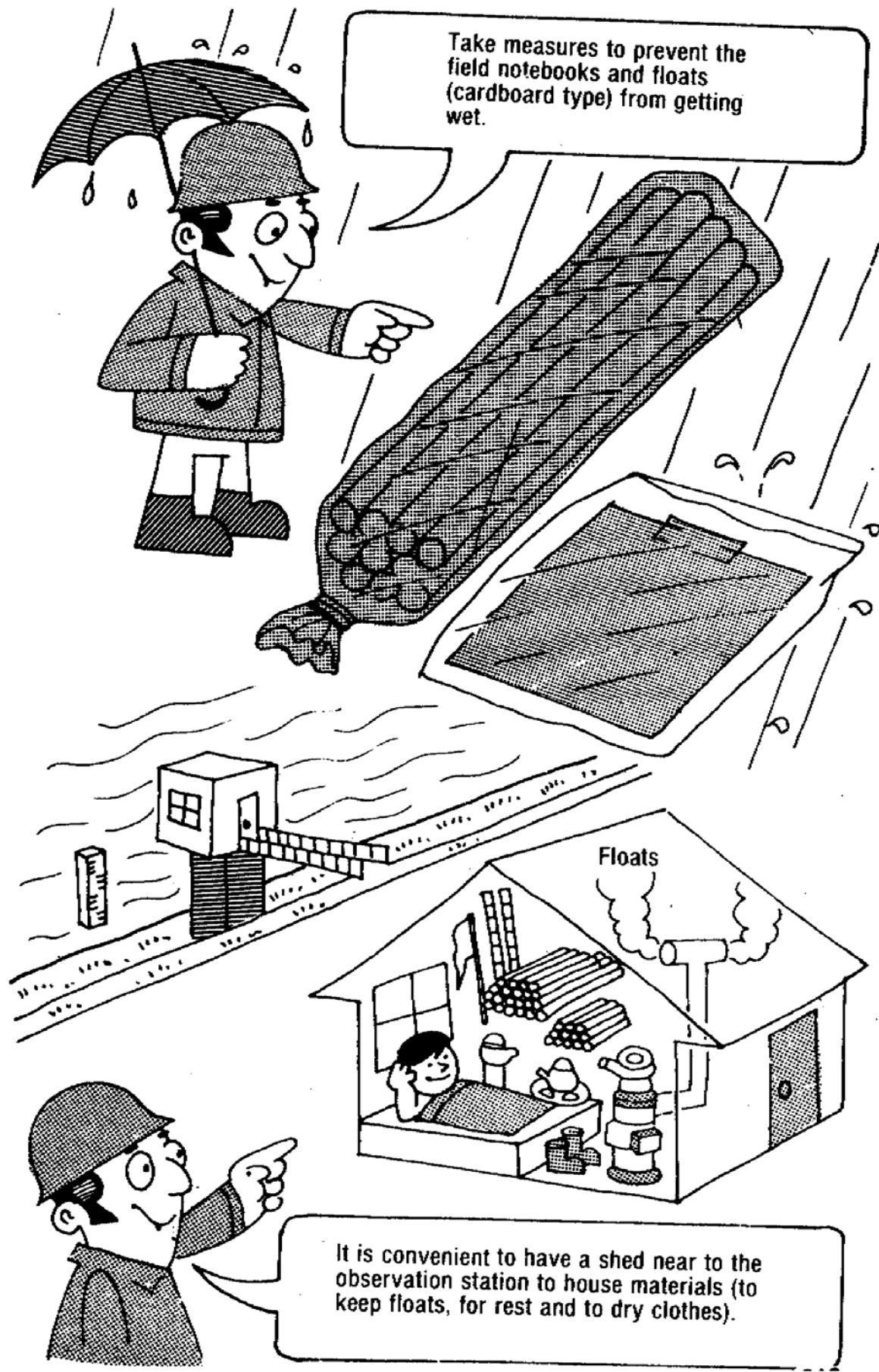


Carry out the measurements after it has been verified that the first and second observation lines are not in error.





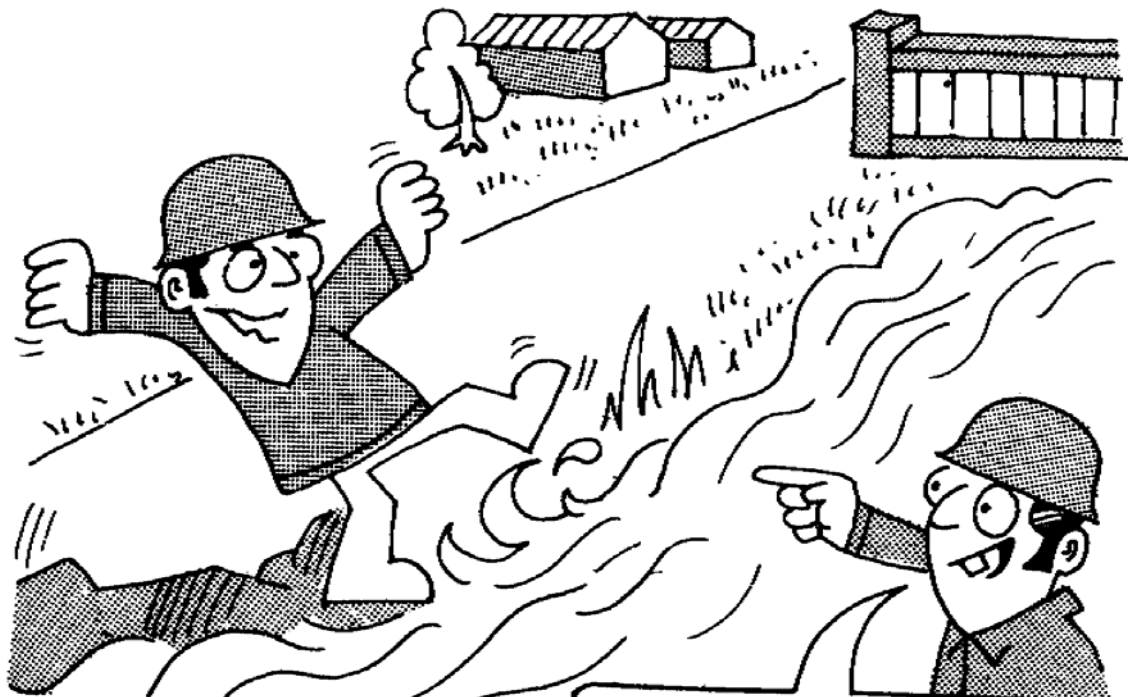




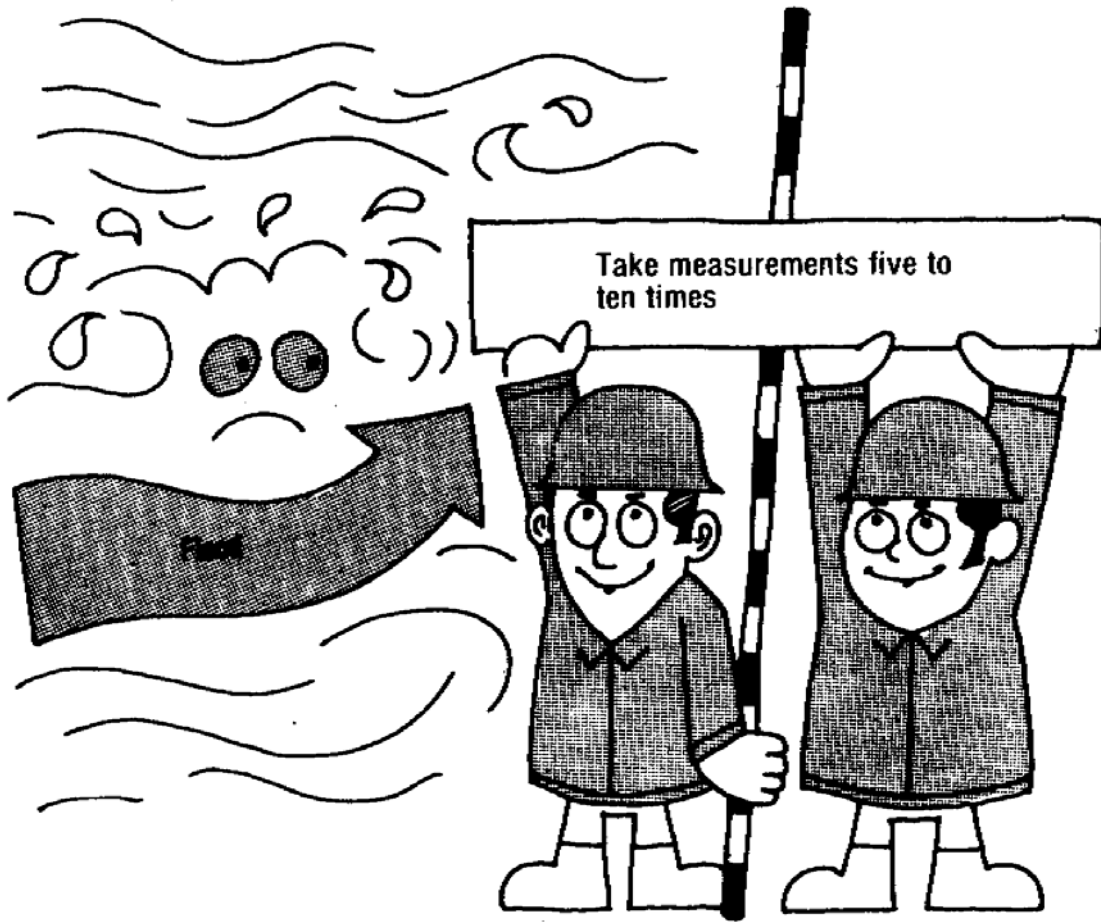
Take measures to prevent the field notebooks and floats (cardboard type) from getting wet.

