

MIL-STD-203F  
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SUPERSEDING  
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MILITARY STANDARD

AIRCREW STATION CONTROLS  
AND DISPLAYS: ASSIGNMENT, LOCATION,  
AND ACTUATION OF, FOR FIXED WING AIRCRAFT



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DEPARTMENT OF DEFENSE  
Washington, D.C. 20301

Aircrew Station Controls and Displays: Assignment, Location, and Actuation of,  
for Fixed Wing Aircraft

MIL-STD-203F

1. This Military Standard is approved for use by all Departments and Agencies of the Department of Defense.
2. Certain provisions of this standard are the subject of international standardization agreements.
3. Recommended corrections, additions, or deletions should be addressed to the Commander, Naval Air Systems Command (AIR-5313), Washington, D.C. 20360.

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## MILITARY STANDARD

AIRCREW STATION CONTROLS  
AND DISPLAYS: ASSIGNMENT, LOCATION,  
AND ACTUATION OF, FOR FIXED WING AIRCRAFT

## 1. SCOPE

1.1 The requirements contained herein apply to the design of aircrew stations in fixed wing aircraft procured by the military departments. The contents describe requirements for the assignment, arrangement, location, actuation of crew station controls and related items of equipment, configuration and color of certain controls; and the relative location of various displays, including the basic flight and engine instrument groups.

1.2 Application - The purpose of this document is to establish the requirements for the uniform assignment, arrangement, location, and actuation of controls and displays used in the functional crew stations of military fixed wing aircraft.

## 2. APPLICABLE DOCUMENTS

2.1 The issues of the following documents in effect on the date of invitation for bids or request for proposal form a part of this standard to the extent specified herein.

## SPECIFICATIONS

Military

MIL-S-3950	Switch, Toggle, General Specification for
MIL-L-6503	Lighting Equipment, Aircraft, General Specification for Installation of
MIL-S-8805	Switches and Switch Assemblies, Sensitive and Push, Snap Action, General Specification for
MIL-H-8810	Handles, Control, Aircraft
MIL-M-18012	Markings for Aircrew Station Displays, Design and Configuration of

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## SPECIFICATIONS

### Military (Continued)

MIL-L-18276	Lighting, Aircraft Interior, Installation of
MIL-F-18372	Flight Control Systems: Design, Installation and Test of, Aircraft (General Specification for)
MIL-S-22885	Switch, Push Button, Illuminated, General Specification for
MIL-K-25049	Knob, Control, Equipment, Aircraft
MIL-A-25165	Aircraft Emergency Escape System, Identification of
MIL-H-46855	Human Engineering Requirements for Military Systems, Equipment and Facilities
MIL-C-81774	Control Panel, Aircraft, General Specification for

## STANDARDS

### Military

MIL-STD-411	Aircrew Station Signals
MIL-STD-783	Legends for Use in Aircrew Stations and on Airborne Equipment
MIL-STD-802	Number, Aircraft Engines and Engine Cylinders, Combustion Chambers, Flame Tubes, Inner Liners, and Similar Items
MIL-STD-1333	Aircrew Station Geometry for Military Aircraft
MIL-STD-1472	Human Engineering Design Criteria for Military Systems, Equipment and Facilities
MS26523	Handle, Control, Aircraft Fire Extinguisher

Military (Continued)

MS28112	Instrument, Basic, Standard Arrangement for Fixed Wing Aircraft
MS33506	Knob, Control, Landing Gear - Standard Shape for
MS33634	Instrument Arrangement, Engine, Standard, Basic for Fixed and Rotary Wing Aircraft
MS33785	Instrument Arrangement, Flight, Standard, Basic for Fixed and Rotary Wing Aircraft

## 3. DEFINITIONS

3.1 Fixed wing aircraft - The definition of fixed wing aircraft for the purpose of this document shall include all nonrotary wing type aircraft. This applies to VSTOL and aircraft with variable sweep wings.

3.2 Types of aircrew stations -

- (a) Single pilot
- (b) Tandem pilot
- (c) Side-by-side

Class A - A dual pilot cockpit in which a copilot is required for safe operation of the aircraft.

Class B - A dual pilot cockpit in which a copilot is not needed for safe operation of the aircraft.

Class C - A cockpit containing one pilot and another crew member.

Class D - A dual pilot cockpit with a systems or flight engineer. The engineer's flight station must be occupied for safe operation of the aircraft.

- (d) Other aircrew stations. (Requirements will be specified by the procuring activity.)

3.3 Controls - A control is a switch, knob, wheel, stick, handle, pedal, or similar device to which the crew member imparts motion or force to effect the desired action.

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3.3.1 Primary controls - Primary controls are defined as the controls normally used by the operator to actuate devices which impart motion or cause to change a situation or event from its static/stabilized mode to a new situation or event.

3.3.2 Alternate controls - Alternate controls are defined as controls which compliment the primary control and are required to provide a secondary path to actuate the same device to insure system safety and/or reliability.

3.3.3 Emergency controls - Emergency controls are defined as controls, other than normally operated flight and engine controls, which are required to be operated immediately to prevent or remedy a hazardous condition.

3.4 Conventional and performance-related control actuation - Complete definitions for the terms "conventional" and "performance-related" can be found in 4.4.

#### 4. GENERAL REQUIREMENTS

4.1 General - The requirements for design, selection, location, assignment, actuation and arrangement of controls and displays shall be as specified herein. Requirements not specified herein shall be in accordance with MIL-H-46855 and MIL-STD-1472.

4.1.1 Selection of controls and displays - Controls and displays shall be chosen in accordance with applicable military standards and specifications as specified herein. The controls and displays must provide an integrated installation which will insure consistent operation, uniform actuation, and consideration for the operational complexity of the aircraft. The design location and actuation of controls shall be oriented to the aircrew members and shall be in accordance with MIL-C-81774 unless otherwise specified.

4.2 Location of controls and displays - Controls and displays shall be located so they are visible from the design eye position as defined in MIL-STD-1333 and as specified herein.

(a) At least the following controls (normal and emergency unless otherwise specified) shall be located in Zone 1 (MIL-STD-1333) to permit their actuation over the entire range of operation by the specified aircrew population:

Control stick/wheel  
Propeller speed

Throttle  
Mixture

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Propeller feathering	Wing sweep
Speed brakes	Trim
Emergency brakes	Stores release
Air start	Landing gear
Primary/Alternate escape system	Arresting hook
Nose wheel steering and engagement	
Emergency canopy jettison	
Restraint device locking	
Bail out/Ditching alarm	
Emergency electrical power	
Autopilot disconnect	
Emergency engine shutdown and fire extinguishing	
Primary fuel selector	

(b) All controls of a like function shall be grouped together and segregated according to systems.

(c) Primary or emergency powerplant controls and fuel system controls shall be operable by the pilot(s) and shall be oriented in such a manner as to preclude the possibility of reverse orientation. This applies whether the panels on which these controls are located are horizontal or vertical.

(d) Display presentations shall be perpendicular to the operator's normal line of sight whenever feasible and shall not be less than 45 degrees from the line of sight, as illustrated in Figure 1 of MIL-STD-1472. The displays shall be arranged in relation to one another according to their sequence of use or the functional relations of the components they represent. The display presentations shall be arranged and identified in sequence within functional groups whenever possible to provide a viewing direction from left to right, top to bottom, or rear to front of the display with respect to the operator.

(e) When horizontal and/or vertical lift engines are mounted in an aircraft, all engines capable of providing horizontal thrust in normal forward flight, and their controls, are to be numbered first. Numbering is to be in accordance with the requirements of MIL-STD-802.

4.3 Assignment of controls to crew members - In aircraft classified in 3.2(c), the assignment of controls to crew members shall be as shown in Table I, unless the results of studies conducted in accordance with the requirements of MIL-H-46855 dictate otherwise and approval of the procuring activity is obtained. In the case of class B aircraft defined in 3.2(c), primary functions for controls required for safe flight shall be assigned to the pilot. The significance of the letters used in Table I is as follows:

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(a) Capital P: "P" stands for primary, and indicates that operation of the particular control is a primary function for the crew member to which it is assigned, and hence, must be readily accessible to the crew member.

(b) Capital S: "S" stands for secondary, and indicates that operation of this particular control is a secondary function of the crew member to which it is assigned. Some compromise regarding accessibility may be tolerated if substantiated by specific design criteria and approved by the procuring activity.

(c) Capital N: "N" stands for none, and indicates that there is no requirement for the control at that station.

(d) Capital D: "D" stands for desirable, and indicates that, although there is no specific requirement for the particular control to be located at the station, it would nevertheless be desirable.

4.4

Actuation of controls -

(a) The term "conventional" referenced throughout this document indicates that:

1. All controls shall be actuated in accordance with established custom or in the direction of intended motion of the structure being controlled.

