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MILITARY STANDARD

# AIRCREW STATION CONTROLS AND DISPLAYS FOR ROTARY WING AIRCRAFT

FSC 1520

DEPARTMENT OF DEFENSE
Washington, DC 20301

Aircrew Station Controls and Displays for Rotary Wing Aircraft

MIL-STD-250D

1. This Military Standard is approved for use by all Departments and Agencies of the Department of Defense.

2. Recommended corrections, additions, or deletions should be addressed to the 4950th Test Wing (4950/TZSA), Wright-Patterson Air Force Base, Ohio 45433.

3. Certain provisions of this standard are the subject of international standardization agreements.

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# AIRCREW STATION CONTROLS AND DISPLAYS FOR ROTARY WING AIRCRAFT

## 1. SCOPE

1.1 Scope. The requirements contained herein apply to the design of aircrew stations in rotary wing aircraft procured by the military departments. The contents describe the requirements for the assignment, arrangement, location, and 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 standardized requirements for the design, uniform assignment, arrangement, location, and actuation of control displays used in the functional crew station of military rotary wing aircraft.

## 2. REFERENCED DOCUMENTS

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

SPECIFICATIONS

Military

| | |
|---|---|
| MIL-S-3950 | Switches, Toggle, Environmentally Sealed, General Specification for |
| MIL-C-7188 | Compasses, Pilot's Standby, Installation of |
| MIL-S-8805 | Switches and Switch Assemblies, Sensitive and Push (Snap Action), General Specification for |
| MIL-H-8810 | Handles, Control, Aircraft |
| MIL-S-9487 | Switch, Trigger, Single Pole, Two Stage, Momentary |
| MIL-M-18012 | Markings for Aircrew Station Displays, Design and Configuration of |
| MIL-L-18276 | Lighting, Aircraft Interior, Installation of |
| MIL-S-22885 | Switch, Push Button, Illuminated, General Specification for |
| MIL-K-25049 | Knobs, 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 Requirements 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 | Numbers, Aircraft Engines and Engine Cylinders, Combustion Chambers, Flame Tubes, Inner Liners, and Similar Items |
| MIL-STD-1333 | Aircrew Station Geometry for Military Aircraft |
| MS26521 | Handles, Control, Aircraft Landing Gear |
| MS26523 | Handles, Control, Aircraft Fire Extinguisher |
| MS33634 | Instrument Arrangement, Engine, Standard, Basic for Fixed and Rotary Wing Aircraft |
| MS33785 | Instrument Arrangement, Flight, Standard, Basic for Fixed and Rotary Wing Aircraft |

AFSC Design Handbook

| | |
|---|---|
| DH 2-2 | Crew Stations and Passenger Accommodations |

(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.)

3. DEFINITIONS

3.1 Rotary wing aircraft. The definition of rotary wing aircraft for the purpose of this document shall include all rotary wing aircraft regardless of the device(s) used to produce the thrust or lift.

3.2 Types or aircrew stations. Unless otherwise specified, the requirements contained herein shall apply to all functional aircrew stations in rotary wing aircraft. Aircrew stations shall be classified as designated for the following types:

(a) Tandem:

Class A - dual pilot. A second pilot is required for safe operation of the aircraft and for mission accomplishment. The second pilot will also have ancillary duties based upon the mission requirements of the aircraft; e.g., copilot/gunner, copilot/observer, copilot/systems engineer.

Class B - pilot and tandem aircrew station, with special function for gunner/observer. A second pilot is not required either for safe operation of the aircraft or for mission accomplishment.

Class C - dual pilot and third crewmember. A second pilot is required for safe operation of the aircraft and for mission accomplishment. The second pilot will also have ancillary duties based upon the mission requirements of the aircraft.

(b) Side-by-side:

Class D - dual pilot. A second pilot is required for safe operation of the aircraft and for mission accomplishment. The second pilot will also have ancillary duties based upon the mission requirements of the aircraft; e.g., copilot/gunner, copilot/observer, copilot/systems engineer.

(c) Tandem and side-by-side:

Class E - single pilot. A second pilot is not required either for safe operation of the aircraft or for mission accomplishment.

(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 crewmember imparts motion or force to effect the desired action.

3.3.1 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 actuation of controls. Definitions for the terms "conventional" and "performance-related" shall be as specified in 4.4.

## 4. GENERAL REQUIREMENTS

4.1 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 shall 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 crewmember 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 that 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:

Cyclic
Collective
Power (throttles, mixture, etc)
External stores release
Trim (aircraft/engine)
Primary/alternate escape system
Restraint device lock
Landing gear selector
Auto-pilot disconnect
Bailout/ditching alarm
Emergency electrical power
Emergency engine shutdown and fire extinguishing
Primary fuel selector
Stick positioner
Air start
Cargo hook release
Cable cutters

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

(c) In aircraft not equipped with stabilization systems, no emergency control that is used during flight shall be so located as to require removal of the pilot's right hand from the cyclic pitch stick for operation.

(d) 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, shall be numbered first. Numbering shall be in accordance with MIL-STD-802.

4.3 Assignment of controls to crewmembers. The assignment of controls to crewmembers in the types of aircrew stations specified in 3.2 shall be in accordance with table I, unless the results of studies performed in accordance with MIL-H-46855 dictate otherwise and approval from the procuring activity is obtained. The mission requirement for the aircraft may be a determining factor for deviation from table I, in which case approval shall be obtained prior to incorporating a change. The crewmember designated as "pilot" (in the right seat of a side-by-side aircraft) will be assigned primary function of controls required for safety of flight. In the case of the class A and class D aircrew stations, as defined in 3.2, a copilot is required for safe operation of the aircraft, in which case control functions required for safety of flight shall be assigned to the copilot as shown in table I.

4.3.1 Definitions of control assignments. The significance of the letters used in table I in the assignment of controls matrix is as follows:

(a) "P" stands for primary and indicates that a particular control must be readily accessible to the crewmember to whom it is assigned. By this it is meant that a control must be so located that the crewmember, when seated, may reach and operate the control throughout the full range of movement with a minimum of effort and with the seat belt fastened and the shoulder harness in place and locked.

(b) "S" stands for secondary and indicates that a particular control is a secondary function of the crewmember to whom it is assigned. Some compromise regarding accessibility may be tolerated if substantiated by specific design criteria and approved by the procuring activity.

(c) "O" stands for optional and indicates that a particular control is an optional function of the crewmember to whom it is assigned. Assignment of controls in this category must be based upon specific mission requirements of the aircraft or specific design criteria, or both, and approved by the procuring activity.

(d) "N" stands for none and indicates that there is no requirement for a particular control at that crew station.

4.3.2 Recognition in this standard of a particular subsystem and associated control(s) shall in no way be construed as a requirement for, or indorsement of, that subsystem or control(s) in any aircraft design. Rather, this matrix designates functional assignment for each control in the event that said control is incorporated. It also establishes a precedence for the accessibility of a particular control to the crewmember designated.

TABLE I. Assignment of Controls for Rotary Wing Aircraft

| | Class A | | Class B | | Class C | | | Class D | | Class E | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1/ P | 1/ CP | P | 1/ CSF | P | CP | 1/ Ø | P | CP | P | Ø |
| A. Primary flight controls | | | | | | | | | | | |
| 1. Cyclic | P | P | P | N | P | P | N | P | P | P | |
| 2. Collective | P | P | P | N | P | P | N | P | P | P | |
| 3. Anti-torque pedals | P | P | P | N | P | P | N | P | P | P | |
| 4. Power (throttle) | P | P | P | N | P | P | N | P | P | P | |
| B. Secondary flight controls | | | | | | | | | | | |
| 1. Trim | P | P | P | N | P | P | N | P | P | P | |
| 2. SAS | P | S | P | N | P | S | N | P | S | P | |
| 3. Auto pilot | | | | | | | | | | | |
| (a) Electric disconnect | P | S | P | N | P | S | N | P | P | P | |
| (b) Mechanical disconnect | P | S | P | N | P | S | N | P | S | P | |
| 4. Control boost system | P | S | P | N | P | S | N | P | S | P | |
| 5. Stick positioner | P | S | P | N | P | S | N | P | S | P | |
| 6. Force trim | P | P | P | N | P | P | N | P | P | P | |
| 7. Speed brake | P | N | P | N | P | N | N | P | S | P | |
| 8. Control decoupler | P | S | P | N | P | S | N | P | P | P | |
| 9. Control command override | P | N | P | N | P | N | N | P | S | P | |
| C. Vehicle subsystem controls | | | | | | | | | | | |
| 1. Wheel brakes - pedals | P | O | P | N | P | O | N | P | P | P | |
| 2. Parking brake | | | | | | | | | | | |
| (a) Apply | P | O | P | N | P | O | N | P | S | P | |
| (b) Release | P | N | P | N | P | O | N | P | S | P | |
| 3. Landing gear selector | P | S | P | N | P | S | N | P | P | P | |
| 4. Ground lock, flight controls | P | O | P | N | P | O | N | P | S | P | |
| 5. Directional pedal adjust | P | P | P | N | P | P | N | P | P | P | |
| 6. Windshield wiper | P | P | P | N | P | P | N | S | P | P | |
| 7. Windshield washer | P | P | P | N | P | P | N | S | P | P | |
| 8. Harness lock | P | P | P | P | P | P | P | P | P | P | |
| 9. Seat adjustment | P | P | P | P | P | P | P | P | P | P | |
| 10. Ground steering | P | O | P | N | P | O | N | P | S | P | |
| 11. Environmental | | | | | | | | | | | |
| (a) Heat temperature selector | P | S | P | S | P | S | O | S | P | P | |
| (b) Cool temperature selector | P | S | P | S | P | S | O | S | P | P | |
| (c) Antifog-defrost | P | S | P | S | P | S | O | S | P | P | |
| (d) Anti-ice-windscreen | P | S | P | S | P | S | O | S | P | P | |
| 12. Rotor, anti-ice | P | S | P | N | P | S | N | S | P | P | |
| 13. Air foil, anti-ice | P | S | P | N | P | S | N | S | P | P | |

1/ See footnote at end of table.