It is convenient to have a shed near to the observation station to house materials (to keep floats, for rest and to dry clothes).

Remove obstacles to measurement such as brush on flood way in advance.



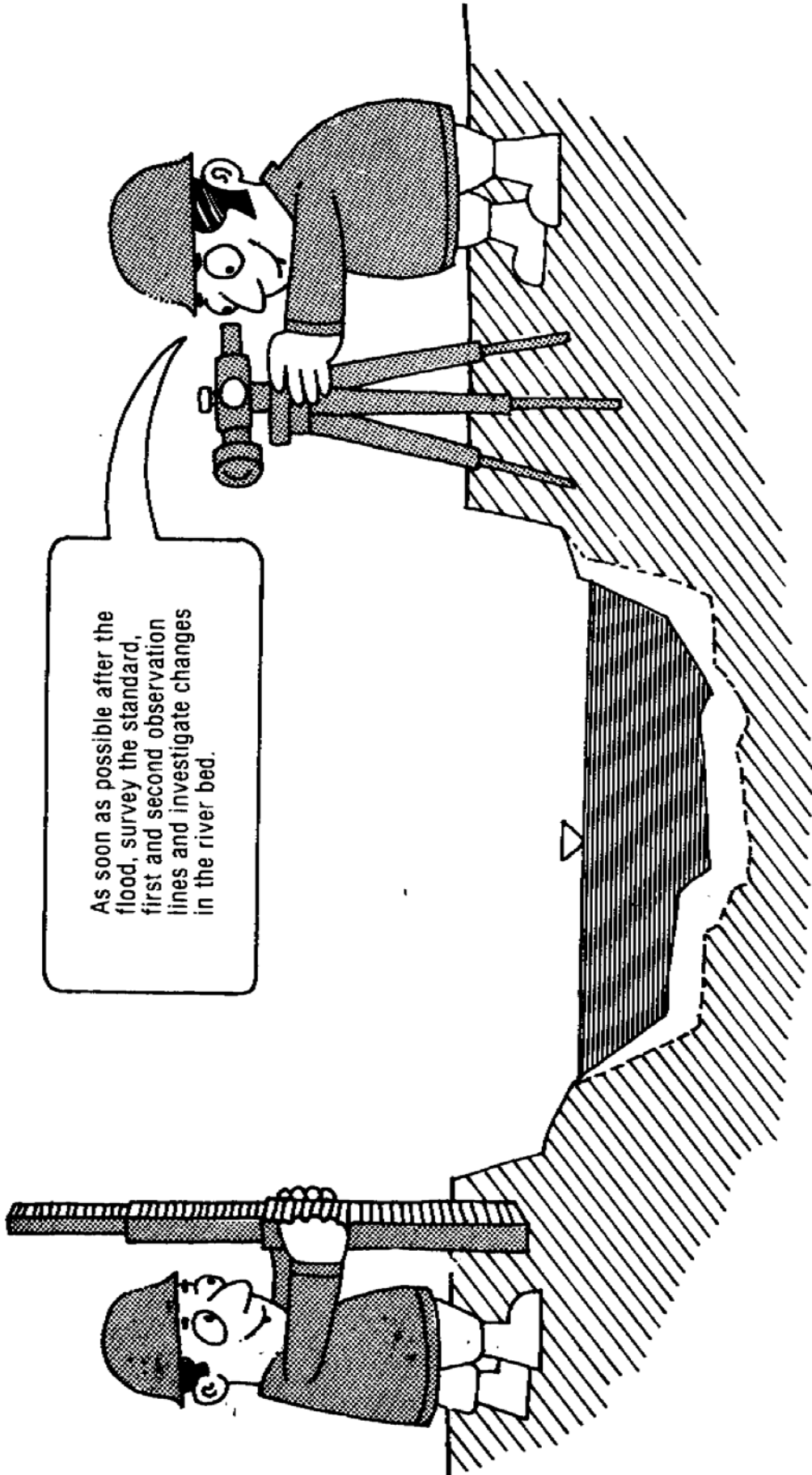
If the bank appears to be giving way or there seems to be danger, seek shelter.



When discharge observation is over and the staff is about to disperse, they should report to the person in charge at the office.

Thank you.





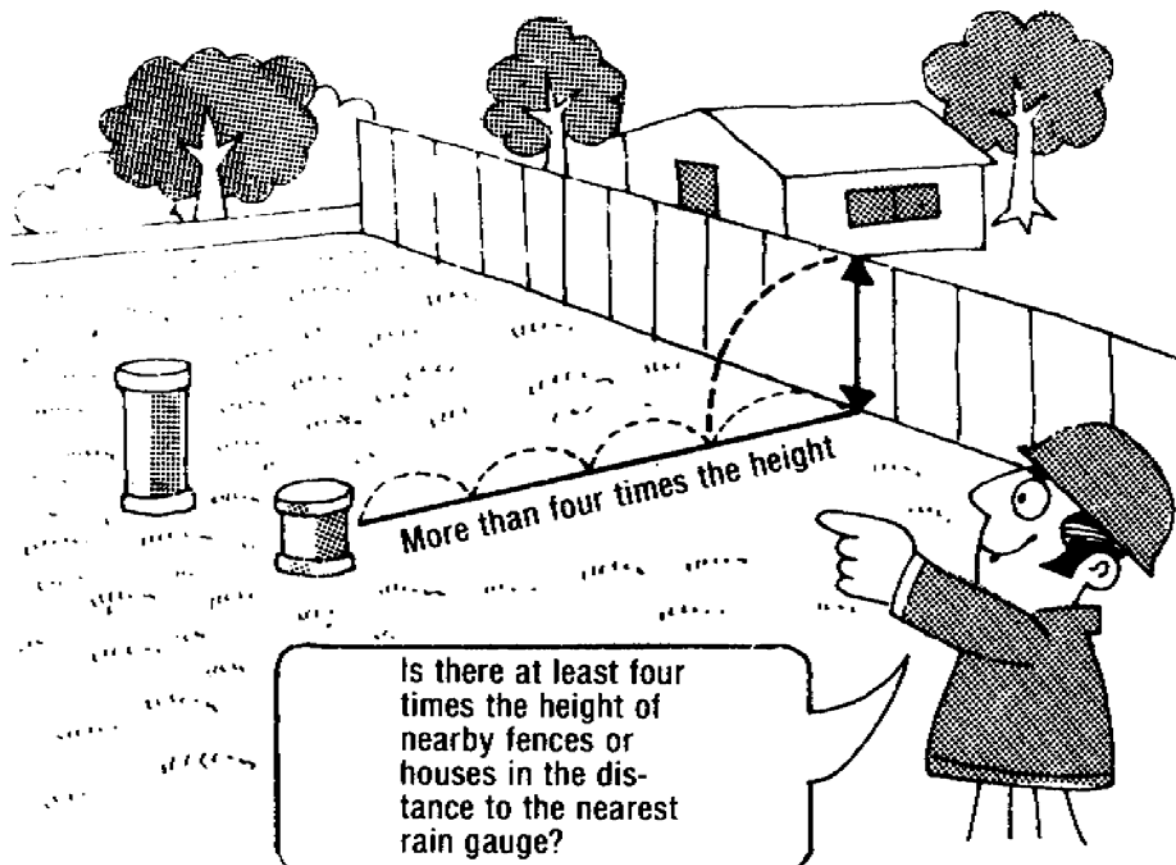
As soon as possible after the flood, survey the standard, first and second observation lines and investigate changes in the river bed.

