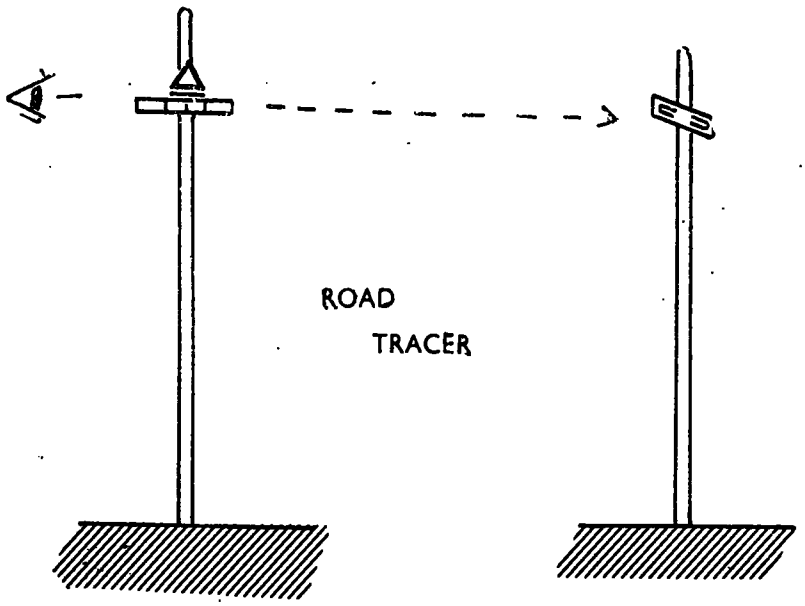
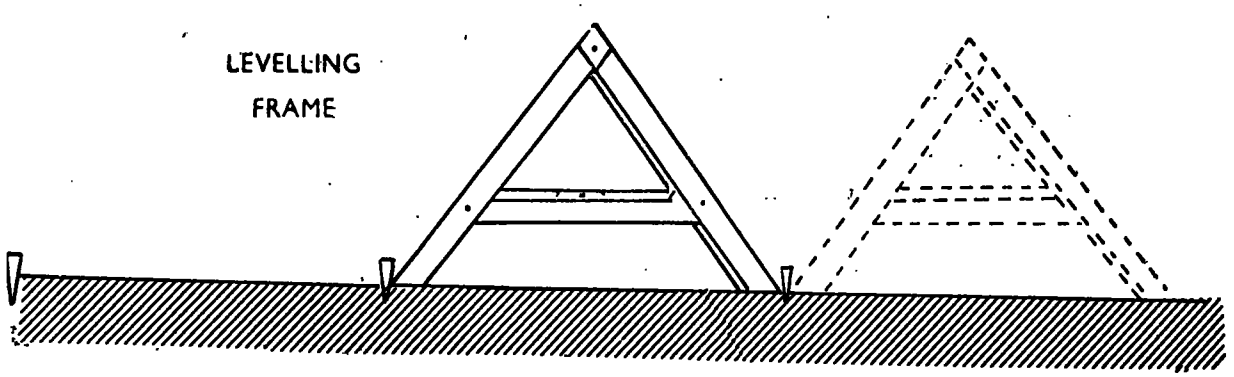
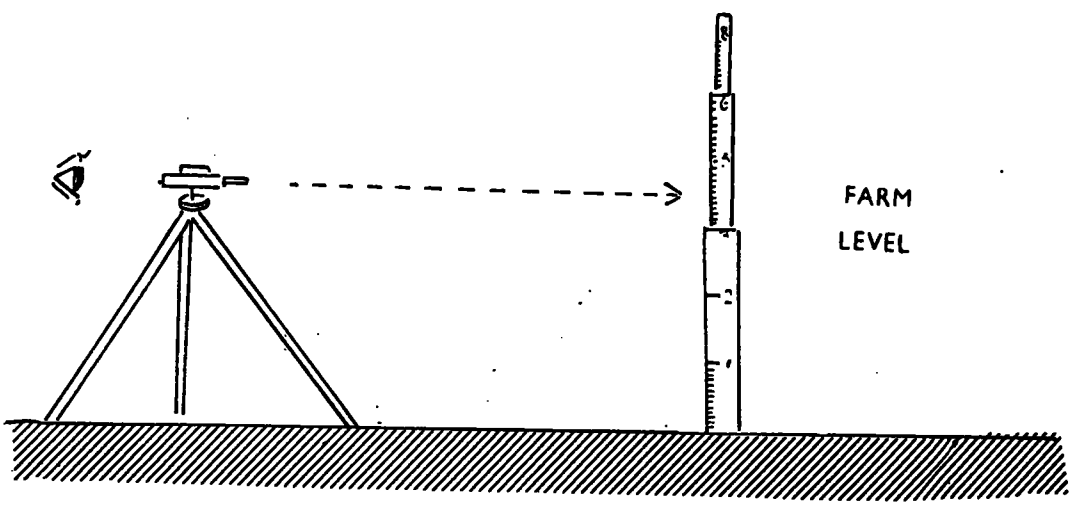






