

**MIL – STD – 1472D  
Checklist**

**Lockheed Missiles & Space Company, Inc.**

**Human Engineering  
Design Criteria for  
Military Systems,  
Equipment and  
Facilities**

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This is a checklist for recording human factors engineering evaluations of how well military systems, equipment, software, and facility characteristics comply with human factors engineering design criteria. It is a sequential listing of all major MIL-STD-1472D Section 5.0 paragraph headings. The main paragraph headings serve as easy reminders to make sure no area of concern is overlooked. Besides allowing the user to make direct compliance checks of criteria to hardware, software, or facility characteristics, the checklist can serve as a vehicle for making other types of comparisons between different systems or to identify subsets of requirements for testing.

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- Distribute ergonomic technologies and publications.
- Perform customized bibliographic searches and reviews.
- Prepare state-of-the-art reports and critical reviews.
- Conduct specialized analyses and evaluations.
- Provide workshop administration support.

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**The MIL-STD-1472D**

**Checklist**

**Lockheed Missiles & Space Company, Inc.**

## **THE HUMAN FACTORS ENGINEERING PRODUCTS AND SERVICES AT LOCKHEED**

This MIL-STD-1472D checklist was developed by the **Lockheed Human Factors Engineering** group. It is a job aid we use every day on programs, proposals, and out in the field. Since 1959, our group has delivered products like this one, plus software guidelines and graphical user interfaces (GUIs), task analyses, facility layouts, part-task training simulations, and many other diversified products to both military and commercial customers.

One resource which has helped Lockheed win major contracts in the pas 3 years is our GUI software development lab. It has the latest workstations and software running in a X Windows/Motif environment for developing prototypes and testing their usability. This Open Systems approach has enabled us to merge commercial off-the-shelf applications, such as signal processing, modules, expert systems, and mapping databases with GUI Builder Toolkits. It provides a single programming environment for developing high quality user interfaces, which will satisfy your design, cost, and schedule requirements.

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## **THE MIL-STD-1472D CHECKLIST**

This booklet is a checklist for recording human factors engineering evaluations of how well military systems, equipment, software, and facility characteristics comply with human factors engineering design criteria. It is a sequential listing of all major MIL-STD-1472D Section 5.0 paragraph headings. You can use it with or without MIL-STD-1472D, depending on how familiar you are with the detailed criteria.

The sequential listing shows you at a glance the breadth of coverage necessary for a complete human engineering evaluation for any selected topic. The main paragraph headings serve as easy reminders to make sure no area of concern is overlooked.

## **OTHER APPLICATIONS**

Besides allowing you to make direct compliance checks of criteria to hardware, software, or facility characteristics, the checklist can serve as a vehicle for making other types of comparisons between different systems or to identify subsets of requirements for testing.

For instance, it can be used to identify the critical MIL-STD-1472D design characteristic of an existing system, which, if altered in an upgraded system, would severely affect human performance of cross-trained operators. It can be used to identify only those directly testable design requirements that, if not satisfied, would critically degrade system performance.

Thus, the checklist is a convenient format for organizing different types of evaluations. You may find other uses for it, too.

## **CHECKLIST FORMAT**

The numbered paragraph headings are presented in a legal display format. Both the first and second levels are flush left to consolidate space. Most checklist entries can be made at the second, third, and fourth levels.

Not all paragraph headings are underlined as in MIL-STD-1472D; instead, capitalizing, bolding, and underlining are used to direct the readers' attention through the five levels of requirements.

Specifics references to Tables and Figures, per MIL-STD-1472D, are included in the applicable line item.

First-level section headings in section 5.0 (Detailed Requirements) are on each of the gray tab pages.

Note pages are inserted at the end of each chapter for recording comments, drawing diagrams, etc.

Ten yellow discrepancy report (DRs) forms are provided at the end of the checklist.

The typeface is Helvetica, 9 pt.



## HOW TO USE THIS CHECKLIST

Check the Satisfactory **(SAT)** column across from the criteria if the characteristic complies.

Check the Not Satisfactory **(N/S)** column if a characteristic is not immediately applicable.

Check the column marked Discrepancy Report **(DR)** if you decide that the particular hardware, software, or system design characteristic severely violates MIL-STD-1472D criteria and standards. Fill out a yellow color coded **DR** form.

Use the checklist as often as space allows, or use it for "one shot" test and evaluations; record the item and date, and place on the back cover for easy reference.

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**4.0**

**GENERAL REQUIREMENTS**

## 4.0 GENERAL REQUIREMENTS

Make your final assessment using section 4.0 (General Requirements) after you have analyzed the software package, hardware, equipment, facility layout, or system using the Detailed Requirements section (5.0).

4.1	Objectives.....				
4.2	Standardization.....				
4.3	Function Allocation.....				
4.4	Human Engineering Design.....				
4.5	Fail Safe Design.....				
4.6	Simplicity of Design.....				
4.7	Interaction.....				
4.8	Safety.....				
4.9	Ruggedness.....				
4.10	NBC Survivability.....				
4.11	EMP Hardening.....				

**SAT N/S DR N/A**

# NOTES

**5.0**

**DETAILED REQUIREMENTS**

## **DETAILED REQUIREMENTS**

This section is divided into 15 detailed requirements subsections. Note pages are provided at the end of each subsection.

The 15 detailed requirements are:

- 5.1 Control/Display Integration
- 5.2 Visual Displays
- 5.3 Audio Displays
- 5.4 Controls
- 5.5 Labeling
- 5.6 Anthropometry
- 5.7 Workspace Design
- 5.8 Environment
- 5.9 Design for Maintainer
- 5.10 Design of Equipment for Remote Handling
- 5.11 Small Systems and Equipment
- 5.12 Operational and Maintenance Vehicles
- 5.13 Hazards and Safety
- 5.14 Aerospace Vehicle Compartments
- 5.15 User-Computer Interface

# NOTES



## **5.1**

# **CONTROL/DISPLAY INTEGRATION**

5.1 **CONTROL/DISPLAY INTEGRATION**

5.1.1 **General Criteria**

5.1.1.1	<b>Relationships</b> .....				
5.1.1.2	<b>Design</b> .....				
5.1.1.3	<b>Complexity/precision</b> .....				
5.1.1.4	<b>Feedback</b> .....				
5.1.1.5	<b>Illumination</b> .....				
5.1.1.6	<b>Simultaneous access</b> .....				

5.1.2 **Position Relationships**

5.1.2.1	<b>Functional grouping</b> .....				
	Functional group arrangement				
	Sequence.....				
	Access.....				
	Functional group marking.....				
	Consistency.....				
5.1.2.2	<b>Location &amp; arrangement</b> .....				
5.1.2.3	<b>Arrangement within group</b> .....				
	Left-to-right.....				
	Vertical and horizontal.....				
	Simultaneous use.....				
	Multiple displays.....				
	Combined control.....				
	Separate panels.....				
	Component groups.....				
	Emergency use.....				

5.1.3 **Movement Relationships**

5.1.3.1	<b>Lack of ambiguity</b> .....				
5.1.3.2	<b>Timelag</b> .....				
5.1.3.3	<b>Moving ptr, circ scales</b> .....				
5.1.3.4	<b>Moving ptr, linear scales</b> .....				
5.1.3.5	<b>Fixed ptr, circ scales</b> .....				
5.1.3.6	<b>Fixed ptr, linear scales</b> .....				
5.1.3.7	<b>Direct linkage</b> .....				
5.1.3.8	<b>Common plane</b> .....				
5.1.3.9	<b>Parallel movement</b> .....				

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5.1.3 Movement Relationships (Cont.)

- 5.1.3.10 Labeling.....
- 5.1.3.11 Movement direction.....


5.1.4 Control/Display Movement Ratio

- 5.1.4.1 Minimization of time.....
- 5.1.4.2 Range of display move.....
- 5.1.4.3 Knob, coarse setting.....
- 5.1.4.4 Knob, fine setting.....
- 5.1.4.5 Bracketing.....
- 5.1.4.6 Lever, coarse setting.....
- 5.1.4.7 Lever two-dimen setting.....
- 5.1.4.8 Counters.....


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# NOTES

# NOTES

**5.2**

**VISUAL DISPLAYS**

5.2 **VISUAL DISPLAYS**

5.2.1 **General**

5.2.1.1 **Alerting/warning**.....