(b) The term "performance-related" referenced throughout this document indicates that:

1. Controls shall be so designed that the actuation thereof, forward, upward, or clockwise shall result in increased performance of the component or the aircraft.
2. Controls shall be so designed that the actuation thereof, aft, downward, or counterclockwise shall decrease the performance of the component or the aircraft.
3. All controls of a variable nature induced by a rotary motion shall move clockwise from the "OFF" position through "LOW" or "DIM" to "HIGH" or "BRIGHT".

TABLE I. Assignment of Controls for Side-by-Side Aircraft.

Control Station	Class A		Class B/C		Class D		
	Pilot	Co-pilot	Pilot	Crew member	Pilot	Co-pilot	Flight engineer
A. Primary flight controls	P	P	P	N	P	P	N
B. Secondary flight controls:							
1. Ground steering	P	D	P	N	P	D	N
2. Tail wheel lock	P	P	P	N	P	P	N
3. Automatic pilot:							
a. Controller	P	S	P	N	P	S	N
b. Mechanical disconnect	P	S	P	N	P	S	N
c. Electrical disconnect	P	P	P	N	P	P	N
d. Other (cage switch, etc.)	P	S	P	N	P	S	N
4. Parking brake	P	S	P	N	P	S	N
5. Trim controls	P	P	P	N	P	P	N
6. Flaps	P	P	P	N	S	P	N
7. Landing gear	P	P	P	N	S	P	N
a. Alternate extension	S	P	P	D	S or N	P or N	N or P
8. Brakes	P	P	P	N	P	P	N
9. Speed (dive) brakes	P	P	P	N	P	P	N
10. Flight control locks	P	S	P	N	P	S	S
11. Rudder pedal adjust	P	P	P	N	P	P	N
C. Powerplant; Reciprocating engines:							
1. Throttles	P	P	P	N	P	P	P
2. Propeller controls:							
a. Master control	P	P	P	N	D	N	P
b. Individual controls	P	P	P	N	D	D	P
c. Feather	P	P	P	N	D	N	P
d. Auto feather arming and test	P	S	P	N	P	S	N
e. Reverse	P	P	P	N	P	P	N
3. Water injection pump	P	P	P	N	N	N	P
4. Supercharger:							
a. Two speed	P	S	P	N	N	N	P
b. Turbo	P	S	P	N	D	N	P
5. Mixture	P	P	P	N	N	N	P
6. Alternate air, filter, carb heat	P	P	P	N	N	N	P
7. Cooling controls (cowl flaps, oil flaps, etc.)	P	P	P	N	N	N	P
8. Starting and prime	P	P	P	N	N	N	P
9. Engine switches - magnetos	P	P	P	N	N	N	P
10. Oil dilution	S	P	P	N	N	N	P
D. Power plant, turbo-prop. engines:							
1. Power levers	P	P	P	N	P	P	P
2. Condition levers	P	P	P	N	P	P	P
E. Powerplant, turbojet engines:							
1. Power levers	P	P	P	N	P	P	P
2. Reverse thrust	P	P	P	N	P	P	N
3. Starting	P	P	P	N	N	N	P
F. Fuel system:							
1. Fuel pumps	P	S	P	N	N	N	P
2. Fuel tanks and cross feeds	P	P	P	N	N	N	P
3. Fuel dumps	S	P	P	N	N	N	P
4. Auxiliary tank jettison	S	P	P	N	S	P	N
G. Oil system transfer	S	P	P	N	N	N	P
H. Electrical:							
1. Generators	S	P	P	N	N	N	P
2. Inverter switches:							
a. Manual changeover type	S	P	P	N	N	N	P
b. Auto changeover type	S	P	P	N	N	N	P

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TABLE I. Assignment of Controls for Side-by-Side Aircraft. (Continued)

Control Station	Class A		Class B/C		Class D		
	Pilot	Co-pilot	Pilot	Crew member	Pilot	Co-pilot	Flight engineer
3. External lights:							
a. Navigation, position, identification	P	S	P	N	S	P	N
b. Ice lights	S	P	P	N	S	P	N
c. Landing lights	P	S	P	N	P	S	N
d. Taxi lights	P	S	P	N	P	S	N
4. Belts/no smoking	P	S	S	P	S	P	N
5. Radio:							
a. Primary communications	P	P	P	P	P	P	N or P
b. Intercommunications (ICS)	P	P	P	P	P	P	P
c. Navigation	S	P	S	P	S	P	N
d. Radar identification controls (IFF/SIF)	S	P	S	P	S	P	N
6. Master electrical switch	P	P	P	D	D	N	P
I. Air conditioning: General controls	S	P	P	D	D	D	P
J. Emergency systems:							
1. Fire warning indicators:							
a. Master	P	P	P	D	P	P	P
b. Individual component	P	P	P	D	S	N	P
2. Fire extinguishing	P	P	P	N	S	S	P
3. Emergency fluid shut-off:	P	P	P	N	S	S	P
4. Emergency hydraulic pump and selector	S	P	P	S	N	P	N
5. Emergency brakes	P	P	P	N	P	P	N
6. Emergency airspeed or altimeter system	P	S	P	N	P	P	N
7. Emergency flight controls (auxiliary boosters, tabs, boost shutoffs, etc.)	P	P	P	N	P	P	N
8. Windshield wiper	P	D	P	N	P	D	N
9. Flares	S	P	P	D	N	P	N
10. Reverse throttle lock override	P	P	P	N	P	P	N
11. Emergency instrument power selector	P	S	P	N	P	S	N
12. JATO:							
a. Arming	P	S	P	N	P	S	N
b. Firing	P	S	P	N	P	S	N
13. Emergency landing gear:							
a. Override retraction	P	P	P	D	S	P	N
14. Emergency flap: Cockpit control	P	P	P	N	P	P	N
15. Emergency depressurization	S	P	P	N	N	P	D
16. Emergency alarm system	P	P	P	N	P	P	N
K. De-icing and anti-icing system:							
1. Wing and tail:							
a. Master	S	P	P	N	S	P	N
b. Auxiliary controls	S	P	P	N	N	N	P
2. Carburetor alcohol	S	P	P	N	N	N	P
3. Windshield	S	P	P	N	S	P	N
4. Pitot static	S	P	P	N	S	P	N
5. Miscellaneous external surfaces	S	P	P	N	S	P	N
6. Propellers	S	P	P	N	N	N	P
L. Ram air turbine	S	P	P	N	P	N	N
M. Wing sweep tilt	P	S	P	N	P	N	N

(c) Control functions not covered by this standard for which the crew member has direct vision of the control-function relationship, shall be covered by "conventional" control actuation methods.

(d) Actuation of switches. On panels located above eye level, every effort shall be made to keep panels as nearly vertical or horizontal as possible to avoid ambiguity of control movement. Where overhead panels are employed, switches shall be actuated upward or forward for increased performance or normal operation in accordance with the following convention:

1. Upward, if the panel forms an angle of 0 degrees to 30 degrees with respect to the vertical axis as shown in Figure 1.
2. Forward, if the panel forms an angle greater than 30 degrees and equal to or less than 90 degrees as shown in Figure 2.

(e) When momentary contact switches are used, exceptions to the foregoing criteria may be desirable to facilitate operation. This is particularly true where multiple switches are used, and where prolonged actuation in flight is necessary (e.g., carburetor alcohol switches). When exceptions are made, the direction of actuation shall be such as to provide the greatest ease of operation and shall be substantiated by design criteria acceptable to the procuring activity.

(f) Controls, including switches, shall be so spaced as to permit ease and accuracy of operation with gloved hands and shall be in accordance with the requirements of MIL-C-81774.

(g) Design continuity. Actuation of controls and switches involving safety of flight shall be consistent with practice of previous models of the particular aircraft provided accepted design methods have been adhered to.

4.5 Flight/Systems engineer's station - The following general recommendation shall be applied to any type of aircrew station defined as class D in paragraph 3.2:

(a) It is desirable that a method be provided to view the engine(s) from the flight engineer's station.

(b) The flight engineer should sit facing his instrument panel with the more important instruments grouped at eye level. The pilot should be able to monitor the flight engineer's station.

