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**Human Factors Engineering
Checklists for Application in the SAR
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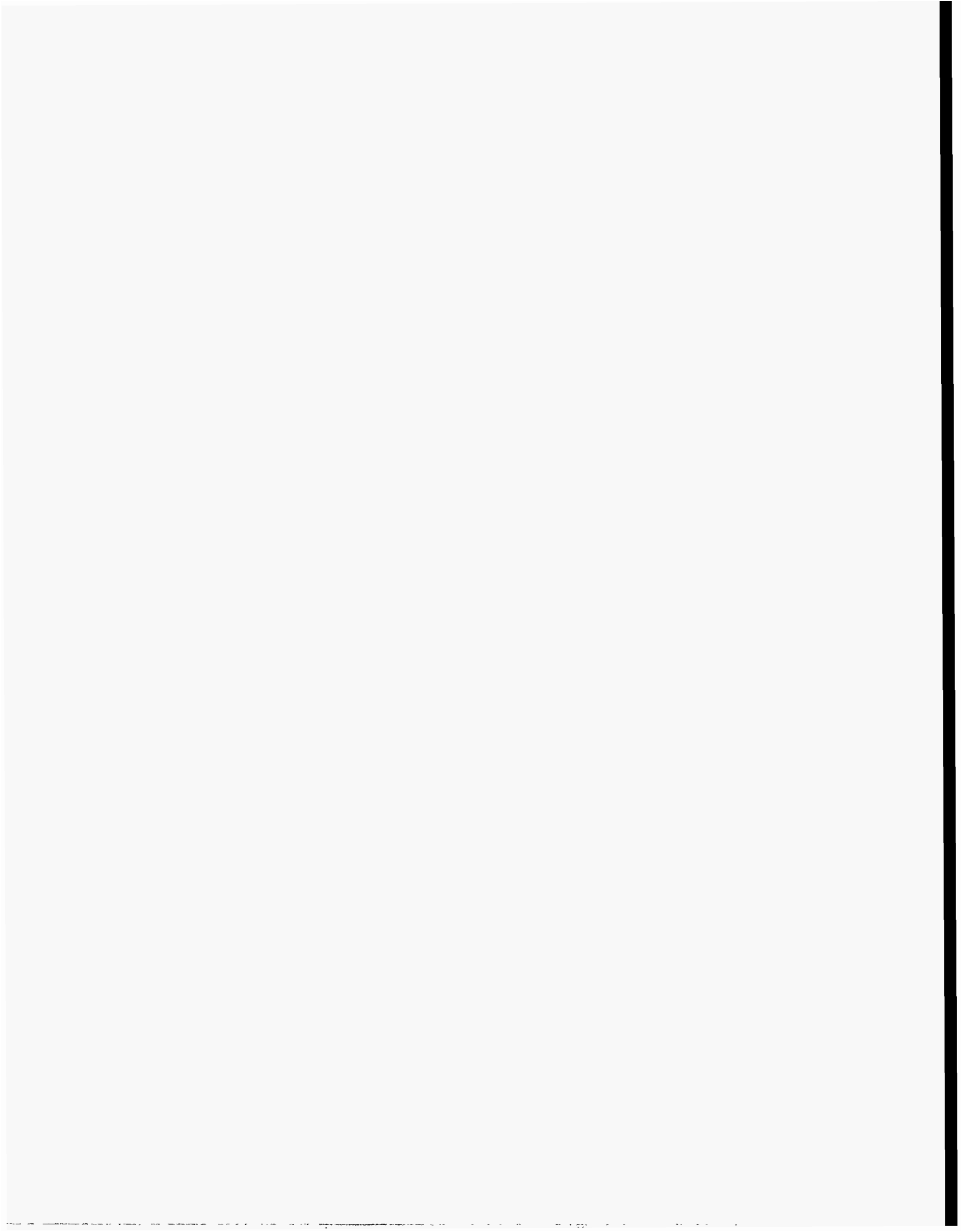
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Human Factors Engineering Checklists for Application in the SAR Process

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Published March 1995

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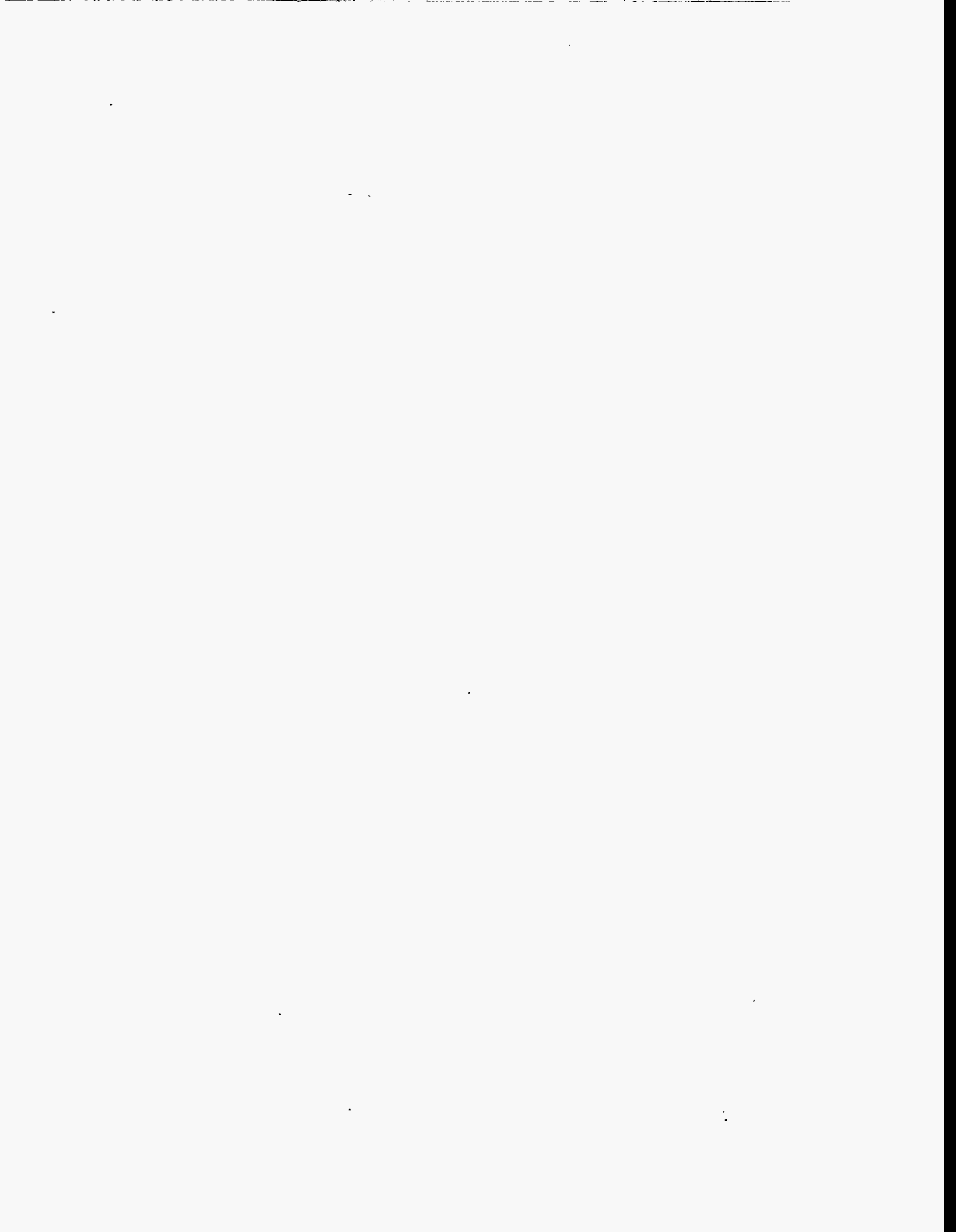
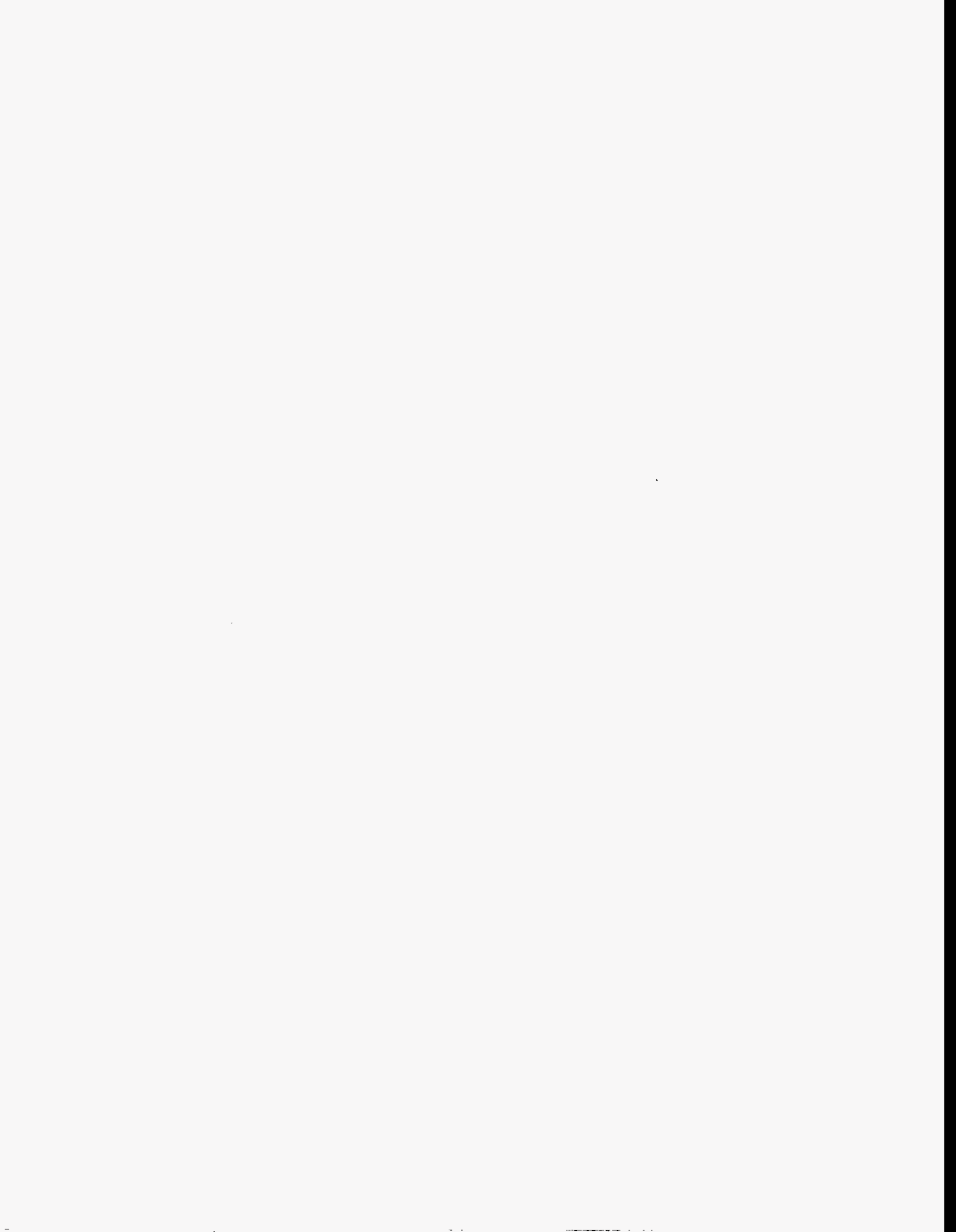


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INTRODUCTION

This technical report was produced to assist the preparers, and reviewers, of the human factors portions of the SAR in completing their assigned tasks regarding analysis and/or review of completed analyses. The checklists, which are the main body of the report, and the subsequent tables, were developed to assist analysts in generating the needed analysis data to complete the human engineering analysis for the SAR.

Purpose

This technical report provides a series of 19 human factors engineering (HFE) checklists which support the safety analyses of the U.S. Department of Energy's (DOE) reactor and nonreactor facilities and activities. The results generated using these checklists and in the preparation of the concluding analyses provide the technical basis for preparing the human factors chapter, and subsequent inputs to other chapters, required by DOE as a part of the safety analysis reports (SARs).

Sources

The checklists were developed utilizing material derived from internationally recognized HFE standards and guidelines, both referenced in, or coming from DOE orders and standards. Included is the draft DOE-STD-1063-94, "Ergonomic and Human Factors Engineering Design Criteria," Volume 1 General Criteria, February 1994. Also, among these sources are:

American National Standards Institute (ANSI), 1981, "Practices for Respiratory Protection", ANSI Z88.2-1981, March

Code of Federal Regulations, 1992a, 29 CFR 1910.132, "Personal Protective Equipment: General Requirements" Office of the Federal Register, February.

DOE, 1994, "Human Factors Engineering Design Criteria, Volume 1 General Criteria", DOE-STD-1062-DFT, February.

DOE, 1989, "Human Engineering Design Criteria for Military Systems, Equipment, and Facilities," MIL-STD-1472D, March

DOE, 1989, "General Design Criteria," Section 1300-12, "Human Factors Engineering," Order 6430.1A, April

Gilmore, Walter E., Gertman, David I., and Blackman, Harold S., User-Computer Interface In Process Control - A Human Factors Engineering Handbook, EG&G Idaho, Idaho National Engineering Laboratory, Academic Press, 1989.

Stramler, James H. Jr., The Dictionary for Human Factors - Ergonomics, CRC Press, 1993.

USNRC (U.S. Nuclear Regulatory Commission), 1981, Guidelines for Control Room Design Reviews, NUREG-0700, September.