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5.2.1.2 **Display Illumination and light distance**

Display illumination

Normal.....

Night vision compatible.....

Field use panel dimming.....

Light distribution.....

Contrast.....


5.2.1.3 **Information**

Content.....

Precision.....

Format.....

Redundancy.....

Combining operations/maint info.....

Display failure clarity.....

Display circuit failure.....

Unrelated markings.....

Duration.....

Timeliness.....

Advisory and alerting.....

NBC contamination.....

Numeric digital displays.....


5.2.1.4 **Location and arrangement**

Location.....

Access.....

Orientation.....

Reflection.....

Vibration.....

Grouping.....

Function and sequence.....

Frequency of use.....

Importance.....

Consistency.....

Maximum viewing distance.....

Minimum viewing distance.....

Aircrew station signals.....


**SAT N/S DR N/A**

**5.2.1.5 Coding**

- Objectives.....
- Techniques.....
- Standardization.....
- Symbology.....


**5.2.2 Transilluminated Displays**

**5.2.2.1 General**

- Use.....
- Equipment response.....
- Information.....
- Positive feedback.....
- Grouping.....
- Location.....
- Location, critical functions.....
- Maintenance displays.....
- Luminance.....
- False indication.....
- Contrast within indicator.....
- Lamp redundancy.....
- Lamp testing.....
- Lamp removal method.....
- Lamp removal, safety.....
- Indicator covers.....
- Color coding.....
- Flashing lights.....


**5.2.2.2 Legend lights**

- Use.....
- Color Coding.....
- Positive/negative legend.....
- Lettering.....
- Visibility and legibility.....
- Multifunction legends.....


**5.2.2.3 Simple indicator lights**

- Use.....
- Spacing.....
- Coding.....


**5.2.2.4 Transilluminated panel assemblies**

- Use.....
- Large, single pictorial panel.....
- Relamping.....
- Brightness.....


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5.2.3 **Scale Indicators**

5.2.3.1 **General**

Types of scale indicators.....				
Use.....				
Type of information.....				
Linear scales.....				

Scale marking

Graduations.....				
Intermediate marks.....				

Numerals

Major marks.....				
Starting point.....				

Pointers

Length.....				
Tip configuration.....				
Mounting.....				
Color.....				

Luminance contrast.....

Calibration information.....				
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Coding

Use.....				
Pattern or color coding.....				
Choice of color coding.....				
Pattern coding.....				

5.2.3.2 **Moving-pointer, fixed scale indicators**

Numerical progression.....				
Orientation.....				

Circular scale

Scale reading/pointer move.....				
Zero position/direction.....				
Scale break.....				
Number of pointers.....				
Pointer alignment.....				
Relative position of marks.....				

Curved, horizontal, and vertical straight scales

Scale reading/pointer move.....				
Zero position/direction.....				
Placement of pointers.....				
Placement of numerals.....				
Pointer alignment.....				

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5.2.3.3 **Fixed-pointer, moving-scale indicators**

- Numerical progression.....,
- Orientation.....
- Alignment of pointer.....
- Setting.....
- Tracking.....
- Moving tape displays.....
- Composite scalar displays.....


5.2.4 **Cathode Ray Tube (CRT) Displays**

- 5.2.4.1 **Signal size.....**
- 5.2.4.2 **Viewing distance.....**
- 5.2.4.3 **Screen luminance.....**
- 5.2.4.4 **Faint signals.....**
- 5.2.4.5 **Lum rng of adj surface.....**
- 5.2.4.6 **Ambient Illuminance.....**
- 5.2.4.7 **Reflected glare.....**
- 5.2.4.8 **Adjacent surfaces.....**
- 5.2.4.9 **Pictorial/graphic format.....**
- 5.2.4.10 **Font legibility.....**


5.2.5 **Large screen Displays**

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- 5.2.5.2 **Avoidance.....**
- 5.2.5.3 **Viewing distance.....**
- 5.2.5.4 **Phy Interruption of view.....**
- 5.2.5.5 **Control of displayed info.....**
- 5.2.5.6 **Content of displayed info.....**


5.2.6 **Other Displays**

- 5.2.6.1 **General**
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  - Applications.....
- 5.2.6.2 **Counters**
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  - Mounting.....
  - Spacing between numerals.....
  - Movement
    - Snap action.....
    - Rate.....
    - Direction.....
    - Reset.....
  - Illumination.....
  - Finish.....
  - Contrast.....




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5.2.6.3 **Printers**

Use.....

(See Table III)

Visibility.....

Contrast.....

Illumination.....

Take-up provision.....

Annotation.....

Legibility.....

Printed tapes.....

Control, replenish, service.....

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5.2.6.4 **Plotters and recorders**

Use.....

Visibility.....

Contrast.....

Take-up device.....

Job aids.....

Smudging/smearing.....

Annotation.....

Control, replenish, service.....


5.2.6.5 **Flags**

Use.....

(See Table III)

Mounting.....

Snap action.....

Contrast.....

Malfunction indication.....

Legend.....

Test provision.....

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5.2.6.6 **Large Screen Optical Projection Displays**

Use.....

Seating area.....

(See Table IV)

Image luminance/distance.....

(See Table IV)

Legibility of display

Style.....

Size.....

Contrast

Luminance ratio.....

Direction of contrast.....

Alignment.....

Keystone effects.....


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**5.2.6.7 Light emitting diodes (LEDs)**

- General.....
- Use.....
- Intensity control.....
- Color coding.....
- Lamp testing.....


**5.2.6.8 Dot Matrix/Segmented Displays**

- General.....
- Use.....
- Symbol definition.....
- A/N character and size.....
- Use of upper case.....
- Viewing angle.....
- Emitter color.....
- Intensity control.....
- Display testing.....
- Location of red A/N LEDs.....


**5.2.6.9 Electroluminescent displays**

- Use.....
- A/N character and symbol size.....


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## **5.3**

# **AUDIO DISPLAYS**

**5.2.7 AUDIO DISPLAYS**

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**5.3.1 General**

- 5.3.1.1 **Use**.....
- 5.3.1.2 **Signal**.....  
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- 5.3.1.3 **False alarms**.....
- 5.3.1.4 **Failure**.....
- 5.3.1.5 **Circuit test**.....
- 5.3.1.6 **Aircrew stations**.....
- 5.3.1.7 **Use w/ several displays**.....


**5.3.2 Audio Warnings**

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Single element signals.....
- 5.3.2.3 **Caution signals**.....
- 5.3.2.4 **Relation to visual display**.....


**5.3.3 Characteristics of Audio Warning Signals**

- 5.3.3.1 **Frequency**  
Range.....  
Spurious signals.....
- 5.3.3.2 **Intensity**  
Compatibility w/acoustic envrt.....  
Compatibility w/clothing.....  
Discomfort.....


**5.3.4 Signal Characteristics in Relation to Operational Conditions and Objectives**

- 5.3.4.1 **Audibility**.....
- 5.3.4.2 **Alerting capability**  
Attention.....  
Onset & SPL.....  
Dichotic presentation.....  
Headset.....
- 5.3.4.3 **Discriminability**  
Use of different characteristics.....  
Coding.....  
Critical signals.....  
Action segment.....  
Differentiation from routine signal.....  
Prohibited types of signals.....


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5.3.4 **Signal Characteristics in Relation to Operational Conditions and Objectives (cont.)**

5.3.4.1 **Compatibility**

Existing signals.....  
Acoustic environment.....


5.3.4.2 **Masking**

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Separate channels.....


5.3.5 **Verbal Warning Signals**

5.3.5.1 **Nature of signals**.....


5.3.5.2 **Intensity**.....

5.3.5.3 **Vocal criteria**

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Delivery style.....


5.3.5.4 **Speech processing**.....


5.3.5.5 **Message content**.....

5.3.5.6 **Message categories**

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Message priorities.....


5.3.6 **Controls for Audio Warning Devices**

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5.3.6.2 **Automatic reset**.....

5.3.6.3 **Redundant visual warning**.....


5.3.6.4 **Volume control**

Automatic or manual.....  
Ganging of mode switches.....  
Caution signal controls.....


5.3.6.5 **Duration**.....


5.3.6.6 **Duration limitation**.....


