

## NOTES

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### ESTIMATING RAINFALL FACTORS FROM DATA OBTAINED IN ACTUAL STORMS

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#### INTRODUCTION

From time to time it is necessary to estimate the rainfall factors for an actual storm event so that comparison can be made between peak discharges as estimated using Technical Memorandum No. 61 (Anon., 1961) and the actual peak discharges obtained from field observations and measurements.

The method involves plotting the cumulative rainfall for the storm and using standard overlays to estimate the maximum rainfall factor for a given time. This is considered to be more convenient and faster than conversion to intensities of rainfall.

#### METHOD

The standard intensity-duration-frequency curve of Tech. Memo. No. 61 is converted to a standard cumulative rainfall-duration curve simply by multiplying the standard intensity, in inches per hour, by the duration in hours. The new curve, and appropriate multiples of it, are plotted on a transparent overlay to the same scale as the cumulative rainfall for the storm. The curves must be plotted on a natural scale.

The overlay can be slid along the storm rainfall curve and the maximum rainfall factor can be interpolated without additional calculation. The variation in rainfall factor during the storm can also be obtained; either forward from say the beginning of the storm, or backwards from say the time of peak discharge.

#### EXAMPLE

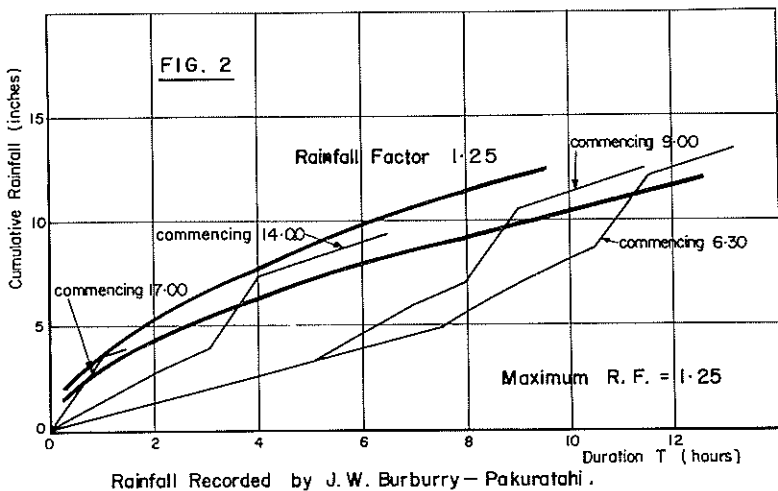
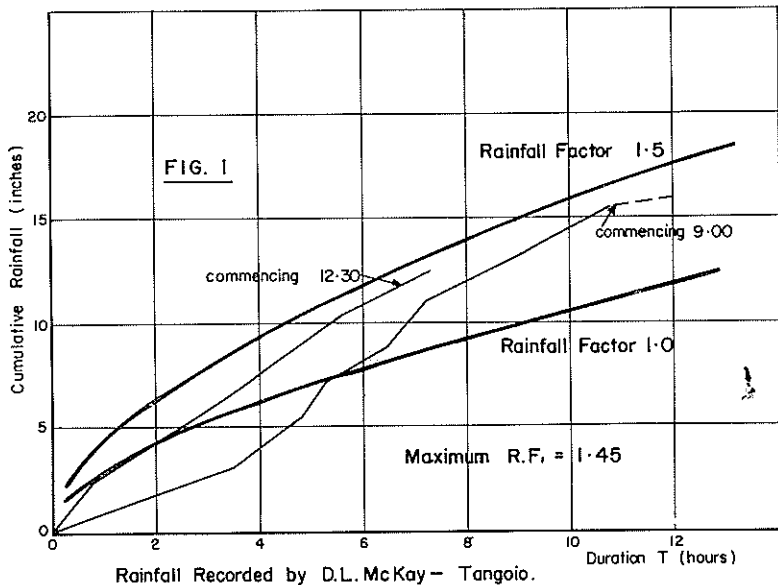
The data from the 1963 Queen's Birthday (3 June) storm in Hawke's Bay are used to illustrate the procedure. These rainfalls were recorded by voluntary observers (Figs. 1 and 2).