In deriving the checklists, each of the HFE criterion contained in DOE and DOE referenced standards and guidelines were reviewed for its individual relevance to DOE reactor and nonreactor facility human-machine operations.

Requirements

The HFE checklists contained in this report respond to HFE requirements explicitly stated in DOE Order 5480.23, "Nuclear Safety Analysis Reports," Attachment 1, Section 14 which requires that:

" A systematic inquiry be included into the importance to safety of reliable, correct, and effective human-machine interactions, including the effectiveness of surveillance, maintenance, and normal, abnormal, and emergency operations. In those contexts in which reliable effective human performance by the operating crew is important to safety, and in proportion to the importance-to-safety, safety analyses should document a systematic inquiry into the optimization of the design of the human-machine interface to enhance reliable performance.

Human-machine design considerations should include:

- 14a communication and operational aids;
- 14b layout of controls and instrumentation and labelling;
- 14c work environment factors such as heat, light, noise, physical access, protective clothing, and breathing apparatus; and
- 14d demonstrated ability of personnel to accomplish their responsibilities under normal, abnormal, and accident conditions."

Organization of Document

This document is divided into four main sections. The first part is the introductory material presented in the front part of the document. This material explains the origin of the checklists, the sources utilized, and other information pertaining to the purpose and scope of the report. The second part, subdivided into 19 sections, is the checklists themselves. These are the checklists that were developed for conducting the HFE analyses for the SAR. At the end of the checklists, are the referenced tables and figures adapted from those found in DOE-1062-DFT. The numbering of the tables and figures is based on the numbering of the tables and figures from DOE-1062-DFT, and have not been modified for this document. The numbering sequences have been kept the same so that the document user can refer to the sections or tables within the Draft Standard if additional information is required. The third section is the glossary which defines terms that could either be unfamiliar or have specific meanings within the context of these checklists. The final section is the subject index in which the glossary terms are referenced back to the specific checklist and page the term is encountered.

Organization of Checklists

The checklists are presented in the following order:

- Checklist 1. Operational Aids
- Checklist 2. Control/Display Integration
- Checklist 3. Principles of Visual Displays
- Checklist 4. Transilluminated Displays
- Checklist 5. Scale Indicators
- Checklist 6. Displays
- Checklist 7. Audio Displays
- Checklist 8. Controls - General
- Checklist 9. Hand Operated Controls
- Checklist 10. Foot Operated Controls
- Checklist 11. User-Computer Interface
- Checklist 12. Labelling
- Checklist 13. Remote Handling
- Checklist 14. Environment
- Checklist 15. Operation and Maintenance: Vehicles
- Checklist 16. Hazards and Safety
- Checklist 17. Physical Access
- Checklist 18. Protective Clothing
- Checklist 19. Communications

Each checklist provides the criteria needed for the analysis pertaining to the specific subject matter. The checklists are broken down into 19 individual checklists in order to accommodate the user applying only the needed checklists for specific areas, and for ease in using and understanding the data being collected. The checklists also are formatted to assist the user in answering the appropriate questions, indicating the equipment/function that is being analyzed, and recording whether a specific item applies, and if so, does the equipment/function meet the requirements or does it deviate from full compliance. The checklists also provide the user with the appropriate information to determine which checklists apply to a particular piece of equipment, building, room, or functional area.

Suggestions for Using the Checklists

The HFE checklists are designed for use in conducting the HFE analyses for the SAR. These checklists however, are useful beyond just the SAR. HFE checklists can be useful in determining whether or not a workstation meets the requirements prescribed by the HFE criteria, and assists in helping a user modify the workstation to meet requirements and provide the maximum possible support and optimum user-computer interface to accommodate the operator.

HFE checklists are based on ergonomic principles, and utilize accepted design and functional criteria. They can assist facility managers in determining whether environmental conditions are meeting the needs of their staff, whether or not conditions exist that may be adverse to

performance, or hazardous. From an industrial safety perspective, the checklists also assist in helping to promote a safer and more user friendly work environment.

The checklists can also be applied during the design process. Application of the checklists will be useful in determining if the design is meeting the applicable HFE requirement preventing expensive redesign and reducing the potential for human error.

CHECKLIST 1: OPERATIONAL AIDS

DATE: _____

REVIEWER: _____

DESCRIPTION OF REVIEWED SYSTEM(S): _____

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
1.	Are plant parameters selected for inclusion in the annunciator warning system and the limit or alarm set points for those established, to allow the operator to monitor the status of the plant and respond to out-of-tolerance conditions effectively? (NUREG 0700 - 6.3.1.2 Alarm Parameter Section)					
2.	Are alarms presented frequently enough to demonstrate their function, but not enough to be considered a nuisance and ignored by operators? (NUREG 0700 - 6.3.1.2 Alarm Parameter Section - Set Points)					
3.	Are setpoints established to give operators adequate time to respond to the warning condition before a serious problem develops? (NUREG 0700 - 6.3.1.2 Alarm Parameter Section - Set Points)					
4.	Are alarms that require the control room operator to direct an auxiliary operator to a given plant location for specific information avoided? (NUREG 0700 - 6.3.1.2 Alarm Parameter Selection - General Alarms)					
5.	If general alarms must be used, are they used only for conditions that allow adequate time for auxiliary operator action and subsequent control room operator action? (NUREG 0700 - 6.3.1.2 Alarm Parameter Selection - General Alarms)					
6.	Are annunciators with inputs from more than one plant parameter set point avoided? Multi-input alarms that summarize single-input annunciators elsewhere in the control room are an exception. (NUREG 0700 - 6.3.1.2 Alarm Parameter Selection - Multichannel or shared Alarms)					

CHECKLIST 1: OPERATIONAL AIDS

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
7.	Where multi-input annunciators must be used, is an alarm printout capability provided? The specifics of the alarm should be printed on an alarm typer with sufficient speed and buffer storage to capture all alarm data. (NUREG 0700 - 6.3.1.2 Alarm Parameter Selection - Multichannel or shared Alarms)					
8.	Is a reflash capability provided to allow subsequent alarms to activate the auditory alert mechanism and reflash the visual tile even though the first alarms may not have been cleared? (NUREG 0700 - 6.3.1.2 Alarm Parameter Selection - Multichannel or shared Alarms)					
9.	Are alarms for any shared plant systems duplicated in all control rooms? (NUREG 0700 - 6.3.1.2 Alarm Parameter Selection - Multiunit Alarms)					
10.	When an item of shared equipment is being operated from one control room, is a status display or signal provided in all other control rooms which could potentially control this equipment? (NUREG 0700 - 6.3.1.2 Alarm Parameter Selection - Multichannel or shared Alarms)					
11.	Because of the large number of annunciators typically found in control rooms and the likelihood that numerous alarms may come in concurrently, is some logical prioritization applied such that operators can differentiate the most important or serious alarms from less important ones? (NUREG 0700 - 6.3.1.4 Prioritization)					
12.	Is prioritization accomplished using a relatively small (24) number of priority levels? (NUREG 0700 - 6.3.1.4 Prioritization - Levels of Priority)					
13.	Is prioritization based on a continuum of importance, severity, or need for operator action in one or more dimensions, e.g., likelihood of reactor trip, release of radiation? (NUREG 0700 - 6.3.1.4 Prioritization - Levels of Priority)					

CHECKLIST 1: OPERATIONAL AIDS

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
14.	Is some method for coding the visual signals for the various priority levels employed? Are acceptable methods for priority coding, including color, position, shape or symbolic coding used? (NUREG 0700 - 6.3.1.4 Prioritization - Priority Coding)					
15.	Is appropriate auditory signal coding for priority level used? See guideline 6.2.2.3 for recommended coding techniques. (NUREG 0700 - 6.3.1.4 Prioritization - Priority Coding)					
16.	Do alarms that have cleared initiate an audible signal and require positive confirmation? (NUREG 0700 - 6.3.1.5 Cleared Alarms)					
17.	Do cleared alarms have a dedicated, distinctive audible signal with a finite duration? (NUREG 0700 - 6.3.1.5 Cleared Alarms - Auditory Signal)					
18.	Is a special flash rate (twice or one-half of the normal flash rate is preferred, to be discriminatory), reduced signal brightness, or a special color of visual signal (consistent with the overall control room color coding scheme) used when a visual alarm is cleared? (NUREG 0700 - 6.3.1.5 Cleared Alarms - Visual Signal)					

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CHECKLIST 2: CONTROL/DISPLAY INTEGRATION

DATE: _____

REVIEWER: _____

DESCRIPTION OF REVIEWED SYSTEM(S): _____

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
1.	Is the relationship control to display and display to control immediately apparent and unambiguous to the operator? (DOE-STD-1062-DFT Relationship: 2.1.1.1)					
2.	Are control/display relationships apparent through proximity, similarity of grouping, coding, demarcation, labeling, spacing, color shading, insert panels, panel relief, use of mimics, and similar techniques? (DOE-STD-1062-DFT Design: 2.1.1.2)					
3.	Are displays and controls sufficient to monitor and control within all design conditions and anticipated abnormal and off normal events? (DOE-STD-1062-DFT Usability: 2.1.1.2.1)					
4.	Are control manipulation and display monitoring complexity and precision consistent with the precision required for the system? (DOE-STD-1062-DFT Complexity and Precision: 2.1.1.3)					
5.	Is feedback on control response adequacy provided as rapidly as possible? (DOE-STD-1062-DFT Feedback: 2.1.1.4)					
6.	Is there no discernible time lag between system condition change and display indication or an immediate feedback indication of the process and direction of parameter change? (DOE-STD-1062-DFT Control Actuation and Display Indication: 2.1.1.5)					
7.	Is adjustable illumination provided for visual displays, including control and panel labels and critical markings, which must be read at night or under darkened conditions? (DOE-STD-1062-DFT Illumination: 2.1.1.6)					

CHECKLIST 2: CONTROL/DISPLAY INTEGRATION

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
8.	Does the operator assigned to control and monitor a particular function or group of related functions have physical and visual access to all controls, displays, and communication capability? (DOE-STD-1062-DFT Simultaneous Access 2.1.1.7)					
9.	Is hierarchical grouping used (i.e. by function, system, and subsystem) to increase the ease and reliability of monitoring of processes (DOE-STD-1062-DFT Hierarchical Grouping: 2.2.1)					
10.	Are functional groups of controls and displays located in proximity to one another (i.e. arranged in groups such as power, status, test)? (DOE-STD-1062-DFT Functional Grouping: 2.2.2)					
11.	Are functional groups of controls and displays located to provide either or both left-to-right (referred) or top-to-bottom order of use? (DOE-STD-1062-DFT Sequence Between Groups: 2.2.2.1)					
12.	Are the more frequently used and the most important groups located in areas of easiest access? (DOE-STD-1062-DFT Access: 2.2.2.2)					
13.	Are functional groups set apart by techniques such as demarcation or color shading? (DOE-STD-1062-DFT Functional Group Marking: 2.2.2.3)					
14.	Is the location of recurring functional groups and individual items similar from panel to panel and are mirror image arrangements eliminated? (DOE-STD-1062-DFT Consistency: 2.2.2.4)					
15.	Are groups of similar controls and displays laid out with no more than five similar components together in an unbroken row or column? (DOE-STD-1062-DFT Size of Group: 2.2.2.5)					

CHECKLIST 2: CONTROL/DISPLAY INTEGRATION

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
16.	When an operator must use a large number of controls and displays does their location and arrangement aid in determining which controls are associated with specific displays and equipment? (DOE-STD-1062-DFT Location and Arrangement: 2.2.3)					
17.	Are controls and displays within functional groups located according to either operational sequence or function or both? (DOE-STD-1062-DFT Arrangement within Groups: 2.2.4)					
18.	Are controls and displays arranged in a manner consistent with their logical flow? (DOE-STD-1062-DFT Logical Flow Arrangement: 2.2.4.1)					
19.	Are controls arranged by importance with the most important or frequently used controls in the most accessible locations? (DOE-STD-1062-DFT Positioning by Importance or Frequency of Use: 2.2.4.2)					
20.	Are associated vertical and horizontal displays arranged so as not to confuse the operator, or to cause the operator to grab the opposite controls due to the horizontal and vertical array? (DOE-STD-1062-DFT Vertical and Horizontal Arrays: 2.2.4.3)					
21.	When a display and control are used concurrently can the operator use the control and view the display without the possibility of parallax error? (DOE-STD-1062-DFT Simultaneous Use: 2.2.4.4)					
22.	Are controls that require the reading of several displays placed as near as possible to the related displays without obscuring the displays? (DOE-STD-1062-DFT Multiple Displays: 2.2.4.5)					
23.	When separate displays are affected by a combined control are the displays arranged from left to right with the combined control underneath the center of the displays without obscuring the displays? (DOE-STD-1062-DFT Combined Control: 2.2.4.6)					

CHECKLIST 2: CONTROL/DISPLAY INTEGRATION

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
24.	Where displays are selected using a rotary selector switch does the control position sequence conform to the display location and does the control move clockwise from OFF through the control settings? Does the control position indication correspond to display labels and do displays read off-scale rather than zero when not selected? (DOE-STD-1062-DFT Display Selectors: 2.2.4.7)					
25.	When related controls and displays must be located on separate panels, are the displays, either on the adjacent upper panel or individual panels, mounted approximately at the same angle relative to the operator and not mounted facing each other? (DOE-STD-1062-DFT Separate Panels: 2.2.4.8)					
26.	Are related control and display positions oriented to correspond to the positions of the controlled and monitored components? (DOE-STD-1062-DFT Component Groups: 2.2.4.9)					
27.	When the techniques in 2.2.2.1-9 cannot be used to make control display relationships apparent are techniques such as mimics or coding used? (DOE-STD-1062-DFT Alternative Techniques: 2.2.4.10)					
28.	Are emergency displays and controls located where they can be seen and reached with minimum delay? (DOE-STD-1062-DFT Emergency Use: 2.2.4.11)					
29.	Do display indicators clearly and unambiguously direct and guide appropriate control responses and is the response of the display to control movements consistent, predictable, and compatible with the operator's expectations? (DOE-STD-1062-DFT Lack of Ambiguity: 2.3.1)					
30.	Is the time lag between system response time to a control input and display presentation minimized, and is it consistent with safe and efficient system operation, meeting the user's expectations? (DOE-STD-1062-DFT Time Lag: 2.3.2)					