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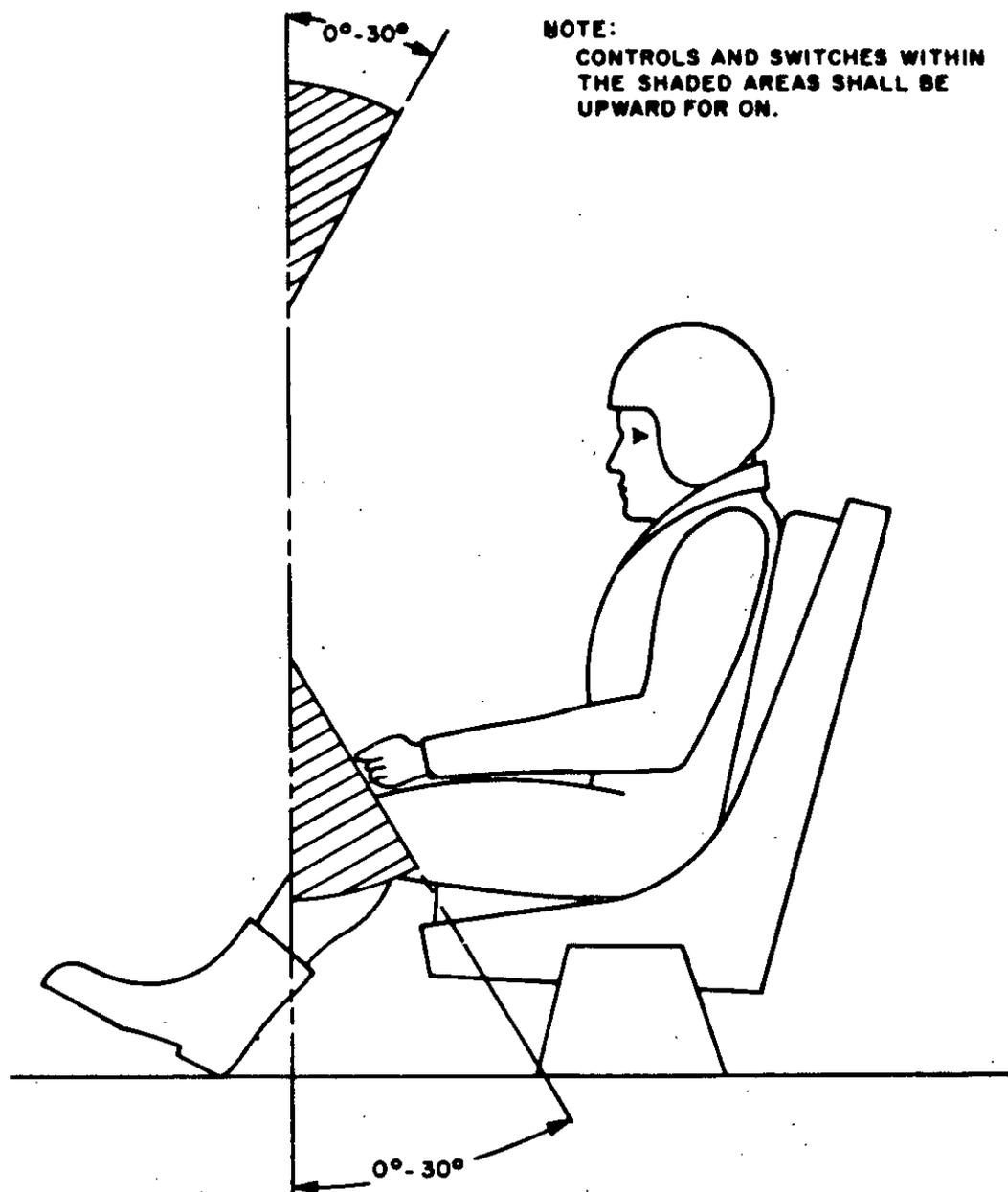


FIGURE 1. UPWARD OPERATION OF CONTROLS AND SWITCHES ON SLANTED PANELS

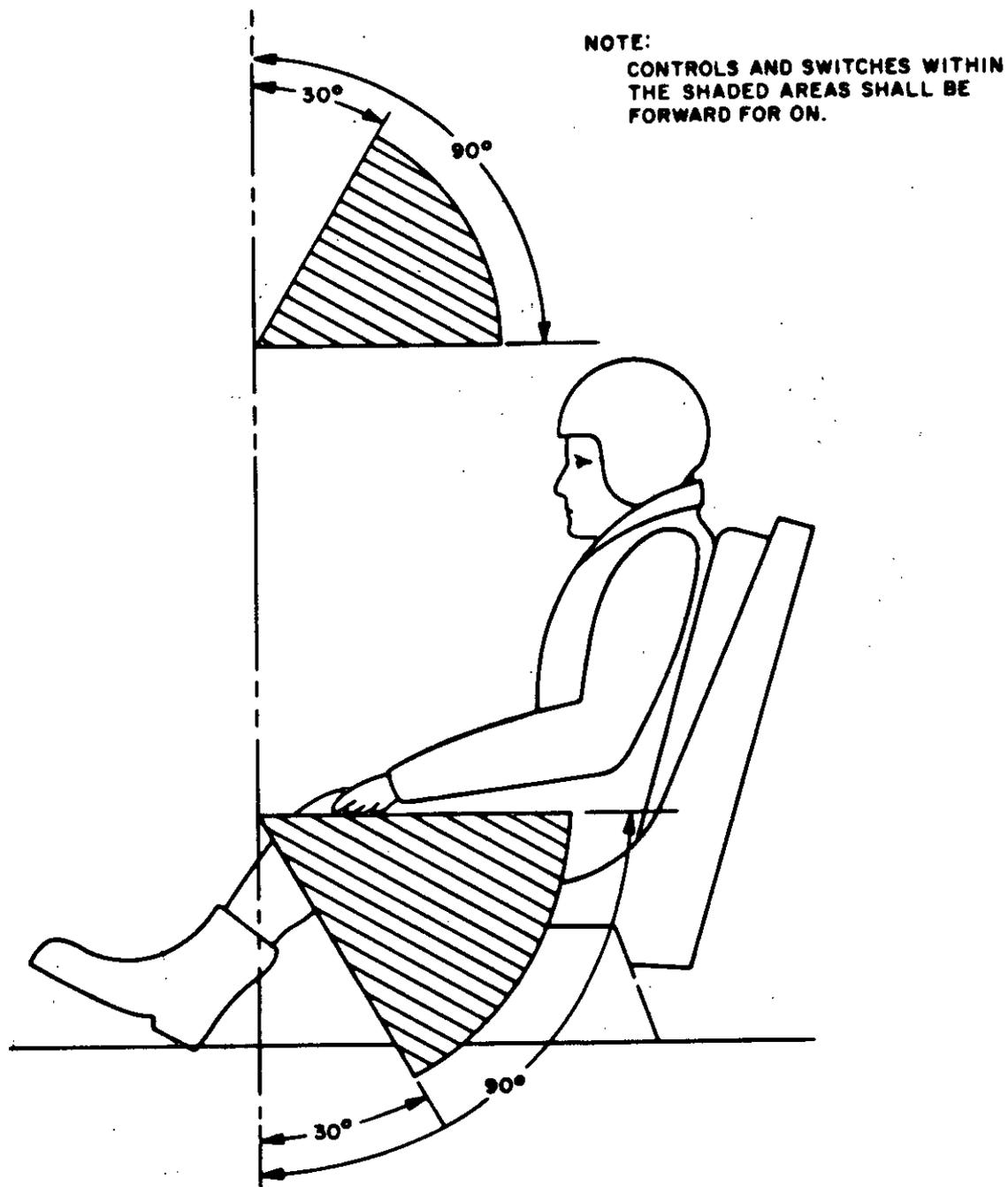


FIGURE 2. FORWARD OPERATION OF CONTROLS AND SWITCHES ON SLANTED PANELS

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(c) The flight engineer's station should be located to permit conversation between the crew stations without using intercoms.

4.6 Displayed information -

(a) Displayed information shall consist of the following:

1. Lettering, numbering, markings, and symbols on instrument displays.
2. Lettering, numbering, markings, and symbols on controls and control panels.
3. Emergency procedure instructions for emergency exiting and ditching.
4. Flight and operational procedure instructions.
5. Radio call signs.

(b) Displayed information in the crew stations shall be kept to a minimum. The design shall conform to the requirements of MIL-M-18012, MIL-C-81774, and MIL-STD-783.

(c) The displayed information shall be located adjacent to the control, instrument, or item of equipment to which it pertains.

(d) For night presentation, all displayed information shall meet the instrument and control panel lighting requirements of MIL-L-18276 or MIL-L-6503 as specified by the procuring activity.

(e) Emergency exiting and ditching. Printed instructions and procedures shall be provided for non-aircrew personnel in the applicable aircraft compartment(s).

(f) Printed instructions and markings for emergency exits shall be in accordance with MIL-A-25165.

(g) Aircrew station signals. Design and selection of aircrew station signals shall conform to the requirements specified in MIL-STD-411. Associated signal displays and controls shall be located and actuated in accordance with the requirements specified herein.

(h) Displayed information. Control panels shall be in accordance with the requirements of MIL-C-81774 unless otherwise specified by the procuring activity.