5.3.7 **Speech Transmission Equipment**

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5.3.7.3 **Noise cancelling phones**.....


5.3.7.4 **Pre-emphasis**.....

5.3.7.5 **Peak-clipping of signals**.....


5.3.7.6 **Noise shields**.....

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5.3.8 **Speech Reception Equipment**

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5.3.8.2	<b>Loudspeakers for multi-channel monitoring</b>				
	Monitoring.....				
	Filtering.....				
	Use of de-emphasis.....				
	Handsets.....				

5.3.9 **Operator Comfort & Convenience**

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5.3.9.2	<b>Hands-free operation.....</b>				
5.3.9.3	<b>Accessibility of handsets.....</b>				

5.3.10 **Operating Controls for Voice Communication**

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5.3.10.2	<b>Squelch control.....</b>				
5.3.10.3	<b>Foot-operated controls.....</b>				
5.3.10.4					

5.3.11 **Speaker/Side Tone**

5.3.11.1	Speaker/side tone.....				
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5.3.12 **Speech Intelligibility**

5.3.12.1	<b>General.....</b>				
5.3.12.2	<b>Criteria.....</b>				

(See Table VI)

# NOTES

# NOTES

# NOTES

**5.4**

**CONTROLS**

**5.4 CONTROLS**

**5.4.4 General Criteria**

**5.4.4.1 Selection**

- Distribution of work load.....
- G-loading.....
- Multirotation controls.....
- Detent controls.....
- Stops.....


**5.4.4.2 Direction of movement**

- Consistency.....
- Multidimensional operation.....
- Operator-control orientation.....
- Valve controls.....


**5.4.4.3 Arrangement and grouping**

- Grouping.....
- Sequential operation.....
- Location of primary controls.....
- Consistency.....
- Remote controls.....
- Maintenance and adjustment.....
- Spacing.....


(See Table VII)

**5.4.4.4 Coding**

- Methods and requirements.....
- (See Table VIII)
- Location coding.....
- Size coding.....
- Shape coding.....
- Color coding.....
  - Choice of colors.....
  - Immediate action controls.....
  - Relation to display.....
  - Control panel contrast.....
  - Ambient lighting.....

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**5.4.4.5 Labeling of controls.....**

**5.4.4.6 Compat w/ handwear.....**

**5.4.4.7 Blind operation.....**

5.4.4.8 **Prevention of accidental actuation**

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Location and design.....				
Internal controls.....				
Rapid operation.....				

Methods

Location/orientation.....				
Recess/shield.....				
Cover/guard.....				
Interlocks.....				
Resistance.....				
Lock.....				
Rotary action.....				
Dead Man controls.....				

Foot-operated controls

Use

Greater force.....				
Hands occupied.....				
Population stereotype.....				
Safety shutdown.....				

Avoidance

Sensitive balancing.....				
Precise control.....				
Many controls.....				

Operation (avoid following)

Frequent, max reaching.....				
Awkward positions.....				
Twisted positions.....				
Frequent, max force.....				
Operator search.....				
Inadvertent activation.....				

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5.4.5 **Rotary Controls**

5.4.5.1 **Discrete rotary controls**

Rotary selector switches

- Use.....
- Moving pointer.....
- Shape.....
- Positions.....
- Contrast.....
- Parallax.....
- Dim, res, displ, sep.....


(See Fig. 4)

Key operated switches

- Use.....
- Dim., Displ., Res.....


(See Fig. 5)

- Color, Shape, and Size Coding.....
- Marking, labeling.....
- Other requirements.....


Discrete thumbwheel

- Application.....
- Shape.....
- Coding.....
- Direction of movement.....


Numerals

- Internal illumination.....
- External illumination.....


Visibility.....


Dimensions.....

(See Fig. 6)

Resistance.....

(See Fig. 6)

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Separation.....

(See Fig. 6)

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5.4.5.2 **Continuous adjustment rotary controls**

Knobs

- Use.....
- Dimension, torque, separation.....


(See Fig. 7)

- Knob style.....

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5.4.2.2 Continuous adjustment rotary controls (cont.)

Ganged control knobs

Application.....


Dimension, separation.....

(See Fig. 8)

Resistance.....

(See Fig. 8)

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Marking.....

Knob/display relationship.....

(See Fig. 8)


Inadvertent operation.....

(See Fig. 8)

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Continuous adjustment thumbwheel

Use.....

Orientation and movement.....

(See Fig. 9)


Turning aids.....

Dimension, separation, resist.....

(See Fig. 9)


Labeling and visibility.....

OFF position.....


Cranks

Use.....

Grip Handle.....

Dimension, resistance, sep.....

(See Fig. 10)


Folding handle.....

Crank balance.....


Handwheels

Use.....

Turning aids.....

Spinner handles.....

Direction of movement.....

Dimension, resistance, sep.....

(See Table IX)


Steering wheel shape.....

Power steering failure.....

(See Table IX)


Steering ratio.....

(See Table IX)

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5.4.3 **Linear Controls**

5.4.3.1 **Discrete linear controls**

Pushbutton

Use.....				
Shape.....				
Positive indication.....				
Guard.....				
Dimension, resistance, displ.....				

(See Fig. 11)

Interlocks/barriers.....				
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(See Fig. 11)

Foot operated switches

Use.....				
Operation.....				
Dimension, resistance, displ.....				

(See Fig. 12)

Feedback.....				
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Keyboards

Use.....				
Layout/configuration.....				
Numeric keyboard.....				
A/N keyboard.....				
Dimension, resistance, displ.....				

(See Table X)

Slope.....				
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Multiple keyboards.....				
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Feedback.....				
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Toggle switch

Use.....				
Accidental activation.....				
Dimension, resistance, displ.....				

(See Fig. 13)

Positive indication.....				
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Orientation.....				
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Legend switch

Dimension, resistance, displ.....				
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(See Fig. 14)

Barrier height.....				
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(See Fig. 14)

Other requirements.....				
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SAT N/S DR N/A

5.4.3.1 Discrete linear controls (cont.)

Rocker switch

- Use.....
- Accidental activation.....
- Positive indication.....
- Dimension, resistance, displ.....  
(See Fig. 15)
- Orientation.....
- Color and illumination.....


Slide switch

- Use.....
- Accidental activation.....
- Dimension, resistance, sep.....  
(See Fig. 16)
- Orientation.....
- Positive indication.....


Push-pull

- Application.....
- Dimension, displacement, clear.....  
(See Table XI)
- Rotation.....
- Detents.....
- Inadvertent activation.....
- Direction of control motion.....
- Resistance.....


PC switch controls

- Use.....
- Dimension, resistance, sep.....
- Shape.....


5.4.3.2 Continuous adjustment linear controls

Levers

- Use.....
- Coding.....
- Labeling.....
- Limb Support.....
- Dimensions.....  
(See Fig. 17)
- Resistance.....  
(See Fig. 17)
- Displacement and separation.....  
(See Fig. 17)


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5.4.3.2 Continuous adjustment linear controls (Cont.)

Displacement Stick

Hand operated

- Use.....
- Dynamic characteristics.....
- Dimension, resistance, clear.....


Finger operated

- Use.....
- Dynamic characteristics.....
- (See Fig. 18)
- Dimension, resistance, clear.....


Thumbtip/fingertip operated

- Use.....
- Dynamic characteristics.....
- Dimension, resistance, clear.....
- (See Fig. 18)


Isometric joystick

- Use.....
- Dynamic characteristics.....
- Dimension, resistance, clear.....


Finger operated

- Use.....
- Dynamic characteristics.....
- Dimension, resistance, clear.....
- (See Fig. 18)


Thumbtip/fingertip operated

- Use.....
- Dynamic characteristics.....
- Dimension, resistance, clear.....
- (See Fig. 18)


Ball control (track ball)

- Use.....
- Dynamic characteristics.....
- Limb support.....
- Dimension, resistance, clear.....
- (See Fig. 19)


Grid & Stylus

- Application.....
- Dynamic characteristics.....
- Dimensions, mounting.....


SAT N/S DR N/A

5.4.3.2 **Continuous adjustment linear controls (Cont.)**

Free-moving XY controller (mouse)

Application.....

Dynamic characteristics.....

Dimensions, shape.....


Lightpen

Use.....

Dynamic characteristics.....

Dimensions, mounting.....


Pedals

Use.....