CHECKLIST 2: CONTROL/DISPLAY INTEGRATION

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
31.	Does the clockwise movement of a rotary control or movement of a linear control forward, up, or to the right produce a clockwise movement of circular scale pointers and increase the magnitude of the setting? (DOE-STD-1062-DFT Moving Pointer, Circular Scales: 2.3.3)					
32.	Does the clockwise movement of a rotary control or movement of a linear control forward, up, or to the right produce a clockwise movement up or to the right for horizontal and vertical scale pointers and increase the magnitude of the reading? (DOE-STD-1062-DFT Moving Pointer, Linear Scales: 2.3.4)					
33.	When circular fixed-pointer, moving-scale indicators are necessary does the clockwise movement of a rotary control or movement of a linear control foreword, up, or to the right produce a counterclockwise movement of the scale and increase the magnitude of the reading? (DOE-STD-1062-DFT Fixed Pointer, Circular Scale: 2.3.5)					
34.	When vertical or horizontal fixed-pointer, moving-scale indicators are necessary does the clockwise movement of a rotary control or movement of a linear control foreword, up, or to the right produce a movement of the scale down to the left and increase the magnitude of the reading? (DOE-STD-1062-DFT Fixed Pointer, Linear Scale: 2.3.6)					
35.	When there is a direct linkage between control and display is a rotary control used if the indicator must move through an arc of more than 180 degrees? (DOE-STD-1062-DFT Direct Linkage: 2.3.7)					
36.	Are controls selected so that the direction of movement of the control is consistent with the related movement of the display, equipment component, or vehicle? (DOE-STD-1062-DFT Common Plane: 2.3.8)					
37.	When control and display are parallel in line of movement are direction-of-movement relationships consistent? (DOE-STD-1062-DFT Parallel Movement: 2.3.9)					

CHECKLIST 2: CONTROL/DISPLAY INTEGRATION

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
38.	When control/display relationships specified in this document cannot be achieved are controls clearly labeled to indicate the direction of control movement required? (DOE-STD-1062-DFT Labeling: 2.3.10)					
39.	When a rotary control and a linear display are in the same plane does the part of the control adjacent to the display move in the same direction as the moving part of the display? (DOE-STD-1062-DFT Movement Direction: 2.3.11)					
40.	Does the control/display ratio for continuous adjustment controls minimize the total time required to make the desired control movement? (DOE-STD-1062-DFT Minimization of Time: 2.4.1)					
41.	Are functional groups of controls and displays located to provide for left-to-right or top-to-bottom sequence of use, or both? (DOE-STD-1062-DFT Sequence of Use: 2.4.2)					
42.	Is the ratio of display element movement to control movement high if a wide range of display element movement is required and low for a small range? (DOE-STD-1062-DFT Range of Display Movement: 2.4.3)					
43.	When a knob is provided for making coarse display element settings on linear scales (0.2 in. to 0.16 in. or 0.4 mm to 2.5 mm) is approximately 5.9 in. (150 mm) of display element movement provided for one complete turn of the knob? (DOE-STD-1062-DFT Knob, Coarse Setting: 2.4.4)					
44.	When a knob is provided for making fine display element settings on linear scales (0.008 in. to 0.16 in. or 0.2 mm to 0.4 mm) is 1 in. to 2 in. (25 mm to 50 mm) of display element movement provided for one complete turn of the knob? (DOE-STD-1062-DFT Knob, Fine Setting: 2.4.5)					
45.	When bracketing is used to locate a maximum or minimum does the control knob swing through an arc between 10 and 30 degrees on either side of the target? (DOE-STD-1062-DFT Bracketing: 2.4.6)					

CHECKLIST 2: CONTROL/DISPLAY INTEGRATION

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
46.	When a lever is provided for coarse settings does one unit of display element movement equal three units of lever movement? (DOE-STD-1062-DFT Lever, Coarse Setting: 2.4.7)					
47.	When a lever is provided for coarse settings in two dimensions does one unit of display element movement equal two and one-half units of lever movement? (DOE-STD-1062-DFT Lever, Two-Dimension Setting: 2.4.8)					
48.	When counters are provided is the control-display ratio such that one revolution of the knob produces approximately 50 counts? (DOE-STD-1062-DFT Counters: 2.4.9)					
49.	Does clockwise movement of rotary controls or movement of linear controls forward, up, or to the right produce increasing values in digital displays and bottom to top or right to left movement in indicator lights? (DOE-STD-1062-DFT Digital Displays and Indicator Lights: 2.5)					

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CHECKLIST 3: PRINCIPLES OF VISUAL DISPLAYS

DATE: _____

REVIEWER: _____

DESCRIPTION OF REVIEWED SYSTEM(S): _____

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
1.	Are visual displays used to provide the operator with a clear indication of equipment or system conditions under any eventuality? (DOE-STD-1062-DFT Use: 3.1.1.1)					
2.	Does the alerting/warning display improve the probability of detecting the triggering condition? (DOE-STD-1062-DFT Alerting/Warning: 3.1.1.2)					
3.	Is information displayed sufficient to allow performance and limited to information necessary to perform specific actions or decisions? (DOE-STD-1062-DFT Content: 3.1.1.3)					
4.	Is information displayed within the limits and precision required for operator actions or decisions? (Precision: 3.1.1.4)					
5.	Is information presented to the operator in a directly usable form? (DOE-STD-1062-DFT Format: 3.1.1.5)					
6.	Is operator and maintainer information presented in separate displays? (DOE-STD-1062-DFT Combining Operator/Maintainer Information: 3.1.1.6)					
7.	Do the panel faces display <i>only</i> functional or operational markings? (DOE-STD-1062-DFT Unrelated Markings: 3.1.1.7)					
8.	Is the duration of a signal or alert long enough to enable the operator to detect it? (DOE-STD-1062-DFT Duration: 3.1.1.8)					
9.	Are displays requiring refreshed information updated in a synchronous manner (where possible) and refreshed in a timely manner? (DOE-STD-1062-DFT Timeliness: 3.1.1.9)					

CHECKLIST 3: PRINCIPLES OF VISUAL DISPLAYS

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
10.	Do complex displays that present simultaneous and integrated information advise or alert operators to information that becomes critical within the display? (DOE-STD-1062-DFT Advisory: 3.1.1.10)					
11.	Is information display redundancy avoided except to achieve specified safety or reliability? (DOE-STD-1062-DFT Redundancy: 3.1.2.1)					
12.	Is the operator immediately aware of the failure of a display or its circuit? (DOE-STD-1062-DFT Display Failure Clarity: 3.1.2.2)					
13.	Does the failure of a display circuit cause a failure in the equipment associated with the display? (DOE-STD-1062-DFT Display Circuit Failure: 3.1.2.3)					
14.	Is the display located so that it can be easily and accurately read? (DOE-STD-1062-DFT Location: 3.1.3.1)					
15.	Are displays visually accessible for normal tasks without needing any aids? (DOE-STD-1062-DFT Access: 3.1.3.2)					
16.	Are display faces not less than 45 degrees from the operators normal line of sight? (DOE-STD-1062-DFT Orientation: 3.1.3.3)					
17.	Is the display installed in a manner that prevents reflection of ambient illumination from display cover? (DOE-STD-1062-DFT Reflection: 3.1.3.4)					
18.	Does the visual display vibrate to the level that task performance is degraded? (DOE-STD-1062-DFT Vibration: 3.1.3.5)					
19.	Are all displays necessary to support an operator activity grouped together? (DOE-STD-1062-DFT Grouping: 3.1.3.6)					
20.	Are displays arranged according to their sequence of use and arranged in sequence within functional groups? (DOE-STD-1062-DFT Function and Sequence: 3.1.3.7)					

CHECKLIST 3: PRINCIPLES OF VISUAL DISPLAYS

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
21.	Are displays most frequently used, and the more critical displays, grouped together in the optimum visual zone? (DOE-STD-1062-DFT Frequency of Use: 3.1.3.8)					
22.	Are important or critical displays located in a privileged position in the optimum projected visual zone or otherwise highlighted? (DOE-STD-1062-DFT Importance: 3.1.3.9)					
23.	Is the arrangement of displays within the system consistent in principle from application to application? (DOE-STD-1062-DFT Consistency: 3.1.3.10)					
24.	Is the viewing distance from the seated operator eye reference point to displays located close to associated controls less than 635mm (25 in)? (DOE-STD-1062-DFT Maximum Viewing Distance: 3.1.3.11)					
25.	Is the display viewing distance (except CRTs and collimated displays) more than 330mm (13 in) and preferably more than 510mm (20 in)? (DOE-STD-1062-DFT Minimum Viewing Distance: 3.1.3.12)					
26.	Is low brightness white light used for panel display illumination when dark adaptation is not required and red or blue-green used when dark adaptation is required? (DOE-STD-1062-DFT Normal: 3.1.4.1)					
27.	Is maximum panel illumination provided when the dimming control is at maximum illumination position with a range of .03 fl near OFF and 1 fl at the 50% or halfway position? (DOE-STD-1062-DFT Panel Dimming: 3.1.4.2)					
28.	Is the lighting of multiple grouped displays balanced across the instrument panel such that the mean indicator luminance of any two differs by less than 33% across the range of full ON to full OFF? (DOE-STD-1062-DFT Light Distribution: 3.1.4.3)					

CHECKLIST 3: PRINCIPLES OF VISUAL DISPLAYS

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
29.	Is sufficient contrast (10:1 to 8:1) provided between all displayed information and the display background to ensure required information can be perceived by the operator under all expected lighting conditions? (DOE-STD-1062-DFT Contrast: 3.1.4.4)					
30.	Are coding techniques used to discriminate between individual displays, identify functionally related displays, indicate relationship between displays, and identify critical information within displays? (DOE-STD-1062-DFT Objectives: 3.1.5.1)					
31.	Are displays uniquely coded within coding type such as color, size, location, and shape? (DOE-STD-1062-DFT Techniques: 3.1.5.2)					
32.	Is information coded in either an analog, digital, or combination form? (DOE-STD-1062-DFT Analog and Digital Coding: 3.1.6.1)					
33.	Are digital displays used when precision is required and trend information is not needed? (DOE-STD-1062-DFT Use of Digital Displays: 3.1.6.1.1)					
34.	Are numeric digital displays used alone only when perception of pattern variation is not important and where rapid or slow digital display rate does not inhibit proper perception? (DOE-STD-1062-DFT Inappropriate Numeric Digital Displays: 3.1.6.1.2)					
35.	Are analog displays used when values must be considered in relation to ranges, zones, or when trend information is required? (DOE-STD-1062-DFT Use of Analog Displays: 3.1.6.1.3)					
36.	Are alerting/warning displays present when they would provide the operator with a greater probability of detecting the triggering condition than normal observation provides in the absence of the display? (DOE-STD-1062-DFT Alerting/Warning: 3.1.7.1)					

CHECKLIST 3: PRINCIPLES OF VISUAL DISPLAYS

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
37.	Are the limits or set points for initiating alarms or warnings set to prevent false alarms and avoid being a nuisance while providing operators adequate time to respond? (DOE-STD-1062-DFT Alarm Parameter Selection: 3.1.7.2)					
38.	Are alarms that require auxiliary person(s) to go to a given plant location for specific information avoided, or if used do they allow sufficient time to collect/use the information? (DOE-STD-1062-DFT General Alarms: 3.1.7.3)					
39.	When multiple alarms are possible is a logical prioritization used so that operators can differentiate the most important or serious alarms? (DOE-STD-1062-DFT Prioritization: 3.1.7.4)					
40.	Is alarm priority accomplished using a minimum number of priority levels (2-4) and are priorities based upon an importance continuum? (DOE-STD-1062-DFT Priority Levels: 3.1.7.5)					
41.	Is a coding method used for prioritizing visual signals such as color, position, shape, alphanumeric, flashing, or symbolic coding? (DOE-STD-1062-DFT Priority Coding: 3.1.7.6)					
42.	Is flashing red used only to denote emergency conditions that require operator action to be taken without delay to avert impending personnel injury or equipment damage? (DOE-STD-1062-DFT Flashing Red: 3.1.7.7.1)					
43.	Is a flash rate of 3 to 5 flashes per second used with equal ON and OFF time and in the case of flasher failure does the light stay illuminated? (DOE-STD-1062-DFT Flashing Rate: 3.1.7.7.2)					
44.	When auditory signals accompany visual alarms are they priority coded using pulse codes, frequency modulation ratios, and discrete frequencies while avoiding intensity as a coding type? (Priority Coding Accompanying Auditory Signals: 3.1.7.8)					

CHECKLIST 3: PRINCIPLES OF VISUAL DISPLAYS

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
45.	When visual tiles are used to indicate function and/or scope are the tile legends unambiguous, singular, specific, consistent, and legible? (DOE-STD-1062-DFT Visual Tiles: 3.1.7.9)					
46.	Is an automatic cleared alarm feature provided to reset the system after the alarm condition has been remedied? (DOE-STD-1062-DFT Automatic Cleared Alarm Feature: 3.1.7.10)					
47.	Are cues for prompt recognition of an out-of-service alarm designed into the system? (DOE-STD-1062-DFT Out-of-Service Alarms: 3.1.7.11)					
48.	Is a control to test visual and associated audio alarms provided and is periodic testing of alarms/warnings required and controlled by administrative procedure? (DOE-STD-1062-DFT Testing Alarms: 3.1.7.12)					

