

Issued	1969-12
Revised	2002-04
Reaffirmed	2008-02

**Numeral, Letter and Symbol Dimensions for
Aircraft Instrument Displays**

1. SCOPE:

The purpose of this AIR is to provide recommendations for the minimum dimensions of characters and symbols used in aircraft instrument dials and panel displays as related to the conditions stated in para. 3.

Numerous variables influence the legibility of aircraft instrument dial characters. This situation makes it very difficult, if not impossible, to establish an exact act of rules for optimizing all installations.

Character size, one of the important considerations, can be optimized where adequate dial space exists. Usually this is not the case and the designer is faced with placing the information in a limited space while continuing to strive for error-free legibility. Appropriate minimum size requirements have been stated herein for guidance in air transport use.

2. REFERENCES:

Spragg & Rock: Dial Reading Performance as a Function of Brightness. Journal of Applied Psychology. Volume 36, pages 128-137, 1952.

WADC Technical Report 54-160; Visual Presentation of Information. Baker & Grether, Aug. 1954.

WADC Technical Report 54-262; The Design of Digits. Crook & Baxter, June 1954.

MS33558 (ASG) Issued 2/4/55 (Rev. 1/26/68) (Supersedes AND 10400) Numeral and letters, Aircraft Instrument Dial, Standard Form of.

Report No. 481-1016-97A, Feb. 15, 1959; Design for Legibility of Visual Displays, Bendix Radio Division, Bendix Aviation Corporation, Baltimore, Md.

Fogel, L. J.: Biotechnology Concepts and Applications. 1963 (Prentice-Hall).

Morgan, Cook, Chapanis, Lund: Human Engineering Guide Equipment Design. 1963. (McGraw-Hill).

SAE Technical Standards Board Rules provide that: "This report is published by SAE to advance the state of technical and engineering sciences. The use of this report is entirely voluntary, and its applicability and suitability for any particular use, including any patent infringement arising therefrom, is the sole responsibility of the user."

SAE reviews each technical report at least every five years at which time it may be reaffirmed, revised, or cancelled. SAE invites your written comments and suggestions.

Copyright © 2008 SAE International

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without the prior written permission of SAE.

TO PLACE A DOCUMENT ORDER: Tel: 877-606-7323 (inside USA and Canada)
Tel: 724-776-4970 (outside USA)
Fax: 724-776-0790
Email: CustomerService@sae.org
SAE WEB ADDRESS: <http://www.sae.org>

2. (Continued):

MIL-STD-803A-1 (USAF)-083A-2; Human Engineering Design Criteria for Aerospace Systems and Equipment. 1/27/64.

Woodson & Conover: Human Engineering Guide for Equipment Designers. 1964. (U.C. Press).

ARP798, Design Criteria for White Incandescent Lighted Aerospace Instruments. 1965. Society of Automotive Engineers.

Poole, H. H.: Fundamentals of Display System, 1966. (Spartan-McMillan).

MIL-P-7788D; Panels, Information, Integrally Illuminated, April 14, 1967.

U. S. Army Technical Note 2/68; Aircraft Instrument Panel Placement. Barnes, J. A., January 1968, Human Engineering Laboratories, Aberdeen Proving Grounds.

MIL-STD-1472; Human Engineering Design Criteria for Military Systems, Equipment, and Facilities. 2/9/68.

FED STD 595B Paint Color Specifications

Federal Supply Service
Standards and Specifications Office
Suite 8100
470 L'Enfant Plaza SW
Washington, D.C. 20407

3. GENERAL ENVIRONMENT:

3.1 Viewing Distance:

Nominal	29 inches
Minimum	10 inches
Maximum	40 inches

3.2 Marking Requirements:

- Light characters on dark background
- Minimum character brightness - 0.3 Foot Lamberts
- Brightness Contrast

White on Black	- 12 (or greater)
Grey on Black	- 5 (or greater)
Yellow on Black	- 5 (or greater)
White on Grey	- 5 (or greater)

- Color of illumination - white

4. NUMERAL, LETTER AND DIAL REQUIREMENTS:

4.1 Color of Finish:

Character
and symbols - White FED. STD 595B Color No. 37875
Yellow FED. STD 595B Color No. 33538

Background - Black FED. STD 595B Color No. 37038
Grey FED. STD 595B Color No. 36373

4.2 Dimensions:

TABLE 1

	<u>MINIMUM CHARACTER HEIGHT</u>		<u>WIDTH/HEIGHT RATIO</u>		<u>STROKE WIDTH/ HEIGHT RATIO</u>
<u>FLAT DIALS</u>	<u>IN.</u>	<u>MM</u>			
Fixed	0.150	3.81	3/5	1	1/7 to 1/8 2
Moving	0.200	5.08	3/5	1	1/7 to 1/8 2
<u>COUNTERS</u> (Cylindrical)					
Fixed (Settable)	0.187	4.75	3/5 to 1/1	1	1/7 to 1/8 2
Moving	0.25	6.35			

- 1 Except for the numerals "1" and "4" and the letters "I, M & W".
The "1" shall be one stroke width.
The "4" shall be one stroke width wider than the others.
The "I" shall be one stroke width.
The "M" & "W" shall be approximately 20% wider than the other letters.
- 2 Assuming direct illumination. When figures are trans-illuminated, a stroke-width/height range of 1/8 to 1/10 should be considered.

4.3 Grouping:

Character spacing - 1 stroke width, minimum.

Word spacing - 1 character width, minimum.

Graduation - Character spacing - 1 stroke width, minimum.