TABLE I. Assignment of Controls for Rotary Wing Aircraft (Cont)

| | Class A | | Class B | | Class C | | | Class D | | Class E | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1/ P | 1/ CP | P | 1/ CSF | P | CP | 1/ Ø | P | CP | P | Ø |
| 14. Thruster propeller, anti-ice | P | A | P | N | P | S | N | S | P | P | |
| 15. Intake screen | P | S | P | N | P | S | N | S | P | P | |
| 16. Canopy opening - normal | P | S | P | N | P | S | N | P | P | P | |
| 17. Rotor blade folding/stowing | | | | | | | | | | | |
| (a) Transition mode selector (in-flight) | P | S | P | N | P | S | O | P | S | P | |
| (b) Blade folding (ground) | O | O | O | N | O | O | O | S | P | P | |
| 18. A/C warning/status information system | P | S | P | S | P | S | S | P | P | P | |
| 19. Rotor brake | P | N | P | N | P | N | N | P | N | P | |
| D. Powerplant controls (turbine) | | | | | | | | | | | |
| 1. Power (throttle) | P | O | P | N | P | O | O | P | P | P | |
| 2. Engine conditioner | P | S | P | N | P | S | O | P | P | P | |
| 3. Engine speed trim | P | P | P | N | P | P | O | P | P | P | |
| 4. Thruster propeller pitch(b) | P | P | P | N | P | P | O | P | P | P | |
| 5. Oil cooler | P | S | P | N | P | S | O | S | P | P | |
| 6. Air start switch(es) | P | O | P | N | P | O | O | P | P | P | |
| 7. Start switch(es) | P | N | P | N | P | N | O | P | S | P | |
| 8. APU | P | N | P | N | P | N | O | S | P | P | |
| 9. Liquid injection (power augmentation) | P | N | P | N | P | N | O | P | S | P | |
| 10. Diverter selector (thrust) | P | S | P | N | P | S | O | P | P | P | |
| 11. Ram air (filter bypass) | P | S | P | N | P | S | O | S | P | P | |
| E. Fuel system controls | | | | | | | | | | | |
| 1. Fuel pump(s) | P | S | P | N | P | S | O | P | P | P | |
| 2. Fuel tank selector(s) | P | S | P | N | P | S | O | P | P | P | |
| 3. Fuel dump valve | P | N | P | N | P | N | O | P | S | P | |
| 4. Fuel transfer selection | P | S | P | N | P | S | O | P | P | P | |
| 5. In-flight refueling system | P | N | P | N | P | N | O | S | P | P | |
| F. Emergency controls | | | | | | | | | | | |
| 1. Blade jettison | P | S | P | N | P | S | N | P | O | P | |
| 2. Ejection seat | | | | | | | | | | | |
| (a) Individual | P | P | P | P | P | P | P | P | P | P | |
| (b) Command ejection | P | N | P | N | P | N | N | P | N | N | |
| 3. Canopy release | | | | | | | | | | | |
| (a) Canopy system release | P | S | P | S | P | S | S | P | S | P | |
| (b) Individual station release | P | P | P | P | P | P | P | P | P | N | |

1/ See footnote at end of table.

TABLE I. Assignment of Controls for Rotary Wing Aircraft (Cont)

| | Class A | | Class B | | Class C | | | Class D | | Class E | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1/ P | 1/ CP | P | 1/ CSF | P | CP | 1/ Ø | P | CP | P | Ø |
| 4. Fuel pump | P | S | P | N | P | S | O | P | S | P | |
| 5. Fuel governor | P | S | P | N | P | S | O | P | S | P | |
| 6. Flight control trim | P | S | P | N | P | S | N | P | S | P | |
| 7. Cargo hook release | N | N | N | N | N | N | N | P | S | O | |
| 8. Hydraulic pump | O | O | P | N | O | O | N | S | P | P | |
| 9. Wheel brake selector | P | O | P | N | P | O | N | P | S | P | |
| 10. Landing gear selector | | | | | | | | | | | |
| (a) Override retraction | P | S | P | N | P | S | N | P | S | P | |
| 11. Flare release | P | P | P | N | P | O | O | P | P | P | |
| 12. Alarm system | N | N | N | N | P | S | S | P | P | N | |
| 13. Auto-pilot disconnect | P | P | P | N | P | P | N | P | P | P | |
| 14. External stores jettison | | | | | | | | | | | |
| (a) All stores (electric) | P | P | P | S | P | P | N | P | P | P | |
| (b) System (specific) | P | P | P | S | P | P | N | P | P | P | |
| (c) Manual | P | N | P | N | P | N | N | P | S | P | |
| 15. Fuel/oil shutoff | P | P | P | N | P | P | O | P | P | P | |
| 16. Hoist cable cutter | N | N | N | N | N | N | N | S | P | O | |
| 17. Circuit breakers ac/dc (safety of flight) | P | S | P | S | P | S | O | P | S | P | |
| G. Auxiliary system controls | | | | | | | | | | | |
| 1. Hoist operate | N | N | N | N | N | N | N | P | S | O | |
| 2. Cargo hook release | N | N | N | N | N | N | N | P | P | O | |
| 3. $O_2$ system | P | P | P | P | P | P | P | P | P | P | |
| 4. Flares | S | P | S | P | S | P | O | S | P | P | |
| 5. Smoke canister dispenser | S | P | S | P | S | P | O | S | P | P | |
| 6. Wire laying | S | P | S | P | S | P | O | S | P | P | |
| 7. Ground illumination system | S | P | S | P | S | P | O | S | P | P | |
| H. Electrical controls | | | | | | | | | | | |
| 1. Master battery switch | P | S | P | N | P | S | O | P | S | P | |
| 2. Generator ac/dc | P | S | P | N | P | S | O | P | S | P | |
| 3. Circuit breakers ac/dc | P | S | P | O | P | S | O | P | S | P | |
| 4. Inverter(s) selector | P | S | P | N | P | S | O | P | S | P | |
| (a) Manual changeover | P | S | P | N | P | S | O | P | S | P | |
| 5. External lights | | | | | | | | | | | |
| (a) Position | P | S | P | N | P | S | N | S | P | P | |
| (b) Navigation | P | S | P | N | P | S | N | S | P | P | |
| (c) Identification | P | S | P | N | P | S | N | S | P | P | |
| (d) Anticollision | P | S | P | N | P | S | N | S | P | P | |

1/ See footnote at end of table.