CHECKLIST 4: TRANSILLUMINATED DISPLAYS

DATE: _____

REVIEWER: _____

DESCRIPTION OF REVIEWED SYSTEM(S): _____

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
1.	Are transilluminated displays used to convey qualitative information requiring immediate action or immediate attention or maintenance/adjustment functions? (DOE-STD-1062-DFT Use: 3.2.1.1)					
2.	Is the following color coding scheme used on transilluminated displays: RED - alert Flashing RED - emergency conditions YELLOW - Caution, recheck, or delay GREEN - Ready or function activated WHITE - Functions without "right or wrong" BLUE - Advisory (prefer to avoid use of blue)? (DOE-STD-1062-DFT Color Coding: 3.2.1.2)					
3.	Do lights, including those used in illuminated push buttons display equipment response and not merely control position? (DOE-STD-1062-DFT Equipment Response: 3.2.1.3)					
4.	Are lights and related indicators used sparingly and only to display information necessary for effective system operation? (DOE-STD-1062-DFT Information: 3.2.1.4)					
5.	Do changes in display status signify changes in functional status rather than results of control actuation alone? (DOE-STD-1062-DFT Positive Feedback: 3.2.1.5)					
6.	Are master caution, master warning, and summation lights used to indicate the condition of an entire subsystem set apart from the lights that show the status of the subsystem components, except as required for maintenance displays? (DOE-STD-1062-DFT 3.2.1.6: Grouping)					

CHECKLIST 4: TRANSILLUMINATED DISPLAYS

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
7.	When a transilluminated indicator is associated with a control is the indicator light located so that it can be associated with the control without error and is it visible to the operator during control operations? (DOE-STD-1062-DFT Location: 3.2.1.7)					
8.	Are displays for critical functions located within 15° of the operator's normal line of sight and are warning lights an integral part of, or located adjacent to, the lever, switch, or other control device by which the operator is to take action? (DOE-STD-1062-DFT Location, Critical Functions: 3.2.1.8)					
9.	Are indicator lights used solely for maintenance and adjustment covered or non-visible during normal equipment operation, and still readily accessible when required? (DOE-STD-1062-DFT Maintenance Displays: 3.2.1.9)					
10.	Is the luminance of transilluminated displays compatible with expected ambient illumination and at least 10% greater than the surrounding luminance? (DOE-STD-1062-DFT Luminance: 3.2.1.10)					
11.	Is a dimming control provided when displays will be used under varied ambient illumination? (DOE-STD-1062-DFT Luminance Control: 3.2.1.11)					
12.	Has a provision been made to prevent direct or reflected light from making indicators appear illuminated when they are not, or to appear de-energized when they are illuminated? (DOE-STD-1062-DFT False Indication: 3.2.1.12)					
13.	Has reflection or glare been minimized by proper orientation of display with respect to viewer? (DOE-STD-1062-DFT Obscuration: 3.2.1.13)					
14.	Is the luminance contrast within at least C=0.1? (DOE-STD-1062-DFT Contrast within the Displays: 3.2.1.14)					
15.	Do incandescent display lamps include filament redundancy or dual lamps? (DOE-STD-1062-DFT Lamp Redundancy: 3.2.1.15)					

CHECKLIST 4: TRANSILLUMINATED DISPLAYS

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
16.	Is a master light test control incorporated for incandescent bulbs installed as display lights on a control panel? (DOE-STD-1062-DFT Lamp Testing: 3.2.1.16)					
17.	Is the procedure for lamp removal and replacement easily and rapidly accomplished without tools? (DOE-STD-1062-DFT Lamp Removal Method: 3.2.1.17)					
18.	Does display circuit design permit lamp removal and replacement while power is applied without causing failure of indicator circuit components and without imposing personnel safety hazards? (DOE-STD-1062-DFT Lamp Removal, Safety: 3.2.1.18)					
19.	If design of legend screen or display covers does not prevent inadvertent interchange, is a means provided for checking the covers after installation to ensure that they are properly installed? (DOE-STD-1062-DFT Display Covers: 3.2.1.19)					
20.	Are flashing lights used only when it is necessary to call the operator's attention to some condition requiring immediate action? (DOE-STD-1062-DFT Flashing Lights: 3.2.1.20)					
21.	Are legend lights used in preference to simple indicator lights except where design considerations demand that simple indicators be used? (DOE-STD-1062-DFT Use of Legend Lights: 3.2.2.1)					
22.	Do legend lights conform to required color coding scheme? (DOE-STD-1062-DFT Color Coding: 3.2.2.2)					
23.	Is illuminated label/opaque background format used for critical alerting indicators where the operator's dark adaptation must be maintained? (DOE-STD-1062-DFT Positive versus Negative Legend: 3.2.2.3)					
24.	Does the size and other characteristics of lettering conform to standards and specifications? (DOE-STD-1062-DFT Lettering: 3.2.2.4)					

CHECKLIST 4: TRANSILLUMINATED DISPLAYS

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
25.	Is the lettering on single-legend indicators visible and legible whether or not the indicator is energized? (DOE-STD-1062-DFT Visibility and Legibility: 3.2.2.5)					
26.	Is only the legend in use visible and if stacked legends are used are they designed for legibility? (DOE-STD-1062-DFT Multifunction Legends: 3.2.2.6)					
27.	Are simple indicator lights used only when design considerations preclude the use of legend lights? (DOE-STD-1062-DFT Use of Simple Indicator Light: 3.2.3.1)					
28.	Are simple indicator lights coded in conformance to standards and specifications? (DOE-STD-1062-DFT Coding: 3.2.3.2)					
29.	Is the spacing between adjacent edges of simple round indicator light fixtures sufficient to permit unambiguous labeling, signal interpretation, and convenient bulb removal? (DOE-STD-1062-DFT Spacing: 3.2.3.3)					
30.	Are transilluminated assemblies used to provide illuminated labels, markings, or pictorialized representation on control panels and illumination for control knobs? (DOE-STD-1062-DFT Use: 3.2.4.2)					
31.	Do large, single pictorial graphic panels comply with the requirements for visibility, legibility, color, and illumination? (DOE-STD-1062-DFT Large, Single Pictorial Graphic Panels: 3.2.4.3)					
32.	Are replaceable incandescent lamps used as the illuminant source for panel assemblies readily accessible without disconnecting the panel(s)? (DOE-STD-1062-DFT Re-Lamping: 3.2.4.4)					
33.	Is the brightness of illuminated markings and transilluminated controls compatible with the ambient environment and operating conditions? (DOE-STD-1062-DFT Brightness: 3.2.4.5)					

CHECKLIST 5: SCALE INDICATORS

DATE: _____

REVIEWER: _____

DESCRIPTION OF REVIEWED SYSTEM(S): _____

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
1.	Does the use of scale indicators conform to the stated criteria? Note: Fixed-pointer, moving-scale indicators may be used only when approved by the design review process or procuring activity? (DOE-STD-1062-DFT Use: 3.3.1.2)					
2.	Is the scale indicator coding used to convey information such as desirable operating range, caution, undesirable condition, inefficient operation, or dangerous operating level? (DOE-STD-1062-DFT Use: 3.3.1.3.1)					
3.	Are standard or usual operating ranges identified by means of pattern or color coding applied to the face of the instrument? (DOE-STD-1062-DFT Pattern or Color Coding: 3.3.1.3.2)					
4.	Do colors applied conform to specification and standards and are they distinguishable under all expected lighting conditions? (DOE-STD-1062-DFT Choice of Color: 3.3.1.3.3)					
5.	When the indicator must be viewed in blackout stations or where the illuminant color will cause difficulty in color band discrimination are the zone scales shape coded? (DOE-STD-1062-DFT Pattern Coding: 3.3.1.3.4)					
6.	Are scale indicators used to display qualitative and quantitative information where there is no requirement for printers or counters? (DOE-STD-1062-DFT Type of Information: 3.3.1.4)					
7.	Are linear scales used in preference to non-linear scales except where system requirements clearly dictate non-linearity? (DOE-STD-1062-DFT Linear Scales: 3.3.1.5)					
8.	Do scale graduations progress in either units or decimal multiples of 1, 2, or 5? (DOE-STD-1062-DFT Graduation: 3.3.1.6.1)					

CHECKLIST 5: SCALE INDICATORS

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
9.	Is the number of minor or intermediate marks between numbered scale pointers nine or less? (DOE-STD-1062-DFT Intermediate Marks: 3.3.1.6.2)					
10.	Are whole numbers used for major graduation marks except for measurements which are normally expressed in decimals? (DOE-STD-1062-DFT Major Marks: 3.3.1.7.1)					
11.	Do display scales start at zero except where this would be inappropriate? (DOE-STD-1062-DFT Starting Point 3.3.1.7.2)					
12.	Do control or display pointers extend to the shortest scale graduation marks without overlapping them? (DOE-STD-1062-DFT Length: 3.3.1.8.1)					
13.	Is the pointer tip tapered to form an angle of 20° to 40° and terminated in a flat tip equal in width to minor scale graduations? (DOE-STD-1062-DFT Tip Configuration: 3.3.1.8.2)					
14.	Is the pointer mounted as close as possible to the face of the dial? (DOE-STD-1062-DFT Mounting: 3.3.1.8.3)					
15.	Is the pointer distinguishable from the background? (DOE-STD-1062-DFT Color: 3.3.1.8.4)					
16.	Is the luminance contrast between the scale face and the markings and pointer ≥ 3.0 ? (DOE-STD-1062-DFT Luminance Contrast: 3.3.1.9)					
17.	Can calibration information be placed on the instruments without degrading dial legibility? (DOE-STD-1062-DFT Calibration Information: 3.3.1.10)					
18.	Do fixed scales read clockwise, from left-to-right, or from bottom up depending on display design and orientation? (DOE-STD-1062-DFT Numerical Progression: 3.3.2.1)					
19.	Are the numbers on stationary scales oriented in the upright position? (DOE-STD-1062-DFT orientation: 3.3.2.2)					

CHECKLIST 5: SCALE INDICATORS

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
20.	Does the magnitude of the circular scale reading increase with clockwise movement of the pointer? (DOE-STD-1062-DFT Scale Reading: 3.3.2.3.1)					
21.	When positive and negative values are displayed around a zero or null position is that point located at either the 12 or 9 o'clock position? (DOE-STD-1062-DFT Zero Position: 3.3.2.3.2)					
22.	Is there an obvious break of at least 10° of arc between the two ends of the scale except on multirevolution instruments such as clocks? (DOE-STD-1062-DFT Scale Break: 3.3.2.3.3)					
23.	On the indicator faces where precise readings are required are no more than two coaxial pointers mounted? (DOE-STD-1062-DFT Number of Pointers: 3.3.2.3.4)					
24.	When a stable value exists for given operating conditions, in a group of circular-scale indicators, are the indicators arranged either in rows or columns so that the points line up in either the 9 or 12 o'clock positions? (DOE-STD-1062-DFT Pointer Alignment: 3.3.2.3.5)					
25.	Are the circular scale markings and associated numbers located and arranged to prevent pointers from covering any portion of the scale marks or numerals, when reading time and accuracy are critical? (DOE-STD-1062-DFT Relative Position: 3.3.2.3.6)					
26.	Does the magnitude of the scale reading increase with movement of the pointer up or to the right? (DOE-STD-1062-DFT Scale Reading: 3.3.2.4.1)					
27.	When positive and negative values are displayed around a zero point does the magnitude of positive values increase with movement of the pointer up or to the right? Also, does the magnitude of negative values increase with movement of the pointer down or to the left? (DOE-STD-1062-DFT Zero Position: 3.3.2.4.2)					

CHECKLIST 5: SCALE INDICATORS

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
28.	Are pointers located to the right of vertical scales and at the bottom of horizontal scales? (DOE-STD-1062-DFT Placement of Pointers: 3.3.2.4.3)					
29.	Are numerals placed on the side of the graduation marks away from the pointer? (DOE-STD-1062-DFT Placement of Numerals: 3.3.2.4.4)					
30.	When a stable value exists for given operating conditions in a group of indicators are the indicators arranged either in rows or columns so that the points line up? (DOE-STD-1062-DFT Pointer Alignment: 3.3.2.4.5)					
31.	On fixed-pointer, moving scale indicators, do the numbers progress in magnitude in a clockwise direction on circular dials and in a bottom to top or left to right on vertical or horizontal straight moving scales? (DOE-STD-1062-DFT Numerical Progression: 3.3.3.1)					
32.	Are numerals on moving scales upright when in the reading position? (DOE-STD-1062-DFT Orientation: 3.3.3.2)					
33.	For circular scales is the alignment of the pointer or fixed reference line in the 12 o'clock position for right-left directional information, and in the 9 o'clock position for up-down information? (DOE-STD-1062-DFT Alignment: 3.3.3.3)					
34.	If the display will be used for setting a value is the unused portion of the dial face covered and is the open window large enough to permit one numbered graduation to appear at each side of any setting? (DOE-STD-1062-DFT Setting: 3.3.3.4)					
35.	If the display will be used for tracking is the whole face of the dial exposed? (DOE-STD-1062-DFT Tracking: 3.3.3.5)					
36.	If the moving tape scale format is used, does the scale length required exceed the limits of the display package capacity? (DOE-STD-1062-DFT Moving Tape Displays: 3.3.3.6)					