Location.....

(See Fig. 20)

Control return.....

Pedal travel path.....

High force application aids.....

Seat backrest.....

Normal reach.....

(See Fig. 22)

Double-width pedal.....

Non-slip pedal surface.....

Dimension, resist, displ, sep.....

(See Fig. 20)




5.4.4 **High Force Controls**

5.4.4.1 Use.....

5.4.4.2 **Arm, hand, thumbfinger**.....

5.4.4.3 **Foot controls**.....

(See Fig.22)


5.4.5 **Miniature Controls**

5.4.5.1 Use.....

5.4.5.2 **Dim, resist, displ, sep**.....

5.4.5.3 **Other requirements**.....


5.4.6 **Touch-screen Controls for Displays**

5.4.6.1 Use.....

5.4.6.2 **Luminance transmission**.....

5.4.6.3 **Positive indication**.....

5.4.6.4 **Dimensions/separation**.....

(See Fig. 14)

5.4.6.5 **Resistance**.....

(See Table X)


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**5.5**

**Labeling**

5.5 LABELING

5.5.1 General

5.5.1.1 Application.....

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5.5.1.2 Characteristics, consistent with

Accuracy.....

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Time available to recognize.....

--	--	--	--

Reading distance.....

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Illuminant level and color.....

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Criticality.....

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Consistency.....

--	--	--	--

5.5.1.3 Proto/prod eqpt. labels.....

--	--	--	--

5.5.2 Orientation and location

5.5.2.1 Orientation.....

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5.5.2.2 Location.....

--	--	--	--

5.5.2.3 Standardization.....

--	--	--	--

5.5.3 Contents

Equipment functions.....

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Abbreviations.....

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Irrelevant information.....

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5.5.4 Qualities

5.5.4.1 Brevity.....

--	--	--	--

5.5.4.2 Familiarity.....

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5.5.4.3 Visibility, legibility.....

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5.5.4.4 Access.....

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5.5.4.5 Label life.....

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5.5.4.6 Label background.....

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5.5.5 Design of Label Characters

5.5.5.1 Black characters.....

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5.5.5.2 Dark adaptation.....

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5.5.5.3 Style.....

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5.5.5 **Design of Label Characters (cont.)**

5.5.5.4 **Capital versus lower case**

Labels.....

Legends.....

Signs.....

5.5.5.5 **Letter width.....**

5.5.5.6 **Numeral width.....**

5.5.5.7 **Wide characters.....**

5.5.5.8 **Stroke width, normal.....**

5.5.5.9 **Stroke width, dark adapt.....**

5.5.5.10 **Stroke width, transillumin.....**

5.5.5.11 **Character spacing.....**

5.5.5.12 **Word spacing.....**

5.5.5.13 **Line spacing.....**

5.5.5.14 **Label size versus lumin.....**  
(See Table XII)

5.5.5.15 **Char height/view distance.....**


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5.5.6 **Equipment Labeling**

5.5.6.1 **Units, assemblies, subassemblies, and parts**

General requirements.....

Location, so that.....

Not obscured.....

Flattest, uncluttered surface.....

On main chassis.....

Minimum wear/tear.....

No accidental removal.....

Terms.....

Other criteria.....

5.5.6.2 **Controls and displays (C/D)**

General requirements.....

Simplicity.....

Functional labeling.....

No similar names.....

Considers user & purpose.....

Indicates functional result.....

Indicates functional relations.....

Location.....

Ease of operation primary.....

Above C/Ds normally.....

Includes units of measure.....

Indicates functional groups.....

Uniform and consistent.....

Size graduation.....



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**5.6**

**ANTHROPOMETRY**

5.6 **ANTHROPOMETRY**

5.6.1 **General**

(See Figs. 23-28; Tables XIII-XVIII)

Design & sizing considers the following by user population

- Accommodation.....
- Compatibility.....
- Operability.....
- Maintainability.....
- 5<sup>th</sup> female to 95<sup>th</sup> male.....
- Nature of task.....
- Frequency of task.....
- Safety of task.....
- Difficulty of task.....
- Body position.....
- Mobility/flexibility requirements.....
- Compensation for:
  - Protective clothing.....
  - Projections.....
  - Obstacles.....
  - Packages.....
  - Lines.....
  - Padding.....



5.6.2 **Anthropometric Data**

(Consult the detail tables in MIL-STD-1472D)

5.6.3 **Use of data**

- 5.6.3.1 **Data limitations**.....
- 5.6.3.2 **Clearance dimensions**.....
- 5.6.3.3 **Limiting dimensions**.....
- 5.6.3.4 **Adjustable dimensions**.....
- 5.6.3.5 **Clothing/personal equipt**.....


5.6.4 **Special populations**

- Special populations.....

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**5.7**

**WORKSPACE DESIGN**

5.7 **WORKSPACE DESIGN**

5.7.1 **General**

- 5.7.1.1 **Kick space**.....
- 5.7.1.2 **Handles**.....
- 5.7.1.3 **Work space**.....
  - Depth of work area.....
  - Lateral work space.....
  - Space between rows of cabinets.....
  - Storage space.....


5.7.2 **Standing Operations**

- 5.7.2.1 **Work surface**.....
- 5.7.2.2 **Display placement, normal**.....
- 5.7.2.3 **Display placement, spcl**.....
- 5.7.2.4 **Control placement, normal**.....
- 5.7.2.5 **Control placement, spcl**.....


5.7.3 **Seated Operations**

- 5.7.3.1 **Work surf, width/depth**.....
- 5.7.3.2 **Work surface height**.....
- 5.7.3.3 **Writing surface**.....
- 5.7.3.4 **Seating**.....
  - Compatibility.....
  - Vertical adjustment.....
  - Backrest.....
  - Cushion.....
  - Armrests.....
- 5.7.3.5 **Knee room**
  - Height.....
  - Width.....
  - Depth.....
- 5.7.3.6 **Display placement, normal**.....
- 5.7.3.7 **Display placement, spcl**.....
- 5.7.3.8 **Warning displays**.....
- 5.7.3.9 **Control placement, normal**.....
- 5.7.3.10 **Control placement, spcl**.....




5.7.4 **Common Working Positions**

- 5<sup>th</sup> female to 95<sup>th</sup> male.....
- (see Tables XIX & Fig. 29)

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5.7.5 **Standard Console Design**

5.7.5.1 **Dimensions**.....  
(See Table XX & Fig. 30)

5.7.5.2 **Configurations**.....  
(See Table XX & Fig. 30)

5.7.5.3 **Variable, consider:**

Visibility over top.....

Operator mobility.....

Panel space.....  
(See Table XX)

Volume below writing surface.....

5.7.5.4 **Console selection**.....  
(See Table XX)

5.7.6 **Special-purpose Console Design**

5.7.6.1 **Horizontal wrap-around design**

(See Fig. 31)

Panel width.....

Panel angle.....

Dimensions (vision over top).....

Dimensions.....

Viewing angle.....  
(See Fig. 2)

5.7.6.2 **Vertical/stacked segments**

(See Fig. 32)

Panel division.....

Height.....

5.7.6.3 **Sit-stand consoles**

(See Table XX).....

5.7.7 **Stairs, Stair-ladders, Ramps**

5.7.7.1 **General criteria**

Selection

(See Fig. 33).....

Provision for hand-carrying.....

Handrails and guardrails.....

5.7.7.2 **Stairs**

(See Fig. 34).....

5.7.7.3 **Stair ladders**

(See Fig. 35).....

5.7.7.4 **Fixed ladders**

(See Fig. 36)

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5.7.7 **Stairs, Stair-ladders, Ramps (cont.)**

5.7.7.5 **Ramps**

- Cleating.....
- Mixed traffic.....


5.7.7.6 **Personnel platforms.....**

5.7.7.7 **Elevators, hydraulic work platforms**

- Maximum load signs.....
- Guards.....
- Limit stops.....
- Automatic failsafe brake.....
- Manual lowering device.....
- Properly treated surfaces.....