It should be noted that very high rainfall factors resulted from this storm, which was estimated to have a recurrence interval of about 100 years. When a large number of storms are being analysed, curves of say 0.2, 0.3, 0.4 times the standard curve are more appropriate.

Notice that the maximum rainfall factor in both cases occurs for the period prior to 1800 hrs, but that the critical duration is different in each case as also is the factor itself.

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## CONCLUSION

The method allows a clearer picture to be built up of the relative importance of various parts of a storm compared with the storm as a whole.

## REFERENCE

Anon., 1961: Provisional Standard for the Empirical Estimation of Flood Discharges. *Tech. Memo. No. 61*. S.C.R.C.C., Wellington,

## PIVOT END-PLAY IN PRICE TYPE CURRENT METERS

E. J. Speight\*

Corbett, and others, (1945:178) state with regard to pivot clearance: "this adjustment provides a suitable end-play of 0.008in. Because the meter is rated with this amount of play, it is essential that this adjustment be made when installing a new pivot or when the point becomes worn."

This writer has been concerned over the matter of end-play (pivot clearance or axial shift) for many years; as a little consideration of mechanics applied to the bearings of the Price type meter makes it obvious that changes in end-play must produce, at the very least, minor changes in the rating of a meter.

English manufacturers paid no attention to this matter; new meters being rated and delivered to the customer with clearances varying between about 0.010in. and 0.030in. Of recent years the manufacturers have been asked by the N.Z. Hydrological Instrument Depot to rate all meters with clearances between 0.006in. and 0.008in.

Meters returned to N.Z.H.I.D. for repair and servicing frequently have excessive pivot clearance, generally in the nature of 0.025-0.030in. and occasionally so excessive that when operating, with the pressure of the stream current on the bucket wheel, the rotor has not been supported on its pivot bearing. Instead it has been supported, on the thread crests in the threaded portion of the pivot, in grooves worn by them in the spindle skirt.

Since the establishment of the N.Z.H.I.D. all Price type meters have had the pivots adjusted to a clearance of 0.006-0.008in. after repair and servicing. The establishment of a rating tank at N.Z.H.I.D. has enabled an investigation on the effects of changes in pivot clearance to be commenced. So far only one meter has been tested but the results are sufficiently important to warrant some publicity in advance of a more complete report.

The effect of gradually increasing the clearance to 0.010in. in increments of 0.005in. is to cause deviations of the rating curve

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from normal. These vary as the velocity is increased up to a velocity of 12.5 ft/s, alternatively negative and positive.

All excessive clearances appear to follow a similar pattern of variation with a maximum amplitude at a pivot clearance of about 0.020in. At this clearance the errors of measurement in the meter tested amounted to:

- 1% at a velocity of 4.5 ft/s
- + 6% at 6.5 ft/s
- 3% at 8.5 ft/s
- + 1% at 10.5 ft/s

No doubt excessive pivot clearance has been an important factor when the factory rating of certain current meters has been under suspicion.

### CONCLUSION

It is essential that pivot clearance be kept within the small tolerance recommended by the U.S. Geological Survey if reasonable accuracy of stream gauging is to be achieved.

### REFERENCE

Corbett, Don M.; and others, 1945: Stream-Gaging Procedure. U.S. Geol. Surv. Water Supply Paper 888.

## LETTERS TO THE EDITOR

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The Editor,  
Journal of Hydrology.  
Sir,

VELOCITY HEAD ROD FOR MEASURING STREAM FLOW  
J. of Hydrol. Vol. 2(1), June 1963

In the above article I made reference to the trailing edge of the improved head rod. This term rightly applied to Wilm and Storey's head rod, where the face opposite the sharp cutting edge was used to measure the hydraulic jump. However, with the steel head rod that I described, the rod is turned through 90° only. Therefore, where I have used the term "trailing edge" (pages 8 and 10) this actually refers to the broad graduated face.

Yours faithfully,  
H. DROST

Hydrological Survey,  
Ministry of Works,  
Whangarei.  
4 June, 1964