CHECKLIST 5: SCALE INDICATORS

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
37.	Does the design of significant reference features conform to the required general specifications and criteria? (DOE-STD-1062-DFT Composite Displays: 3.3.3.7)					

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CHECKLIST 6: DISPLAYS

DATE: _____

REVIEWER: _____

DESCRIPTION OF REVIEWED SYSTEM(S): _____

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
1.	Is the CRT screen refreshed at a rate of at least 60 Hz to insure a stable (flicker free) display? (DOE-STD-1062-DFT Refresh Rate: 3.4.1)					
2.	Since high-persistence phosphors tend to produce trains or after-images behind moving elements, and low persistence phosphors are more likely to cause flicker, are CRTs, intended for general purpose use, medium-persistence phosphors? (DOE-STD-1062-DFT Screen Phosphor: 3.4.1.1)					
3.	Are display update rates compatible with the information needs of the user and the processing capabilities of the system used? (DOE-STD-1062-DFT Display Update: 3.4.1.2)					
4.	When light characters are used on a dark background are the characters amber or green instead of white? (DOE-STD-1062-DFT Monochrome: 3.4.2.1)					
5.	Are highly saturated colors used to maximize differences between colors where possible and where hue saturation combinations are used to provide different values for color code are changes in saturation avoided that produce colors difficult to see? (DOE-STD-1062-DFT Color Saturation: 3.4.2.2)					
6.	Do color codes adhere to the accepted conventions which require red, green and/or yellow being used to code alphanumerics, white for peripheral signals, and blue to be either not used or limited to large symbols where symbol identification is not a problem? (DOE-STD-1062-DFT Color Coding: 3.4.2.3)					
7.	Have color combinations that might interfere with display function been avoided? (DOE-STD-1062-DFT Limitations on the use of Color: 3.4.2.4)					

CHECKLIST 6: DISPLAYS

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
8.	Are display colors with dominant wavelengths above 650 nm avoided? (DOE-STD-1062-DFT Red: 3.4.2.4.1)					
9.	When orange is used for attention-getting is the selected hue readily distinguishable from red, yellow, and white? (DOE-STD-1062-DFT Orange: 3.4.2.4.2)					
10.	Is the color magenta avoided or used only for attention-getting where other means are not practical? (DOE-STD-1062-DFT Magenta: 3.4.2.4.3)					
11.	Is pure blue on a dark background avoided? (DOE-STD-1062-DFT Blue: 3.4.2.4.4)					
12.	Are color combinations that may result in a three-dimensional effect avoided unless the effect is intentional? (DOE-STD-1062-DFT Combinations: 3.4.2.4.5)					
13.	Is the maximum displacement of any point from its correct position on the projected display less than 5% of picture height? (DOE-STD-1062-DFT Geometric Distortion: 3.4.3)					
14.	Is the achievable luminance for either character or background, whichever is higher, greater than 35 cd/m ² ? (DOE-STD-1062-DFT Luminance: 3.4.5)					
15.	Does the ambient illumination contribute through diffuse reflection and phosphor excitation less than 25% of screen brightness? (DOE-STD-1062-DFT Screen Luminance Adjustability: 3.4.6.1)					
16.	Is the CRT provided with a control to vary the luminous symbol/dark background or dark symbol/luminous background contrast ratio? (Contrast: 3.4.6.1.1)					
17.	Is the CRT provided with a brightness control having a range from 10% to full CRT luminance? (DOE-STD-1062-DFT Brightness: 3.4.6.1.2)					

CHECKLIST 6: DISPLAYS

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
18.	When the detection of faint signals is required and when the ambient illumination may be above 2.7 lux is the CRT provided with a hood or shield or is it recessed? (DOE-STD-1062-DFT Faint Signal: 3.4.6.2)					
19.	Is the luminance range of surfaces immediately adjacent to CRTs between 10% and 100% of screen background luminance? (DOE-STD-1062-DFT Luminance Range: 3.4.6.3)					
20.	Is the ambient illumination in the CRT area appropriate for other visual functions such as setting controls, reading instruments, or maintenance activities? (DOE-STD-1062-DFT Ambient Illumination: 3.4.6.4)					
21.	When ambient illumination near the CRT is in the medium to high range does the display use dark characters/symbols on a light background and with low illumination does it use light signals on a dark background? (DOE-STD-1062-DFT Preferred Screen Polarity: 3.4.6.5)					
22.	Is reflected glare minimized by proper placement of the CRT relative to the light source, and/or by use of anti-glare treatments? (DOE-STD-1062-DFT Reflected Glare: 3.4.7.1)					
23.	Do surfaces adjacent to the scope have a dull matte finish? (DOE-STD-1062-DFT Adjacent Surfaces: 3.4.7.2)					
24.	Is an appropriate viewing distance that is visually compatible with the task, operator position, and illumination provided? (DOE-STD-1062-DFT Viewing Distance: 3.4.8.1)					
25.	Is the CRT screen placed in front of the viewer's normal position such that line-of-sight to the center of the screen is from 10°-20° below horizontal? (DOE-STD-1062-DFT viewing Angle: 3.4.8.2)					
26.	When alphanumeric characters appear on CRT displays does the display font allow clear discrimination of similar characters such as letter "l" and the number "1"? (DOE-STD-1062-DFT Font Legibility: 3.4.9.1)					

CHECKLIST 6: DISPLAYS

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
27.	Do the screen character heights meet the recommended minimum subtended viewing angle for black-on-white or color or information types? (DOE-STD-1062-DFT Character Height: 3.4.9.2)					
28.	Is the luminance ratio of character/background screen have minimums of 1:6 for dark characters and 6:1 for light characters? (DOE-STD-1062-DFT Contrast: 3.4.9.3)					
29.	Do alphanumeric characters have a minimum of 10 resolutions elements per character height and are high-resolution monitors (35 pixels/in.) used when high reading speeds are required? (DOE-STD-1062-DFT Resolution: 3.4.9.4)					
30.	Is pictorial or situation data presented as luminous symbols/dark background? (DOE-STD-1062-DFT Pictorial: 3.4.10.1)					
31.	When a target of complex shape is to be distinguished from a non-target of complex shape does the target signal subtend at least 6 mrad of visual angle (12 mrad preferred) and do complex shaped targets subtend at least 10 lines of resolution elements? (DOE-STD-1062-DFT Signal Size: 3.4.10.2)					
32.	If the CRT is used for displaying complex symbols and graphic detail does it have a minimum resolution of 100 pixels per inch? (DOE-STD-1062-DFT Complex Symbols: 3.4.10.3)					
33.	For constant width characters is the height-to-width ratio between 1:0.7 to 1:0.9 except for lines requiring more than 80 characters (minimum 1:0.5) and proportionally spaced presentations (maximum 1:1)? (DOE-STD-1062-DFT Character Height-to-Width Ratio: 3.4.10.4)					
34.	Is the stroke width to character height ratio within the range of 1:5 to 1:12? (DOE-STD-1062-DFT Stroke Width: 3.4.10.5)					
35.	Is the spacing between characters at least 10% of character height? (DOE-STD-1062-DFT 3.4.10.6)					

CHECKLIST 6: DISPLAYS

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
36.	Is at least one character width used between words? (DOE-STD-1062-DFT Between-Word Spacing: 3.4.10.7)					
37.	Is the between-line spacing at least two stroke widths or 15% of character height (whichever is greater)? (DOE-STD-1062-DFT Between-Line Spacing: 3.4.10.8)					
38.	When using large-screen displays, do the spatial and environmental conditions allow observational geometry to insure that all critical operators have appropriate visual access in terms of viewing distance, angle, intervening objects, intervening personnel, and ambient lighting? (DOE-STD-1062-DFT Use: 3.5.1.1b)					
39.	Is the large-screen display placed no further from the observer than will provide appropriate resolution of critical detail and no closer than 1/2 the display width or height, whichever is greater? (DOE-STD-1062-DFT Viewing Distance: 3.5.1.2)					
40.	Is the large-screen display located so that the view of the display is not obscured regularly by persons moving about or by normal traffic patterns? (DOE-STD-1062-DFT Physical Interruption: 3.5.1.3)					
41.	Do the controls of large-screen group display system ensure that critical information cannot be modified or deleted inadvertently or arbitrarily? (DOE-STD-1062-DFT Control of Displayed Information: 3.5.1.4)					
42.	Is the content of displayed information evident to a trained observer without requiring reference to display control settings? (DOE-STD-1062-DFT Content: 3.5.1.5)					
43.	When large-screen optical projects are used, is rear projection used where physical obstructions may block front projections or where high ambient illumination is required for other activities? (DOE-STD-1062-DFT Use: 3.5.2.1)					

CHECKLIST 6: DISPLAYS

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
44.	Does the viewing distance/image width relationship and off-center viewing of optical projection displays conform to the preferred limits (DOE STD-1062-DFT Table 4)? (DOE-STD-1062-DFT Seating Area: 3.5.2.2)					
45.	Does the image luminance and light distribution conform to the preferred limits (DOE STD-1062-DFT Table 4)? (DOE-STD-1062-DFT Seating Area: 3.5.2.3)					
46.	Is a simple style of numerals and letters used? (DOE-STD-1062-DFT Style: 3.5.2.4.1)					
47.	Is the height of letters and numerals no less than 3 mrad of visual angle from the longest anticipated viewing distance with the preferred angle greater than 4.5 mrad? (DOE-STD-1062-DFT Size: 3.5.2.4.2)					
48.	Does the luminance ratio conform to stated standards by image type and projection conditions? (DOE-STD-1062-DFT Luminance Ratio: 3.5.2.5)					
49.	For subtractive superposition is the data presented as dark marking on a transparent background and for additive superposition is light marking on an opaque background used? (DOE-STD-1062-DFT Direction of Contrast: 3.5.2.5.1)					
50.	Is the misregistration of superimposed alphanumeric data or symbols minimized? (DOE-STD-1062-DFT Alignment: 3.5.2.6)					
51.	Does the projector-screen arrangement minimize the "keystone effect", e.g., distortion of projected data proportions due to non-perpendicularity between projector and screen? (DOE-STD-1062-DFT Keystone Effect: 3.5.2.7)					
52.	When segmented displays are used for applications requiring only numeric information, are there at least seven segments? (DOE-STD-1062-DFT Use: 3.6.1)					
53.	Do light emitting diodes, (LED) displays meet the standards for transilluminated displays? (DOE-STD-1062-DFT General: 3.6.2.1)					

CHECKLIST 6: DISPLAYS

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
54.	Are LED displays bright enough to be readable in the environment of intended use? (DOE-STD-1062-DFT Use: 3.6.2.2)					
55.	Does LED color coding conform to color coding standards? (DOE-STD-1062-DFT Color Coding: 3.6.2.3)					
56.	Is the dimming of LEDs compatible with the dimming of incandescent lamps? (DOE-STD-1062-DFT Intensity Control: 3.6.2.4)					
57.	Is the LED lamp test feature omitted for indicator lights with mean time between failure (MTBF) of 100,000 hours or more? (DOE-STD-1062-DFT Lamp Testing: 3.6.2.5)					
58.	When red warning lights are present are red LEDs separated and not grouped with the warning lights? (DOE-STD-1062-DFT Location: 3.6.2.6)					
59.	When using liquid crystal or gas discharge displays are dot matrix symbols at least 5 by 7 dots, and if symbol rotation is required are they a minimum of 8 by 11 dots? (DOE-STD-1062-DFT Symbol Definition: 3.6.3.2)					
60.	When using liquid crystal or gas discharge displays are alphanumeric and symbolic characters subtending at least 5.8 mrad of visual angle? (DOE-STD-1062-DFT Sizes: 3.6.3.3)					
61.	Are dot matrix or segmented displays always presented for viewing at an angle less than 30° off axis? (DOE-STD-1062-DFT Viewing Angle: 3.6.3.4)					
62.	When using monochrome displays is the color selected by the following order of preference: green; yellow; orange; and red; with blue avoided? (DOE-STD-1062-DFT Emitter Color: 3.6.3.5)					
63.	When applicable are dimming controls provided to maintain appropriate legibility and operator dark adaptation level? (DOE-STD-1062-DFT Intensity Control: 3.6.3.6)					

CHECKLIST 6: DISPLAYS

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
64.	Is the lamp test feature omitted for indicator lights with MTBF of 100,000 hours or more? (DOE-STD-1062-DFT Lamp Testing: 3.6.3.7)					
65.	When using electro-luminescent displays is the height of alphanumeric characters and geometric or pictorial symbols at least 4.4 mrad of visual angle? (DOE-STD-1062-DFT Sizes: 3.72)					
66.	Are the displays based upon the criteria in Table 2 of DOE STD-1062-DFT? (DOE-STD-1062-DFT Applications: 3.8.1.1)					
67.	Are mechanical counters used for presenting quantitative data only when a continuous trend indication is not required and a quick precise indication is required? (DOE-STD-1062-DFT Use: 3.8.2.1)					
68.	Are counters mounted as close as possible to the panel surface to minimize parallax and shadows, and maximize the viewing angle? (DOE-STD-1062-DFT Mounting: 3.8.2.2)					
69.	Is the horizontal separation between numerals consistent and between 1/4 and 1/2 the numeral width? (DOE-STD-1062-DFT Spacing: 3.8.2.3)					
70.	Does the counter design conform to the following criteria: snap action; rate not faster than 2 seconds; direction clockwise; and reset automatic with provision for manual? (DOE-STD-1062-DFT Movement: 3.8.2.4)					
71.	Are counters self-illuminated when used in areas in which ambient illumination will not provide display luminance below 3.5 cd/m ² ? (DOE-STD-1062-DFT illumination: 3.8.2.5)					
72.	Is the surface of the counter drums and the surrounding areas a dull finish to minimize glare? (DOE-STD-1062-DFT Finish: 3.8.2.6)					
73.	Does the color of the numerals and background provide high contrast? (DOE-STD-1062-DFT Contrast: 3.8.2.7)					
74.	Are the printers based upon the criteria in Table 2 of DOE STD-1062-DFT? (DOE-STD-1062-DFT Use: 3.8.3.1)					