TABLE I. Assignment of Controls for Rotary Wing Aircraft (Cont)

| | Class A | | Class B | | Class C | | | Class D | | Class E | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1/ P | 1/ CP | P | 1/ CSF | P | CP | 1/ Ø | P | CP | P | Ø |
| 6. Landing light(s) | P | S | P | N | P | S | N | P | S | P | |
| 7. Searchlight(s) | P | P | P | P | P | P | S | P | S | P | |
| 8. Taxi light(s) | P | S | P | N | P | S | N | P | S | P | |
| 9. Crew signal | | | | | | | | | | | |
| (a) No smoking | N | N | N | N | P | N | N | S | S | N | |
| (b) Seat belts fasten | N | N | N | N | P | N | N | S | S | N | |
| (c) Passenger/cargo compartment lighting | N | N | N | N | P | P | P | S | S | N | |
| 10. Floodlight, instruments | P | P | P | P | P | P | P | P | P | P | |
| 11. Cockpit integral light (panel) | P | P | P | P | P | P | P | P | P | P | |
| 12. Utility light | P | P | P | P | P | P | P | P | P | P | |
| I. Avionics controls | | | | | | | | | | | |
| 1. Navigation | | | | | | | | | | | |
| (a) Computer control | P | S | P | O | P | S | O | P | S | P | |
| (b) Map plotter | P | O | P | O | P | O | O | S | P | P | |
| (c) Heading reference | P | N | P | N | P | N | O | S | P | P | |
| (d) VHF NAV | P | O | P | O | P | O | P | O | P | P | |
| (e) UHF NAV | P | O | P | O | P | O | O | P | P | P | |
| (f) FM homing | P | P | P | O | P | P | O | P | P | P | |
| (g) LF/ADF | P | O | P | O | P | O | O | P | P | P | |
| (h) Position fixing navigation system | P | O | P | O | P | O | O | P | P | P | |
| 2. Communications | | | | | | | | | | | |
| (a) VHF | P | O | P | O | P | O | O | P | P | P | |
| (b) UHF | P | O | P | O | P | O | O | P | P | P | |
| (c) FM | P | S | P | S | P | S | O | P | P | P | |
| (d) ICS | P | P | P | P | P | P | P | P | P | P | |
| (e) VHF/SSB | P | O | P | O | P | O | O | P | P | P | |
| 3. IFF/SIF | P | S | P | N | P | S | N | P | P | P | |
| 4. Environmental sensing | | | | | | | | | | | |
| (a) TF/TA system | P | O | P | N | P | O | N | P | S | O | |
| (b) SKS station keeping system | P | O | P | N | P | O | N | P | S | O | |
| (c) Night vision system | P | S | S | P | P | S | O | O | O | N | |
| 5. Survivability systems | | | | | | | | | | | |
| (a) Passive (warning) | P | P | P | P | P | P | O | S | P | P | |
| (b) Active (jamming) | P | P | P | P | P | P | O | S | P | P | |

1/ See footnote at end of table.

TABLE I. Assignment of Controls for Rotary Wing Aircraft (Cont)

| | Class A | | Class B | | Class C | | | Class D | | Class E | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1/ P | 1/ CP | P | 1/ CSF | P | CP | 1/ Ø | P | CP | P | Ø |
| J. Fire control | | | | | | | | | | | |
| 1. Master arm/disarm | P | S | P | S | P | S | O | P | S | P | |
| 2. Fixed weapons | P | S | P | S | P | S | N | P | S | P | |
| 3. Flexible weapons | S | P | S | P | N | P | O | N | P | N | |
| 4. Guided weapons | S | P | O | P | S | P | O | S | P | P | |
| 5. Special stores | O | O | O | O | O | O | O | O | O | P | |
| 6. Override/interrupt | P | N | P | N | P | N | N | P | N | P | |
| 7. Central computer | P | S | P | S | O | O | O | P | S | P | |
| K. Surveillance controls | | | | | | | | | | | |
| 1. Standby/on/off | S | P | O | P | N | O | P | S | P | N | |
| 2. Mode selection | S | P | O | P | N | O | P | S | P | N | |
| 3. Record | S | P | O | P | N | O | P | S | P | N | |
| 4. Process | S | P | O | P | N | O | P | S | P | N | |
| 5. Display | O | P | O | P | N | O | P | O | P | N | |
| 6. Optimize/tuning | O | P | O | P | N | O | P | O | P | N | |
| 7. Transmit | S | P | S | P | N | O | P | S | P | N | |
| L. ASW controls | | | | | | | | | | | |

1/ Symbols used in table I for different crewmembers are as follows:

P - Pilot
CP - Copilot
CSF - Crewmember with special function (may be a pilot)
Ø - Nonpilot crewmember(s) with special function(s)

4.4 Actuation of controls. Actuation of controls shall be in accordance with the following:

(a) The term "conventional" referenced throughout this document indicates that all controls shall be actuated in accordance with established custom or in the direction of intended motion if the structure being controlled is applicable.

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

(1) Controls shall be so designed that the forward, upward, or clockwise actuation thereof shall result in increased performance of the component or the aircraft.

(2) Controls shall be so designed that the aft, downward, or counterclockwise actuation thereof 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.

(c) Control functions not covered by this standard for which the crewmember 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 vertical or horizontal to avoid ambiguity of control movement. For these panels, the 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 to 30 degrees with respect to the vertical axis.

(2) Forward, if the panel forms an angle greater than 30 degrees and equal to or less than 90 degrees.

(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 Displayed information. Displayed information shall consist of and shall be in accordance with the following:

(a) Displayed information shall consist of:

(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 station shall be kept to a minimum and shall be in accordance with MIL-M-18012 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.

(e) Emergency exiting and ditching. Printed instructions and procedures shall be provided for nonaircrew 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 MIL-STD-411. Associated signal displays and controls shall be located and activated in accordance with the requirements specified herein.

(h) Displayed information. Control panels shall be in accordance with MIL-C-81774.

4.6 Control knobs, handles, and switches. The following requirements shall apply to control knobs, handles, and switches:

(a) Control knobs, handles, and switches shall be in accordance with the applicable military standard (MS), except when space necessitates the use of miniature sizes which shall require approval by the procuring activity. Miniaturized switches shall not be employed for functions which are critical for safety of flight operation. 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-22885.

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

(c) The more frequently used controls shall be located closer 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, and temperature, do not require intermediate position markings between extreme control positions at the control location.

(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 or would produce a dangerous situation, shall have guarded or safety detent design features.

(f) Control coding. Controls within functional groups, e.g., tactical air navigation (TACAN) controls and internal navigation system (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, particularly for controls not easily viewed from the operator's design eye position (see MIL-STD-1333).

4.7 Cockpit dimensional requirements. The dimensional requirements for rotary wing aircraft shall conform to MIL-STD-1333 or AFSC DH 2-2 (USAF).

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. 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 on figures 1, 2, and 3.

4.10 Other aircrew stations. Generally, 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 this standard.

4.10.1 Duplication of flight and key mission functions. Where flight and key mission functions are duplicated at stations other than the pilot/copilot stations, the configuration, location, and associated controls and displays shall be identical with those of the pilot/copilot except where functional priorities and duties dictate alternate configurations; i.e., load facing pilot, copilot, gunner, etc. In these cases, departure from standard configurations shall require approval by the procuring activity.