#### 4. Inspection at Observation Stations

##### 1) Rainfall observation stations

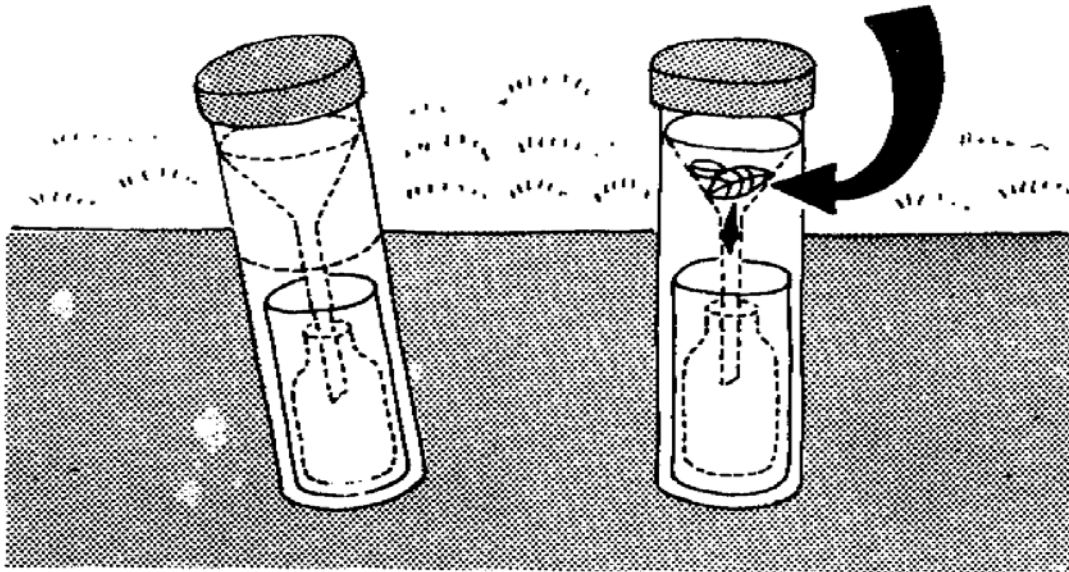




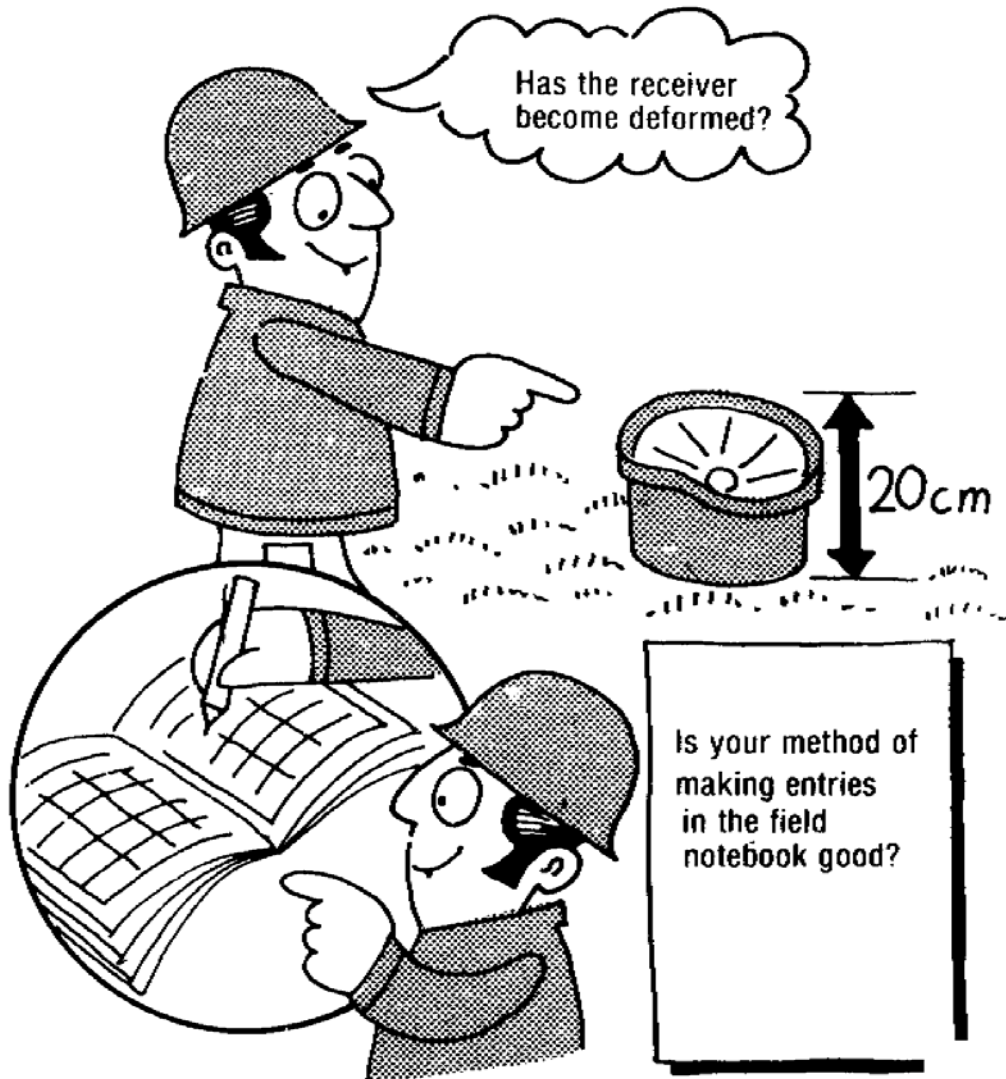


● Is it installed level?