CHECKLIST 6: DISPLAYS

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
75.	When monitoring of printers is required is the printed material unobscured in any manner that impairs direct reading? (DOE-STD-1062-DFT Visibility: 3.8.3.2)					
76.	Is there a minimum luminance ratio of 3:1 between the printed material and the background it is printed on? (DOE-STD-1062-DFT Contrast: 3.8.3.3)					
77.	If the printed matter is not legible in the operational illumination is the printer provided with internal illumination? (DOE-STD-1062-DFT Illumination: 3.8.3.4)					
78.	Is a take-up device for printed material provided? (DOE-STD-1062-DFT Take-Up Provision: 3.8.3.5)					
79.	Where applicable is the printer mounted so that the printed matter is easily annotated while still in the printer? (DOE-STD-1062-DFT Annotation: 3.8.3.6)					
80.	Is the printed output free from character line misregistration, character tilt or smear? (DOE-STD-1062-DFT Legibility: 3.8.3.7)					
81.	When printers are used for recording trend data, computer alarms, and critical status is the printing capability at least 300 lines per minute and if it is used to interact with the computer is the speed at least 400 lines per minute? (DOE-STD-1062-DFT Speed: 3.8.3.8)					
82.	When information is printed on tapes can it be read as it is received from the machine without requiring cutting or pasting? (DOE-STD-1062-DFT Printed Tapes: 3.8.3.9)					
83.	Does the printer(s) conform to the criteria for control, replenishment, and service? (DOE-STD-1062-DFT Control: 3.8.3.10)					
84.	When a visual record of continuous graphic data is necessary or required are plotters and records used? (DOE-STD-1062-DFT Use: 3.8.4.1)					

CHECKLIST 6: DISPLAYS

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
85.	Are critical graphics unobscured by hardware elements and do they have sufficient resolution so significant changes are apparent? (DOE-STD-1062-DFT Visibility: 3.8.4.2)					
86.	Is there a minimum luminance ratio of 2:1 between plotted functions and the background it is drawn on? (DOE-STD-1062-DFT Contrast: 3.8.4.3)					
87.	Is a take-up device (paper tray) for extruded plotting material provided? (DOE-STD-1062-DFT Take-Up Device: 3.8.4.4)					
88.	Are graphic overlays provided where they may be critical to proper interpretation of graphic data and do these aids not obscure or distort the data? (DOE-STD-1062-DFT Job Aids: 3.8.4.5)					
89.	Is the plot resistant to smudging or smearing under operational use? Smudging/Smearing: 3.8.4.6)					
90.	Does the plotter or recorder have adjustable paper speeds to accurately portray time-event relationships? (DOE-STD-1062-DFT Variable Paper Speed: 3.8.4.7)					
91.	Where applicable is the plotter or recorder mounted so that the printed matter is easily annotated while still in the plotter/recorder? (DOE-STD-1062-DFT Annotation: 3.8.4.8)					
92.	Do the plotters and recorders conform to criteria for control, replenishment, and service? (DOE-STD-1062-DFT Control: 3.8.4.9)					
93.	Is the use of flags based upon the criteria in Table 2 of DOE STD-1062-DFT? (DOE-STD-1062-DFT Use: 3.8.5.1)					
94.	Are flags mounted as close to the surface of the panel as possible without restricting their movement or obscuring necessary information? (DOE-STD-1062-DFT Mounting: 3.8.5.2)					
95.	Do the flags operate by snap action (click or otherwise indicate they are in place)? (DOE-STD-1062-DFT Snap Action: 3.8.5.3)					

CHECKLIST 6: DISPLAYS

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
96.	Is there a minimum of 3.0 luminance contrast between flags and their background under all expected lighting conditions? (DOE-STD-1062-DFT Contrast: 3.8.5.4)					
97.	When flags are used to indicate the malfunction of a visual display does the malfunction position of the flag obscure part of the operators view of the malfunctioning display and is it readily apparent to the operator under all expected levels of illumination? (DOE-STD-1062-DFT Malfunction Indication: 3.8.5.5)					
98.	When a legend is provided on the flag does the lettering appear upright when the flag assumes the active or no-go position? (DOE-STD-1062-DFT Legend: 3.8.5.6)					
99.	Is a convenient means provided for testing the operation of flags? (DOE-STD-1062-DFT Test Provision: 3.8.5.7)					

CHECKLIST 6: DISPLAYS

Table 2: Application of various types of mechanical displays.

Use	Scales		Counters	Printers	Flags
	Moving Pointer	Fixed Pointer			
Quantitative Information	<u>Fair</u> May be difficult to read while pointer is in motion.	<u>Fair</u> May be difficult to read while scale is in motion.	<u>Good</u> Minimum time and error for exact numerical value; however, cannot be read when changing rapidly.	<u>Good</u> Minimum time and error for exact numerical value. Provides reference records.	N/A
Qualitative Information	<u>Good</u> Location of pointer easy. Numbers and scale need not be read. Position change easily detected.	<u>Poor</u> Difficult to judge direction and magnitude of deviation without reading numbers and scale.	<u>Poor</u> Numbers must be read. Position changes not easily detected.	<u>Poor</u> Numbers must be read. Position changes not easily detected.	<u>Good</u> Easily detected. Economical space.
Setting	<u>Good</u> Simple and direct relation of motion of pointer to motion of setting knob. Position change aids monitoring.	<u>Fair</u> Relation to motion of setting knob may be ambiguous. No pointer position change to aid monitoring. Not readable during rapid setting.	<u>Good</u> Most accurate monitoring of numerical setting. Relation to motion of setting knob less direct than for moving pointer. Not readable during rapid setting.	N/A	N/A
Tracking	<u>Good</u> Pointer position readily controlled and monitored. Simplest relation to manual control motion.	<u>Fair</u> No position changes to aid monitoring. Relation to control motion somewhat ambiguous.	<u>Poor</u> No gross position changes to aid monitoring.	N/A	N/A
General	Requires largest exposed and illuminated area on panel. Scale length limited unless multiple pointers used.	Saves panel space. Only small section of scale need be exposed and illuminated. Use of tape allows long scale.	Most economical of space and illumination. Scale length limited only by number of counter drums.	Limited application.	Limited application.

CHECKLIST 7: AUDIO DISPLAYS

DATE: _____ REVIEWER: _____

DESCRIPTION OF REVIEWED SYSTEM(S): _____

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
1.	Are audio displays used when the information to be processed is short, simple, and transitory, requiring immediate or time-based response? (DOE-STD-1062-DFT Use: 4.1.1a)					
2.	Are audio displays used when the common mode of visual display is restricted by over-burdening, ambient light variability or limitation, operator mobility, degradation of vision by vibration, other environmental considerations, or anticipated operator inattention? (DOE-STD-1062-DFT Use: 4.1.1b)					
3.	Are audio displays used when the criticality of transmission response makes supplementary or redundant transmission desirable? (DOE-STD-1062-DFT Use: 4.1.1c)					
4.	Are audio displays used when it is desirable to warn, alert, or cue the operator to subsequent additional response? (DOE-STD-1062-DFT Use: 4.1.1d)					
5.	Are audio displays used when custom or usage has created anticipation of an audio display? (DOE-STD-1062-DFT Use: 4.1.1e)					
6.	Are audio displays used when voice communication is necessary or desirable? (DOE-STD-1062-DFT Use: 4.1.1f)					
7.	Are audio displays used with several visual displays only when immediate discrimination is not critical to personnel safety or system performance? (DOE-STD-1062-DFT Use: 4.1.1.1)					
8.	When audio presentation is required is the optimum type of signal presented in accordance with Table 5 of DOE STD-1062-DFT? (DOE-STD-1062-DFT Signal Type: 4.1.1.2)					

CHECKLIST 7: AUDIO DISPLAYS

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
9.	Does the design of audio display devices and circuits minimize false alarms? (DOE-STD-1062-DFT False Alarms: 4.1.2.1)					
10.	Are the audio display device and circuit designed to preclude warning signal failure in the event of system or equipment failure? (DOE-STD-1062-DFT Failure: 4.1.2.2)					
11.	Are all audio displays equipped with circuit test devices or other means of operability testing? (DOE-STD-1062-DFT Circuit Operability Test: 4.1.2.3)					
12.	Are audio signals provided as necessary to warn or alert personnel and does the alerting/warning system or signal provide the operator with a greater probability of detecting the triggering condition? (DOE-STD-1062-DFT General: 4.2.1)					
13.	Do audio warning signals consist of an alerting signal with the possibility of an identifying or action signal? (DOE-STD-1062-DFT Nature of Signals: 4.2.2.1)					
14.	When reaction time is critical and a two-element signal necessary is the alerting signal 0.5-sec in duration and is all essential information transmitted in the first 2.0-sec of the identifying or action signal? (DOE-STD-1062-DFT Two-Element Signals: 4.2.2.1.1)					
15.	When a single element signal is permissible is all essential information transmitted in the first 0.5-sec? (DOE-STD-1062-DFT Single Element Signal: 4.2.2.1.2)					
16.	When used are caution signals readily distinguishable from normal or warning signals and are they used to indicate conditions requiring awareness, but not necessarily immediate action? (DOE-STD-1062-DFT Caution Signals: 4.2.2.2)					
17.	When used in conjunction with visual displays are audio warning devices supplementary or supportive and are they used to alert and direct operators attention to the appropriate visual display? (DOE-STD-1062-DFT Relation to Visual Display: 4.2.2.3)					

CHECKLIST 7: AUDIO DISPLAYS

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
18.	Does the selected audio frequency range conform to the criteria stated in DOE STD-1062-DFT section 4.2? (DOE-STD-1062-DFT Frequency Range: 4.2.2.4)					
19.	Is the frequency of warning tones different from that of the electric power employed in the system? (DOE-STD-1062-DFT Spurious Signals: 4.2.2.4.1)					
20.	Is the intensity, duration, and source location of audio alarms and signals compatible with the acoustical environment of the intended receiver and with the requirements of other personnel in the signal area? (DOE-STD-1062-DFT Compatibility: 4.2.2.5.1)					
21.	As applicable are audio signals loud enough to be heard and understood through equipment or garments covering the ears of the listener? (DOE-STD-1062-DFT Compatibility: 4.2.2.5.2)					
22.	Is the intensity of the normal audio signal less than 90 dB(A) at any personnel position and are evacuation signals less than 115dB(A)? (DOE-STD-1062-DFT Maximum Intensity: 4.2.2.5.3)					
23.	Are signals with high alerting capacity provided, when the system or equipment imposes a requirement on the operator for concentration of attention? (DOE-STD-1062-DFT Attention: 4.2.3.1.1)					
24.	Is the onset of critical alerting signals sudden and of sufficiently high volume to attract attention? Is this onset also not so startling as to preclude appropriate responses or interfere with other functions? (DOE-STD-1062-DFT Onset and Sound Pressure Level: 4.2.3.1.2)					
25.	When earphones will be worn in the operational situation is a dichotic presentation used whenever feasible? (DOE-STD-1062-DFT Dichotic Presentation: 4.2.3.1.3)					

CHECKLIST 7: AUDIO DISPLAYS

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
26.	When the operator is wearing earphones covering both ears during normal equipment operation are the audio warning signals directed to the operator's headset as well as to the work area? (DOE-STD-1062-DFT Headset: 4.2.3.1.4)					
27.	When several different audio signals are to be used to alert an operator to different types of conditions are discriminable differences in intensity, pitch, or use of beats and harmonics provided and when absolute discrimination is required is the number of signals less than five? (DOE-STD-1062-DFT Use of Different Characteristics: 4.2.3.2.1)					
28.	Where discrimination of warning signals from each other is critical to personnel safety or system performance are audio signals appropriately coded? (DOE-STD-1062-DFT Coding: 4.2.3.2.2)					
29.	Are audio alarms intended to bring the operator's attention to a malfunction or failure differentiated from routine signals? (DOE-STD-1062-DFT Differentiation: 4.2.3.2.3)					
30.	Are the meanings of audio warning signals selected for the system consistent with warning signal meanings already established for that function? (DOE-STD-1062-DFT existing Signals: 4.2.3.3.1)					
31.	Are established signals used provided they are compatible with the environment and are not used to convey new meaning? (DOE-STD-1062-DFT Acoustic Environment: 4.2.3.3.2)					
32.	Are audio warning signals prevented from interfering with any other critical functions or warning signals and prevented from masking any other critical audio signals? (DOE-STD-1062-DFT Other Critical Channels: 4.2.3.4.1)					
33.	When a warning signal delivered to a headset might mask another essential audio signal are separate channels provided? (DOE-STD-1062-DFT Separate Channels: 4.2.3.4.2)					