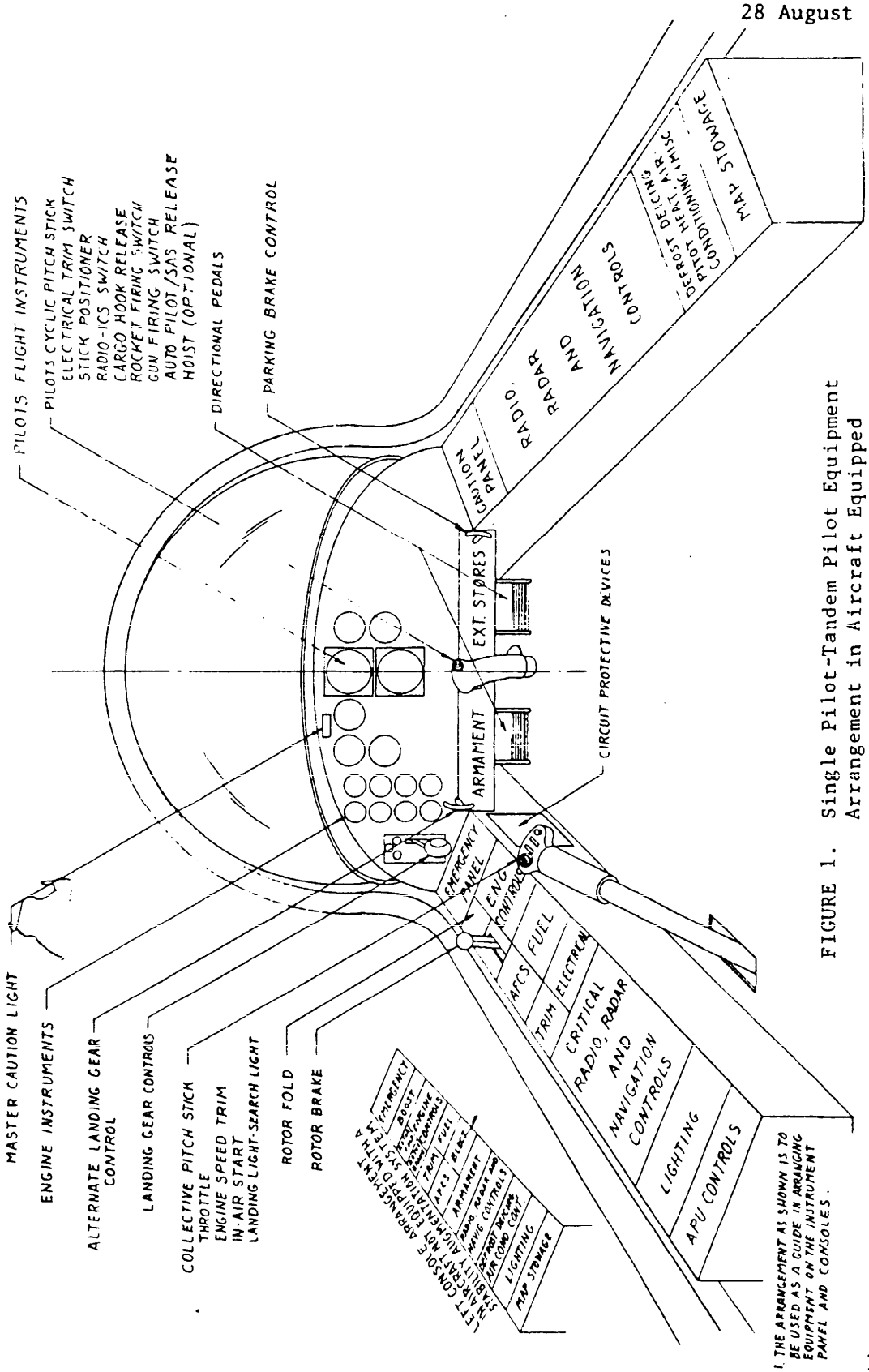
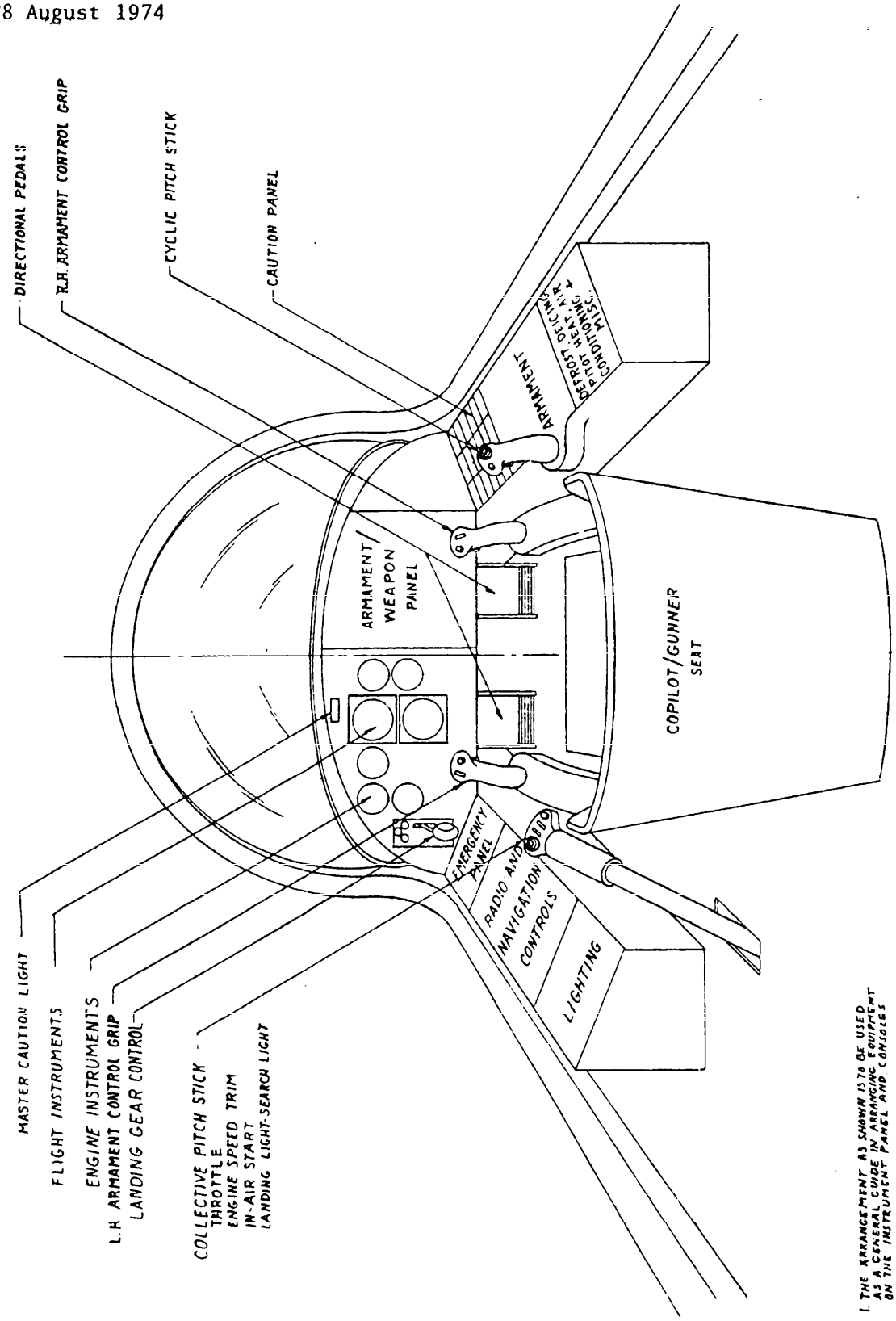



FIGURE 1. Single Pilot-Tandem Pilot Equipment Arrangement in Aircraft Equipped With a Stability Augmentation System




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

FIGURE 2. Copilot/Gunner Equipment Arrangement

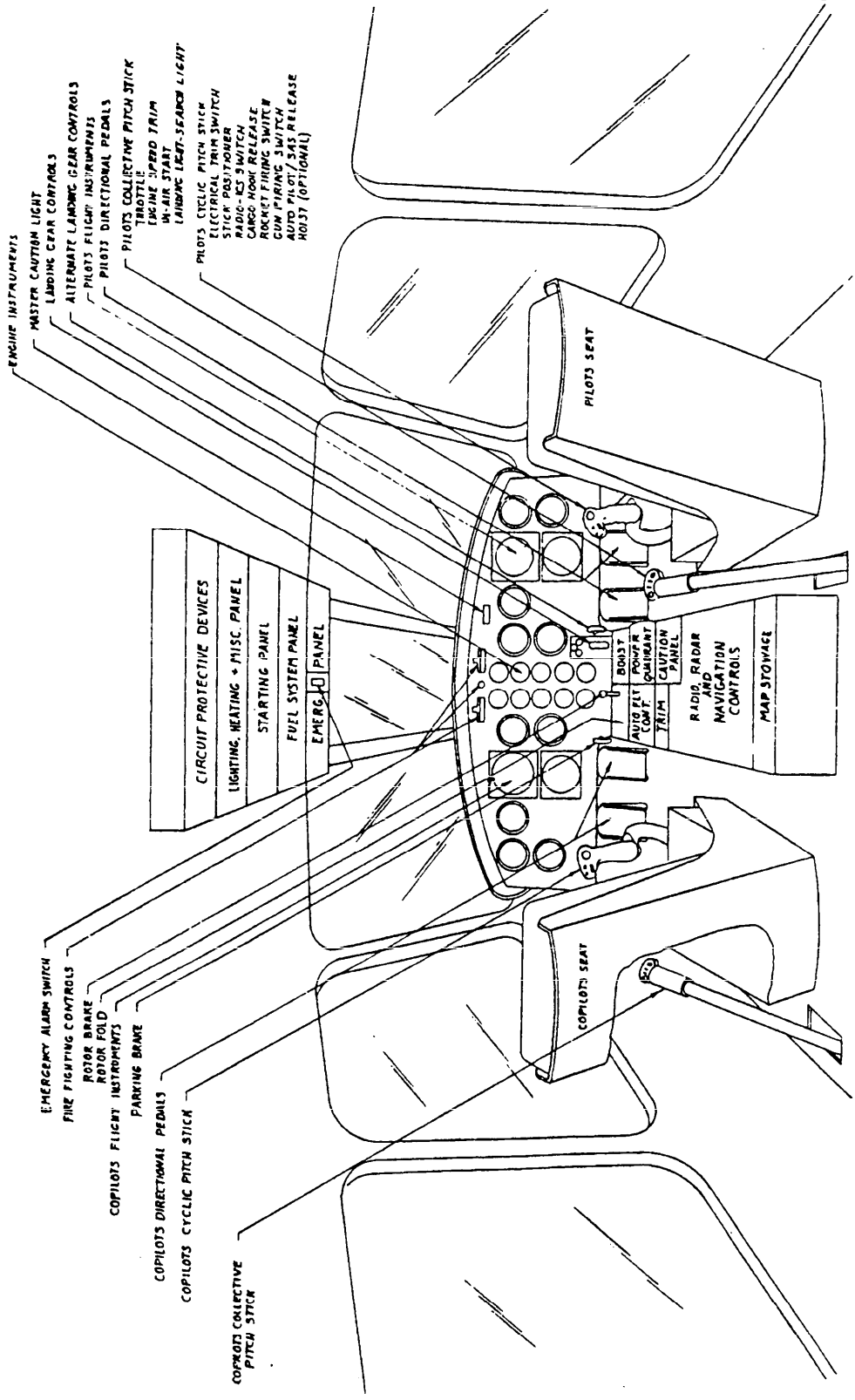



FIGURE 3. Side-by-Side Pilot Equipment Arrangement

## 5. DETAIL REQUIREMENTS

### 5.1 Flight and ground controls and displays

5.1.1 Checkoff lists. Checkoff lists shall be in accordance with the following requirements:

(a) Single/tandem pilot:

(1) Location - When required, the landing checkoff list shall be located on the left and the takeoff checkoff list on the right of the instrument panel or adjacent thereto.