4.7 Control knobs, handles, and switches -

(a) Control knobs and handles shall be in accordance with the applicable military standards, except when space necessitates the use of miniature sizes which shall be approved by the procuring activity. Control knobs shall conform to MIL-K-25049. Control handles shall conform to MIL-H-8810. Switches and switch assemblies shall conform to MIL-S-8805. Toggle switches shall conform to MIL-S-3950. Pushbutton and limit switches shall conform to MIL-S-8805 and MIL-S-22885. In addition, for control panels, the applicable requirements of MIL-C-81774 shall apply.

(b) Emergency controls and/or their panel backgrounds shall be provided with orange-yellow and black striping as described in MIL-M-18012.

(c) The more frequently used controls shall be located close to the operator. The location of controls on the panel shall also be determined by the following, not necessarily in order of importance:

1. Size
2. Type of control
3. Number of controls
4. Interlinkage of the controls
5. Operating requirements either specified or necessitated.
6. Visual display on the control panel.

(d) Control monitoring.

1. Remote and indirect control monitoring. Controls which are monitored remotely or indirectly such as radio volume, light intensity, temperature etc. do not require intermediate position markings between extreme control positions at the control location.

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2. Direct control monitoring. Controls which are monitored visually at the control location usually require associated markings on the control panel. On plastic lighting plates an illuminated locator ring shall be employed with each continuously variable control. Where control panel space is at a premium, suitably illuminated control knobs or lighted knob skirts conforming to MIL-K-25049 may be used.

(e) Control guards. All controls, the inadvertent actuation of which could/would produce a dangerous situation, shall have guarded or safety detent design features.

(f) Controls and associated panels shall be marked in accordance with MIL-M-18012.

(g) Control coding. Controls within functional groups (e.g. tacan controls, INS controls) shall be selected to provide ease of identification/actuation for the operator. Shape coding, size coding or other coding techniques approved by the procuring activity shall be utilized as necessary where tactile information for control selection and/or actuation is highly desirable.

4.8 Ground maintenance controls and displays - The installation of ground maintenance displays, controls, and switches in the cockpit area shall be held to an absolute minimum and shall conform to the requirements of MIL-C-81774. In no case shall a ground maintenance control or switch be located in a space required or normally occupied by controls used during normal flight operations.

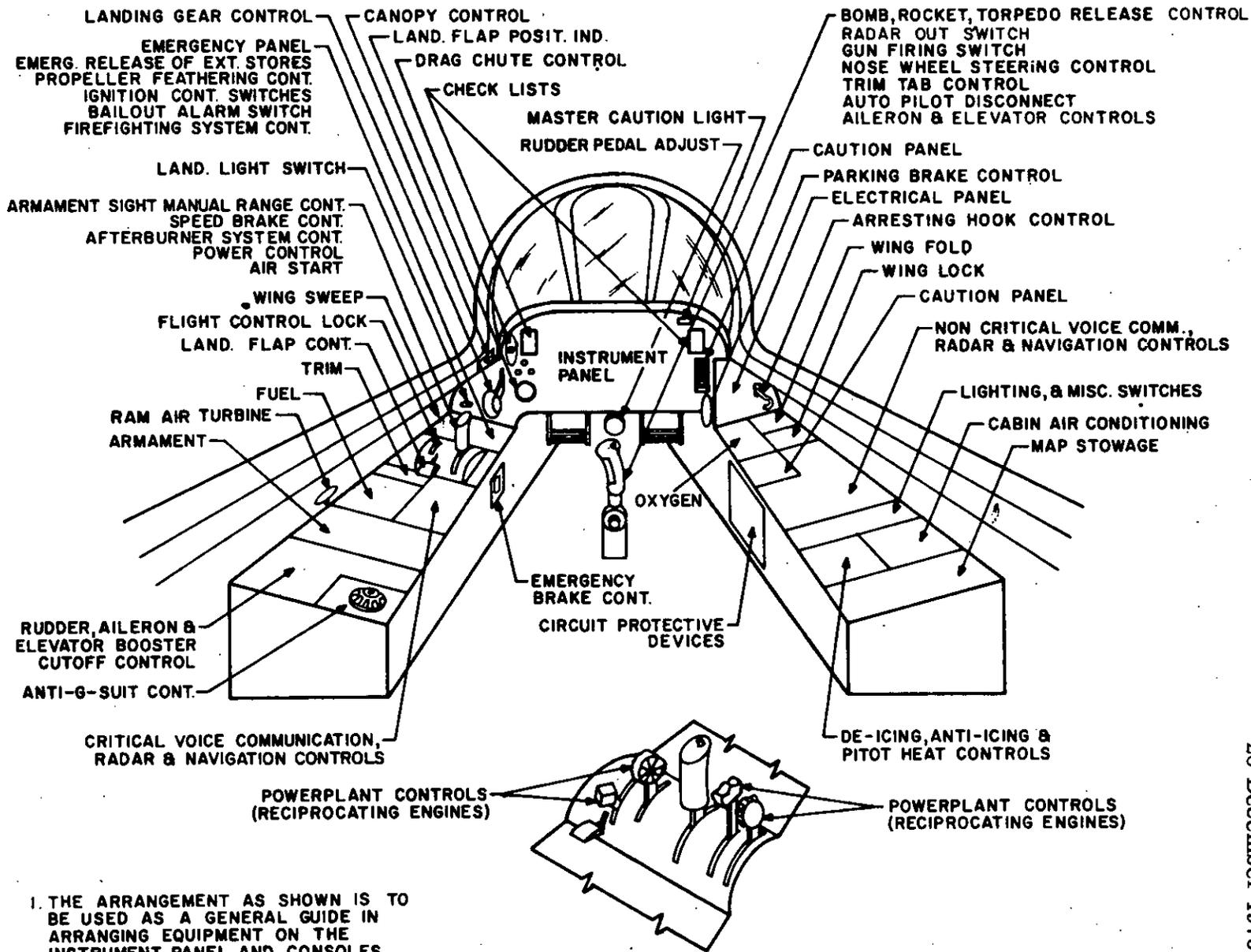
4.9 Cockpit equipment arrangement - Cockpit controls, displays and support equipment on instrument panels and consoles shall be generally arranged as shown in Figures 3 and 4.

4.10 Other aircrew stations - Unless otherwise specified by the procuring activity, the arrangement, location, and actuation of controls and displays in other crew stations not identified herein shall conform to the requirements specified herein.

