

being successfully handled, and in no wise furnishes an excuse for not obtaining the most adequate and descriptive data of what occurs, in fact it rather furnishes a new reason for accumulating such data.

32a. In paragraph 14, the alleged inability of the micromotion film to record certain important data is criticised. To this we reply that anything that cannot be recorded, in situ, by our motion picture machine to our complete satisfaction is written on slates, which are always provided for that special purpose, and then photographed in the films. In this way much more information can be and is recorded than Mr. Barth lists as essential. It may be interesting to note that if there is any question concerning the particular film that Mr. Barth refers to, it is possible to re-examine it at any time, to decide the matter, without prejudice, for what is once recorded is not dependent upon anyone's ideas as to what occurred and its value is in no way associated with the psychological variables of memory, prejudice, bias, enthusiasm and personal interest, that have so often made stop-watch time study data worthless. The fact that Mr. Barth, as he says, sees no value to the film except the accurate minute times simply shows that he fails to comprehend and appreciate the importance of the capture of the skill of the super-expert and its transfer, the educative value of finding and teaching The One Best Way to do work, and the value in building up an organization of first-class workers, so trained.

33. It was not the "direct disciples" who recognized the benefits of accurate measurement. It was one of our clients who wrote:

"The micromotion study enables us:

- a. To capture the experience of the most skilled workman and record it for the benefit of all;
- b. To determine the motions of least waste;
- c. To teach the best known method only;
- d. To analyze, measure and compare new data so that improved methods may be constantly standardized as fast as discovered.

"I believe that the time will soon come when we will have a national bureau of standards of best methods, and micromotion study will provide a means that the government can use for collecting and recording the best practice of the workmen in our industries."

34. We appreciate the attitude of Mr. Barth in paragraph 15, and can testify that he has always been outspoken with praise or blame.

35. In paragraph 16, Mr. Barth says "it did not take me long to learn to make allowances for Dr. Taylor's emphatic statement, as to the importance of the sci-

entific study of unit times." He also speaks of Dr. Taylor's emphasis slightly when he says that Dr. Taylor "spoke as the enthusiastic originator and reformer seeking a following."

36. We disagree with Mr. Barth, and we agree with Dr. Taylor's statement, exactly as he makes it. Dr. Taylor exhibits here, as in many other cases, an *instinct* for the correct system, even tho he did not possess the correct apparatus or understand the only method which conforms to the descriptions of his philosophy. It is because of this and other instances where the true Taylor philosophy has suffered in the hands of Mr. Barth and of many other loyal friends of Dr. Taylor, that we have written for the benefit of the young engineers a series of Management Commentaries which will be issued in the immediate future.

37. Mr. Barth stresses the point that the same operation done twice may vary in time much more than the difference between two time observations of the stop-watch timing method. Of course it will, but if the method is also recorded and all the individual therbligs are timed, it is then possible to study the unit times with due reference to the method employed and the detailed result. This is what Dr. Taylor meant. If one does not get this point, then he misses that philosophy upon which, as Dr. Taylor said, "this whole system rests." Mr. Barth says that he does not take Dr. Taylor's statement about this "seriously," in spite of the fact that Dr. Taylor emphasizes this in detail in many places in his writings, several years apart. Of course it is not to be expected, then, that he will take the micromotion method seriously.

38. Mr. Barth's belief that in his own case the preparatory work has been of more value than the time studies, is doubtless justified, but such preliminary work can attain its maximum value only when it is based upon the experience of previous accurate motion studies and time studies. We have between nine and ten thousand such standards so derived, complete and ready for selection and immediate installation, unable before "subsequent time studies" are taken. These are based upon long accurate motion study and "the study of accurate times," and they bear out Dr. Taylor's statement to the letter, which Mr. Barth says he does not "take seriously."

39. In paragraphs 18 and 19, Mr. Barth defends Mr. Merrick's unscientific statistical methods. We have only to state that they are opposed by the entire statistical profession. We do not see how Mr.

Barth, the expert mathematician, can condone such procedure, when more precise methods and devices are available today.

40. In paragraphs 20-22, the comparison to a telescope and microscope is meant to be complimentary, but the feature of *permanence* of record which is so important in micromotion study is neglected. The "guess work" advocated simply shows how different one's views of one's own field and that of others are, for Mr. Barth scorns guess work in re-speeding of machines. In Mr. Barth's comparison with the telescope, which we think quite irrelevant, we would call to his attention that even here the best work was not done until the astronomer used photography.

41. In paragraph 23 Mr. Barth chides us for calling attention to the secret time study of the stop-watch advocates. We persist in saying that the stop-watch is still used today in many places in the manner he disclaims. It is to the credit of the Philadelphia Section of the Taylor Society that they passed, after hearing his objection, a resolution against secret time study, after our paper was discussed. The reason that stop-watch time study men are prone to use secret time study is because they do not know when the observed man is working at the proper pace, and have no way of knowing, whether or not he really is expert. They have no method for judging exhibition and demonstration speed, as compared with economic speed, because they have no fundamental correct data or norms with which to compare his records. Neither have they their records in such form that they could compare them, if they did possess such norms. Therefore, the secret time study men are continually prone to resort to "peeking thru a knothole," as it has sometimes been truthfully described with facetious intent, and to class such secret observations under "production studies," with the idea of making them more justifiable. For Mr. Barth to say that secret time study "has not been done since I became associated with Mr. Taylor," must be construed as meaning that it has not been done by him, or that he has not been in close touch with stop-watch time study practice.

42. In paragraph 24 Mr. Barth has opened a large subject when he states that the micromotion method does not necessarily imply "the consent and full co-operation of the worker." We must repeat that we always observe *the best man obtainable only*, which gives us an entirely different procedure and

result from Mr. Barth's practice of not observing the "extraordinarily expert worker," which he specially warns against. The worker who does not thoroly cooperate is, therefore, of no use to us. Micromotion records are so perfect that we can instantly detect him by his variation from established norms, should we, by mistake, record a man who is not cooperating fully. This fact stands out clearly in the Simultaneous Motion Cycle Chart, which we make from the film. Regardless of what he may desire, the worker who does not cooperate cannot hide that fact from us. Obviously, the observer might photograph a worker who did not consent and who did not desire to cooperate, but neither one would be a party to it, if he could help it, for the record, when completed, would be worthless from the standpoint of finding the One Best Way to do work.

43. In the final three paragraphs of his discussion Mr. Barth criticises us for believing that efficient planning is based only on standards derived from accurate data. Apparently he fears that superstandardization will lead to rigidity. As a matter of fact, it leads to the standardization of such minute elements that we have a flexible equipment to meet the emergency, which is always expected and prepared for. It is axiomatic that the more accurate the data on which the planning is based the easier it is to keep to schedule. It is a law of statistics that the accuracy of a whole is no greater than the accuracy of its components. For further proof of the correctness of the theory we have the experience of our practice. We may say that even the blank forms used in planning and control, and the old methods of their making and their use, have invariably been found inefficient and out of date, as a result of recording and analysing the old methods accepted by management engineers, without question, before our micromotion studies of them.

44. Mr. Barth has not discussed the relative values of the two methods for purposes of teaching. He has acknowledged the superiority of our devices from the accuracy standpoint. His criticism of our methods is from the cost standpoint only, and here he has been shown to be mistaken. It need only be said here that the micromotion method does not always imply the use of film for recording immaterial happenings. The camera has two shafts for the handles, one of which takes only one picture per revolution, and such a picture can be taken as often or as seldom as desired. Besides, the multifilm pro-