(2) Design - Each takeoff and landing list shall be applicable to a particular aircraft model. 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:

(1) 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.

(2) Design - Single pilot design requirements apply.

5.1.2 Anti-torque pedals. The location and the method of actuation of anti-torque pedals in single/tandem/side-by-side pilot aircrew stations shall be conventional.

5.1.3 Anti-torque pedal adjustment control. The anti-torque pedal adjustment control in single/tandem/side-by-side pilot aircrew stations shall be located and actuated as follows:

(a) Location - A single control to adjust both pedals is required and shall be located forward of and near the centerline of the pilot.

(b) Actuation - The control motion to extend the pedals shall be clockwise, push, or lift (depending on the type of mechanism employed).

5.1.4 Cyclic pitch stick control. The location and the method of actuation of the cyclic pitch stick control in single/tandem/side-by-side pilot aircrew stations shall be conventional. Separate controls shall be incorporated for each pilot.

5.1.4.1 Cyclic pitch stick grip. The following functions, if required, shall be provided on the cyclic pitch stick grip:

(a) Electric trim control

(b) Force trim

(c) Radio - Intercommunication control system (ICS) switch

(d) Release (cargo hook, tow hook, external stores)

(e) Rocket firing

(f) Gun firing

(g) Auto pilot/ stability augmentation system (SAS) release.

5.1.5 Collective pitch stick control. The collective pitch stick control in single/tandem/side-by-side pilot aircrew stations shall be in accordance with the following requirements:

(a) Location - To the left of the pilot(s) seat.

(b) Actuation - Conventional.

(c) Design - Separate controls of the same configuration shall be provided for each pilot. An adjustment friction device or irreversible mechanism shall be incorporated in the pilot-in-command control only.

5.1.6 Control system power boost control(s). The location and actuation of the control system power boost control(s) shall be as follows:

(a) Single/tandem pilot:

(1) Location - On the console forward of power controls.

(2) Actuation - Performance related.

(b) Side-by-side pilot:

(1) Location - On the center console forward of the power controls.

(2) Actuation - Performance related.

5.1.7 Automatic flight control system controls. The location and actuation of the automatic flight control system controls shall be as follows:

(a) Single/tandem pilot:

(1) Location - On the left console convenient to the pilot.

(2) Actuation - Performance related.

(b) Side-by-side pilot:

(1) Location - On the center console accessible to both pilots.

(2) Actuation - Performance related.

(c) An emergency cutoff switch shall be located on the cyclic pitch stick grip.

5.1.8 Flight trim controls. The following requirements shall apply to the location, actuation, and design of trim controls:

(a) Single/tandem pilot:

(1) Location - On the left console convenient to the pilot, except when the trim controls are electrically actuated, in which case they shall be placed on the top aft portion of the cyclic stick grip.

(2) Actuation - Performance related.

(3) Design:

(a) Trim controls shall be designed to safeguard against inadvertent or abrupt operation. An override switch shall be provided to stop overtrim action.

(b) If required, means shall be provided to indicate the direction of adjustment and position of the trim device with respect to the range of adjustment. The indicator shall be clearly distinguishable day and night over the entire trim range.

(c) Unless otherwise specified by the procuring activity, the electrical trim shall be a four-way "Chinese hat" type control.

(b) Side-by-side pilot:

(1) Location - On the center console accessible to both pilots, except when the trim controls are electrically actuated, in which case they shall be placed on the top aft position of the cyclic control stick grip.

(2) Actuation - Performance related.

(3) Design - Requirements for single pilot apply.

5.1.9 Force trim. The following requirements shall apply to the force trim control in single/tandem/side-by-side pilot aircrew stations:

(a) Location - When an electrically actuated force trim is used, the control shall be located on the cyclic stick grip.

(b) Actuation - Performance related.

(c) Design - The force trim shall be a pushbutton-type switch.

5.1.10 Landing gear control. The landing gear control shall be in accordance with the following requirements:

(a) Single/tandem pilot:

(1) Location - Forward on the left and operable by the pilot with shoulder harness locked.

(2) Actuation - Performance related.

(3) Design - Landing gear control knob shape shall conform to MS26521. Indicator light shall be steady ON when landing gear position does not correspond with landing gear control selection.

(b) Side-by-side pilot:

(1) Location - On the lower center portion of the instrument panel or on the center console operable by both pilots in their normal positions while maintaining forward visibility out of the aircraft.

(2) Actuation - Performance related.

(3) Design - Requirements for single pilot apply.

(c) Emergency retraction - Single/tandem/side-by-side pilot:

(1) Location - As close as practicable to the normal control.

(2) Actuation - Depress pushbutton or similar device and raise landing gear control lever.

(3) Design - Emergency override control shall be provided with a safety device to prevent inadvertent actuation on the ground.

5.1.11 Alternate landing gear control. The alternate landing gear control in single/tandem/side-by-side pilot aircrew stations shall be in accordance with the following requirements:

(a) 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 alternate gear system.

(b) Actuation - A separate and distinct motion from normal operation (performance related).

5.1.12 Landing gear position indicators. The landing gear position indicators in single/tandem/side-by-side pilot aircrew stations shall be located on the instrument panel or adjacent to the landing gear control lever visible to the pilot(s).

5.1.13 Wheel brake controls. The following requirements shall apply to wheel brake controls in single/tandem/side-by-side pilot aircrew stations:

(a) Location - Toe pedals, integral with each anti-torque (rudder) pedal.

(b) Actuation - Conventional.

(c) Design - When dual brake controls are incorporated, simultaneous braking action by both pilots shall be possible.

5.1.14 Parking brake control. The location and actuation of the parking brake control shall be as follows:

(a) Single/tandem pilot:

(1) Location - Under the instrument panel to the left of the pilot's centerline.

(2) Actuation - Pull to actuate. Press brake pedals to release.

(b) Side-by-side pilot:

(1) Location - On the center console or below the instrument panel, accessible to both pilots.

(2) Actuation - Actuation for single pilot applies.

5.1.15 Wheel centering lock. The wheel centering lock in single/tandem/side-by-side aircrew stations shall be located on the left or center console. Actuation shall be upward or forward, or both, to lock and reverse action to unlock.

5.1.16 Rotor brake control. The following requirements shall apply to the rotor brake control in single/tandem/side-by-side pilot aircrew stations:

(a) Location - Adjacent to the power quadrant, on left, center, or overhead console, operable by either pilot.

(b) Actuation - Performance related.

(c) Design - A safety device shall be incorporated in the system to prevent starting of rotor while brake is engaged. Design of the control shall be such that inadvertent operation will not be possible.

5.1.17 Rotor blade folding controls (ground). The following requirements shall apply to the rotor blade folding controls (ground) in single/tandem/side-by-side pilot aircrew stations:

(a) Location - On the left console or overhead console accessible to the pilot(s).

(b) Actuation - Forward for the spread position, aft for the fold position.

(c) Design - Actuation of the control to fold the rotor blades shall automatically position the blades for folding. Positive interlocks shall be provided to prevent premature or accidental engagement and to prevent rotation of the rotor head during fold/spread cycle or while blades are folded.

5.2 Powerplant controls

5.2.1 Reciprocating engine controls

5.2.1.1 Rotary power control (throttle). The following requirements shall apply to the rotary power control (throttle) in single/tandem/side-by-side pilot aircrew stations:

(a) Location - On the collective pitch stick.

(b) Actuation - Clockwise to increase power (viewed from free end of stick).

(c) Design - This control shall be an integral part of the collective pitch stick grip and shall be a "motorcycle" type throttle. The desired angle of grip rotation is 120 degrees. The maximum shall be 150 degrees. A suitable means shall be incorporated in the linkage system for obtaining proper sensitivity. Override provisions in excess of 150 degrees may be provided if a particular design dictates. An adjustable friction device or irreversible mechanism shall be provided for the pilot's control only. This friction device shall be adjustable by the pilot without requiring removal of his hand from the power control.

5.2.1.2 Other power controls. The location and actuation of other power controls shall be as follows:

(a) Single/tandem pilot:

(1) Location - On a power quadrant on the console and operable by the pilot with shoulder harness locked.

(2) Actuation - Performance related.

(b) Side-by-side pilot:

(1) Location - On the center console accessible to both pilots.

(2) Actuation - Performance related.