5.7.8 **Ingress and Egress**

5.7.8.1 **Doors.....**

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5.7.8.2 **Hatches**

- Configuration.....
- Force requirements.....  
(See Table IX)
- Dimensions.....
- Whole-body access.....  
(See Fig. 37)



5.7.9 **Surface Colors**

5.7.9.1 **Army.....**


5.7.9.2 **Navy.....**

5.7.9.3 **Air Force**

- Console, rack and cabinet exterior.....
- Panels.....
- Non-critical pads.....
- Interior walls, ceilings.....
- Uninhabited interiors.....
- Standard commercial equipment.....
- Conductive surfaces.....
- Lettering colors.....
- Non-painted surfaces.....
- Commercial equipment.....


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**5.8**

**ENVIRONMENT**

5.8 **ENVIRONMENT**

5.8.1 **Heating, Ventilating and Air Conditioning**

5.8.1.1 **Heating**

(See Fig. 38)

Mobile facilities.....

Permanent facilities.....

Semi-permanent facilities.....


5.8.1.2 **Ventilating**

(See Fig. 39)

Small enclosures.....

Large enclosures.....

Air velocity.....

NBC conditions.....

Exhaust pipes.....


5.8.1.3 **Air Conditioning**

(See Fig. 38)

Detailed, extended work.....

Cold air discharge.....


5.8.1.4 **Humidity**

(See Fig. 40)

5.8.1.5 **Temperature uniformity**.....

5.8.1.6 **Pers equip thermal control**.....

5.8.1.7 **Thermal tolerance/comfort**.....

(See Fig. 39)

5.8.1.8 **Ltd thrm tolerance zone**.....


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5.8.2 **Illuminance**

(See Table XXII)

Enclosures, no blackout.....

Dimming capability.....

Task compatibility.....


5.8.3 **Acoustical Noise**

5.8.3.1 **General**.....

5.8.3.2 **Hazardous noise**.....

5.8.3.3 **Non-hazardous noise**.....

(See Fig. 41)

General workspaces.....

Operational workspaces.....

Large work areas.....

Small office spaces/special area.....

Extreme quiet areas.....

Shipboard areas.....



5.8.3 **Acoustical Noise (cont.)**

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5.8.3.4 **Facility design**

- General provision.....
- Attenuation.....
  - by materials.....
  - by layout.....
- Reduction of reverberation time.....  
(See Fig. 42)


5.8.4 **Vibration**

5.8.4.1 **Whole body vibration**

- Vehicular vibration.....  
(See Fig. 43)
- Safety level.....  
(See Fig. 43)
- Proficiency level.....  
(See Fig. 43)
- Comfort level.....  
(See Fig. 43)
- Motion sickness.....  
(See Fig. 43)
- Building vibrations.....


5.8.4.2 **Equipment vibrations**

(See Fig.43)

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**5.9**

**DESIGN FOR MAINTAINER**



5.9 **DESIGN FOR MAINTAINER**

5.9.1 **General**

5.9.1.1	Standardization.....				
5.9.1.2	Special tools.....				
5.9.1.3	Modular replacement.....				
5.9.1.4	Separate adjustability.....				
5.9.1.5	Malfunction identification.....				
5.9.1.6	Assembly/disassembly.....				
5.9.1.7	Clothing constraints.....				
5.9.1.8	<b>Error-proof design</b>				
	Interchangeability.....				
	Improper mounting.....				
	Facilitate identification.....				
	Facilitate mounting.....				
	Cable/connector alignment.....				

5.9.2 **Mounting of Items Within Items**

5.9.2.1	Stacking avoidance.....				
5.9.2.2	Similar items.....				
5.9.2.3	Delicate items.....				

5.9.3 **Adjustment Controls**

5.9.3.1	Knob adjustments.....				
5.9.3.2	Blind screwdriver adjs.....				
5.9.3.3	Reference scale for adjs.....				
5.9.3.4	Control limits.....				
5.9.3.5	Critical controls.....				
5.9.3.6	Hazardous locations.....				

5.9.4 **Accessibility**

5.9.4.1	Structural members.....				
5.9.4.2	Large items.....				
5.9.4.3	Use of tools & test equip.....				
5.9.4.4	Rear access.....				
5.9.4.5	Relative accessibility.....				
5.9.4.6	High-failure-rate items.....				
5.9.4.7	Skills.....				

5.9.5 **Lubrication**

5.9.5.1	General.....				
5.9.5.2	<b>Labeling</b>				
	Type and frequency.....				

5.9.6 **Case and Cover Mounting**

5.9.6.1 **Cover & shield holes**.....

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5.9.7 **Cases**

5.9.7.1 **Orientation**.....

5.9.7.2 **Removal**.....

5.9.7.3 **Size**.....

5.9.7.4 **Guides**.....


5.9.8 **Covers**

5.9.8.1 **Securing of covers**.....

5.9.8.2 **Instructions**.....

5.9.8.3 **Clearance**.....


5.9.9 **Access Openings and Covers**

5.9.9.1 **Application**.....

5.9.9.2 **Self-supporting covers**.....

5.9.9.3 **Labeling**.....

5.9.9.4 **Rounding**.....

5.9.9.5 **Physical access**.....

    Arm and hand access.....

        Opening covers.....

        Reach access dimensions.....

            (See Fig. 45)

        Tool access dimensions.....

        Remove & replace dimensions.....

        Covering hazardous conditions.....

        Type of opening.....

5.9.9.6 **Visual access**.....

5.9.9.7 **Access cover attachment**.....



5.9.10 **Fasteners**

5.9.10.1 **General**.....

5.9.10.2 **Hinges/tongue/slot catches**.....

5.9.10.3 **Captive fasteners**.....

5.9.10.4 **Size and quantity**.....

5.9.10.5 **Fastener head type**

    High-torque fasteners.....

    Low-torque fasteners.....

    Common fasteners.....

5.9.10.6 **Accessibility**.....

5.9.10.7 **Number of turns**.....

5.9.10.8 **Torque labeling**.....



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5.9.11 **Unit Design for Efficient Handling**

5.9.11.1	<b>Rests and stands</b> .....				
5.9.11.2	<b>Extensions</b> .....				

5.9.11.3 **Weight**

Lifting limits (18”h x 18”w x 12” d)

(See Table XXIII)

Lift & place 5” above floor.....

Lift & place 3” above floor.....

Carry object 33 ft or less.....

Lifting frequency.....

(See Table XXIII)

Load size.....

(See Table XXIV)

Obstacles.....

(See Table XXIII)

Carrying limits.....

(See Table XXIII)

Carrying frequency.....

Object carry size.....

User population.....

(See Table XXIII)

Labeling.....

(See Table XXIII)

5.9.11.4 **Push and pull forces**

Horizontal.....

(See Table XXIV)

Vertical.....

(See Fig. 21)

5.9.11.5 **Handles and grasp areas**

General.....

Location.....

Nonfixed handles.....

Grasp surface.....

Handle dimensions.....

(See Fig. 48)

Handle/grasp force requirements.....

(See Fig. 21)

Handle material.....

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5.9.12 **Mounting**

- 5.9.12.1 **General**.....
- 5.9.12.2 **Tools**.....
- 5.9.12.3 **Removal**.....
- 5.9.12.4 **Alignment**.....
- 5.9.12.5 **Coding**.....
- 5.9.12.6 **Rollout rack, slide, hinges**.....
- 5.9.12.7 **Limit stops**.....
- 5.9.12.8 **Interlocks**.....
- 5.9.12.9 **Hinged mounting**.....
- 5.9.12.10 **Layout**.....
- 5.9.12.11 **Covers or panels**.....


5.9.13 **Conductors**

- 5.9.13.1 **Coding**.....
- 5.9.13.2 **Cable clamps**.....
- 5.9.13.3 **Length**.....
- 5.9.13.4 **Cable routing**.....
- 5.9.13.5 **Access**.....
- 5.9.13.6 **Susceptibility to abuse**.....
- 5.9.13.7 **Cable protection**.....
- 5.9.13.8 **Identification**.....


5.9.14 **Connectors**

- 5.9.14.1 **Quick disconnect plugs**.....
- 5.9.14.2 **Keying**.....
- 5.9.14.3 **Identification**.....
- 5.9.14.4 **Alignment**.....
- 5.9.14.5 **Aligning pins and keyway**.....
- 5.9.14.6 **Orientation**.....
- 5.9.14.7 **Coding**.....
- 5.9.14.8 **Spacing**.....
- 5.9.14.9 **Testing and servicing**.....
- 5.9.14.10 **Drawer modules**.....
- 5.9.14.11 **Electronic modules**.....
- 5.9.14.12 **Disassembly/adaptors**.....
- 5.9.14.13 **Dust covers**.....