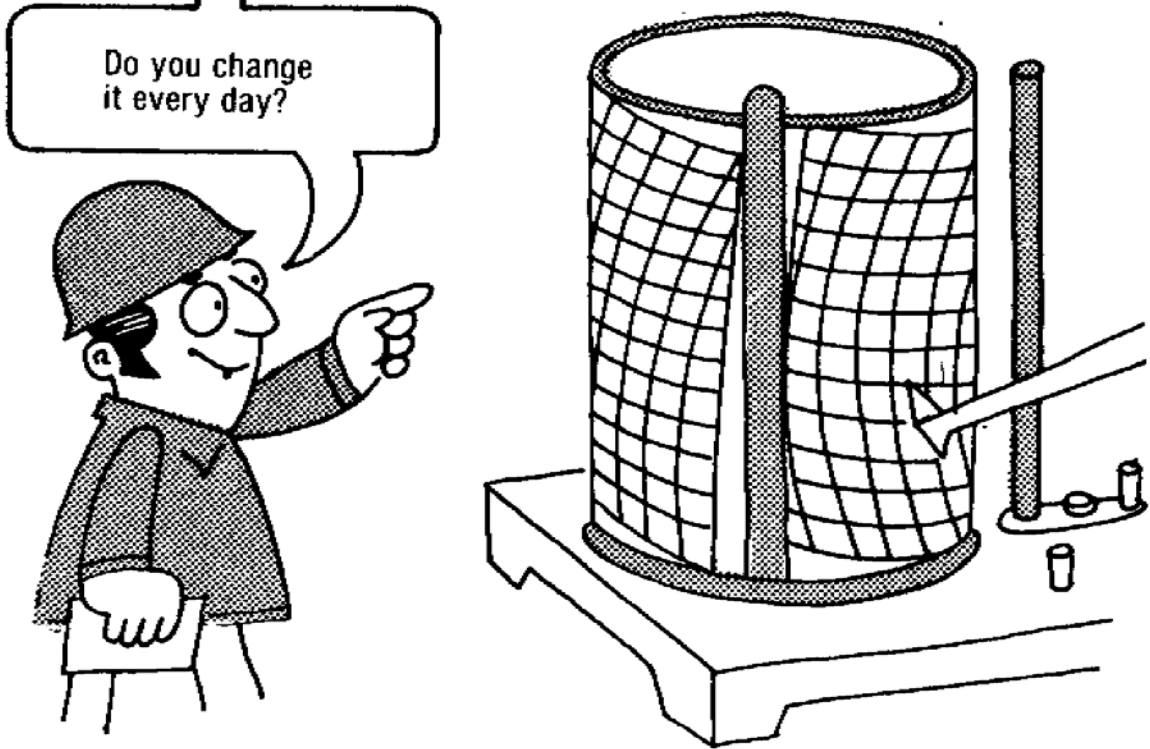
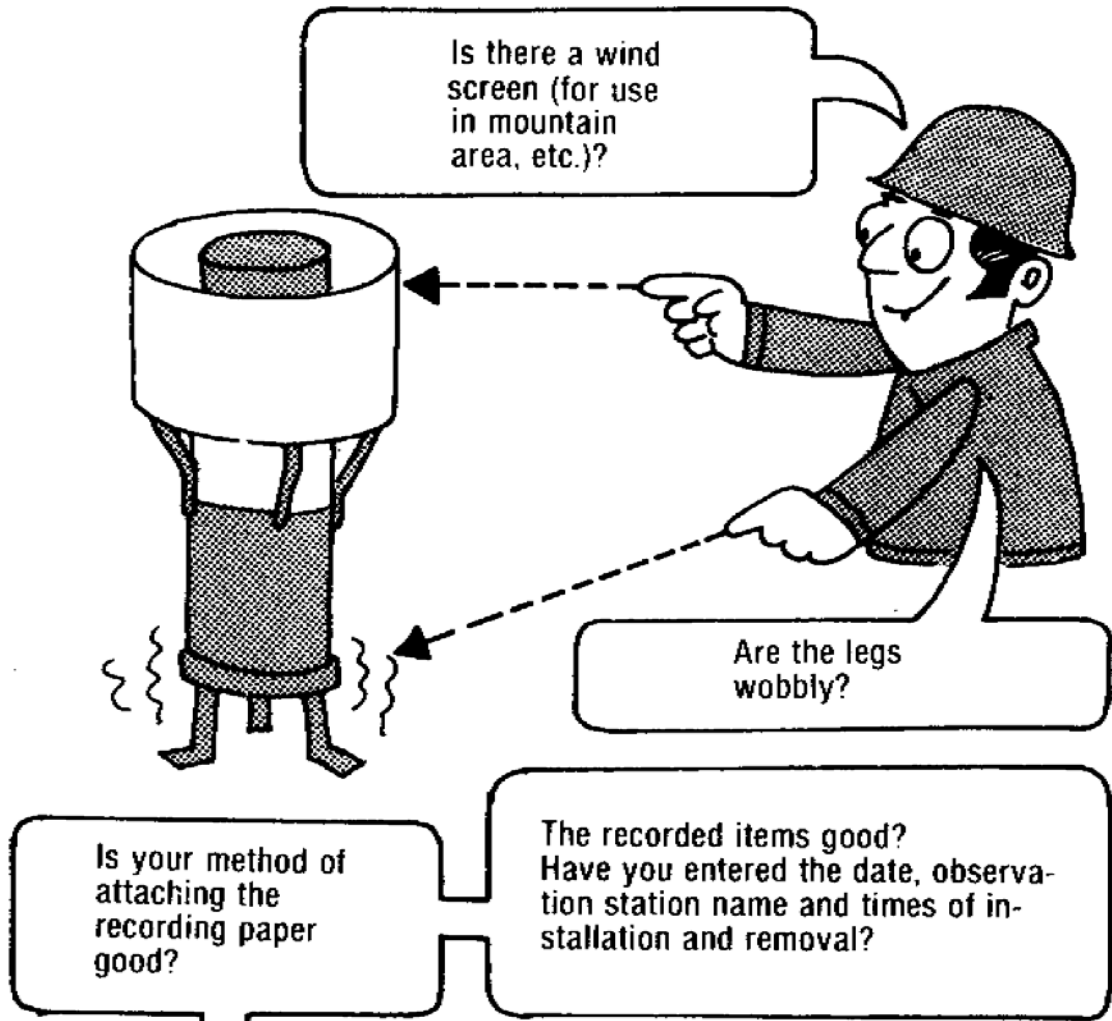
● Have leaves or debris fallen in?



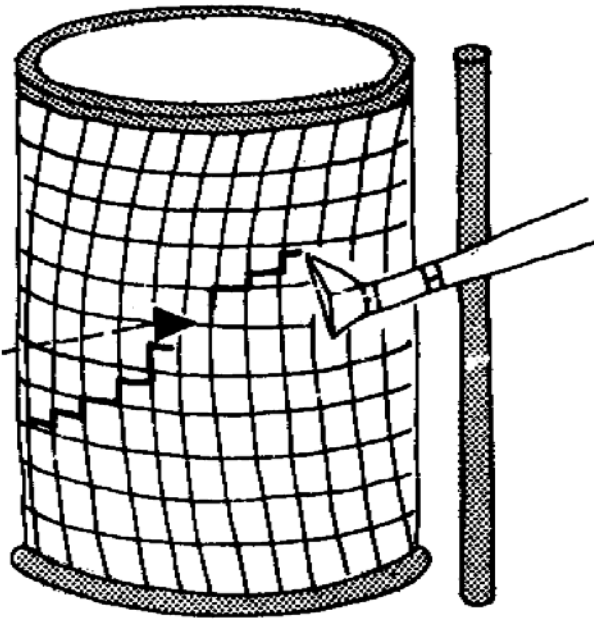
Has the receiver become deformed?



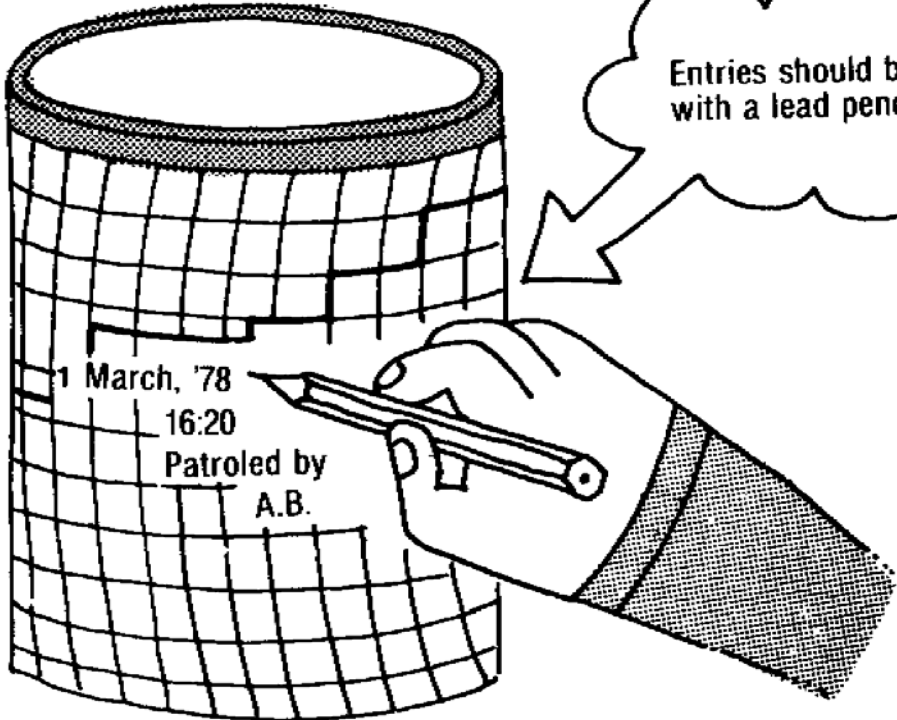
Is your method of making entries in the field notebook good?