5.2.2 Turbine engine controls

5.2.2.1 Engine conditioner control. The engine conditioner control shall be in accordance with the following requirements:

(a) Location - The control may be an integral part of the collective stick control grip, or it may be arranged on a separate engine control panel, depending on the mission requirement. If the engine conditioner control is located on the collective stick control, it shall be a twist-grip-type control. When a beta control (thruster propeller pitch) is employed on the collective stick, the engine conditioner control shall be located immediately aft of the beta control. When the engine conditioner control is arranged on an engine control panel, it shall be located on the left console in a tandem pilot seating arrangement or on the center pedestal in a side-by-side pilot seating arrangement. In the event space is not available on the pedestal, the engine control panel may be located on the overhead console when approved by the procuring activity.

(b) Actuation - Actuation shall be to rotate the twist grip control clockwise (viewed from free end of stick), starting at the OFF position. Actuation of controls on the engine control panel shall be conventional or performance-related. When required, the engine conditioner control shall be provided with the following functions:

(1) Off (stop engine)

(2) Start and ignition

(3) Ground idle

(4) Flight idle

(5) Run

(6) Friction control.

(c) Design - Maximum angle of rotation for the twist grip control shall not exceed 150 degrees, and it is preferred the rotation shall not exceed 120 degrees when possible. The rotation angle is measured starting from the OFF position. Positive stops shall be provided for each function. A safety feature shall be incorporated to prevent inadvertent rotation of the control to the next function. A friction device, adjustable by the pilot, shall be provided to control the effort required to rotate the control. The friction control shall be operable by the pilot with his left hand without releasing his hold on the collective stick grip. Markings shall be provided to show each control function and arrowheads to show the direction of rotation.

5.2.2.2 Engine(s) speed trim control(s). The engine(s) speed trim control(s) shall be in accordance with the following requirements:

(a) Location - On the top end of the collective stick control and accessible by the pilot without removing his left hand from the collective stick grip control. If two or more engines are installed, engine speed trim controls (beepers) shall be located side-by-side on the top forward end of the collective stick control head and shall be numbered from left to right in accordance with engine numbering convention.

(b) Actuation - Actuation shall be momentary (beep) type switch, forward to increase engine RPM and aft to decrease engine RPM.

(c) Design - Engine trim switch(es) shall provide fine adjustment of the engine speed when the engine conditioner control is in the run position. Markings shall be provided to show the increase and decrease RPM positions. When more than one engine is controlled, the trim switch(es) shall provide for individual adjustment of the engine speed. Markings shall be provided to identify the trim switch(es) corresponding to the engine.

(d) Emergency engine trim switch(es)

(1) Location - Aft of the engine condition levers on the console.

(2) Actuation - Actuation shall be momentary (beep) type switch forward to increase engine RPM and aft to decrease engine RPM.

(3) The emergency engine trim switch(es) shall provide for emergency engine trim if the power turbine control box (normal beep trim) malfunctions. Marking shall be provided as specified in (c) above.

5.2.2.3 Beta control (thrust propeller). The beta control (thrust propeller) shall be in accordance with the following requirements:

(a) Location - The control shall be an integral part of the collective stick control grip and shall be a twist grip control similar to the engine conditioner control. It shall be located immediately forward of the engine conditioner control and shall adjust the pitch of the thrust propeller for forward and reverse thrust.

(b) Actuation - Actuation shall be accomplished by twisting or rotating the grip clockwise (viewed from free end of stick) to increase pitch and counterclockwise to decrease pitch in the forward thrust position. Reverse thrust shall be accomplished by rotating the control counterclockwise (viewed from free end of stick). Rotation counterclockwise while in reverse thrust shall increase the pitch of the thrust propeller in reverse. A positive stop or detent shall be provided at the neutral beta pitch setting to prevent inadvertent selection of reverse pitch and to provide a distinct point of reference between forward and reverse pitch settings.

(c) Design - The maximum angle of rotation shall be 120 degrees from full reverse thrust to full forward thrust. A friction control shall be provided for adjusting the friction on the beta twist control. The friction control shall be adjustable by the pilot without removing his left hand from the collective stick control. Markings shall be provided to show the position of the control, with arrowheads showing the direction of rotation.

5.2.2.4 Pitch trim speed, range control. Location, actuation, and design of the pitch trim speed, range control shall be as follows:

(a) Location - On the center pedestal in side-by-side aircrew station, accessible to both pilots. In tandem aircrew station, on the left side console.

(b) Actuation - Forward actuation to select the high speed range for the beta control and aft to select the low speed range.

(c) Design - The switch shall be marked to show the position corresponding to the speed range.

5.2.3 Engine oil temperature control. The engine oil temperature control shall be in accordance with the following requirements:

(a) Location - On the center pedestal in side-by-side aircrew station, accessible by both pilots. In tandem aircrew station, on the left console.

(b) Actuation - Actuation of the switch to any position other than automatic (neutral or center position) shall require overriding of a positive stop or detent. Movement of the switch forward of the automatic stop/detent shall increase cooling. Movement of the switch aft of the automatic stop/detent shall decrease cooling of the engine oil.

(c) Design - Markings shall be provided to show the switch position corresponding to the action required.

5.2.3.1 Engine oil cooler flap control. The location, actuation, and design of the engine oil cooler flap control shall be as follows:

(a) Location - On the center pedestal in side-by-side aircrew station, accessible to both pilots. On left side console in tandem aircrew stations.

(b) Actuation - Performance related.

(c) Design - Markings shall be provided to show position of the control corresponding to the oil cooler flap. Whenever possible, the engine oil cooler flap control should be deleted as a separate control and its functions integrated into the operation of the engine oil temperature control (see 5.2.3).



* NET PROPELLANT MASS:

5.2.4 Induction systems air control(s) (carburetor heat, air filter). The air induction system control(s) in single/tandem/side-by-side pilot aircrew stations shall be in accordance with the following requirements:

(a) Location - To the left of the mixture control(s).

(b) Actuation - Performance related.

(c) Design - A unitary control is desirable. The forward or upward position shall be for ram or direct air, and the aft or lower position shall be for alternate or heated air. Filter positions shall be appropriately marked.

5.2.5 Induction system anti-icing control. The induction system anti-icing control in single/tandem/side-by-side pilot aircrew stations shall be located aft or outboard of the induction system control. Actuation shall be performance related.

5.2.6 Fuel system selector controls. The fuel system selector controls shall be in accordance with the following requirements:

(a) Single/tandem pilot:

(1) Location - Immediately aft of the power quadrant or engine control panel.

(2) Actuation - Mechanical rotary and lever-type control(s) or electrical switch selector(s) shall be forward or up for ON and aft or down for OFF.

(3) 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 turn the fuel selector(s) to the OFF position. Where selection of fuel may be obtained 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 aircraft.

(b) Side-by-side pilot:

(1) Location - Selector(s) shall be located on the center console convenient to the pilots. Where electrical selection is incorporated, the selector(s) may be grouped in a fuel panel in the number 2 position of the overhead console (see figure 4).

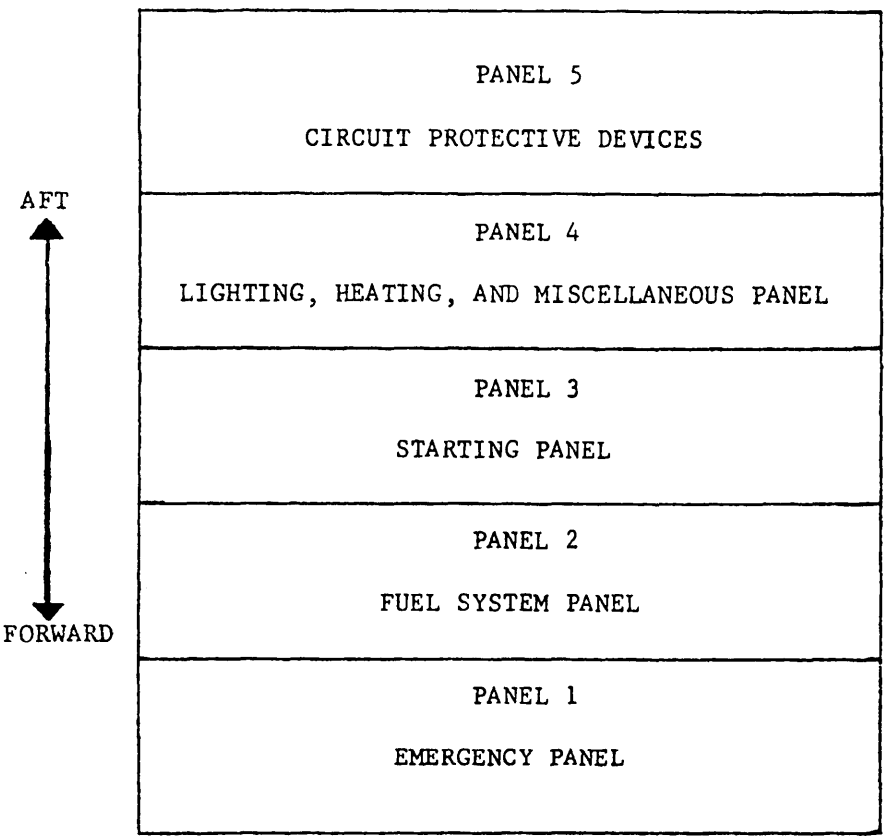



FIGURE 4. Forward and Overhead Switch Panel for Side-by-Side Rotary Wing Aircraft

(2) Actuation - Actuation for single pilot applies.

