SAE Aerospace
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AEROSPACE RECOMMENDED PRACTICE

SAE ARP1088

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Supersedes ARP1088

Aircraft Indicating Systems

FOREWORD

Changes in this revision are format/editorial only.

1. SCOPE:

1.1 This ARP is intended to cover the warning, caution and advisory indicating system required for aerospace vehicles.

1.2 This ARP sets forth recommendations for the design and installation of indicating systems. It is recognized that many types of warning indicators and systems are available for the designer to use. This ARP does not recommend any specific system but outlines design and installation requirements.

2. PURPOSE:

The purpose of this ARP is to recommend certain basic considerations which the design engineer should observe when designing a visual warning indicating system.

3. CATEGORIES OF INDICATING SYSTEMS:

3.1 Warning Indicating Systems:

A Warning Indicating System is one which indicates to the pilot, or crew member, that a hazardous condition requiring immediate action exists.

Example: Fire Warning

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3.2 Caution Indicating Systems:

A Caution Indicating System is one which indicates to the pilot, or crew member, that an impending dangerous condition exists. The condition will require attention but not necessarily immediate action.

Example: Fuel Pressure Low or Generator Out

3.3 Advisory Indicating Systems:

An Advisory Indicating System is one which indicates to the pilot, or crew member, a safe or normal configuration, operation of essential equipment, or otherwise attracts attention for routine purposes.

4. RECOMMENDATIONS:

4.1 Design Criteria:

4.1.1 Warning and Caution System Indicators should always be of the legend type. Actuation of the indicator should display the warning legend.

4.1.2 Advisory System Indicators may be either the legend type or bulls-eye type, with the legend type preferred. In the event a legend type indicator is not employed, an illuminated legend shall be provided adjacent to the indicator. The bulls-eye indicator, if used, should not have the movable shield or shutter for dimming, but be tied into the regular dimming system.

4.1.3 Indicators may be either Light Indicators or Mechanical Indicators. A lighted type indicator is defined as one employing lamps as the primary method of indication. A mechanical type indicator is defined as one employing motion as the primary method of indication, such as rotating a drum or electrically opening or closing a shutter.

4.2 Color:

4.2.1 Warning Indicator Lights shall be Aviation Red in accordance with MIL-C-25050. The legends shall be opaque on a translucent background.

4.2.2 Caution Lighted Indicators shall be Aviation Yellow in accordance with MIL-C-25050. The legends shall be translucent on an opaque background.

4.2.3 Caution Mechanical Indicators shall be Aviation Yellow in accordance with MIL-C-25050. The legends shall be opaque on a translucent background.

4.2.4 Advisory Lighted Indicators shall be Aviation Green in accordance with MIL-C-25050. The legends shall be translucent on an opaque background.

4.2.5 Advisory Mechanical Indicators should be Aviation Green in accordance with MIL-C-25050. The legends shall be opaque on a translucent background.

NOTE: On large Systems, such as commercial aircraft, consideration could be given to using other colors at the flight engineer's panel. Green should be used in flight compartment, however, green, blue or white may be used at other crew stations.

4.2.6 The use of Aviation Blue is not recommended for indicators. The low transmission of Aviation Blue does not allow for sufficient brightness. If a blue indication is required, a lighter shade of blue should be selected so adequate brightness may be obtained. Also, blue indicators should be shaded from direct sunlight if used.

NOTE: Mechanical Indicators shall have the same appearance for daylight or night operation.

4.3 Brightness:

4.3.1 Warning Lighted Indicators shall have a minimum brightness of 150 foot lamberts at rated voltage. At least two lamps operated in parallel shall be employed. When required the lights shall be dimmed to approximately 15 foot lamberts for night operation. This dimming may be automatically incorporated when the pilot's primary light control is energized. The lights should return to the bright condition with removal of power from the dimming control. This will prevent inadvertent daylight operation of the warning lights in the dim mode. In the event this is not used a bright dim switch should be located in a conspicuous location. This would give the pilot a visual indication plus control in the event he wants dim panel lights and bright warnings.

4.3.2 Caution and Advisory Lighted Indicators shall have a minimum brightness of 150 foot lamberts at rated voltage. At least two lamps operated in parallel shall be employed. When required, indicators shall be dimmed to approximately 1.5 foot lamberts for night operation. This dimming may be automatically incorporated when the pilot's primary light control is energized. The lights should return to the bright condition with removal of power from the dimming control. This will prevent inadvertent daylight operation of the warning lights in the dim mode. In the event this is not used, a bright dim switch should be located in a conspicuous location. This would give the pilot a visual indication plus control in the event he wants dim panel lights and bright warnings.

4.3.3 Mechanical Indicators (Including Legend Type) shall require no internal lighting under daylight conditions, and shall be illuminated to a level of 15 foot lamberts for night operation. The mechanical indicators should be lighted internally for night operation.

4.4 Master Indicators:

4.4.1 All aircraft equipped with multiple Warning and Caution Indicators should be equipped with a Master Warning and/or Caution Indicator. The only exception would be a small system where all indications could be grouped on the panel within the pilot's field of vision. If this method is used flashing of the incoming fault could be considered. The fault could then be acknowledged by resetting to steady. If flashing is used, the flash rate should be three to five flashes per second with approximately equal on-off time.

4.4.2 The Master Warning Indicator and/or Master Caution Indicator may be similar to the legend type indicators in presentation, except they should have a minimum brightness of 250 foot lamberts. The indicators may be a steady light or a flashing light with provisions for mechanical resetting. Provided the master lights are located so sufficient attention getting is obtained, they should also be dimmed for night operation. The intensity should be approximately 15 foot lamberts. If flashing is used, the flash rate should be three to five flashes per second with approximately equal on-off time.

4.4.3 The Mechanical Master Warning and/or Master Caution Indicator shall be designed to give the effect of a flashing light for night operation and utilize motion for daylight operation. Brightness for night operation should be approximately 10 foot lamberts. The color shall be the same as specified for the individual mechanical indicators.

4.4.4 Advisory Indicators normally do not require a Master Indicator.

4.5 Test System:

The Warning and/or Caution Indicating Systems shall be provided with a Master Test Switch. This shall test each individual indicator simultaneously as a complete system. The test function should check the complete system operation, not just the lamps in the indicators. The system is defined as the indicators, master lights and associated electronics.

5. GENERAL:

5.1 The size and placement of the indicator must be sufficient to allow for the proper legend and lighting design to provide a readable presentation from the pilot's normal eye position, night or day.

5.2 The legend used must be clear and concise. It is recommended that consistent with design space, no indicator be required to present a legend that will require two lines for presentation. If two lines are required sufficient spacing must be provided so that clarity of presentation is maintained.

5.2.1 The legend must present easily understood information. The use of abbreviations is discouraged; however, if abbreviations are used, select them so that the information can not be misread. Reference: MIL-STD-411C or MIL-STD-783A.