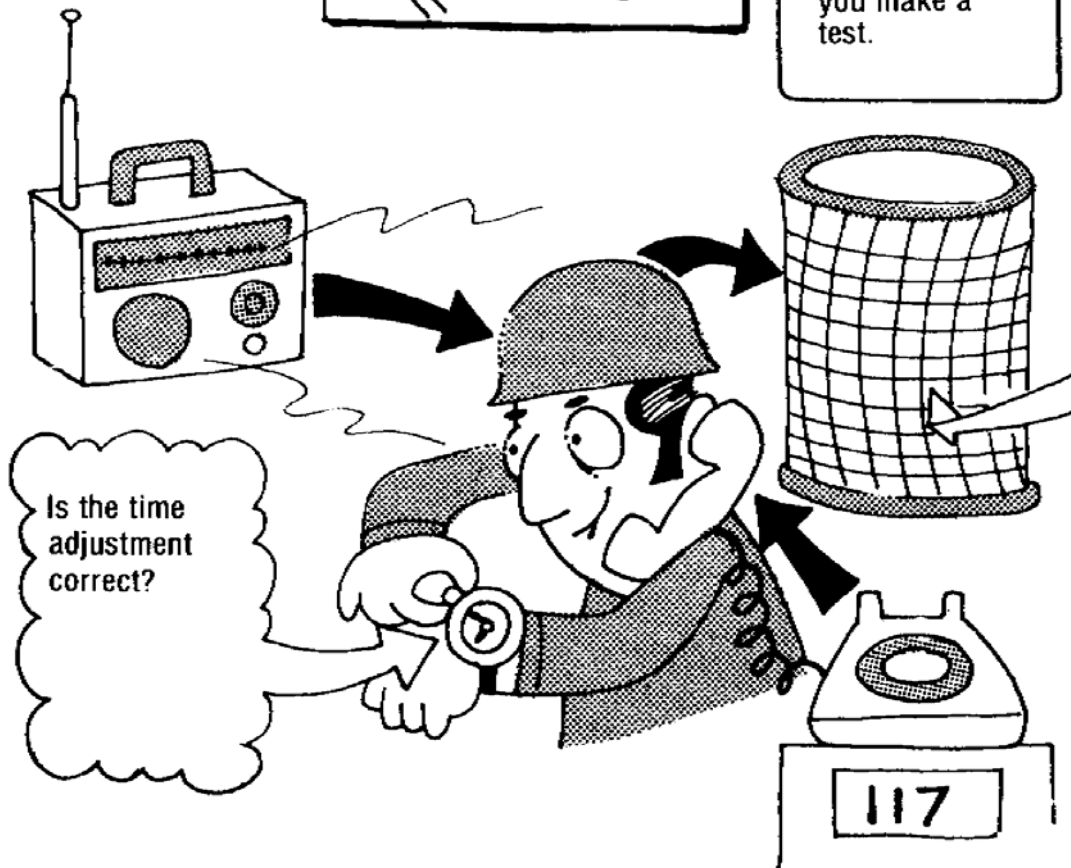
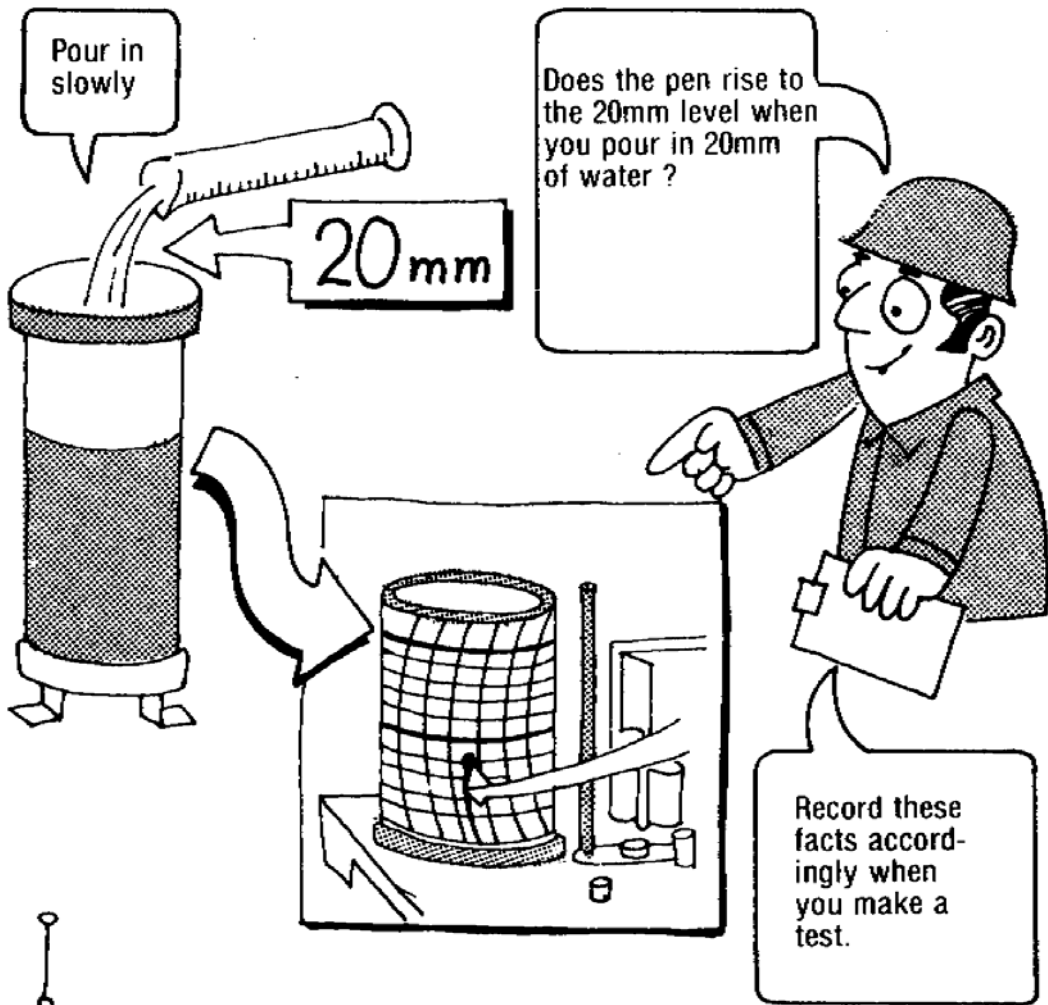


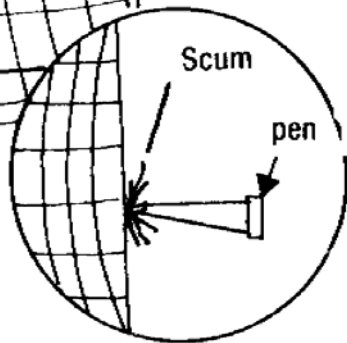
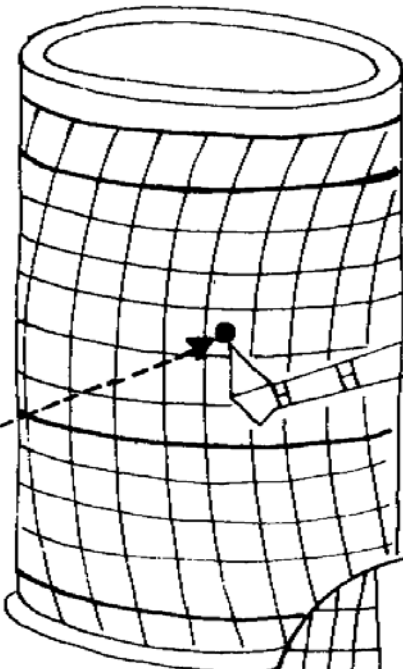
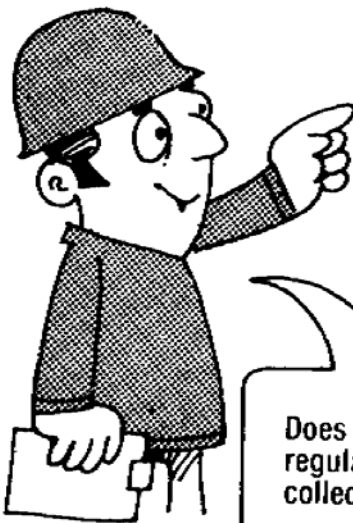
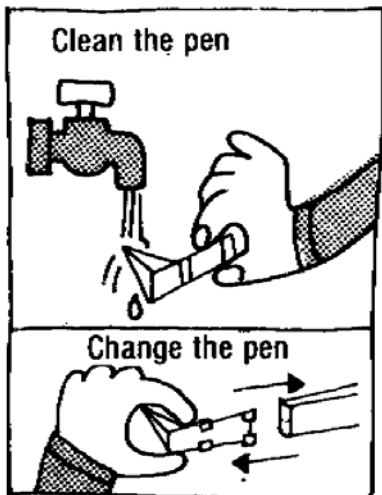
Are there any un-natural places on the recording?



Entries should be made with a lead pencil.



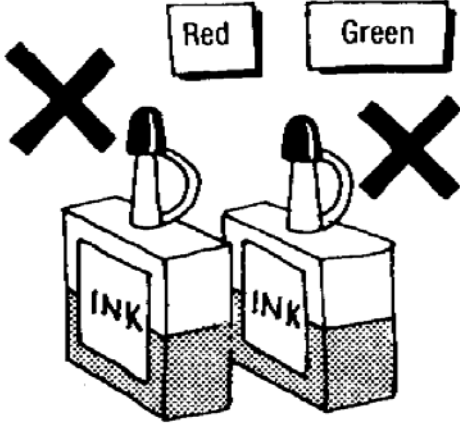
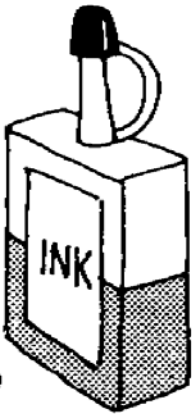




Does the ink flow regularly? Has scum collected at the pen tip?



