#14 M-402

MEMORANDUM

DATE: 3-11-49
M-402

TO: E. W. Paxson

FROM: Harvey Hall

SUBJECT: Preliminary Considerations Concerning a New Technique for Delivering Large Bombs.

COPIES TO: F. R. Collbohm, L. E. Root, J. E. Lipp, L. Young, E. H. Plesset

1. One of the most serious limitations on accuracy in high altitude bombing arises from the difficulty of seeing the target, or otherwise discriminating between the target and other neighboring objects. The slant range at the time of release for high altitude bombing will, of course, be generally of the order of several miles. Even in the absence of pronounced haze, or other obscuring effects, severe demands are thus placed on the bombardier. Even in Toss Bombing, for example, which is ordinarily conducted at slant ranges up to only about two miles, it has been found that accuracy is often limited by the pilot's ability to distinguish a well-known target, well within the maximum range of the equipment.

2. It is believed that difficulties of target discrimination would be reduced materially, at any high altitude, if a longer time were available to study the target area at closer range.

Suppose, for example, that it would be feasible to devise a technique by which a bomb released from a position exactly above the target, would strike the target. Such a technique would provide a longer time to study the target area, and in addition, it would reduce the dropping range somewhat, and thus would also tend to improve target visibility. Before going into a discussion of technical means by which such a system could be provided, it is of interest to consider the extent of improvement in target discrimination, and bombing accuracy, which would thus be available in principle. The extent of this improvement under realistic flying conditions could only be ascertained by actual flights, simulating a bomb release at the conventional bombing point, and comparing these results with those obtained from simulated bomb releases directly above the target.

A definitive evaluation of the potential improvement could thus be obtained from such tests, where the two release points are determined for the same bombing run by means of a radio pulse sent out from the bombing aircraft at each release point. The aircraft position, obtained by theodolite, or similar means, could then be correlated with the time of each bomb release, and the accuracy of the aircraft position at the different release points thus obtained. This type of quantitative evaluation would require that a bombsight suitable for retro bombing be designed and constructed and would probably also require modification of the airplane to provide adequate downward field of view for the bombardier. A qualitative evaluation could be obtained, however, from simplified flight tests in which the bombardier is merely asked to decide on the basis of experience whether the additional time made available by a later bomb release would be of significant value.

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FORM 209
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DATE: 3-11-49
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TO: L. W. Paxson - 24 -

FROM: Harvey Hall

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3. An obvious method for shifting the bomb release point to a position over the target is suggested by the retro bombing technique developed for anti-submarine warfare, where the bombing position is determined by MAD (magnetic airborne detection). The necessary retro velocity can be obtained for high altitude bombing by means of a large JATO unit, or rocket, so designed as to impart a backward velocity to the bomb (with respect to the airplane), just equal to the aircraft velocity. In this situation, the theoretical striking point of the bomb is directly (i.e., vertically) below the airplane position at the time of release.

4. The use of a JATO unit for this purpose would entail, of course, a sacrifice in bomb load, or fuel. Whether the improvement in accuracy would justify this sacrifice can only be determined by controlled tests. It is estimated for large bombs that the necessary JATO unit weight would be about 15 per cent of the bomb weight.

5. Other questions raised by a consideration of retro bombing, and which will require study if the method appears promising, can be enumerated as follows:

a. Is retro bombing more hazardous to the attacking airplane against fighter defense?

b. Apart from the improvement in target selection, what is the relative accuracy in conventional bomb aiming, versus a new type of retro bomb aiming device?

c. What degree of flexibility can be incorporated into the design of retro bombing equipment, making it possible to choose the release point at any time after the target has been adequately selected?

d. Can MAD be usefully applied to actuate the bomb release at high altitudes? (This question is being investigated separately, but it appears from a preliminary estimate that MAD altitudes over large cities would be limited to about 10,000 ft.).

e. What is the relative effect of bomb ballistics for the two types of bombing?

6. While the ultimate advantage derivable from retro bombing cannot be anticipated accurately without flight tests, a measure of the additional time available for target inspection during the bombing run can be

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MEMORANDUM

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TO: R. W. Paxson - 3 -

FROM: Harvey Hall

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estimated for specified bombing altitudes and speeds, and assumed ballistic properties. For an altitude of 40,000 ft., flight speed of 400 mph, and typical bomb ballistics, it turns out that the conventional bombing release occurs at a point which is about 5 miles short of the target, measured horizontally. The additional time interval which can be made available for target selection through the use of retro bombing technique is thus in the neighborhood of 45 seconds. (The time of fall in this example is of the order of 75 seconds. The position of the airplane at the moment the bomb strikes will thus be about 7 miles beyond the burst). It is believed that this additional time, at closer range, might lead to such improved accuracy as to be decisive where A bombs are employed.

Harvey Hall
Nuclear Energy Division

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