5.9.15 **Test Points**

- 5.9.15.1 **Adjustment**.....
- 5.9.15.2 **Troubleshooting**.....
- 5.9.15.3 **Marking and color coding**.....


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5.9.16 **Test Equipment**

5.9.16.1 **Storage**.....

5.9.16.2 **Instructions**.....


5.9.17 **Failure Indication & Fuse Requirements**

5.9.17.1 **Indications of equipment failure**

Power failure.....

Out of tolerance.....

Critical malfunctions.....


5.9.17.2 **Fuses and circuit breakers**

General.....

Replacement and resetting.....

Markings.....

Circuit breaker controls.....

Dimensions and separations.....

(See Fig. 13 & Table XI)


5.9.17.3 **Printed circuit boards**.....

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## **5.10**

### **DESIGN OF EQUIPMENT FOR REMOTE HANDLING**



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**5.10 DESIGN OF EQUIPMENT FOR REMOTE HANDLING**

**5.10.1 Characteristics of Equipment**

- 5.10.1.1 **Alignment**.....
- 5.10.1.2 **Disconnect**.....
- 5.10.1.3 **Fasteners**.....
- 5.10.1.4 **Lock/latching mechanism**.....


**5.10.2 Feedback**

- Visual.....
- Kinesthetic.....
- Tactual.....
- Auditory.....


**5.10.3 Manipulators**

- 5.10.3.1 **Safety**.....
- 5.10.3.2 **Characteristics**.....
- 5.10.3.3 **Power Assist**.....


**5.10.4 Viewing Equipment**

- 5.10.4.1 **General**.....
- 5.10.4.2 **Viewing angle**.....
- 5.10.4.3 **Coding**.....
- 5.10.4.4 **Lettering**.....
- 5.10.4.5 **Stereo viewing**.....


**5.10.5 Illumination**

- 5.10.5.1 **Reflected light**.....
- 5.10.5.2 **Threshold viewing**.....


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**5.11**

**SMALL SYSTEMS AND EQUIPMENT**

**5.11 SMALL SYSTEMS AND EQUIPMENT**

**5.11.1 Portability and Load Carrying**

(See Table XXVI)

Distributed load through muscles.....  
 Stress on sensitive areas.....


**5.11.1.3 Portability**

Weight.....  
 Lifting aids.....  
 Configuration  
     Length of step.....  
     Head movements.....  
     Raise/lower over obstacles.....  
     Visibility to feet.....  
     Ability to squat.....  
     Body temperature regulation.....  
     Normal posture maintenance.....



Carrying by two persons.....  
 Standardization.....

**5.11.1.2 Transportability by personnel**

Weight.....  
 Load carrying.....  
 Lifting aids  
     Handles.....  
     Placing load.....  
 Back packing aids.....  
 Projections.....  
 Standardization.....



**5.11.2 Tracking**

5.11.2.1 **Gunner environment**.....


5.11.2.2 **Crank size**.....  
 (See Fig. 10)

5.11.2.3 **Two-dimensional tracking**.....


5.11.2.4 **Supports**.....


5.11.2.5 **Compatibility**.....

**5.11.3 Optical Instruments and Related Equipment**

5.11.3.1 **General**.....


5.11.3.2 **Visual accommodation**.....


5.11.3.3 **Viewing angle**.....

5.11.3 **Optical Instruments and Related Equipment (cont.)**

5.11.3.4 **Magnification**

- General.....
- Unstabilized handheld sights.....
- Multiple magnification requirement.....


5.11.3.5 **Field of view.....**


5.11.3.6 **Entrance pupil.....**

5.11.3.7 **Exit pupil**

- General.....
- Daylight.....
- Low light levels.....


5.11.3.8 **Eye relief.....**

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5.11.3.9 **Eyepiece adjustments**

- 4-power and less.....
- Over 4-power.....


5.11.3.10 **Optical quality**

- Axial resolution.....
- Luminous transmission.....


5.11.3.11 **Reticles**

- Line thickness.....
- Patterns.....
- Format.....
- Parallax.....


5.11.3.12 **Illuminated sights and reticles**

- Night operations.....
- Color.....
- Dimming.....
- Illumination level.....
- Uniformity.....
- Reticle lines.....


5.11.3.13 **Binoculars/bioculars**

- Biocular viewing.....
- Eyepiece separation.....
- Magnification differences.....
- Luminous transmission differences.....
- Matched oculars.....
- Weight.....
- Size and configuration.....


5.11.3.14 **Eyecups and headrests.....**

- Eyecups.....
- Headrests/browpads.....
- Compatibility w/clothing/equipment.....


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5.11.3.15 **Accessories**

Filters

General.....

Use.....

Shutters.....

Positioning aids.....


5.11.3.16 **Environmental conditions**.....

5.11.3.17 **Lighting**.....

5.11.3.18 **Maintenance**.....

Modular design.....

Positioning aids.....

Quick release.....

Collimation.....

Purging and charging.....

Component replacement.....

Boresighting

Positive locks.....

Lock-unlock resistance.....

Adjustment operation.....



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## **5.12**

### **OPERATIONAL AND MAINTENANCE VEHICLES**

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**5.12 OPERATIONAL & MAINTENANCE GROUND,  
SHIPBOARD VEHICLES**

5.12.1 **General**..... 

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5.12.2 **Seating**  
5.12.2.1 **Dimension/Clearances**..... 

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(See Fig. 50 & 51)

5.12.2.2 **Vertical adjustment**..... 

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5.12.2.3 **Horizontal adjustment**..... 

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5.12.2.4 **Backrest angle**..... 

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5.12.2.5 **Seat pan**..... 

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5.12.2.6 **Seat padding**..... 

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5.12.2.7 **Seat belts**..... 

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5.12.3 **Controls**  
5.12.3.1 **Design**..... 

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5.12.3.2 **Steering**..... 

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(See Fig. IX)

5.12.3.3 **Pedals**..... 

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5.12.3.4 **Control of haz. Operations**..... 

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5.12.4 **Operating Instructions**  
5.12.4.1 **Provision of operating instr**..... 

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5.12.4.2 **Format**..... 

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5.12.4.3 **Speed notice**..... 

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5.12.4.4 **Shift handle positions**..... 

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5.12.4.5 **Control movements**..... 

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5.12.4.6 **General labeling criteria**..... 

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5.12.5 **Visibility**  
5.12.5.1 **Night operation**..... 

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5.12.5.2 **Visual field**..... 

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5.12.5.3 **Ground view**..... 

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5.12.5.4 **Rear view (vehicle)**..... 

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5.12.5.5 **Rear view (road)**..... 

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5.12.5.6 **Glare**..... 

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5.12.5.7 **Windshields & windows**..... 

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5.12.5.8 **Windshield wiper/washers**..... 

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5.12.5.9 **Fork lifts**..... 

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5.12.6 **Heating and Ventilation**

- 5.12.6.1 **Heating**.....
- 5.12.6.2 **Ventilation**.....
- 5.12.6.3 **Visibility**.....


5.12.7 **Trailers, Vans, and Intervehicular Connections**

5.12.7.1 **Trailers**

- Brake controls.....
- Positioning controls.....
- Tie downs.....
- Landing gear lock.....


5.12.7.2 **Vans**

- Ceiling height.....
- Personnel opening.....
- Steps, stairs, ladders.....
- Access doors.....
- Inclinometers.....


5.12.8 **Cranes, Materials Handling and Construction**

5.12.8.1 **General**

- 5.12.8.2 **Control labels**.....
- 5.12.8.3 **Control placement**.....
- 5.12.8.4 **Foot-operated controls**.....
- 5.12.8.5 **Load capacity**.....
- 5.12.8.6 **Visibility**.....
- 5.12.8.7 **Access**.....
- 5.12.8.8 **Handholds& footholds**.....


5.12.9 **Automotive Subsystems**

5.12.9.1 **General**

- Drain valves.....
- Filters.....
- Adjustment and access.....
- Battery terminals.....


5.12.9.2 **Tires**

- Dual tires.....
- Spare tires.....


5.12.9.3 **Turn signal & flashers**.....