Purple



Red

Green



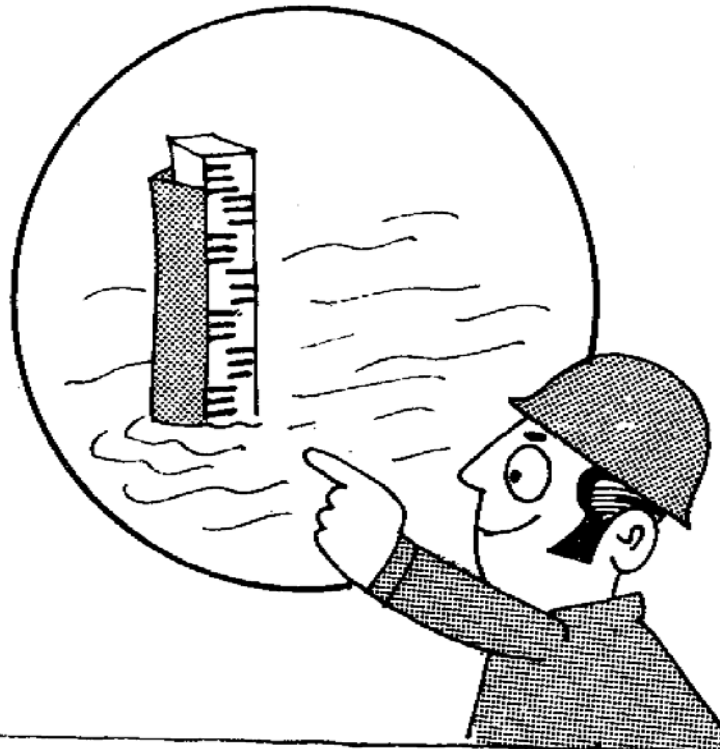
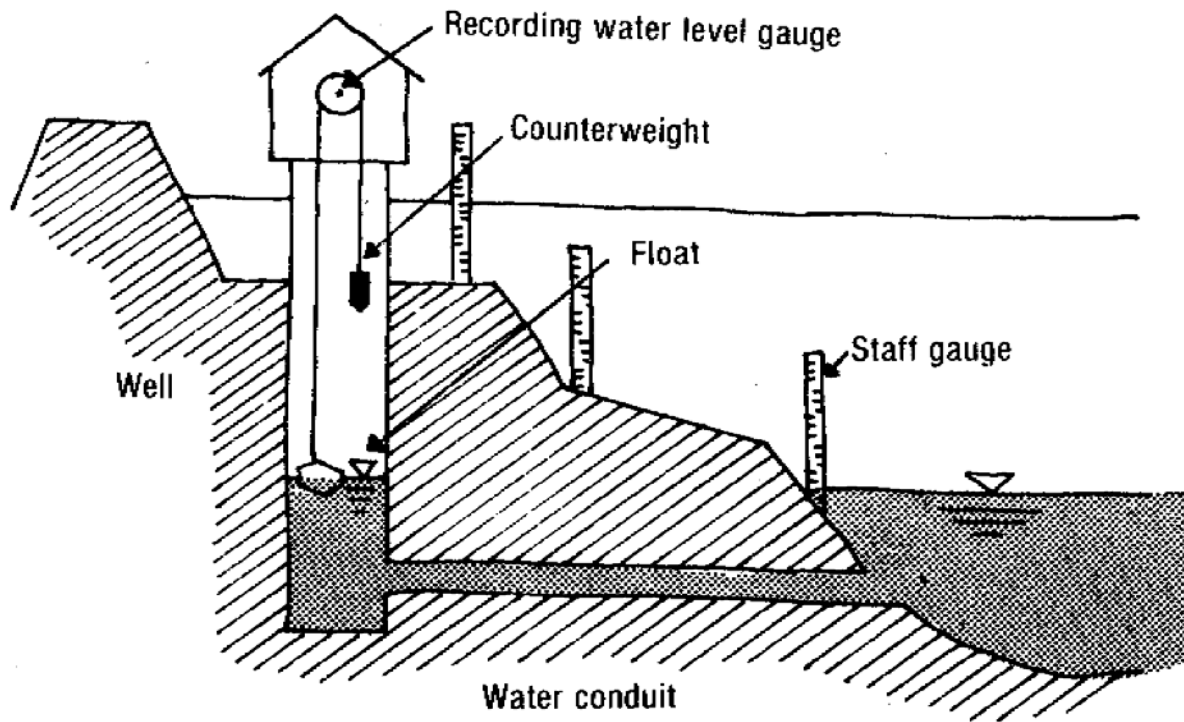
Are you using the prescribed ink?





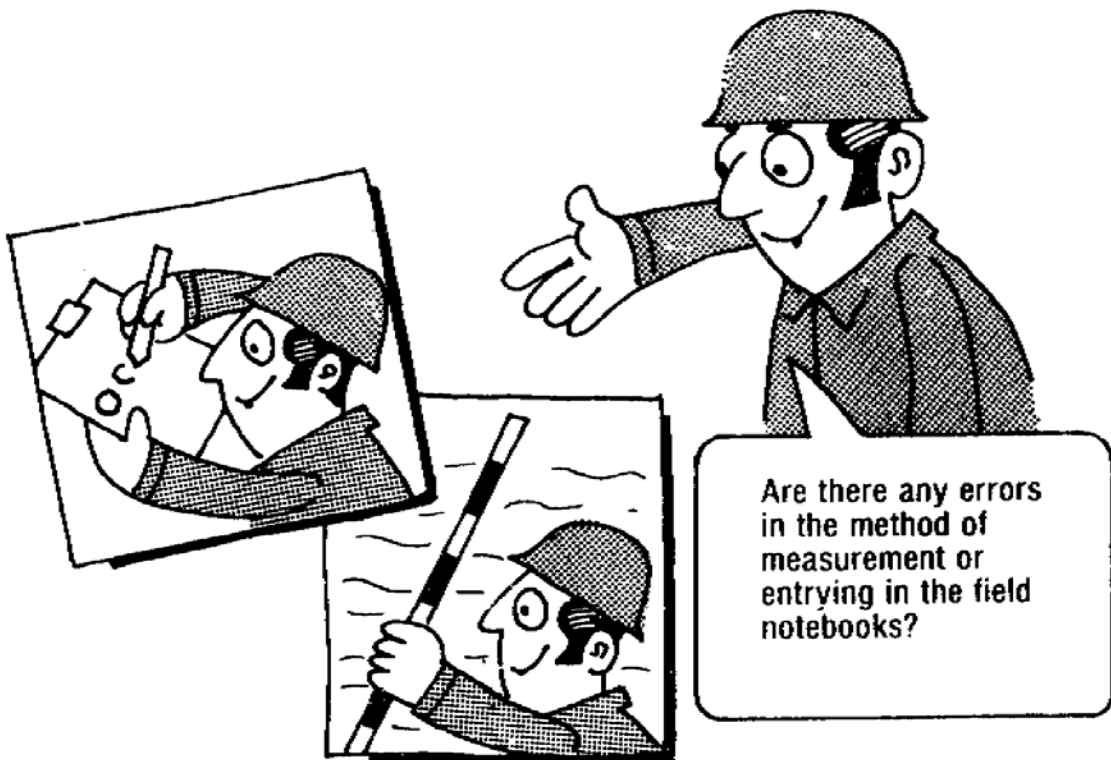
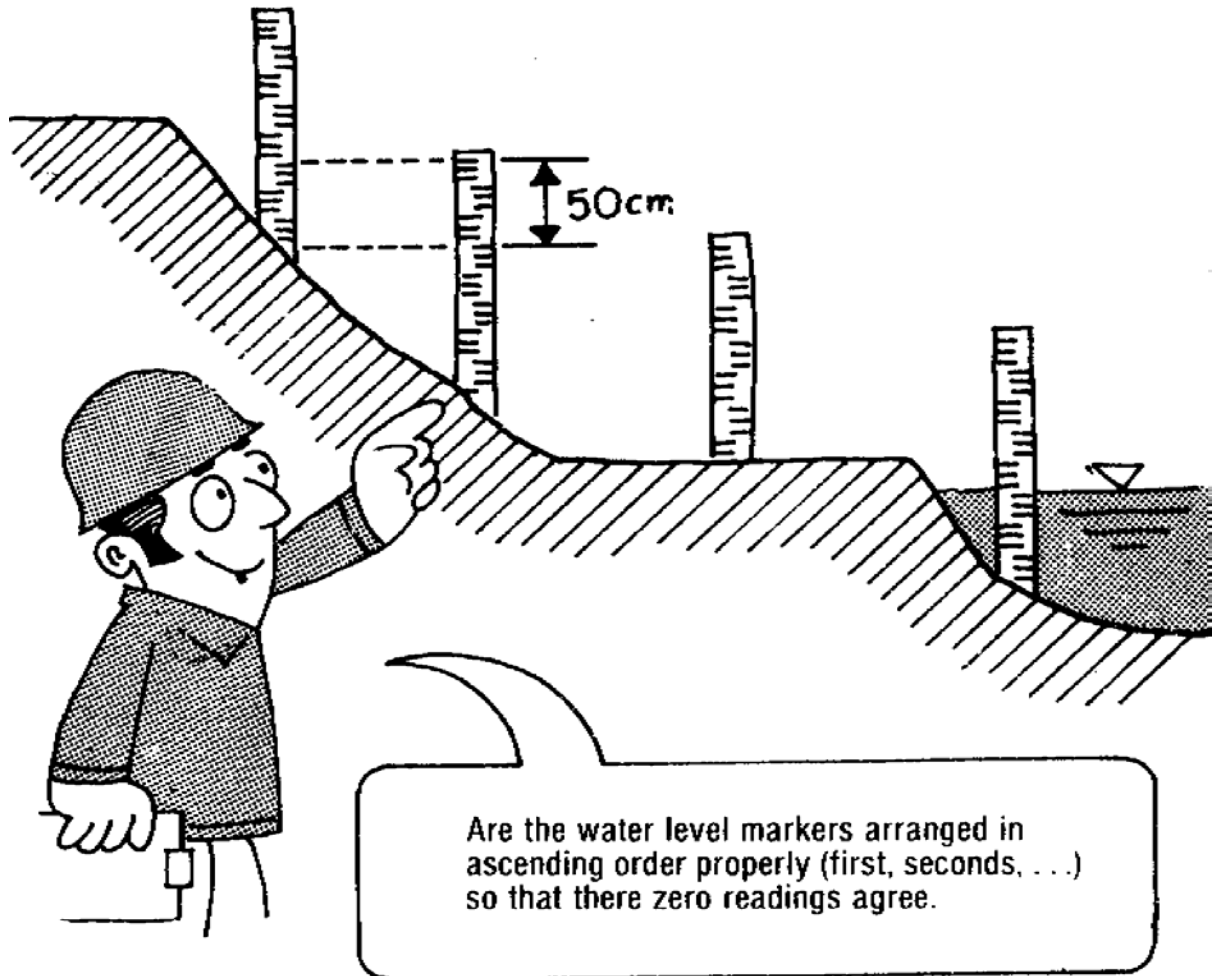