## 5. FLIGHT AND GROUND CONTROLS

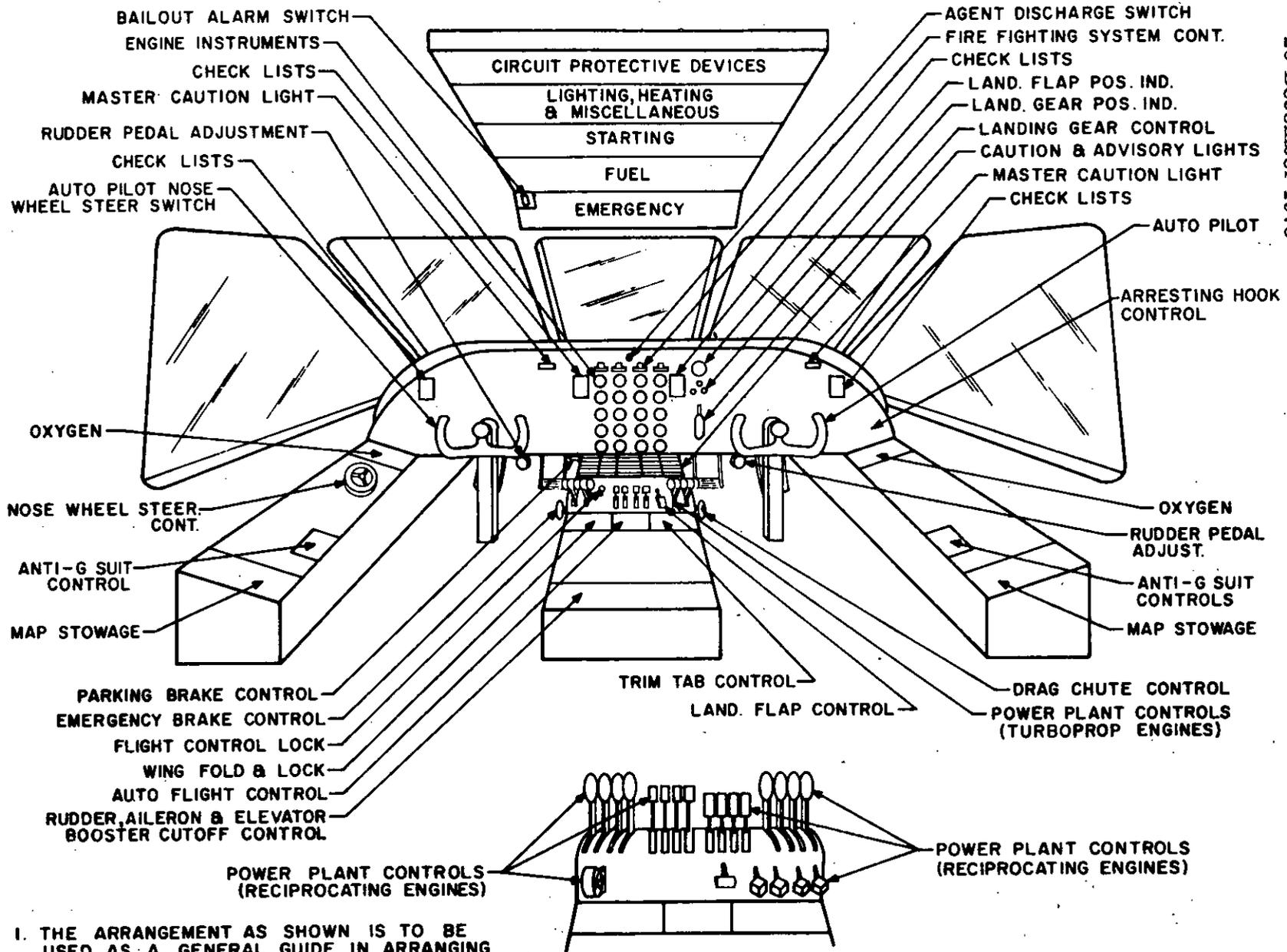
### 5.1 Checkoff lists -

(a) Single pilot/tandem pilot: Location - When required, the landing checkoff list shall be on the left of the instrument panel and the takeoff checkoff list on the right of the instrument panel or adjacent thereto. Design - Each takeoff and landing list shall be applicable to a particular aircraft model.



1. THE ARRANGEMENT AS SHOWN IS TO BE USED AS A GENERAL GUIDE IN ARRANGING EQUIPMENT ON THE INSTRUMENT PANEL AND CONSOLES.

FIGURE 3. SINGLE PILOT-TANDEM PILOT EQUIPMENT ARRANGEMENT



1. THE ARRANGEMENT AS SHOWN IS TO BE USED AS A GENERAL GUIDE IN ARRANGING EQUIPMENT ON THE INSTRUMENT PANEL AND CONSOLES.

FIGURE 4. SIDE-BY-SIDE PILOT EQUIPMENT ARRANGEMENT.  
(CONTROL WHEELS SHOWN - CONTROL STICKS OPTIONAL)

They shall consist of a listing, in the order of normal operation, of only those items permanently fixed in the cockpit and the checking of operations which are necessary for safety of flight during takeoff and landing. Preferably, this list shall consist of a single column. Where multiple columns are used, the listings shall be numbered in order of operation. The listing shall not include operation or actuation data.

(b) Side-by-side pilot: Location - Permanently installed in such a position as to be clearly legible to both the pilot and copilot in their normal positions. If necessary, duplicate sets shall be used. Design - Requirements for single pilot apply.

5.2 Rudder control - Single pilot/tandem pilot/side-by-side pilot: Location - See Figures 3 and 4. Actuation - Conventional.

5.3 Rudder pedal adjustment control - Single pilot/tandem pilot/side-by-side pilot: Location - A single control to adjust both pedals is desirable. If utilized it shall be located forward of and near the centerline of the pilot. Actuation - The control motion to extend the rudder pedals shall be clockwise, push, or lift (depending on the type of mechanism employed). Design - If kick type rudder pedal adjustment controls are utilized, a legible numerical index shall be provided to indicate rudder pedal position.

5.4 Aileron and elevator controls - Single pilot/tandem pilot/side-by-side pilot: Location - See Figures 3 and 4. Actuation - Conventional.

5.5 Rudder, aileron, and elevator booster cutoff control -

(a) Single pilot/tandem pilot: Location - Left-hand console. Actuation - Performance-related.

(b) Side-by-side pilot: Location - Centrally located on the center console aft of radio control panel, accessible to both pilots. Actuation - Performance-related.

5.6 Flight control lock - Single pilot/tandem pilot/side-by-side pilot: Location - Adjacent to the power control. Actuation - The flight control lock shall incorporate a device that restricts throttle motion to make it impossible to apply takeoff power simultaneously to all engines. However, it shall be possible to apply sufficient power to all engines to permit normal taxiing and low power engine checks. It shall also permit takeoff power on each engine provided that not more than 50 percent of the engines may be run up to takeoff power at one time.

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5.7 Automatic flight controls (auto-pilot) -

(a) Single pilot/tandem pilot: Location - On the right-hand side of the cockpit, except where control stick steering is employed; the control panel shall then be located on the left console. Actuation - Conventional. Design - An electrical disconnect shall be provided on the forward side of the control stick. If a manual disconnect is employed, it shall be located adjacent to the normal automatic flight controls.

(b) Side-by-side pilot: Location - On the center console aft of the power controls and accessible to each pilot. Actuation - Conventional. Design - A guarded disconnect shall be provided on the control stick or wheel. In wheel controlled aircraft, the disconnect switch shall be located on the side of the wheel opposite the throttle hand. If a manual disconnect is employed, it shall be located on the after portion of the pedestal of wheel controlled aircraft. If stick controlled, comments for single pilot apply.

5.8 Trim controls (rudder, elevator, aileron) -

(a) Single pilot/tandem pilot: Location - Immediately aft of the power control on the left console, except when the trim controls are electrically actuated, in which case the control switch to activate the elevator and aileron trim shall be placed on the top aft portion of the control stick grip. Actuation - Conventional. Design:

1. Trim controls shall be designed to safeguard against inadvertent or abrupt operation.
2. Means shall be provided adjacent to the trim control to indicate the direction of the control movement relative to the airplane motion.
3. If required, means shall be provided to indicate the position of the trim device with respect to the range of adjustment. The indicating means shall be clearly distinguishable day and night over the entire trim range.
4. A wheel, knob, or switch shall be used, not a crank.
5. A trim control emergency override or circuit breaker shall be provided and located so as to be readily accessible to the operator.

(b) Side-by-side pilot: Location - Within normal reach and easily accessible to each pilot for all aircraft flight conditions. Actuation - Actuation for single pilot applies. Design - Requirements for single pilot apply, except when the trim controls are electrically actuated in wheel controlled aircraft, in which case the control switch to actuate the elevator and aileron trim shall be placed on that portion of the control opposite the throttle hand.

5.9 Landing gear control -

(a) Single pilot/tandem pilot: Location - Forward of and above the primary power controls when the power controls are in the full open position and operable by pilot. Actuation - Conventional. Design - The landing gear control knob shape shall conform to MS33506. The indicator light shall be located in the handle and shall be steady "ON" when the landing gear is inconsistent with the handle position.

(b) Side-by-side pilot: Location - Forward of and above the primary power controls when the power controls are in the full open position. The landing gear control shall be operable by both pilots in their normal position. Actuation - Actuation for single pilot applies. Design - Requirements for single pilot apply.

(c) Emergency retraction. Single pilot/tandem pilot-side-by-side pilot: Location - As close as practicable to normal control. Actuation - With one hand, depress push button type device and raise landing gear control lever.

5.10 Alternate landing gear control actuation - Single pilot/tandem pilot/side-by-side pilot: Location - The alternate control shall be separate from, but as close as practicable to, the normal control unless specific approval is granted for an integral control. Where cockpit space is at a premium, consideration shall be given to integrating this control with the normal gear control. The design shall be such as to preclude interaction between normal and alternate operation. Failure of the normal gear control shall not preclude subsequent successful actuation of the gear system.

5.11 Landing gear position indicator(s) - Single pilot/tandem pilot/side-by-side pilot: Location - On the instrument panel or adjacent to the landing gear control lever visible to the pilot(s) in his (their) normal position(s).

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5.12 Landing flap control -

(a) Single pilot/tandem pilot: Location - On the left console aft of and outboard of the power controls, and operable by pilot. Actuation - Conventional.

(b) Side-by-side pilot: Location - On the center console aft of the power controls. Actuation - Conventional. Design - It shall be possible for either pilot to operate the control while maintaining normal forward visibility out of the airplane.

5.13 Landing flap position indicator - Single pilot/tandem pilot/side-by-side pilot: Location - On the instrument panel visible to the pilot(s) as close as practicable to the landing gear position indicator.

5.14 Speed brake control - Single pilot/tandem pilot/side-by-side pilot: Location - Stick-controlled aircraft - On the power control lever. Wheel-controlled aircraft - On the throttle nearest the pilot if electrically controlled and immediately aft of the throttles if mechanically controlled. Actuation and design - The actuation and design of the speed brake control shall conform to the requirements of MIL-F-18372.