LEVELLING INSTRUMENTS

LEVELLING INSTRUMENTS FOR CONTOURING

By ERNEST DE SILVA,

Field Assistant, Planting Division.

IN order to check the rush of water over the land surface and to prevent the removal of top soil by run-off water during the monsoon rains, all earth works should follow the contour. It is not possible to do proper contour work by judgment and therefore levelling instruments should always be used.

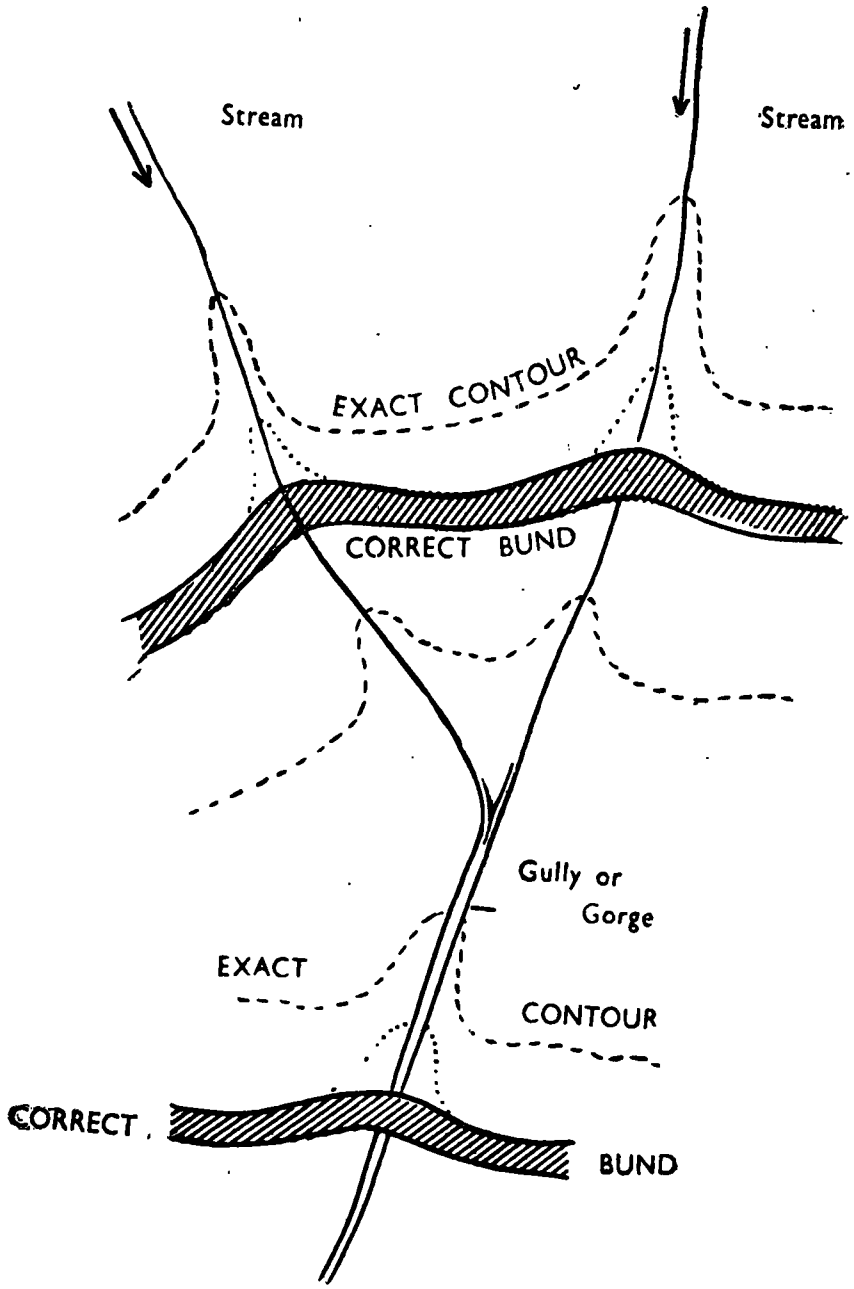
The most popular instrument in use to-day is the *Road Tracer*. This consists of a sighting tube (mounted on a staff) and a cross staff. The sighting tube is marked with gradients and can be adjusted, if required, for graded slopes, but in the construction of contour earth works, the sighting tube is always kept at zero *i.e.* horizontal.