CHECKLIST 7: AUDIO DISPLAYS

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
34.	Are verbal alarms for critical functions at least 20 dB(A) above speech interference level but less than 90 dB(A)? (DOE-STD-1062-DFT Intensity: 4.3.1.2)					
35.	Is the voice used in recording verbal warning signals distinctive and readily understandable? (DOE-STD-1062-DFT Voice Quality: 4.3.1.3)					
36.	Are verbal warning signals presented in a formal, impersonal manner? (DOE-STD-1062-DFT Delivery Style: 4.3.1.4)					
37.	Are verbal warning signals processed only when necessary to increase or preserve intelligibility? (DOE-STD-1062-DFT Speech Processing: 4.3.2.1)					
38.	When selecting words to be used in audio warning signals is priority given to intelligibility, aptness, and conciseness in that order? (DOE-STD-1062-DFT Message Content: 4.3.2.2)					
39.	Do critical warning signals repeat with a 3-sec or less pause between messages until the condition is corrected or overridden by an operator? (DOE-STD-1062-DFT Critical Warning Signals: 4.3.3.1)					
40.	Is a message priority system established in accord with criteria in DOE STD-1062-DFT? (DOE-STD-1062-DFT Message Priorities: 4.3.3.2)					
41.	When an audio signal is designed to persist as long as it contributes useful information is a shut-off switch provided that is controllable by the operator or by sensing mechanism or by both? (DOE-STD-1062-DFT Automatic or Manual Shut-Off: 4.4.1.1)					
42.	No matter how a warning signal is terminated is an automatic reset function provided? (DOE-STD-1062-DFT Automatic Reset: 4.4.1.2)					
43.	Are all non-verbal aural annunciations accompanied by a visual annunciation which defines the condition? (DOE-STD-1062-DFT Redundant Visual Warning: 4.4.1.3)					

CHECKLIST 7: AUDIO DISPLAYS

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
44.	Is the volume of an audio warning signal designed to be controlled by the operator or sensing mechanism or both depending on the operational situation and personnel safety factors? Additionally are control movements restricted to prevent reducing the volume to an inaudible level or to prevent increasing the volume to an unacceptable high level? (DOE-STD-1062-DFT Control of Volume: 4.4.2.1)					
45.	When volume controls are ganged is the possibility of intense noise or inaudibility prevented? (DOE-STD-1062-DFT Ganging: 4.4.2.2)					
46.	Are audio caution signals provided with manual reset and volume controls? (DOE-STD-1062-DFT Caution Signal Controls: 4.4.2.3)					
47.	Is audio warning signal duration at least 0.5 sec and does the completion of a corrective action automatically terminate the signal? (DOE-STD-1062-DFT Duration: 4.4.2.4)					
48.	In an emergency situation are signals that persist or increase progressively in level used if manual shut-off may interfere with the corrective action required? (DOE-STD-1062-DFT Duration Limitations: 4.4.2.5)					
49.	Are microphones and associated system input devices designed to respond optimally to that part of the speech spectrum most essential to intelligibility? (DOE-STD-1062-DFT Frequency Range: 4.5.1.1)					
50.	When a microphone is used with a selected amplifier is the dynamic range great enough to admit variations in signal input of at least 50 dB(A)? (DOE-STD-1062-DFT Dynamic Range: 4.5.1.2)					
51.	In very loud, low-frequency noise environments are noise canceling microphones used? (DOE-STD-1062-DFT Noise Canceling Microphones: 4.5.1.3)					
52.	If necessary do speech system input devices employ frequency pre-emphasis? (DOE-STD-1062-DFT Pre-Emphasis: 4.5.1.4)					

CHECKLIST 7: AUDIO DISPLAYS

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
53.	When peak-clipping (limited to 12 to 20 dB) is employed do the transmission channels show less than 15 dB peak speech to root-mean-square noise ratios? (DOE-STD-1062-DFT Peak-Clipping: 4.5.1.5)					
54.	When the talker is in an intense noise field is a noise shield used and does it meet the criteria in DOE STD-1062-DFT? (DOE-STD-1062-DFT Noise Shields: 4.5.1.6)					
55.	Do headphones and loudspeakers meet the frequency response criteria as stated in DOE STD-1062-DFT? (DOE-STD-1062-DFT Frequency Range: 4.5.2.1)					
56.	When transmission equipment employs pre-emphasis and peak-clipping is not used does reception equipment employ frequency de-emphasis of characteristics complementary to those of pre-emphasis? (DOE-STD-1062-DFT Use of De-Emphasis: 4.5.2.2)					
57.	When several channels are to be monitored simultaneously by means of loudspeakers are the speakers mounted at least 10° apart in the horizontal plane ranging from 45° left to 45° right of the operator's normal forward facing position? (DOE-STD-1062-DFT Monitoring of Speakers: 4.5.2.3.1)					
58.	When additional channel differentiation is required, is apparent lateral separation enhanced by applying low-pass filtering to signals fed to loudspeakers on one side of the central operator position? Is a visual signal provided to show which channel is in use? (DOE-STD-1062-DFT Filtering: 4.5.2.3.2)					
59.	If listeners will be working in high-ambient noise (above 90 dB(A)) are binaural rather than monaural headsets provided? (DOE-STD-1062-DFT Use of binaural Headsets: 4.5.2.4)					
60.	Is communication equipment to be worn by an operator designed to preclude operator discomfort? (DOE-STD-1062-DFT Comfort: 4.5.3.1)					

CHECKLIST 7: AUDIO DISPLAYS

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
61.	Are conventional powered operator microphones, headphones, telephone headsets, sound-powered phones, and walkie-talkie radio transceivers designed to permit hands-free operation under normal working conditions? (DOE-STD-1062-DFT Hands-Free Operation: 4.5.3.2)					
62.	Where communication requirements necessitate the use of several telephone handsets is the accessibility of their standby locations determined by operational priority? (DOE-STD-1062-DFT Accessibility of Handsets: 4.5.3.3)					
63.	Are accessible volume or gain controls provided for each communication receiving channel with sufficient electrical power to drive sound pressure level to at least 100dB overall when using two earphones? (DOE-STD-1062-DFT Volume Controls: 4.5.4.1)					
64.	Where communication channels are to be continuously monitored is each channel provided with a signal-activated switching device to suppress channel noise during no-signal periods? (DOE-STD-1062-DFT Squelch Control: 4.5.4.2)					
65.	When normal working conditions will permit the operator to remain seated at the working position and access to "talk-listen" or "send-receive" control switches are required for normal operation are foot-operated controls provided? (DOE-STD-1062-DFT Foot-Operated Controls: 4.5.4.3)					
66.	Is the speaker's verbal input in phase with its reproduction as heard on the headset and are side tones not filtered or modified before being received in the headset? (DOE-STD-1062-DFT Speaker/Side Tone: 4.5.4.4)					
67.	In special environments such as control rooms are telephone systems selected that provide a good frequency response and are the system interfaces compatible with operator anthropometry? (DOE-STD-1062-DFT General: 4.5.5.1)					

CHECKLIST 7: AUDIO DISPLAYS

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
68.	Are telephone cords non-kinking or self retracting, long enough to permit operator movement to any position from which phone use may be required, and positioned to avoid entangling critical controls or endangering passing traffic? (DOE-STD-1062-DFT Cords: 4.5.5.2)					
69.	Are vertically mounted handset cradles designed and located to prevent the handset from being knocked out of the cradle by passing traffic? (DOE-STD-1062-DFT Handset Cradles: 4.5.5.3)					
70.	Where multiple telephone instruments are located together are they coded to indicate circuit or function? (DOE-STD-1062-DFT Multiple Telephone: 4.5.5.4)					
71.	Where press-to-talk button is used is the button convenient to both left and right hand operation? (DOE-STD-1062-DFT Press-to-Talk Button: 4.5.5.5)					
72.	Is switching designed and/or programmed to minimize delay under both normal and emergency conditions and is switching programmed to give the control room and/or critical functions automatic priority of access to the switching system? (DOE-STD-1062-DFT Switching: 4.5.5.6)					
73.	Are volume controls for ringer and speaker output provided in noisy environments? (DOE-STD-1062-DFT Noisy Environments: 4.5.5.7)					
74.	When information concerning the speech intelligibility of a system is required are methods selected from those recommended in DOE STD-1062-DFT? (DOE-STD-1062-DFT General: 4.5.6.1)					
75.	Are the intelligibility criteria from Table 6 DOE STD-1062-DFT used for voice communication? (DOE-STD-1062-DFT Criteria: 4.5.6.2)					

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CHECKLIST 8: CONTROLS: GENERAL

DATE: _____

REVIEWER: _____

DESCRIPTION OF REVIEWED SYSTEM(S): _____

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
1.	Does control selection conform to Table 7 DOE STD-1062-DFT? (DOE-STD-1062-DFT Selection of Common Controls: 5.1.1.1)					
2.	Are controls selected and distributed so that none of the operator's limbs will be overburdened? (DOE-STD-1062-DFT Distribution of Work Load: 5.1.1.2)					
3.	Are stops provided at the beginning and end of the range of control positions if the control is not required to be operated beyond the indicated end positions or specified limits? (DOE-STD-1062-DFT Stops: 5.1.1.3)					
4.	Is the direction of control movement consistent with the related movement of an associated display, equipment component, or vehicle? (DOE-STD-1062-DFT Consistency of Movement: 5.1.2.1)					
5.	Do rotary and hand wheel valve controls open the valve with a counterclockwise motion and is labeling provided with double-ended arrows showing direction and function? (DOE-STD-1062-DFT Rotary and Hand Wheel Valve Controls: 5.1.2.2)					
6.	Are all controls that function in sequential operation necessary to a particular task or that operate together grouped together along with their associated displays? (DOE-STD-1062-DFT Grouping: 5.1.3.1)					
7.	When several steps of a sequence are selected by one control are the steps arranged by order of occurrence and is cycling through the control's ON/OFF position avoided? (DOE-STD-1062-DFT Grouping: 5.1.3.1)					
8.	Where sequential operations follow a fixed pattern are controls arranged to facilitate operation? (DOE-STD-1062-DFT Sequential Operation: 5.1.3.2)					

CHECKLIST 8: CONTROLS: GENERAL

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
9.	Do the most important and frequently used controls have the most favorable position with respect to ease of reaching and grasping? (DOE-STD-1062-DFT Location of Primary Controls: 5.1.3.3)					
10.	Is the arrangement of functionally similar or identical controls consistent from panel to panel throughout the system, equipment, or vehicle? (DOE-STD-1062-DFT Consistency: 5.1.3.5)					
11.	Where controls are operated at a position remote from the display, equipment, or controlled vehicle are they arranged to facilitate direction-of-movement consistency? (DOE-STD-1062-DFT Remote Controls: 5.1.3.5)					
12.	Are controls used solely for maintenance and adjustment covered during normal operation and readily accessible and visible to the maintenance technician when required? (DOE-STD-1062-DFT Maintenance and Adjustment: 5.1.3.6)					
13.	Does the spacing between controls and spacing between a control and any adjacent obstruction comply with Table 9 DOE STD-1062-DFT? (DOE-STD-1062-DFT Spacing: 5.1.3.7)					
14.	Is the minimum spacing between controls shown in Table 9 increased for operation with gloves, mittens, or protective hand wear when such operation is a system requirement? (DOE-STD-1062-DFT Accommodation for Handwear: 5.1.3.7.1)					
15.	When coding is used to differentiate among controls is the application of the code uniform throughout the system and where possible is redundant coding provided? (DOE-STD-1062-DFT Methods and Requirements: 5.1.4.1)					
16.	Are controls associated with similar functions in the same relative location from operator work station to work station and from panel to panel? (DOE-STD-1062-DFT Location-Coding: 5.1.4.2)					

CHECKLIST 8: CONTROLS: GENERAL

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
17.	Are no more than three different sizes of controls used in coding controls for discrimination by absolute size? (DOE-STD-1062-DFT Size Coding: 5.1.4.3)					
18.	Are controls used for performing the same function on different items of equipment the same size? (DOE-STD-1062-DFT Size Coding: 5.1.4.3)					
19.	When knob diameter is used as the coding parameter is the difference between diameters not less than 0.5 in. (13 mm) and for thickness as a coding parameter the is the difference in thickness at least 0.39 in. (10 mm)? (DOE-STD-1062-DFT Size Coding: 5.1.4.3)					
20.	When shape coding is used are the shapes identifiable both visually and tactually? (DOE-STD-1062-DFT Shape Coding: 5.1.4.4)					
21.	The ease of control manipulation is not effected by shape coding? (DOE-STD-1062-DFT Shape Coding: 5.1.4.4a)					
22.	Can shapes used for coding be identified by hand regardless of the position and orientation of the control knob or handle? (DOE-STD-1062-DFT Shape Coding: 5.1.4.4b)					
23.	Can the shapes be tactually identified by an operator wearing gloves? (DOE-STD-1062-DFT Shape Coding: 5.1.4.4c)					
24.	Are a sufficient number of identifiable shapes provided to cover the expected number of controls that require tactual identification? (DOE-STD-1062-DFT Shape Coding: 5.1.4.4d)					
25.	Are shape coded knobs and handles positively and non-reversibly attached to their shafts to preclude incorrect attachment when replacement is required? (DOE-STD-1062-DFT Shape Coding: 5.1.4.4e)					
26.	Are shapes associated with or resemble control function and not alternate functions? (DOE-STD-1062-DFT Shape Coding: 5.1.4.4f)					

CHECKLIST 8: CONTROLS: GENERAL

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
27.	Is color coding used only as a redundant method of coding? (DOE-STD-1062-DFT Color Coding: 5.1.4.5)					
28.	When color coding is used are the color as recommended in DOE STD-1062-DFT used? (DOE-STD-1062-DFT Choice of Colors: 5.1.4.5.1)					
29.	When color coding must be used to relate a control to its corresponding display is the same color used for both? (DOE-STD-1062-DFT Relation to Display: 5.1.4.5.2)					
30.	Does the color of the control provide contrast between the panel background and the control? (DOE-STD-1062-DFT Control Panel Contrast: 5.1.4.5.3)					
31.	Is the color-coding compatible with anticipated ambient lighting? (DOE-STD-1062-DFT Ambient Lighting: 5.1.4.5.4)					
32.	Are controls compatible with hand wear to be utilized in the anticipated environment? (DOE-STD-1062-DFT Compatibility with Hand Wear: 5.1.6.1)					
33.	When "blind" operation is necessary are hand controls shape-coded or separated from adjacent controls by at least 5.0 in. (125 mm)? (DOE-STD-1062-DFT Blind Operation: 5.1.6.2)					
34.	Are controls designed and located so that they are not susceptible to being moved accidentally? (DOE-STD-1062-DFT Location and Design: 5.1.7.1)					
35.	Are internal or hidden controls protected from accidental movement? (DOE-STD-1062-DFT Internal Controls: 5.1.7.2)					
36.	Are controls free to operate within the time required to satisfy system requirement without regard to the method of protecting a control from inadvertent operation? (DOE-STD-1062-DFT Rapid Operation: 5.1.7.4)					

CHECKLIST 8: CONTROLS: GENERAL

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
37.	For situations in which controls must be protected from accidental actuation are the methods, as applicable, from DOE STD-1062-DFT used? (DOE-STD-1062-DFT Methods: 5.1.7.4)					
38.	Wherever operator incapacity can produce a critical system condition are dead man controls, which will result in system shut-down to a non-critical operating state, used? (DOE-STD-1062-DFT Dead Man Controls: 5.1.7.5)					

CHECKLIST 8: CONTROLS: GENERAL

Table 7: Comparison of the characteristics of common controls.