5.15 Tail wheel lock - Single pilot/tandem pilot/side-by-side pilot: Location - On the console aft of and below power controls. Actuation - Upward or forward, or both, for locked.

5.16 Arresting hook control -

(a) (Normal system operation) Single pilot/tandem pilot/side-by-side pilot: Location - Upper forward right-hand side of cockpit, and operable by pilot. Actuation - Direction of motion shall correspond to hook movement. Design - When an indicator light is used, it shall be located in the control handle, and shall be "ON" when the arresting hook is inconsistent with control position.

(b) Emergency arresting hook control (ground use only). Single pilot/tandem pilot/side-by-side pilot: Location - Accessible to the pilot's throttle hand. Actuation - Pushbutton switch - Push to extend hook. Hook shaped switch - Down or aft for hook "down". Design - A recessed, guarded pushbutton switch or a guarded hook-shaped, coded toggle switch.

**5.17 Wing folding control** -

(a) **Single pilot/tandem pilot:** Location - Forward part of right-hand console, and operable by pilot. Actuation - Control shall move forward or outboard to spread; aft or inboard to fold.

(b) **Side-by-side pilot:** Location - On the center console aft of the power control. Actuation - Actuation for single pilot applies.

**5.18 Wing locking control** - Single pilot/tandem pilot/side-by-side pilot: Location - Adjacent to wing folding control. Actuation - Control shall move forward or outboard to lock; aft or inboard to unlock. Design - An aural warning system shall be incorporated to indicate the existence of an unsafe condition.

**5.19 Wing sweep control** - Single pilot/tandem pilot/side-by-side pilot: Location - Left side forward and as high as possible. Actuation - Conventional.

**5.20 Wheel brake controls** - Single pilot/tandem pilot/side-by-side pilot: Location - Toe pedals, integral with each rudder pedal. Actuation - Conventional. Design - When dual brake controls are incorporated, simultaneous braking by both pilots shall be possible.

**5.21 Parking brake control** - Single pilot/tandem pilot/side-by-side pilot: Location - On the lower portion of or under the instrument panel to the right of the pilot's centerline. Actuation - Pull to actuate. Push pedals to release.

**5.22 Emergency brake control** -

(a) **Single pilot/tandem pilot:** Location - Left console, operable by pilot. Actuation - Pull to apply.

(b) **Side-by-side pilot:** Location - Adjacent to the power controls operable by pilot. Actuation - Pull to apply.

**NOTE:** When a parking brake control is combined with an emergency wheel brake control, its location shall be as above.

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5.23 Canopy control (sliding or hinged) - Single pilot/tandem pilot/side-by-side pilot: Location - Left side forward on the canopy rail. Actuation - Forward or down to close; aft or up to open. Design - External controls shall be located in path of normal ingress to the cockpit and, when feasible, operable by persons on the ground.

5.24 Canopy emergency opening (jettison) control -

(a) Single pilot/tandem pilot: Location - The primary emergency opening control shall be integral with the ejection seat actuation control. Additional or secondary jettison controls shall be located forward on the left-hand side, and operable by pilot. Actuation - Conventional.

(b) Side-by-side pilot: Location - Location for single pilot/tandem pilot applies, except that additional or secondary jettison controls shall be located forward on overhead emergency panel. Actuation - Conventional.

5.25 Nose wheel steering control -

(a) Single pilot/tandem pilot: A pushbutton control to engage and disengage the nose wheel steering shall be provided on the control stick grip. Actuation of this pushbutton shall be push to engage, push to disengage; however, the nose wheel steering shall always be engaged when the pushbutton is depressed and held. A physical indication for the engaged mode shall be presented to the pilot(s).

(b) Side-by-side pilot: The nose wheel steering control shall be a single wheel-type control located outboard of the pilot's station (left-hand seat only) or rudder pedal controlled steering actuated by a pushbutton on the flight control wheel on the side opposite to the throttle hand. Actuation of this pushbutton shall be push to engage, push to disengage; however, the nose wheel steering shall always be engaged when the pushbutton is depressed and held.

5.26 Thermal protective cockpit closure control -

(a) Single pilot/tandem pilot: Location - On the thermal closure, easily actuated by the left hand. Actuation - Positive acting latches for open, intermediate, and closed positions shall be incorporated. Single motion shall be required for unlatching.

(b) Side-by-side pilot: Location - On the thermal closure, overhead, readily accessible to both pilots. Actuation for single pilot applies.

5.27 Drag chute control -

(a) Single pilot/tandem pilot: Location - Handle - Upper left portion of the instrument panel or adjacent subpanel. Switch - Left side of instrument panel or subpanel or forward on left console. Actuation - Handle - Pull to deploy (handle nonrotatable during pull) rotate handle 90 degrees (handle will be capable of both clockwise and counterclockwise rotations) and pull to jettison. Switch - Two-position lever - lock, forward or up for stowed/jettison, aft or down for deployment.

(b) Side-by-side pilot: Location - Handle - On or adjacent to the right side of power quadrant. Switch - On or adjacent to or immediately aft of the right side of the power quadrant. Actuation - Actuation for single pilot/tandem pilot applies.

5.28 Launch bar control -

(a) Single pilot/tandem pilot/side-by-side pilot: Location - On power console immediately adjacent to the throttle in full power position. Actuation - Forward to extend, aft for retract. Design - An advisory light shall be provided to indicate extended position. Where applicable, a legend light indication shall be provided to present an unsafe condition.

## 6. POWERPLANT CONTROLS

6.1 Power controls -

(a) Reciprocating engines (throttle(s), propeller(s), mixture(s)).

1. Single pilot/tandem pilot: Location - On the left of the pilot. Actuation - Performance related. Design - The power control(s) shall be arranged from left to right in the following order: Throttle control(s), propeller control(s), mixture control(s). The propeller control(s) shall be shorter than the throttle control(s). It is desirable that the mixture control be to the right and shorter than the propeller control.
2. Side-by-side pilot: Location - On the center console accessible to both pilots with shoulder harness in place and locked. On aircraft having single grip control of flight services, i. e. stick control, and side-by-side seating which requires duplicated

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primary power controls, one set of controls shall be accessible to the left hand of each pilot when his shoulder harness is in place and locked. Actuation - Performance-related. Design - Requirements for single pilot apply.

(b) Turboprop engines (power lever(s), condition lever(s)).

1. Single pilot/tandem pilot: Location - On the left of the pilot. Actuation - Performance-related. Design - The power control(s) shall be arranged from left to right in the following order: Power lever(s), condition lever(s). The condition lever shall be shorter than the power lever.
2. Side-by-side pilot: Location - On the center console accessible to both pilots with the shoulder harness in place and locked. On aircraft having single grip control of flight services, i.e. stick control, and side-by-side seating which requires duplicated primary power controls, one set of controls shall be accessible to the left hand of each pilot when his shoulder harness is in place and locked. Actuation - Performance-related. Design - Requirements for single pilot apply.

(c) Turbojet engines (power lever(s)).

1. Single pilot/tandem pilot: Location - On the left of the pilot. Actuation - Performance-related.
2. Side-by-side pilot: Location - On the center console accessible to both pilots with the shoulder harness in place and locked. On aircraft having single grip control of flight services, i.e. stick control, and side-by-side seating which requires duplicated primary power controls, one set of controls shall be accessible to the left hand of each pilot when his shoulder harness is in place and locked. Actuation - Performance-related.
3. To preclude inadvertent engine shutdown, the "IDLE" to "OFF" position shall be protected by a safety device in which a separate, distinct action is required for engine shutdown. This safety device shall prevent unintentional movement of the throttle from "IDLE" to "OFF" during any flight maneuvers.

6.2 Reverse thrust control -

(a) Shaft power engines. Single pilot/tandem pilot/side-by-side pilot: Location - Integral with the normal power lever. Actuation - The control shall be moved aft through a stop that employs a "lift to reverse type of control mechanism" to obtain reverse thrust.

## (b) Turbojet engines.

1. Single pilot/tandem pilot: Location - On the console outboard of the power control(s) and on the same axis as the power control(s). Actuation - Aft for reverse thrust. Design - A single, separate control shall be actuated to modulate the reverse thrust feature. Reverse thrust shall be immediately available with no decrease in engine power. A mechanical interconnect shall be provided so that the power lever is advanced to maximum engine power when the reverse thrust control is moved to its most aft position. Reduction of the amount of reverse thrust shall be controlled by normal operation of the power lever. Forward movement of the reverse thrust control shall have no effect upon the position of the normal power lever.
2. Side-by-side pilot: Location - On the power quadrant and on the same axis as the power control. Actuation - Aft for reverse thrust. Design - In the event of failure in multi-engine aircraft, the reverse thrust control will apply selective reverse thrust only to operating engines of symmetry. An additional reverse thrust control is authorized when required. Design - Requirements for single pilot apply.