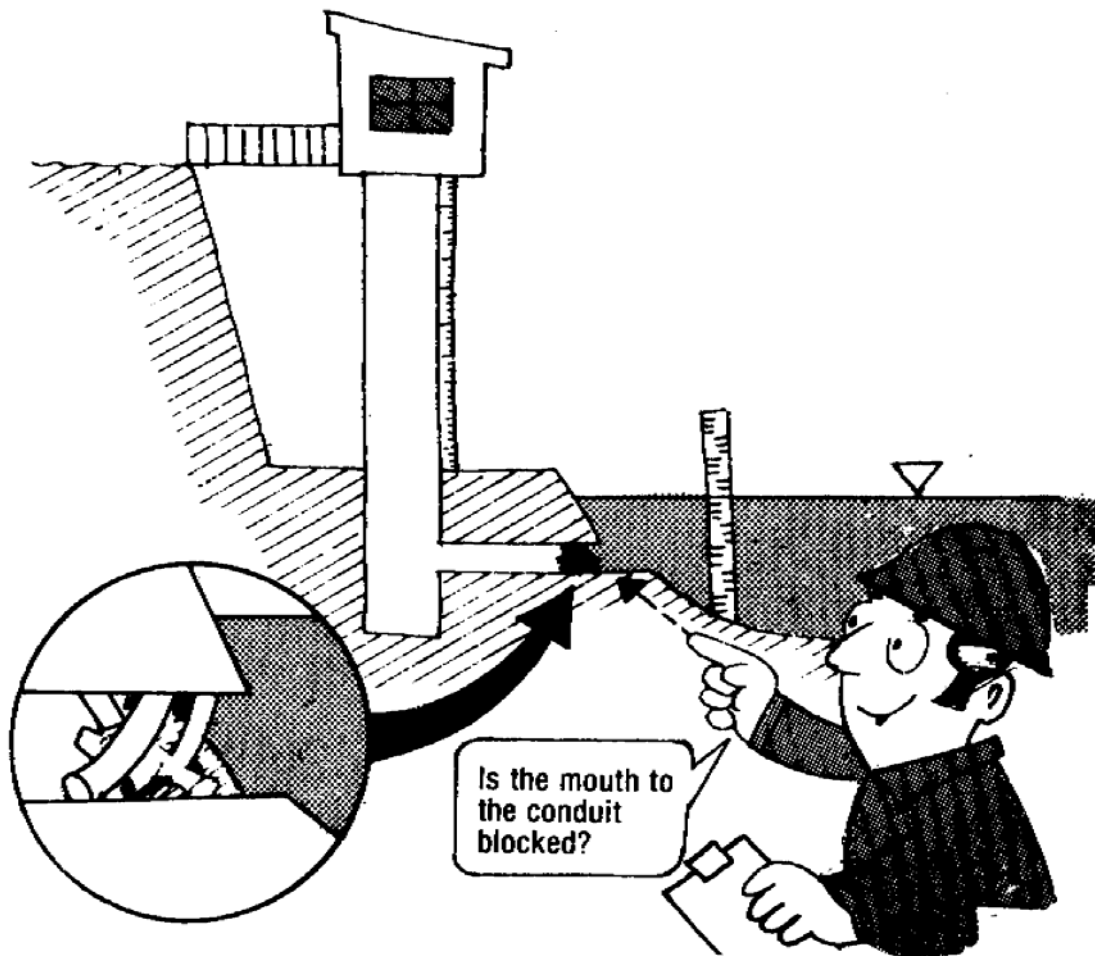
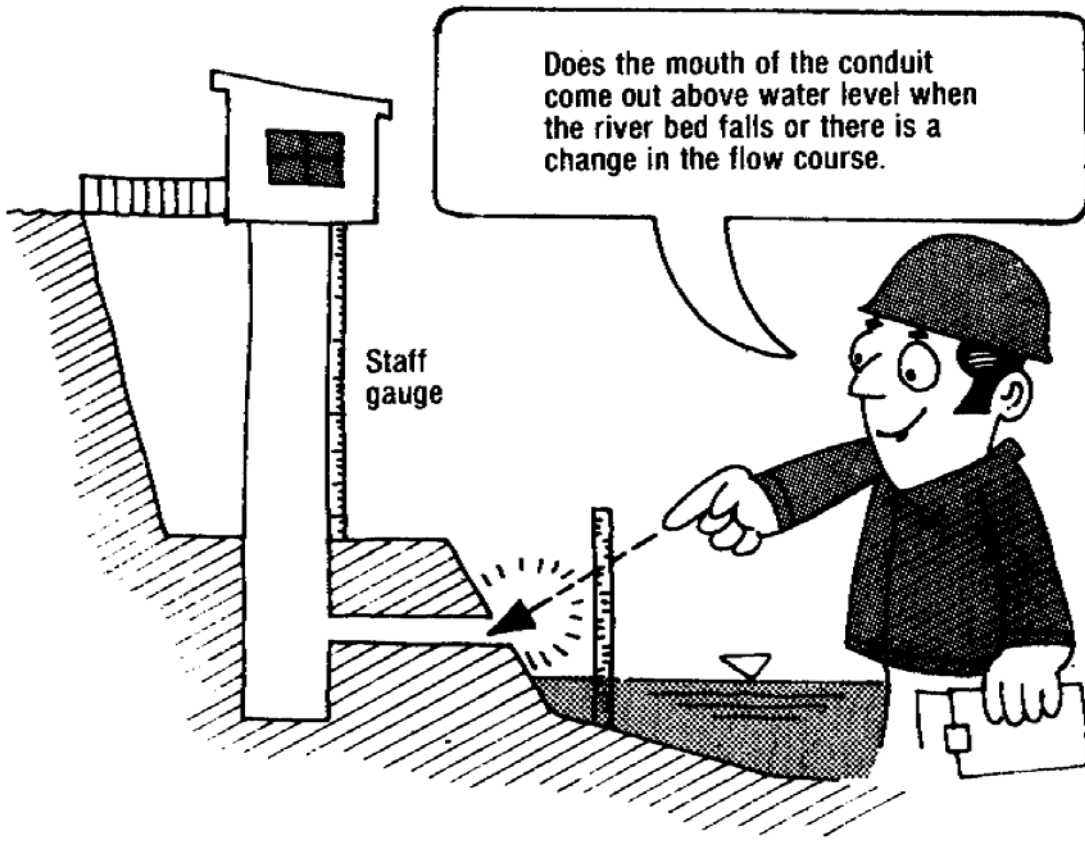
## 2) Water level observation stations