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5.12.9.4 **Winches**

- Instruction plates.....
- Operation.....
- Cable unwinding.....
- Control location.....
- Clothing compatibility.....


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**5.13**

**HAZARDS AND SAFETY**

5.13 **HAZARDS AND SAFETY**

5.13.1 <b><u>General</u></b> .....				
5.13.2 <b><u>Safety Labels and Placards</u></b> .....				
5.13.2.1 <b>Warning placards</b> .....				
5.13.2.2 <b>Center-of gravity</b> .....				
5.13.2.3 <b>Weight capacity</b> .....				
5.13.2.4 <b>ID of protective items</b> .....				
5.13.2.5 <b>“No Step” marking</b> .....				
5.13.2.6 <b>Electrical labels</b> .....				
5.13.2.7 <b>Hand grasp areas</b> .....				
5.13.3 <b><u>Pipe, Hose, &amp; Tube line ID</u></b> .....				
5.13.4 <b><u>General workspace hazards</u></b> .....				
5.13.4.1 <b>Alerting device</b> .....				
5.13.4.2 <b>Emergency door/exit</b> .....				
Simple operation.....				
Readily accessible.....				
Unobstructed.....				
Location.....				
Quick opening.....				
Operating force.....				
Safety hazard.....				
Permit one person egress.....				
5.13.4.3 <b>Stairs</b> .....				
(See Table XXI)				
5.13.4.4 <b>Obstructions</b> .....				
5.13.4.5 <b>Illumination</b> .....				
5.13.4.6 <b>Thermal contact hazard</b> .....				
5.13.5 <b><u>General Equipment Related Hazard</u></b>				
5.13.5.1 <b>Interlocks &amp; alarms</b> .....				
5.13.5.2 <b>Access</b> .....				
5.13.5.3 <b>Hazardous access</b> .....				
5.13.5.4 <b>Edge rounding</b> .....				
5.13.5.5 <b>Safety pins &amp; streamers</b> .....				
5.13.6 <b><u>Platforms</u></b>				
5.13.6.1 <b>Locks</b> .....				
5.13.6.2 <b>Handrails, safety bars and chains</b> .....				
5.13.6.3 <b>Safety mesh</b> .....				



**5.13.7 Electrical, Mechanical, Fluid, Toxic & Radiation Hazards**

**SAT N/S DR N/A**

**5.13.7.1 Electrical hazards**

- Insulation of tools.....
- Plugs and receptacles.....
- Voltage exposure.....
- Dangerous voltage or current.....
- Ground potential.....
- Electronically-operated hand tool.....
- Electronic equipment.....
- Vehicle batteries.....

**5.13.7.2 Mechanical hazards.....**

- Guards.....
- Telescoping ladders.....

**5.13.7.3 Fluiding hazards.....**

- Connectors.....
- Fluid & fuel servicing equipment.....

**5.13.7.4 Toxic hazards.....**

- General.....
- Carbon monoxide.....

**5.13.7.5 Radiation.....**


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# NOTES

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**5.14**

**AEROSPACE VEHICLE COMPARTMENTS**

**5.14 AEROSPACE VEHICLE COMPARTMENTS**

5.14.1	<b><u>General</u></b> .....		
5.14.1.1	<b><u>Windows, canopies and windshields</u></b> .....		
	Visual performance.....		
	Multi-layered performance.....		
	Angle of incidence.....		
	Unobstructed vision.....		
	Head-up displays.....		
	General.....		
	Symbol brightness.....		
	Legibility.....		
	Field of view.....		
	Exit pupil.....		
	Symbol line width.....		
5.14.1.2	<b><u>Instrument location</u></b> .....		
5.14.2	<b><u>Crew stations &amp; passenger compartments</u></b>		
5.14.2.1	<b><u>Aircrew stations</u></b> .....		
5.14.2.2	<b><u>Layout for shared work space</u></b> .....		
	General.....		
	Location & arrangement group.....		
	Effects of crew size.....		
	Standing operations.....		
	Effects of variable gravity.....		
5.14.2.3	<b><u>Work space dimension</u></b> .....		
	(See Figs. 23-29 & Tables XIII-XIX)		
5.14.2.4	<b><u>Seating &amp; restraint</u></b> .....		
	General.....		
	Vertical & horizontal adjustment.....		
	Swivel adjustment.....		
	Height.....		
	Access to foot control.....		
	Backrest.....		
	Armrest.....		
	Legroom.....		
	Height.....		
	Width.....		
	Depth.....		
	Passenger seats.....		

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5.14.3 **Personnel ingress and egress**

- 5.14.3.1 **Hatches for normal exit and entrance**.....
  - Exit markings.....
- 5.14.3.2 **Handhold & foothold**.....
- 5.14.3.3 **Tunnels**.....
  - Diameter.....
  - Personal equipment space.....
- 5.14.3.4 **Doors**.....
  - Jamming.....
  - Latches.....
- 5.14.3.5 **Incline, stairs, and ladders**.....
  - Angle of incline.....  
(See Fig. 33)
  - Hand & foot surface.....
- 5.14.3.6 **Floors**.....



5.14.4 **Emergency Evacuation**

- 5.14.4.1 **General criteria**.....
  - Simplicity.....
  - Evacuation time.....
  - Cutaway areas.....
  - Movable articles.....
  - Exterior protrusions.....
  - Evacuation aids.....
  - Handholds.....
- 5.14.4.2 **Escape exits**.....
  - Emergency lighting.....
  - Escape openings.....
  - Ease of operation.....
  - Latch-handle actuation.....
  - Control protection.....
- 5.14.4.3 **Ejection systems**.....
  - Clearance.....
  - Safety harnesses.....
  - Ejection control.....
  - Control protection.....
  - Safety pins & streamers.....
  - Automatic sequencing.....
  - Survival requirements.....


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**5.14.4.3 Ejection systems (cont.)**

Survival requirements.....  
Escape capsule.....  
Capsule provision.....  
Pressurization.....  
Alighting impact.....  
Flotation.....


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**5.15**

**USER-COMPUTER INTERFACE**

**5.15 USER-COMPUTER INTERFACE**

**5.15.1 General**

- 5.15.1.1 **Standard procedures.....**
- 5.15.1.2 **Computer response.....**
- 5.15.1.3 **On-line guidance.....**
- 5.15.1.4 **System status.....**
- 5.15.1.5 **Log-on procedures.....**
  - Automatic log-on display.....
  - Log-on feedback.....
  - Log-on delay.....
- 5.15.1.6 **Log-on off procedures.....**
- 5.15.1.7 **Computer failure.....**
- 5.15.1.8 **Interaction.....**


**5.15.2 Data Entry**

**5.15.2.1 General**

- User pacing-manual.....
- Positive feedback.....
- Processing delay.....
- Explicit action.....
- Validation.....
- Software-available data.....
- Input units.....
- Cursors.....
  - Control.....
  - Display.....
  - Home position.....
  - Explicit actuation.....
  - Consistent positioning.....
  - Keyboard cursor control.....
  - Movement relationship.....
- Abbreviations, mnemonics, codes.....
- Explicit delete action.....
- Change of data.....
- Single method of data entry.....
- Data entry display.....


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5.15.2.2 **Keyboard**

- Use.....
- Configuration.....
- Timely display.....  
(See Table XXVIII)
- Length.....
- Justification.....
- Numeric keypads.....
- Minimization of keying.....
- Minimization of shift keying.....
- Data change.....



5.15.2.3 **Fixed-function (dedicated) keys**

- Use.....
- Standardization.....
- Functional consistency.....
- Availability.....
- Non-active keys.....
- Grouping.....
- Actuation.....
- Feedback.....
- Function labels.....


5.15.2.4 **Variable-function keys**

- Use.....
- Status display.....
- Reprogrammable default function.....
- Relabeling.....
- Shifted characters.....
- Easy return to baselevel function.....


5.15.2.5 **Lightpen**

- Use.....
- Dimensions and mounting.....
- Actuation.....
- Feedback
  - Position of lightpen.....
  - Lightpen activated/input revd.....


5.15.2.6 **Directional controllers**

- Use.....
- Actuation/deactuation.....


5.15.2.7 **Touch Screen**

- Use.....
- Luminance transmission.....
- Positive transmission.....
- Dimensions and separation.....
- Resistance.....