6.3 Fluid injection systems controls - Single pilot/tandem pilot/side-by-side pilot: Location - Master (pump control) switch shall be adjacent to power control. Actuation - Performance-related. Design - The system shall be automatically actuated by the power control.

6.4 Afterburner system control - Single pilot/tandem pilot/side-by-side pilot: Location - Integral with power control. Actuation - Performance-related. Design - The system shall be automatically actuated by the power control.

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6.5 Supercharger(s) or turbo-supercharger controls -

(a) Single/pilot tandem pilot: Location - On the left console to the left and aft of the power controls or outboard and on the same axis as the power controls. Actuation - Forward or up for low blower.

(b) Side-by-side pilot: Location - On the center console left and aft of the power controls or outboard and on the same axis as the power controls. Actuation - Forward or up for low blower.

6.6 Assisted takeoff control (including the firing switch, circuit test and bottle jettison controls -

Single pilot/tandem pilot/side-by-side pilot: Location - Console, adjacent to the power control(s) when the power control is in the full open position, and operable by pilot. Actuation - Performance-related.

6.7 Cooling controls (cowl flaps, intercoolers, oil coolers, etc.) -

(a) Single pilot/tandem pilot: Location - Aft of the power control(s). Actuation - Forward, upward, or clockwise for increased cooling.

(b) Side-by-side pilot: Location - On the overhead panel. Actuation - Forward for automatic if automatic controls are utilized. If manual controls are utilized, forward, upward, or clockwise for increased cooling.

6.8 Induction system air controls (carburetor heat air filter, alternate air and turbo-bypass system) -

Single pilot/tandem pilot/side-by-side pilot: Location - Aft of and below the cooling controls. Actuation - Performance-related. Design - A unitary control is desirable. The forward or upward position shall be for ram air, the middle position shall be for filtered air, and the aft to lower position shall be for the alternate or heated air.

6.9 Induction system anti-icing control - Single pilot/tandem pilot/side-by-side pilot: Location - Aft or outboard of the induction system control. Actuation - Performance-related.

6.10 Fuel system selector controls -

(a) Single pilot/tandem pilot: Location - Aft of the trim controls and as close to the power control(s) as practicable. Actuation - Conventional. Design - To preclude inadvertent cutoff of fuel, the "OFF" position shall be protected by a safety device in which a separate and distinct action is

required to position the fuel selector(s) to the "OFF" position. Where selection of fuel may be from various tanks, a diagrammatic fuel system shall be provided around the fuel selector(s) in order that the pilot may have a positive indication of the fuel flow as it actually exists in the airplane.

(b) Side-by-side pilot: Location - Selector(s) grouped in a fuel control panel located on the center console aft of the power controls or on the overhead between the pilots. Actuation - Actuation for single pilot applies.

6.11 Fuel system controls -

(a) Fuel controls. Single pilot/tandem pilot/side-by-side pilot: Location - Adjacent to power controls. Actuation - Conventional.

(b) Inflight refueling. Single pilot/tandem pilot/side-by-side pilot:

1. Inflight refueling selector, reset, and manual override switches. Location - Easily accessible to the pilot(s) left hand while maintaining visual tanker aircraft reference. Actuation - Conventional.
2. Disconnect switch - Location - On the stick grip or on the control wheel opposite the pilot(s) throttle hand. Actuation - Conventional.
3. Indicator lights. Location - Easily visible to the receiver aircraft pilot(s) while maintaining visual tanker aircraft reference. Design - Inflight refueling indicator lights shall be designed in accordance with MIL-STD-411 and shall have the following legend presentation:

READY - A green light indicating that the receptacle/slipway is locked in the "OPEN" position and ready for contact.

LATCHED - A green light indicating that contact has been made.

DISCONNECT - An amber light indicating that the tanker and receiver aircraft have separated.

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6.12 Ignition control switch(es) -

(a) Reciprocating engines.

1. Single pilot/tandem pilot: Location - On the left forward of power controls, and operable by pilot. Actuation - Clockwise rotation shall produce the following sequence: "OFF", "LEFT", "RIGHT", "BOTH". Design - Individual switches with provisions for emergency grounding should be used for reciprocating engines in multi-engine aircraft. Ignition switches shall be separated electrically and mechanically without provisions for multiple cutoff, unless specified by the procuring activity.
2. Side-by-side pilot: Location - Located overhead and between the pilots. Actuation - Actuation for single pilot applies. Design - Requirements for single pilot apply.

(b) Turboprop or turbojet engines. Single pilot/tandem pilot/side-by-side pilot: Location - Aft or adjacent to power lever(s) or integral with power lever(s). Actuation - Performance-related. Design - For installations which use switch(es) not integral with the power lever(s), this switch shall function as an ignition arming switch. Actual ignition shall not occur until power lever is moved from "OFF" position.

6.13 Air start switch(es) -

(a) Single pilot/tandem pilot: Location - On the aft side of the power lever(s). Actuation - Performance related.

(b) Side-by-side pilot: Location - Aft or adjacent to the power levers, or on the overhead panel. Actuation - Performance-related.

6.14 Propeller feathering controls -

(a) Single pilot/tandem pilot: Location - On the left, forward of the power controls, operable by the pilot, so located or protected or both, as to avoid inadvertent operation. Actuation - Push to feather. Design - Feathering controls shall be provided with a light to indicate power failure or feathering actuation.

(b) Side-by-side pilot: Location - Forward and overhead, accessible to both pilots and in their normal field of vision looking forward. Actuation - Push to feather. Design - Requirements for single pilot apply.

6.15 Vector thrust-mechanical controls -

(a) Nozzle selector control. Single pilot/tandem pilot/side-by-side pilot: Location - Adjacent to the throttle. Actuation - Aft movement of the control shall change the direction of the thrust vector downward through the vertical, if necessary.

(b) Nozzle selector stop control. Single pilot/tandem pilot/side-by-side pilot: Location - Adjacent to the nozzle selector control. Actuation - Aft movement of the stop control shall preselect the amount of thrust vector change downward through the vertical, if necessary.

6.16 Ram air turbine control -

(a) Single pilot/tandem pilot/side-by-side pilot class A: Location - On left hand side aft of power controls operable by the pilot. Actuation. Pull to release.

(b) Side-by-side class B and C: Location - Center console aft of power controls operable by both pilots. Actuation - Pull to release. Design - Control design shall be distinctive from adjacent controls.

## 7. FIRE FIGHTING CONTROLS

7.1 Fire fighting system controls -

(a) Single pilot/tandem pilot/side-by-side pilot: Location - On an emergency panel. Actuation - Pull to actuate. Design - Fire fighting control shall consist of a single emergency control for each engine or critical area and one agent discharge switch. The control knob(s) shall incorporate a red light which is illuminated when the fire warning system for the area served by the control is activated. A master fire warning light in accordance with MIL-STD-411 shall be provided on the instrument panel when the control knob(s) cannot be placed in the 30-degree forward cone of vision. Actuation of the control shall perform all necessary fire extinguishing operations except the discharge of the agent. Actuation of the agent discharge switch shall release the agent to the area selected by the fire emergency control. The control knob will conform to MS26523.

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## 8. ELECTRICAL AND RADIO CONTROLS

### 8.1 Master electrical control switches (including the battery, generator, starter(s), primer(s), and oil dilution controls) -

(a) Single pilot/tandem pilot: Location - Grouped together forward on the right console. Actuation - Conventional. Design - Battery and generator switches shall be operable by the pilot. Where air start and ground start switches are combined, the location shall be that of the air start switch.

(b) Side-by-side pilot: Location - Functionally grouped together in a central overhead location. Actuation - Performance-related.

### 8.2 Lighting and miscellaneous switches -

(a) Single pilot/tandem pilot: Location - Grouped together on the right console, switches and rheostats functionally grouped together convenient to pilot. Actuation - Performance-related. Design - For carrier aircraft, a master exterior light switch shall be located near the throttle.

(b) Side-by-side pilot: Location - On the overhead panel, switches and rheostats functionally grouped together convenient to pilots. Actuation - Performance-related. Design - Requirements for single pilot apply.

### 8.3 Landing light and searchlight switches -

(a) Single pilot/tandem pilot: Location - Adjacent to landing gear control or adjacent to the power control. Actuation - Performance-related. Design - Separate switches shall be incorporated to control filament and movement of the light where a retractable light is used. The "ON" and "EXTEND" position of these switches shall be reached by movement in the same direction.

(b) Side-by-side pilot: Location - Adjacent to the landing gear control or adjacent to the power control. Actuation - Performance-related. Design - Requirements for single pilot apply.