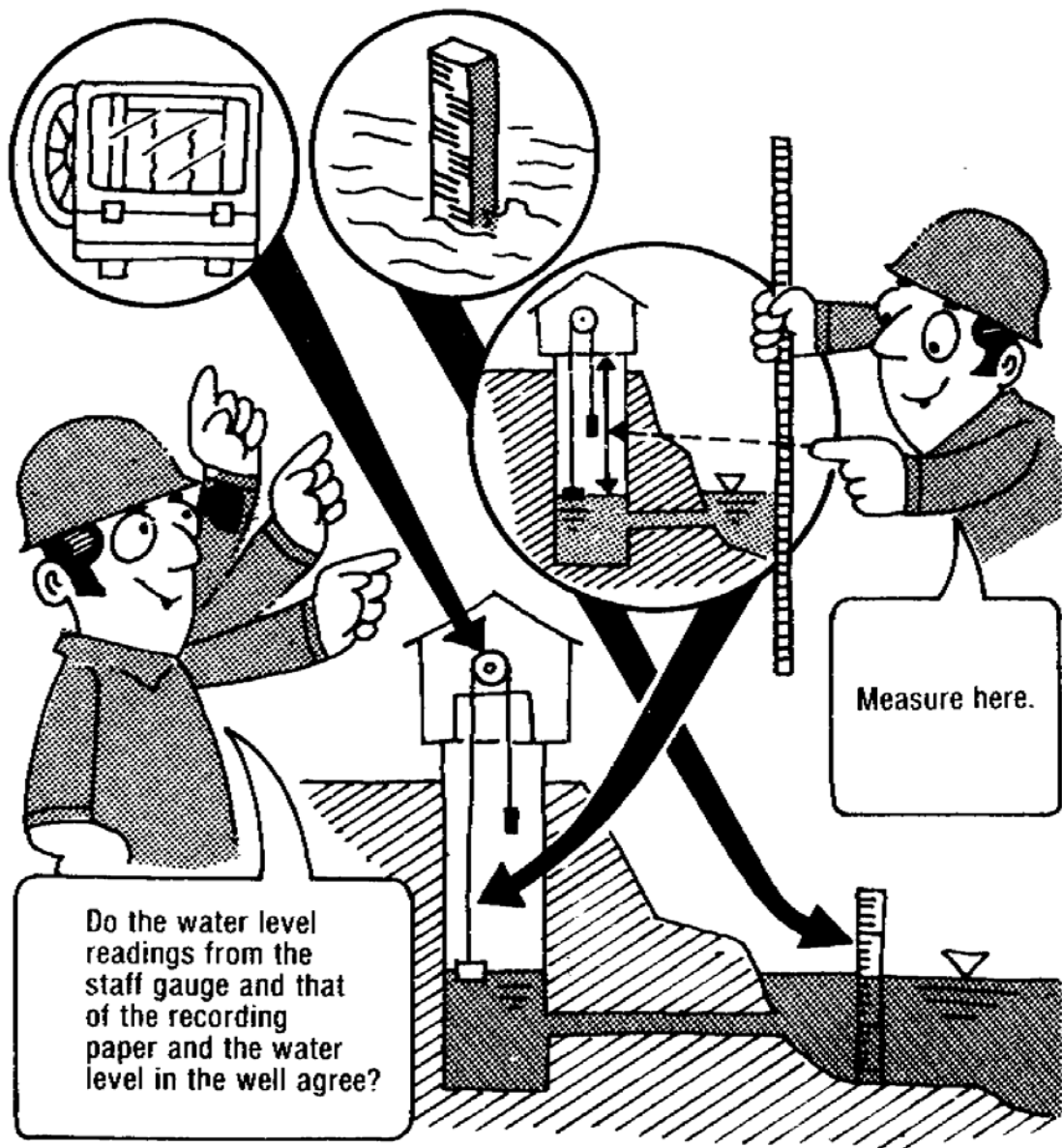


Is the installation of the staff gauge all right?  
(Is it leaning, fallen, washed away or damaged?)

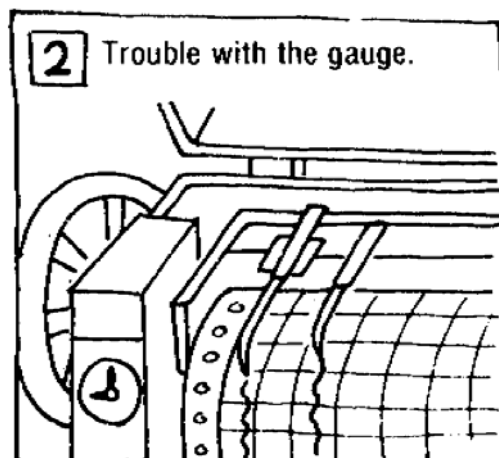
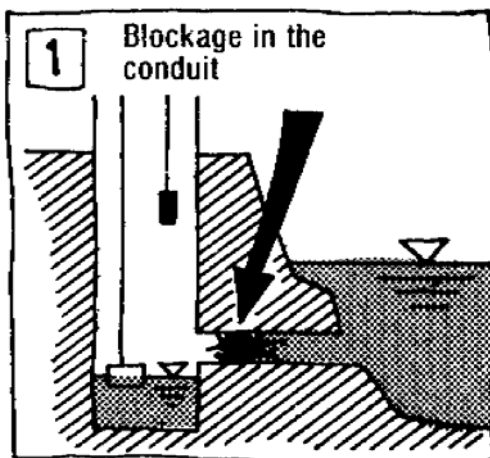




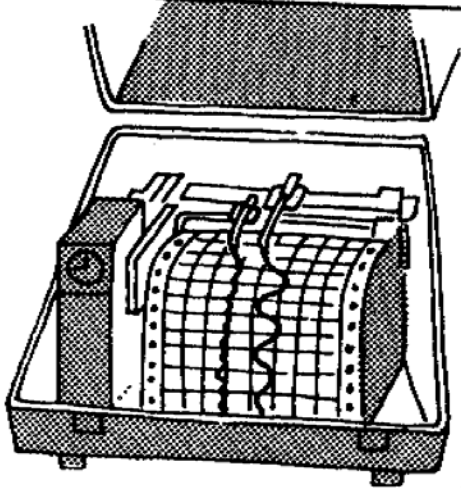




Causes for difference among the water levels on the staff, recording paper and water level in the well:

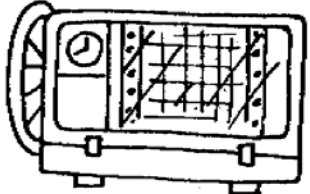
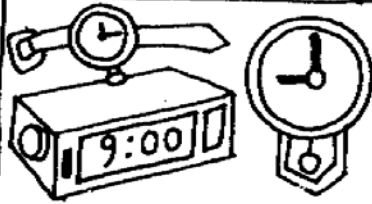

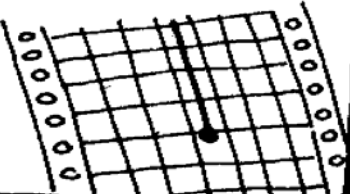


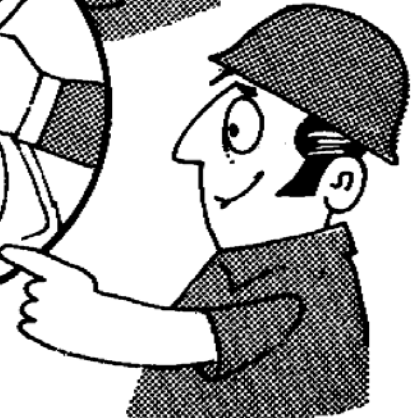
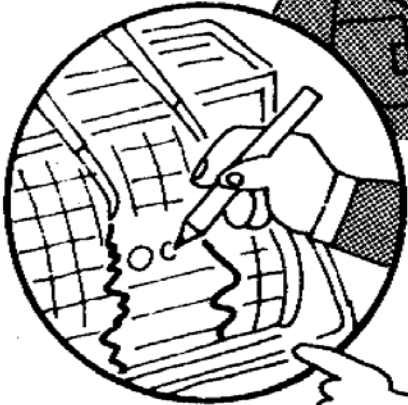
Do the staff gauge level and recording paper levels agree?



Are there any steps or other irregularities shown on the recording? Has the paper been installed at an angle? Do the claws enter the sprocket properly?

Does the time on the recording paper agree with standard time?

 <p>Water level gauge timber</p>	 <p>Standard time</p>
	 <p>Recording paper</p>



Are the entries on the recording paper good?