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5.15.3 **Data Display**

5.15.3.1 **Display format**

Consistency

- Input and output.....
- Match source documents.....
- Computer, not user control.....


Criticality.....

Readily usable form.....

Order and sequence

- Data grouped by importance.....
- Data grouped by function.....
- Data grouped by frequency.....


Data separation.....

Recurring separation.....

Extended alphanumerics.....

Comparative data fields.....

Labels and titles.....

- Display title.....
- Command entry, prompts.....

Data group labels.....

Scrolling.....

Page numbering.....

Frame Identification.....

5.15.3.2 **Display content**

Standardization.....

Information density.....

- Crowded displays.....
- Related data on same page.....
- Page labeling.....


Abbreviations and acronyms.....

Data entry/display consistency.....

Context for displayed data.....

5.15.3.3 **Display coding**

Use.....

Flash.....

Brightness.....

Pattern and location.....

Underlining.....

Symbol and size.....

- Special symbols.....
- Markers close to words.....

Color.....

Shape.....

Brightness inversion.....




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5.15.3.6 **Graphic displays (cont.)**

- Drawing figures.....
- Changing size.....
- Highlighting critical data.....
- Reference index.....
- Data annotation.....
- Normal orientation for labels.....
- Pictorial symbols.....
- Display of scale.....
- Consistent scaling.....
- Single scale only.....
- Unobtrusive grids.....
- Direct display of differences.....
- Bar graphs.....
  - Bar spacing.....
- Histograms.....


5.15.3.7 **Text/program editing**

- Buffer.....
- Presentation mode.....
- Display window.....
- Editing commands.....
  - Text edit columns.....
  - Program edit command.....
  - Tab controls.....
- Editing commands.....
- Highlighted text.....
- String search.....
- Automatic line break.....
- Format control.....
- Predefined formats.....
- Frequently used text.....
- Text displayed as printed.....
- Control annotations.....
- Flexible printing option.....
- Head & foot of file.....


5.15.3.8 **Audio displays**

- Uses.....
- Other requirements.....
- Supportive function-audio.....
- Signal characteristics.....
- Frequency.....
  - Audibility.....
  - Alarm setting.....


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5.15.4 **Interactive Control**

5.15.4.1 **General**

- Question & answer.....
- Menu selection.....
- Form filling.....
- Function keys.....
- Command language.....
- Natural/query language.....
- Graphic interaction.....
- Response time.....
- Response time induced keyboard lockout.....
- Keyboard restoration.....
- Interrupt to end keyboard, lockout.....
- Simplicity.....
- Accidental actuation.....
- Compatibility with user skill.....
- Availability of information.....
- Concurrent display.....
- Hierarchical process.....
- User memorization.....
- Dialogue type.....
- Number system.....
- Data manipulation.....
- Computer processing constraint.....
- Feedback for correct input.....
- Feedback for erroneous input.....
- Control input data display.....
- Originator ID.....


5.15.4.2 **Menu selection**

- Use.....
- Selection
  - Devices.....
  - Titles.....
  - Series entry.....
  - Sequences.....
- Active option presentation.....
- Format consistency.....
- Option sequence.....
- Simple menus.....
- Option presentation.....
- Direct function call.....
- Consistency w/command language.....

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- 5.15.4.2 **Menu selection (cont.)**
- Option coding.....
- Keyed codes.....
- Position in structure.....
- Back menu.....
- Return to top level.....


- 5.15.4.3 **Form Filling**
- Use.....
- Grouping.....
- Format & content consistency.....
- Distinctiveness of fields.....
- Field labels.....
- Cursor.....
- Entry length indication.....
- Overwriting.....
- Unused underscores.....
- Dimensional units.....
- User omissions.....
- Non-entry areas.....
- Flexible data entry.....
- Informative labels.....
- Logical order.....
- Form filling for control entry.....


- 5.15.4.4 **Fixed function keys.....**
- 5.15.4.5 **Command language**

- Use.....
- User viewpoint.....
- Distinctiveness.....
- Punctuation.....
- Abbreviations.....
- Standardizations.....
- Displayed location.....
- Command prompts.....
- Complexity.....
- User definition of macro cmd.....
- Standard tech. for command edit.....
- Destructive command.....


- 5.15.4.6 **Question & answer**
- Use.....
- Question displayed separately.....
- Recapitulating prior answer.....
- Source document capability.....


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5.15.4.7 **Query language**

- Use.....
- Natural organization of data.....
- Coherent representation of data.....
- Task-oriented wording.....
- Logic to link queries.....
- Confirming large-scale retrieval.....


5.15.4.8 **Graphic interaction**

- Use.....
- Iconic menus.....
- Supplement verbal labels.....


5.15.5 **Feedback**

- 5.15.5.1 Use.....
- 5.15.5.2 Stand-by.....
- 5.15.5.3 Process outcome.....
- 5.15.5.4 Input confirmation.....
- 5.15.5.5 Current modes.....
- 5.15.5.6 Highlight option selection.....
- 5.15.5.7 User input rejection.....
- 5.15.5.8 Feedback message cont.....
- 5.15.5.9 Time consuming process.....


5.15.6 **Prompts**

- 5.15.6.1 Use.....
- 5.15.6.2 Standard display.....
- 5.15.6.3 Explicit prompts.....
- 5.15.6.4 Prompt clarity.....
- 5.15.6.5 Definitions.....
- 5.15.6.6 Consistent terminology.....
- 5.15.6.7 User confirmation.....


5.15.7 **Default**

- 5.15.7.1 Workload reduction.....
- 5.15.7.2 User selection.....
- 5.15.7.3 Default substitution.....
- 5.15.7.4 Default entry.....


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5.15.8 **Error Management/Data Protection**

- 5.15.8.1 **Error correction**.....
- 5.15.8.2 **Early detection**.....
- 5.15.8.3 **Internal software checks**.....
- 5.15.8.4 **Critical entries**.....
- 5.15.8.5 **Error message content**.....
- 5.15.8.6 **Error recover & process**.....
- 5.15.8.7 **Diagnostic info**.....
- 5.15.8.8 **Correct entry & confirm**.....
- 5.15.8.9 **Spelling errors**.....
- 5.15.8.10 **Error in stack command**.....
- 5.15.8.11 **Display of error entry**.....
- 5.15.8.12 **Help**


- Standard action to request HELP.....
- Multilevel HELP.....
- Browsing HELP.....


5.15.8.13 **Data security**

- Automated security measures.....
- Warning of threat to security.....
- Segregate real from simulated data .....
- Display of simulated data.....
- Displayed security classification.....
- User ID.....
- Choice of passwords.....
- Changing of passwords.....


5.15.9 **System Response Time**

(See Table XXIX)

- Key response.....
- Key print.....
- Page turn.....
- Page scan.....
- XY entry.....
- Function.....
- Pointing.....
- Sketching.....
- Local update.....
- Host update.....
- File update.....
- Inquiry (simple).....
- Inquiry (complex).....
- Error feedback.....


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5.15.10 **Other Requirements**

- 5.15.10.1 **Overlays**.....
- 5.15.10.2 **Hard copy**.....
- Display print.....


5.15.11 **Data & Message Transmission**

- 5.15.11.1 **Functional integration**.....
- 5.15.11.2 **Consistent procedures**.....
- 5.15.11.3 **Minimal memory load**.....
- 5.15.11.4 **Interrupt**.....
- 5.15.11.5 **Stored message forms**.....
- 5.15.11.6 **Incorp. Existing files**.....
- 5.15.11.7 **Addresses**
  - Prompt address entry.....
  - Address directory.....
  - Aids for directory search.....



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# NOTES

# **DEFICIENCY REPORTS**



**Each deficiency report is two pages.**

**Left and right hand sides face each other for easy copying.**

# **DEFICIENCY REPORT**

## **Who/What/Where/When/How Information**

**Name of Item**

**Part/Model Number**

**Date of Analysis**

**Location of Test/Evaluation**

**Design Engineer**

**Method of Analysis (inspection, test, drawing review, etc.)**

**Description of Deficiency**

**Proposed Change and Rationale**

**Prepared by**

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**Description of Deficiency**

**Proposed Change and Rationale**

**Prepared by**

**MIL-STD-1472D**

**CHECKLIST**

**PROJECT TITLE**

**DATE, TIME, PLACE**

**EVALUATOR**