(3) Design - Requirements for single pilot apply.

5.2.7 Ignition control switch(es)

5.2.7.1 Reciprocating engine ignition control switch(es). The following requirements shall apply to the ignition control switch(es) for reciprocating engines:

(a) Single/tandem pilot:

(1) Location - On the left console and operable by the pilot with shoulder harness locked.

(2) Actuation - Clockwise rotation shall produce the following sequence: OFF, RIGHT, LEFT, BOTH.

(3) Design - Individual switches with provisions for emergency grounding should be used on multireciprocating engine aircraft. Ignition switches shall be separated electrically and mechanically without provision for multiple cutoff.

(b) Side-by-side pilot:

(1) Location - On the overhead console in the number 3 position as shown on figure 4.

(2) Actuation - Actuation for single pilot applies.

(3) Design - Requirements for single pilot apply.

5.2.7.2 Gas turbine engine ignition control switch(es). The following requirements shall apply to the ignition control switch(es) for gas turbine engines:

(a) Single/tandem pilot:

(1) Location - On the left console and operable by the pilot with shoulder harness locked.

(2) Actuation - Clockwise rotation from the off position shall produce the sequence IGNITION, START, NORMAL for systems which incorporate single as well as integrated functions.

(3) Design - Individual switches with provisions for emergency aborting shall be used on gas turbine engine aircraft. Ignition switches shall be separated electrically and mechanically without provision for multiple cutoff.

(b) Side-by-side pilot:

(1) Location - On the overhead console in the number 3 position as shown on figure 4.

(2) Actuation - Actuation for single pilot applies.

(3) Design - Requirements for single pilot apply.

5.2.8 Ground start switches. The ground start switches shall be in accordance with the following requirements:

(a) Location - On power panel or collective stick control console or pedestal convenient for ground starting operations.

(b) Actuation - Conventional.

(c) Design - The start switch shall combine starter and ignition function.

5.2.9 Stop switch. The stop switch shall be in accordance with the following requirements:

(a) Location - On the collective stick control grip or on the power panel, accessible to the pilot.

(b) Actuation - Conventional.

(c) Design - The switch shall be clearly marked and located to prevent inadvertent actuation by the pilot while operating the collective stick control.

5.2.10 In-air start switch. The in-air start switch shall be in accordance with the following requirements:

(a) Location - On the collective stick control.

(b) Actuation - Pushbutton type switch. Press for ignition and spring return for OFF.

(c) Design - The pilot shall be capable of actuating the switch without removing his left hand from the collective stick control. Markings shall be provided to identify the switch from other pushbutton-type switches. Inadvertent actuation of the in-air start switch shall have no adverse effect upon engine operation.

5.3 Firefighting system controls. The following requirements shall apply to firefighting system controls:

(a) Single/tandem pilot:

(1) Location - On an emergency panel forward of the pilot, operable with his left hand when the shoulder harness is locked.

(2) Actuation - Pull to actuate.

(3) Design - Firefighting control shall consist of a single emergency control for each engine or critical area and one agent discharge switch per aircraft. The control knob(s) shall incorporate a warning light which is illuminated when the fire warning system for the area served by the control is activated. Additional fire warning lights shall be provided on the instrument panel when the control knob(s) or handle(s) cannot be placed in the 30-degree forward cone of vision. Actuation of the control shall perform all necessary fire extinguishing operations except 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 shape shall conform to MS26523.

(b) Side-by-side pilot:

(1) Location - Either on the instrument panel under the glare shield or on an emergency overhead panel in the number 1 position (see figure 4).

(2) Actuation - Pull to actuate.

(3) Design - Requirements for single pilot apply.

5.4 Electrical and radio controls

5.4.1 Master electrical control switches, including the battery, generator, and inverter controls. The following requirements shall apply to the master electrical control switches, including the battery, generator, and inverter controls:

(a) Single/tandem pilot:

(1) Location - Functionally grouped in an electrical panel immediately aft of the fuel panel.

(2) Actuation - Performance related.

(3) Design - Battery and generator switches shall be operable by the pilot with shoulder harness locked.

(b) Side-by-side pilot:

(1) Location - Functionally grouped on the overhead console in the number 3 position (see figure 4).

(2) Actuation - Performance related.

5.4.2 Lighting and miscellaneous switches. Lighting and miscellaneous switches shall be in accordance with the following requirements:

(a) Single/tandem pilot:

(1) Location - Switches and rheostats functionally grouped in a lighting panel on the aft portion of the console.

(2) Actuation - Performance related.

(b) Side-by-side pilot:

(1) Location - Switches and rheostats functionally grouped in the number 4 position of the overhead console (see figure 4).

(2) Actuation - Performance related.

5.4.3 Landing light and searchlight switch(es). The landing light and searchlight switch(es) in single/tandem/side-by-side pilot aircrew stations shall be in accordance with the following requirements:

(a) Location - On the forward end of the collective pitch stick.

(b) Actuation - Performance related.

(c) Design - Actuation of the switch(es) shall not require removal of the pilot's left hand from the collective pitch stick grip. The searchlight slew control shall be a four-way "Chinese hat" type switch.

5.4.4 Circuit protective devices. The location, actuation, and design of circuit protective devices shall be as follows:

(a) Single/tandem pilot:

(1) Location - Inboard face of left-hand console grouped functionally.

(2) Actuation - Conventional.

(3) Design - In aircraft where available cockpit space is limited, only those circuit protective devices essential to safety of flight shall be located in a position accessible to and readable by the pilot. Circuit breakers not essential to the safety of flight may be placed elsewhere in the cockpit in such positions as not to occupy space considered more essential for operating controls but must be accessible to the pilot or copilot.

(b) Side-by-side pilot:

(1) Location - On the overhead console in the number 5 position, as shown on figure 4, and grouped functionally.

(2) Actuation - Push to reset.

(3) Design - Requirements for single pilot apply.

5.4.5 Radio, radar, and navigation controls. The location, actuation, and design of radio, radar, and navigation controls shall be as follows:

(a) Single/tandem pilot:

(1) Location - In a radio panel on the left-hand console aft of the electrical panel, as shown on figure 1.

(2) Actuation - Performance related.

(3) Design - The radio-ICS switch shall be a three-position switch located on the cyclic pitch stick grip. In aircraft equipped with a stabilization system, other radio, radar, and navigation controls may be located on the right side console.

(b) Side-by-side pilot:

(1) Location - Radio panel aft of power quadrant on center console, as shown on figure 3.

(2) Actuation - Performance related.

(3) Design - Requirements for single pilot apply.

5.5 Instrument panels. The following instrument panel and instrument requirements shall apply to single/tandem/side-by-side aircrew stations.

5.5.1 Instrument panels - general design. The arrangement of instruments shall be such as to achieve maximum effectiveness. Insofar as practicable, instruments shall be grouped functionally with priority of placement being given to the most important instruments.

5.5.2 Basic flight instrument group. The basic flight instrument group shall be located as near to the centerline of the pilot as possible, with minimum restriction to the pilots' forward visibility. The basic flight instruments shall be arranged in accordance with MS33785.

5.5.3 Engine instruments. The engine instruments shall be located adjacent to the basic flight instruments and arranged in accordance with MS33634.

5.5.4 Standby compass. The standby compass shall be located above the instrument panel and clearly legible to both pilots. In a tandem seating arrangement, the compass shall be located in the front aircrew station. Obstruction to the pilots' outside view shall be kept to a minimum. Installation shall be in accordance with MIL-C-7188.

5.6 Armament controls

5.6.1 General requirements. Armament controls shall be located and designed as follows:

(a) Location - On separate armament panel(s) forward of the pilot or crewmember, on the lower part of the instrument panel separate from the standard

instrument arrangement. When space is provided, the armament panel may be located on the center or side console.

(b) Design - The controls shall be accessible to the pilot(s) or crewmember(s) having operational responsibility over the particular armament. The pilot(s) shall have primary control of all armament systems. They shall be functionally grouped on the panel(s). Armament controls considered a safety hazard shall be provided with a safety device to guard against inadvertent actuation.

5.6.2 Weapon(s) control and associated equipment. The following requirements shall apply to the designated weapon(s) control and associated equipment:

(a) Weapon(s) firing switch:

(1) Location - On the cyclic stick control grip, accessible to the pilot's forefinger of his right hand while holding the grip during flight conditions. When crewmembers other than the pilot are provided with a firing switch not on the cyclic stick control grip, it shall be similarly located on the armament grip provided.