There are, however, minor disadvantages and difficulties in the use of the road tracer. There is a possibility that it may slip out of adjustment and not be accurate. It is, therefore, necessary before starting work to test its setting by reversing the position of the two staffs and sighting back. Then it is essential that both the sighting staff and the cross staff must always be held absolutely vertical while a sight is being taken, as any slight tilting causes errors. Furthermore, there is also a possibility of error if the cross staff is placed too far away from the sighting staff and a distance of 10 feet should not generally be exceeded, otherwise it is difficult to spot the pointer on the cross staff.

A simpler and more accurate device than the road tracer has been found in the *Levelling Frame*. This is simply a triangular wooden frame made of any light and strong timber, on a base 12 feet. There is a cross bar about half way between the base and the apex of the triangle, and into this a mason's or carpenter's spirit level is countersunk, so that the operator can observe the movement of the bubble whenever he moves the frame. This frame is less cumbersome and simpler to handle than the road tracer.

To operate it, first drive in a peg at the point from which the alignment or contour is to be started; then place one toe of the frame against this peg. Now move the other toe, to and fro over the ground, until the bubble is central. Then drive in a second peg beside this toe, and from this point swing the frame round through 180 degrees and when the bubble is central insert a third peg. The first and the third pegs will thus be 24 feet apart along the contour. This process is then continued by inserting other pegs successively along the line of contour which will thus be marked by a continuous line of pegs.

Where the land has been so highly eroded that there is gully formation, the pegged contour line will be very sinuous or winding. In this case, it is necessary to round off and shorten all sharp curves and so simplify and straighten the earth work; otherwise the long bund is expensive to build and maintain, while a sinuous earth work will interfere with cultivation.



CONTOUR – BUNDING

In addition to the road tracer and the levelling frame, there is the *Farm or Quick-set Leveller.* This is a theodolite type of instrument, with a ball and socket joint, which permits the sighting tube to be turned horizontally. The instrument is mounted on tripod and, in setting it up, the operator moves the legs of the tripod until the bubble in the spirit level of the instrument is at zero.

Then the instrument is ready for use and a sight can be taken when the sighting tube can be swung horizontally right round the full circle without moving the bubble.

In this sighting tube there are cross wires in the centre of the line of vision. A surveyor's staff, marked in feet is used in conjunction with it and the sighting tube is directed at a point on this staff, at some convenient height above the level of the ground, *e.g.*, 4 feet. The attendant moves the staff over the ground and up or down the slope, and the surveyor follows it through his sighting tube until the correct level is found. Then a peg is driven in the staff is moved on to a succession of fresh positions until the limit of vision of the theodolite is reached; whereupon the instrument has to be moved and set up afresh over the last peg inserted. In this way a continuous line of pegs on the exact contour is established. The farm level has a vision of 200 yards and is accurate 1/1,000 part of foot. This instrument is the best of the three, but it is too expensive for individual ownership and it will be necessary to employ a surveyor if a large estate is to be contoured. For small properties, the road tracer or levelling frame is quite adequate; they are simple and inexpensive instruments and the latter can be made by any carpenter.