### 8.4 Circuit protective devices (breakers) -

(a) Single pilot/tandem pilot: Location - Inboard face of the right or left-hand console, functionally grouped together. Design - Only those circuit protective devices which directly affect safety of flight need be located so that they will be accessible in flight to the pilot or crew. The installation of the circuit breakers shall be such as to prevent inadvertent deactivation of the circuit.

(b) Side-by-side pilot: Location - Overhead or elsewhere in the cockpit accessible to the responsible aircrew member, functionally grouped together. Design - Requirements for single pilot apply.

**8.5                    Primary voice communications (VHF, UHF) controls(s) -**

(a) Single pilot/tandem pilot: Location - On the left console aft of the power lever(s). Actuation - Performance-related. Design - The pilot's primary voice communications transmitter (MIC) switch shall be located on the power lever.

(b) Side-by-side pilot: Location - Aft of the power controls on the console accessible to both pilots. Actuation - Performance-related. Design - A primary voice communications transmitter (MIC) switch shall be located on the left-hand grip of the pilot's control wheel and on the right-hand grip of the copilot's control wheel. An additional (MIC) switch for the pilot may be installed on the nose wheel steering control.

**8.6                    Intercommunication (ICS) controls -**

(a) Single pilot/tandem pilot: Location - On the right side of the cockpit easily operable by pilot's right hand. Actuation - Performance-related. Design - Pilot shall have a transmitting (ICS) switch on the power lever.

(b) Side-by-side pilot: Location - Pilot's selector control on left console. Copilot's selector control on right console. In aircraft which do not have outboard consoles, these controls shall be located on the appropriate side of the center console. Actuation - Performance-related. Design - Pilot shall have transmitting (ICS) switch on left-hand grip of control wheel. Copilot shall have transmitting (ICS) switch on right-hand grip of control wheel. ICS and MIC switches may be combined by use of two position or rocker type switch.

**8.7                    Navigation controls -**

(a) Single pilot/tandem pilot: Location - On the right side of the cockpit easily operable by pilot's right hand. Actuation - Performance-related.

(b) Side-by-side pilot: Location - Aft of the power quadrant on the center console. Actuation - Performance-related.

**8.8                    Radar identification controls (IFF/SIF) -**

(a) Single pilot/tandem pilot: Location - Optional on either side of the cockpit, right-hand side preferable. Actuation - Performance-related.

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(b) Side-by-side pilot: Location - On the center console adjacent to the navigation controls. Actuation - Performance-related. Design - IFF/SIF controls shall be readily accessible to both pilots.

## 9. INSTRUMENT PANELS

9.1 Instrument panels - General - Single pilot/tandem pilot/side-by-side pilot: Design - The arrangement of instrument panels shall be such as to achieve maximum pilot effectiveness. Instruments shall be grouped functionally insofar as is practicable with priority of placement being given to the most important instruments as determined from the primary mission for the aircraft.

9.2 Basic flight instrument group - Single pilot/tandem pilot/side-by-side pilot: Location - Shall be grouped on the pilot's(s') centerline at the top of the instrument panel with minimum parallax. Arrangement - The basic flight instrument arrangements in MS28112 for U.S. Navy aircraft, or MS33785 for U.S. Army and U.S. Air Force aircraft aircraft, shall be employed, unless consideration of the following factors or analysis conducted in accordance with MIL-H-46855 dictates otherwise:

- (a) The primary operational mission(s) of the aircraft.
- (b) The specific type of instruments and/or instrument system(s) to be employed.
- (c) Size and shape of the instruments.
- (d) Instrument panel size and configuration.

9.3 Engine instruments - The engine instruments shall be placed adjacent to the basic flight instruments and arranged in accordance with MS33634.

## 10. ARMAMENT CONTROLS

10.1 Armament controls - General - Single pilot/tandem pilot/side-by-side pilot: Location - Either in a separate armament panel on the left console, or on the left side of, or along the upper left edge of the instrument panel. These controls shall preferably be located in Zone 1, with a minimum acceptability of Zone 2, as defined in MIL-STD-1333. Actuation - Performance-related. Design - All armament controls shall be operable by the pilot. All necessary pilot-operated armament controls shall be functionally grouped.

10.2 Gun controls and associated items -

(a) Gun firing switch. Single pilot/tandem pilot/side-by-side pilot: Location - At the right forefinger position on the control wheel or stick. Actuation - Squeeze to fire. Design - Actuation of the gun firing switch shall also start the gun camera.

(b) Armament sight manual range control. Single pilot/tandem pilot/side-by-side pilot: Location - On the power control. Actuation - Turn clockwise or press for closing range.

(c) Radar out switch. Single pilot/tandem pilot/side-by-side pilot: Location - On the control stick grip or wheel. Actuation - Performance-related.

(d) Gun charging control. Single pilot/tandem pilot/side-by-side pilot: Location - On or adjacent to armament panel. Actuation - As marked.

10.3 Bomb, rocket, torpedo, and external stores controls -

(a) Normal release switch. Single pilot/tandem pilot/side-by-side pilot: Location - At right-thumb position on the control stick grip or wheel. Actuation - Press to release or fire preselected components of ordnance load.

(b) Emergency release of external stores.

1. Master electrical jettisoning control. Single pilot/tandem pilot/side-by-side pilot: Location - On ordnance or emergency panel, and operable by pilot. Actuation - Push to release. Design - The switch shall be of the guarded plunger type.
2. Mechanical release of external stores. Single pilot/tandem pilot/side-by-side pilot: Actuation: Pull to release. Location - Operable by pilot's throttle hand, and so positioned that the pilot may apply maximum force while maintaining normal forward visibility out of the aircraft. Design - Shall be in addition to the electrical jettisoning control.

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## 11. MISCELLANEOUS CONTROLS AND EQUIPMENT

11.1 Oxygen system controls and displays (including oxygen "ON" "OFF" valve, oxygen regulator with integral pressure gauge and flow indicator, liquid oxygen quantity) -

(a) Single pilot/tandem pilot: Location - Right or left side, forward on console. Design - The integral pressure gauge and flow indicator (when utilized) shall be placed in a position in order to be readily visible.

(b) Side-by-side pilot: Location - Outboard of each pilot, forward. Design - Requirements for single pilot apply.

11.2 Anti-G suit control -

(a) Single pilot/tandem pilot: Location - Aft on the left-hand side of the cockpit adjacent to the seat. Actuation - Performance-related.

(b) Side-by-side pilot: Location - Outboard of each pilot adjacent to the seat. Actuation - Performance-related.

11.3 Cabin air-conditioning control -

(a) Single pilot/tandem pilot: Location - On the right-hand console readily accessible to the pilot. Actuation - Conventional.

(b) Side-by-side pilot: Accessible to the responsible crew member. Actuation - Conventional.

11.4 Shoulder harness lock -

(a) Single pilot/tandem pilot: Location - Forward on the left side of the seat or immediately adjacent thereto. Actuation - Forward to lock.

(b) Side-by-side pilot: Location - Forward on the left side of each seat or immediately adjacent thereto. Actuation - Forward to lock.

11.5 Seat adjustment controls -

(a) Single pilot/tandem pilot/side-by-side pilot: Location - On the right side of each seat or adjacent thereto. Actuation - Control actuation shall correspond to seat movement desired.

11.6 Map stowage -

(a) Single pilot/tandem pilot: Location - Preferably right-hand side of pilot.

(b) Side-by-side pilot: Location - Two map stowage positions, one each on right and left console for the copilot and pilot, respectively.

11.7 De-icing, anti-icing, and pitot heat controls -

(a) Single pilot/tandem pilot: Location - On the right-hand console readily accessible. Actuation - Performance-related.

(b) Side-by-side pilot: Location - On the overhead panel readily accessible. Actuation - Performance-related.

11.8 Bail-out alarm switch -

Single pilot/tandem pilot/side-by-side pilot. Location - On emergency panel. Design - The switch shall be appropriately guarded to prevent inadvertent actuation.

INTERNATIONAL INTEREST: Certain provisions of this standard are the subject of international standardization agreements (ASCC 10/12-STANAG 3217; ASCC 10/13-STANAG 3318; ASCC 10/14-STANAG 3219; ASCC 10/15-STANAG 3220; ASCC 10/16-STANAG 3221; ASCC 10/17-STANAG 3222; ASCC 10/21-STANAG 3258; ASCC 10/22-STANAG 3259; ASCC 10/24-STANAG 3260; ASCC 10/26-STANAG 3357). When revision or cancellation of this standard is proposed, the departmental custodians will inform their respective Departmental Standardization Offices so that appropriate action may be taken respecting the international agreements concerned.

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Copies of specifications, standards, drawings, and publications required by suppliers in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.

**Custodians:**

Army - AV  
Navy - AS  
Air Force - 11

**Preparing activity:**

Navy - AS

(Project No. 1510-0020)

