

I. Facility Designation

Small Supersonic Tunnels

II. Purpose

1. To investigate scale models of:
 - a. Air inlets
 - b. Air exits
 - c. Other configurations intended for supersonic application
2. Information gained
 - a. Aerodynamic characteristics of configurations

III. Identification, Location and Description

1. There are nine tunnels in the small supersonic wind tunnel group. Figure C-11156 (above) shows structure 33, the Small Supersonic Tunnel Building which houses tunnels No. 1, No. 2 and No. 3 (f, g, and h, respectively of the following list.) The other six small supersonic wind tunnels are located in the Engine Research Building or Altitude Wind Tunnel Basement as shown in the listing on page 2. The characteristics of the nine supersonic tunnels are given in the tables on pages 2 and 3 following.

IV. Operation

1. These tunnels are supplied with dried, refrigerated or compressed air from equipment in the Altitude Wind Tunnel, the Propulsion Systems Laboratory or the Engine Research Building as shown in the table under "Air Flow Source". The tunnels discharge air into exhaust piping systems connected to exhausters in the Altitude Wind Tunnel, Engine Research Building or Propulsion Systems Laboratory, also as noted. The effective sharing of supply and exhaust equipment is accomplished by careful advance scheduling.

| <u>Designation</u> | <u>Location</u> | <u>Size</u> | <u>Completed</u> | <u>Mach No.</u> | <u>Pressure</u> <u>Area</u> |
|--|---|---|----------------------|---------------------|--------------------------------|
| a. 1'x1' V.R.N.J. Tunnel | ERB (1-NW) | 1 ft. x 1 ft. Length 12 ft. | Jan. 1950 | 3.12 | 140 inlet 2 exit |
| b. 1'x1' Pilot Tunnel for 10'x10' U.SWT | ERB (155) | 1 ft. x 1 ft. Length 3 ft. 9 in. | Mar. 1952 | 0.7 to 4 | 140 inlet 2 exit |
| c. 1'x1' Supersonic Tunnel | ERB (1-NW) | 1 ft. x 1 ft. Length 15- in. | Sept. 1955 | 1.3 to 3 | 140 inlet 2 exit |
| d. 6" x 6" Supersonic Tunnel | ERB (C-5) | 6 in. x 6 in. Length 10 ft. | Jan. 1948 | 3.0 to 5.5 | 465 inlet 2 exit |
| e. 4" x 10" Supersonic Tunnel | Duct Lab. Bsm. AWT | 4 in. x 10 in. Length 3 ft. 10 in. | Nov. 1947 | 2 to 4 | 25 inlet 1 exit |
| f. 18" x 18" Supersonic Tunnel (No. 1) | Small Supersonic Tunnel Bldg. Fig. C-14156 Structure No. 33 | 18 in x 18 in. Length 3 ft. | Jan. 1945 | 1.91 | Atmos. to abt 1 psia |
| g. 18"x18" Supersonic Tunnel (No. 2) | | 18 in. x 18 in. Length 4 ft. | July 1951 | 3.05 | " |
| h. 2' x 2' Supersonic Tunnel (No. 3) | | 2 ft. x 2 ft. Length 6 ft. | Sept. 1949 | 3.96 | " |
| i. 4" x 4" Supersonic Tunnel | ERB (SW-11) | 4 in. x 4 in. Length 3 ft. 11 in. | Nov. 1950 | 3.0 | 55 inlet 2 exit |

- Notes: 1. Individually designed strain gauge applications are used to measure forces as required.
2. Schlieren apparatus is used for flow observation. The 4" x 4" tunnel (SW-11, ERB) also has an interferometer.

j 26" diam.

E-7

7

Air flow
Source

Air Temperature

- | | | | | |
|----|--|----|--|-----------------------------|
| a. | ERB and PSL compressors and exhausters | a. | 250°F. max. inlet air temp. to -60°F. min. or +50°F. to + 250°F. Dowtherm, all pressures | 10 psig 40 " 125 psig |
| b. | " | b. | Continuously variable -60°F. to + 250°F. ERB ref. air and Dowtherm | |
| c. | " | c. | Same as item (a) | |
| d. | ERB Compressors & Exhausters | d. | Approx. 50°F. or approx. 90°F. no control | |
| e. | ERB Compressors & AWT exhausters | e. | +20°F. to + 250°F. continuous, ERB ref. air and electric and steam heaters in series | |
| f. | AWT exhausters | f. | 150°F. operating temp. to avoid vapor shock - Elec. heaters. | |
| g. | " | g. | Same as above | |
| h. | " | h. | 200°F. operating temp. to avoid vapor shock - Elec. heaters. | |
| i. | ERB Compressors & Exhausters | i. | 250°F. max. -60°F. min. -60°F. to 250° continuous with 10 psig air) +90°F. to 250° continuous with 40 psig air) | steam heaters |