

*note  
Aug 59*

**MEMORANDUM FOR:**

**SUBJECT: Effect of supersonic Airflow and Shock Wave on  
Aerial Photographic Resolution**

**References: As Listed**

1. Considerable effort has been expended by the ARL at WADC, to determine the effect of supersonic airflow (Mach 1 to Mach 5) and shock wave on Aerial photographic Resolution. This work carried on under Task 62468, Project 6291 and later Project 6220 indicates that although the Airflow and shock wave will have some effect, it will be small in systems having up to 100/μm resolution. WADC reports (in supersonic air flow and photographic resolution are:

- a. Some notes about the deviation of a light beam passing the disturbed density field surrounding a fast flying aircraft.
- b. Interim report on the study of the influence of supersonic flight conditions on aerial photography.
- c. Some direct determinations of the influence of supersonic airflow on photographic resolution power.

2. Parallel efforts at Boston University, now ITEK, produced no conclusive results and have been cancelled. (See Task 62794, Project 6220). Reports that may contain information on B.U.'s effort are as follows:

25 YEAR RE-REVIEW

- a. Tech. Note No. 54 - "A Preliminary Consideration of Air Turbulence Effects on Definition in Aerial Photography" - D. E. Macdonald - 21 June 1949.
- b. Tech. Note No. 91 - "Photographic Window Design in Supersonic Aircraft" - W. C. Britton - 15 Nov. 1952.
- c. Tech. Note No. 128 - "Effects of Supersonic Air Flow on Photographic Image Quality" - W. C. Britton - Dec. 1956.
- d. Tech. Note No. 98 - "A Comparative Study of Some High-Altitude Photographic Systems" - C. Aschenbrenner - June 1953.
- e. AF 30 (602) - 1479 - Final Report- Advanced Reconnaissance System, Special Research Studies Committee - D. E. Macdonald, et al - 31 July 1957 - SECRET
- f. P.O. #6108-2470 - Final Report - The Effect of Thermal Shock on Focus of the Fairchild Lightweight, 36-Inch Aerial Camera - Hadrian B. Lechner - UNCLASSIFIED
- R g. P.O. #5115-2470 - Scientific Report - Optical Consideration of the MX-1963 1964 Photo Reconnaissance System - J. T. Watson, W. C. Britton, H. K. Howell, and J. A. Wolfe - March 1954 - CONFIDENTIAL

3. Of special interest in the area of supersonic flight are the RB-58 tests soon to be conducted by Convair. Tests will take about 5 months and are scheduled to begin about 1 Jan. 1959. These tests of the photographic pad, having 36, 6 and 3 inch cameras, will be at all speeds, altitudes and ranges.

4. Preliminary investigation indicates that the following other non-government organizations may have also made investigations in the effect of supersonic airflow on photographic resolution:

Robinson Aviation Inc.  
Teterboro, New Jersey

Rand Corporation  
Attn: Amron H. Katz  
1700 Main St.  
Santa Monica, Calif.

Chicago Aerial Industries, Inc.  
1980 N. Hawthorne Ave.  
Melrose Park, Ill.

Pacific Optical Corp.  
120 S. Glasgow Ave.  
Inglewood 1, California

Cornell Aeronautical Lab., Inc.  
4455 Genesee St.  
Buffalo 21, N. Y.

Bell Aircraft Corp.  
P.O. Box 1,  
Buffalo, New York

University of Michigan  
Ann Arbor, Mich.

Northrup Aircraft Inc.  
Hawthorne, California

NACA  
Douglas Aircraft  
Santa Monica, Cal.

5. Although no search was made at ASTIA for reports in this area, it is felt that they must have numerous reports available.

6. Since the supersonic area seems to pose only a minor problem to aerial reconnaissance, the Air Force has directed all efforts to the Hypersonic area. (10 to 25 Mach). The Air Force has also indicated that should the "Dinosaur" program be dropped they would stop work in this area. Some reports in this area made during the study phase of "Brass Bell," are as follows:

- a. #17. Brass Bell Reconnaissance Aircraft Weapon Systems - Test Results: Ames Supersonic Tunnel Tests of Double Wall Construction. Bell Aircraft Corporation Report No. D143-941-026, dated 30 June 1958.
- #28. "A Study of the Hypersonic Laminar Boundary Layer with Dissociation", Part I, Technical Report No. 1, by T. C. Adamson, University of Michigan Report No. 2606-6-T.
- #29. Same as above except - Part I Final Report and Report No. 2606-7-F.

- #32. "Some New Data on High Speed Impact Phenomena",  
by J. Huth, J. Thompson, and U. Volkenburg.  
ASME Paper 56-4-15, Applied Mechanics Division,  
November 1956.