(2) Actuation - Squeeze action shall actuate firing of the selected weapon(s). When required, the weapon(s) firing switch shall also operate the gun camera.

(3) Design - The weapon(s) firing switch shall be an on-off trigger switch incorporating a spring return to OFF when released (MIL-S-9487). A safety guard shall be provided over the trigger to prevent inadvertent actuation.

(b) Armament sight and range controls - tandem aircrew station:

(1) Location - Controls for the armament sight and ranging shall be located as follows:

(a) Pilot: On the weapon/armament panel on the lower left side of the instrument panel or on the sight. The pilot direct sight shall be above the instrument panel. If required to facilitate crew visibility, a means of moving the armament sight to a stowed position when not in use shall be provided.

(b) Copilot gunner: On the weapon/armament panel in the center of the instrument panel or on the sight. An auxiliary weapon panel may be located on the lower right side of the instrument

panel. When the copilot gunner is provided with a rotating gunner's seat, the ranging controls shall be on an armament grip on the left side of the seat.

(2) Actuation - Conventional.

(c) Armament sight and range controls - side-by-side aircrew station:

(1) Location - On the weapon/armament panel(s) below the instrument panel or on the sight, accessible to both pilots.

(2) Actuation - Conventional.

(3) Design - The pilot may have a direct sight located above the instrument panel. Provisions shall be made to stow the sight out of the way when not in use. If required to facilitate crew visibility, light indicators shall be provided on the weapon/armament panel to show the status of the weapons system. Counters shall be provided to show the number of rounds fired from each gun. Red indicator lights shall not be used for advisory on the armament panel. This design shall apply in the case of single and tandem pilot crew stations.

5.6.3 External stores controls. External stores controls shall be in accordance with the following requirements:

(a) External stores release switch:

(1) Location - On the cyclic stick control grip, accessible to the pilot with his right thumb.

(2) Actuation - Press pushbutton-type switch to release external stores.

(3) Design - The external stores release switch may serve a dual function of releasing external stores or as cargo hook release when a selector control is provided. The selector switch on the armament panel must be selected to correspond with external stores release when provided. If a requirement for a dual function is not specified, approval shall be obtained from the procuring activity to provide the dual function. A feature shall be incorporated to guard against inadvertent release of external stores.

(b) Emergency release of external stores:

(1) Location - On armament/weapons panel or adjacent to it accessible to the pilot.

(2) Actuation - Pull to release external stores.

(3) Design - The mechanical release control shall be provided in addition to tne electrical release switch. Location of a mechanical release of external stores in other than the pilot aircrew station shall require approval by the procuring activity. Emergency markings shall be provided on the control handle in accordance with MIL-M-18012.

5.7 Miscellaneous controls and displays

5.7.1 Oxygen system controls and quick-disconnect hose. The following requirements shall apply to oxygen system controls and quick-disconnect hose:

(a) Location - Forward to the left side of the pilot's seat readily accessible with his left hand and clearly visible from his operating position. For other crewmembers, conveniently located to correspond with their crew duties.

(b) Actuation - Conventional.

(c) Design - The type of oxygen regulator shall be provided as specified by the procuring activity.

5.7.2 Release switch (external, tow cable, cargo hook). The release switch (external, tow cable, cargo hook) shall be in accordance with the following requirements:

(a) Location - On the cyclic stick control grip accessible to the pilot with his right thumb or in the hoist operator's station on a hoist control panel or remote handgrip control.

(b) Actuation - Press pushbutton switch to release. Selector switch on the appropriate panel must be selected to correspond with release function.

(c) Design - A feature shall be incorporated to guard against inadvertent release of the cargo hook. When controls are provided for a crewmember, a release switch shall be provided for him as specified.

5.7.3 Cargo emergency release control. The location, actuation, and design of the cargo emergency release control shall be as follows:

(a) Location - Immediately accessible forward of the cyclic pitch stick and between the anti-torque pedals and guarded against inadvertent actuation.

(b) Actuation - Push foot pedal control to release cargo or pull when a hand-operated control is provided in the aircrew station for the hoist operator.

(c) Design - The mechanical release control shall be provided the pilot in addition to the electrical release switch. Location of a mechanical release in other than the pilot aircrew station shall require the approval of the procuring activity. Markings shall be provided to show for emergency use. The foot pedal control shall be so located as to require positive action by the pilot to guard against inadvertent actuation.

5.7.4 Hoist control switch. The following requirements shall apply to the hoist control switch:

(a) Location - On the cyclic or collective stick control grip, on a panel, or on a remote handgrip in the hoist operator's aircrew station, as specified by the procuring activity.

(b) Actuation - Performance related. The switch shall spring return to OFF when released.

(c) Design - Responsibility for control of the hoist shall be as specified and as dictated by mission requirements.

5.7.5 Tow winch system - cable cutter arm switch and tow displays. The tow winch system (cable cutter arm switch and tow displays) shall be located on the upper outboard area of the instrument panel. The design shall include provisions for monitoring cable tension payout and load yaw. A switch for activation of the cable cutter shall be located on the pilot's collective stick control.

5.7.6 Defrosting, deicing, pitot heat, cockpit air conditioning, and windshield controls. Location and actuation of these controls shall be as follows:

(a) Single/tandem pilot:

(1) Location - Functionally grouped on a miscellaneous panel on the left console aft of the radio controls or aft on the right console, if provided in aircraft equipped with automatic stabilization system.

(2) Actuation - Performance related.

(b) Side-by-side pilot:

(1) Location - Functionally grouped in a miscellaneous panel on the overhead console in the number 4 position (see figure 4).

(2) Actuation - Performance related.

5.7.7 Ventilating system controls. The following requirements shall apply to the ventilating system controls:

(a) Location - When no air-conditioning system is provided, controls shall be located adjacent to the heater control panel. Vent controls shall be located on the lower part of the instrument panel.

(b) Actuation - Conventional.

(c) Design - Individual air outlets, when provided, shall be equipped with controls to regulate the flow of air.

5.7.8 Auxiliary power unit (APU) controls. The location and actuation of APU controls shall be as follows:

(a) Location - Arranged on individual panel located on overhead console, if provided, or on center pedestal accessible to both pilots in side-by-side aircrew stations; in tandem aircrew stations, on the left console. The APU control panel shall be grouped with electrical power panels.

(b) Actuation - Momentary-type switch actuated forward to start and spring return to center (run position). Aft position shall stop operation of the APU. Instruments shall be provided adjacent to the control switch to show the engine speed and operating temperature.

5.7.9 Safety shoulder harness locking control. The safety shoulder harness locking control shall be located on the left side forward on the seat, accessible with the left hand when the harness is locked in place.

5.7.10 Seat adjustment controls. Seat adjustment controls shall be located on the right side of the pilot's seat for up and down adjustment and on the left side for forward and aft adjustment.

5.7.11 Emergency alarm switch. The following requirements shall apply to the emergency alarm switch:

(a) Single/tandem pilot and third crewmember:

(1) Location - Forward of the power controls on the emergency panel.

(2) Actuation - Performance related.

(3) Design - Switch shall be properly guarded.

(b) Side-by-side pilot:

(1) Location - Overhead on emergency panel in the number 1 position (see figure 4).

(2) Actuation - Performance related.

(3) Design - Switch shall be properly guarded.

5.7.12 Map stowage. Provision for map stowage shall be located as follows:

(a) Single/tandem pilot - Located so that it is accessible to the pilot. In aircraft equipped with stabilization control system, it may be located on the right console.

(b) Side-by-side pilot - Located on the aft end of the center console.

5.7.13 Copilot/gunner status panel. The location and design of the copilot/gunner status panel shall be in accordance with the following requirements:

(a) Location - In tandem aircrew station, located so that the copilot has visual reference to the panel. It shall not interfere with other displays having a primary function.

(b) Design - Shall be provided as specified by the procuring activity.

6. NOTES

6.1 International standardization agreements. Certain provisions of this standard are the subject of international standardization agreements ASCCAS 10/12, STANAG 3217; ASCCAS 10/16, STANAG 3221; ASCCAS 10/18, STANAG 3223;

ASCCAS 10/20, STANAG 3225; ASCCAS 10/23, STANAG 3341; ASCCAS 10/11, STANAG 3343; ASCCAS 10/19, STANAG 3224; ASCCAS 10/22, STANAG 3259; ASCCAS 10/25, STANAG 3359; ASCCAS 10/38, and STANAG 3222. When amendment, revision, or cancellation of this standard is proposed which will affect or violate the international agreement concerned, the preparing activity will take appropriate reconciliation action through international standardization channels including departmental standardization offices, if required.

6.2 Marginal indicia. Asterisks are not used in this revision to identify changes with respect to the previous issue due to the extensiveness of the changes.

Custodians:
Army - AV
Navy - AS
Air Force - 11

Review activities:
Army - TE

International interest (see 6.1)

Preparing activity:
Air Force - 11

Project No. 1520-0020

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OMB Approval
No. 22-R255

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