Characteristic	Type of Control										
	Discrete Adjustment					Continuous Adjustment					
	Rotary Selector Switch	Thumb Wheel	Push Button	Foot Operated Switches	Toggle Switch	Knob	Thumb Wheel	Hand Wheel	Crank	Pedal	Lever
Large forces can be developed	--	--	--	--	--	No	No	Yes	Yes	Yes	Yes
Time required to make control setting	Medium to quick	--	Very quick	Quick	Very quick	--	--	--	--	--	--
Recommended number of control positions (settings)	3 to 24	3 to 24	2	2	2 to 3	--	--	--	--	--	--
Space requirements for location and operation of control	Medium	Small	Small	Large	Small	Small to Medium	Small	Large	Medium to large	Large	Medium to large
Likelihood of accidental activation	Low	Low	Medium	High	Medium	Medium	High	High	Medium	Medium	High
Desirable limits to control movement	270°	--	*3.2 to 3.8 mm (1.3 to 1.5 in.)	*13 to 100 mm (0.5 to 4.0 in.)	120°	Unlimited	180°	60°	Unlimited	Small.	45°
Effectiveness of visually identifying control position	Fair to good	Good	Poor ¹	Poor	Fair to good	Fair ¹ to good	Poor	Poor to fair	Poor ¹	Poor to fair	Poor to fair
Effectiveness of non-visually identifying control position	Fair to good	Poor	Fair	Poor	Good	Poor to good	Poor	Poor to fair	Poor ¹	Poor to fair	Poor to fair
Effectiveness of check reading to determine control positions when part of a group of like controls	Good	Good	Poor ¹	Poor	Good	Good ¹	Poor	Poor	Poor ¹	Poor	Good
Effectiveness of operating control simultaneously with like controls in an array	Poor	Good	Good	Poor	Good	Poor	Good	Poor	Poor	Poor	Good
Effectiveness as part of a combined control	Fair	Fair	Good	Poor	Good	Good ¹	Good	Good	Poor	Poor	Good

Note: 1° = 17.453292 mrad. This table adapted from Van Cott and Kincade. *Except for rotary pedals which have unlimited range.

¹Except when control is backlit and light comes on when control is activated (transilluminated). ¹Applicable only when control makes less than one rotation. Round knobs must also have a pointer attached. ¹Assumes control makes than one rotation. ¹Effective primarily when mounted concentrically on one axis with other knobs.

CHECKLIST 9: HAND OPERATED CONTROLS

DATE: _____

REVIEWER: _____

DESCRIPTION OF REVIEWED SYSTEM(S): _____

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
1.	When a control or an array of controls is needed for momentary contact or for activating a locking circuit, particularly in high-frequency-of-use situations are push buttons used? (DOE-STD-1062-DFT Use: 5.2.1.1)					
2.	Are push buttons concave to fit the finger or provided with a high degree of frictional resistance to prevent slipping? (DOE-STD-1062-DFT Shape: 5.2.1.2)					
3.	Is a positive indication of control activation provided? (DOE-STD-1062-DFT Positive Indication: 5.2.1.3)					
4.	When it is imperative to prevent accidental actuation of controls is a channel or cover guard provided? (DOE-STD-1062-DFT Channel or Cover Guard: 5.2.1.4)					
5.	Except for use of push buttons in keyboards do control dimensions, resistance, displacement and separation between adjacent edges of finger or hand-operated push buttons conform to the criteria in figure 10 DOE STD-1062-DFT? (DOE-STD-1062-DFT Dimensions: 5.2.1.5)					
6.	Are thumbwheels controls used only if the function requires a compact digital control-input device and a readout of these manual inputs for verification? (DOE-STD-1062-DFT Application: 5.2.2.1)					
7.	Does each position around the circumference of a discrete thumbwheel have a concave surface or is it separated by a high-friction area which is raised from the periphery of the thumbwheel? (DOE-STD-1062-DFT Shape: 5.2.2.2)					

CHECKLIST 9: HAND OPERATED CONTROLS

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
8.	Does the thumbwheel allow viewing of the digits within 30° viewing angle to the left and right of a perpendicular to the thumbwheel digits? (DOE-STD-1062-DFT Shape: 5.2.2.2)					
9.	When thumbwheels are used as input devices is the switch OFF or NORMAL position color coded? (DOE-STD-1062-DFT Coding: 5.2.2.3)					
10.	Does moving the thumbwheel edge forward, upward, or to the right increase the setting? (DOE-STD-1062-DFT Direction of Movement: 5.2.2.4)					
11.	For areas in which ambient illumination will provide display brightness below 3.5cd/m ² is the thumbwheel internally illuminated? (DOE-STD-1062-DFT Internal Illuminance: 5.2.2.5.1)					
12.	When illuminated do thumbwheel digits appear as illuminated characters on a black background and do their dimensions approximate the following: height 0.2 in. (4.8 mm); height-to-width ratio 3:2; height-to-stroke width ratio 10:1? (Internal Illuminance: 5.2.2.5.1)					
13.	For areas in which ambient illumination will provide display brightness above 3.5cd/m ² and internal illumination is not required are the digits bold black numerals engraved on a light background and are the dimensions the same as illuminated digits? (DOE-STD-1062-DFT External Illuminance: 5.2.2.5.2)					
14.	Does thumbwheel design permit viewing of in-line digital read-out from all operator positions? (DOE-STD-1062-DFT Visibility: 5.2.2.6)					
15.	Do thumbwheel control dimensions conform to criteria in Figure 11 DOE STD-1062-DFT? (DOE-STD-1062-DFT Dimensions: 5.2.2.7)					
16.	Are detents provided for discrete position thumbwheels? (DOE-STD-1062-DFT Resistance: 5.2.2.8)					

CHECKLIST 9: HAND OPERATED CONTROLS

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
17.	Is thumbwheel resistance elastic, building up and then decreasing as each detente is approached so that the control snaps into position without stopping between adjacent detents? (DOE-STD-1062-DFT Resistance: 5.2.2.8)					
18.	Is the thumbwheel resistance within the limits indicated in Figure 11 DOE STD-1062-DFT? (DOE-STD-1062-DFT Resistance: 5.2.2.8)					
19.	Is the separation between adjacent edges of thumbwheel controls sufficient to preclude accidental actuation of adjacent controls and does it conform to the criteria in Figure 11 DOE STD-1062-DFT? (DOE-STD-1062-DFT Separation: 5.2.2.9)					
20.	Are toggle switches used for functions that require two discrete positions or where space limitations are severe? (DOE-STD-1062-DFT Use: 5.2.3.1)					
21.	Are three position toggle switches used only when other switch types are not feasible? (DOE-STD-1062-DFT Use: 5.2.3.1)					
22.	Are three position toggle switches with spring-load to center-off used only when release from the spring-loaded position does not result in switch handle travel beyond the off position? (DOE-STD-1062-DFT Use: 5.2.3.1)					
23.	When the prevention of accidental actuation is of primary importance are channel guards, lift-to-unlock switches, or other equivalent prevention mechanisms provided? (DOE-STD-1062-DFT Accidental Actuation: 5.2.3.2)					
24.	When lift-to-unlock mechanisms are used is the resistance less than 3 lbs? (DOE-STD-1062-DFT Accidental Actuation: 5.2.3.2)					
25.	If cover guards are used is their location such that when open they do not interfere with the operation of the protected switch or adjacent controls? (DOE-STD-1062-DFT Accidental Actuation: 5.2.3.2)					

CHECKLIST 9: HAND OPERATED CONTROLS

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
26.	Do the dimensions, resistance, displacement, and separation between adjacent edges of toggle switches conform to the criteria in figure 12 of DOE STD-1062-DFT? (DOE-STD-1062-DFT Dimensions: 5.2.3.3)					
27.	Is an indication of control actuation provided (e.g., snap feel, audible click, associated or integral light)? (DOE-STD-1062-DFT Positive Indication: 5.2.3.4)					
28.	Are toggle switches vertically oriented when OFF is down and horizontal only for compatibility with the controlled function or equipment location? (DOE-STD-1062-DFT Orientation: 5.2.3.5)					
29.	Do the dimensions, resistance, displacement, and separation between adjacent edges of legend switches conform to the criteria in figure 13 of DOE STD-1062-DFT? (DOE-STD-1062-DFT Dimensions: 5.2.4.1)					
30.	Unless otherwise specified are barriers provided on critical switches and on switches likely to be accidentally actuated? (DOE-STD-1062-DFT Barriers: 5.2.4.2)					
31.	When barriers are used do they have rounded edges and are they prevented from obscuring visual access to controls, labels, or displays? (DOE-STD-1062-DFT Barriers: 5.2.4.2)					
32.	Is the legend switch provided with a detente or click for positive indication of switch actuation? (DOE-STD-1062-DFT Other Requirements: 5.2.4.3a)					
33.	When touch sensitive switches are used is a positive indication of actuation provided? (DOE-STD-1062-DFT Other Requirements: 5.2.4.3a)					
34.	Is the legend legible with or without internal illumination? (DOE-STD-1062-DFT Other Requirements: 5.2.4.3b)					
35.	When the MTBF is less than 100,00 hours is a lamp test or dual lamp/filament reliability test provided for switches? (DOE-STD-1062-DFT Other Requirements: 5.2.4.3c)					

CHECKLIST 9: HAND OPERATED CONTROLS

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
36.	Are legend switch lamps replaceable from the front of the panel by hand? (DOE-STD-1062-DFT Other Requirements: 5.2.4.3d)					
37.	Are legends or covers keyed or controlled to prevent the possibility of interchanging the legend covers? (DOE-STD-1062-DFT Other Requirements: 5.2.4.3d)					
38.	Is there a maximum of three lines of lettering on the legend plate? (DOE-STD-1062-DFT Other Requirements: 5.2.4.3e)					
39.	Are rocker switches used in lieu of toggle switches when the toggle switch handle protrusions might snag or when there is insufficient panel space for separate labeling of switch positions? (DOE-STD-1062-DFT Use: 5.2.5.1)					
40.	When the prevention of accidental actuation is of primary importance are channel guards or equivalent protective measures provided? (DOE-STD-1062-DFT Accidental Actuation: 5.2.5.2)					
41.	Is an indication of control actuation provided (e.g. snap feel, audible click, associated or integral light)? (DOE-STD-1062-DFT Positive Indication: 5.2.5.3)					
42.	Do the dimensions, resistance, displacement, and separation between centers of rocker switches conform to the criteria in figure 14 of DOE STD-1062-DFT? (DOE-STD-1062-DFT Dimensions: 5.2.5.4)					
43.	Are rocker switches vertically oriented with OFF in the down position and horizontal only for compatibility with the controlled function or equipment location? (DOE-STD-1062-DFT Orientation: 5.2.5.5)					
44.	For areas in which ambient illumination will provide display brightness below 3.5cd/m ² is the rocker switch internally illuminated? (DOE-STD-1062-DFT Color and Illumination: 5.2.5.6)					

CHECKLIST 9: HAND OPERATED CONTROLS

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
45.	When illuminated do rocker switch digits/characters dimensions approximate the following: height 0.2 (4.8 mm); height-to-width ratio 3:2; height-to-stroke width ratio 10:1? (DOE-STD-1062-DFT Color and Illumination: 5.2.5.6)					
46.	Are alternate colors used to denote the ON and OFF portions of a rocker switch? (DOE-STD-1062-DFT Color and Illumination: 5.2.5.6)					
47.	When slide switch controls are used for functions requiring more than two discrete positions are the switches arranged in a matrix to permit easy recognition of relative switch settings? (DOE-STD-1062-DFT Use: 5.2.6.1)					
48.	When mispositioning of controls is to be avoided is the use of slide switches avoided? (DOE-STD-1062-DFT Use: 5.2.6.1)					
49.	When the prevention of accidental actuation is of primary importance are channel guards or other equivalent prevention mechanisms provided? (DOE-STD-1062-DFT Accidental Actuation: 5.2.6.2)					
50.	Do the dimensions, resistance, displacement, and separation between centers of slide switch handles conform to the criteria in figure 15 of DOE STD-1062-DFT? (DOE-STD-1062-DFT Dimensions: 5.2.6.3)					
51.	Are detents provided for each slide switch control setting? (DOE-STD-1062-DFT Dimensions: 5.2.6.3)					
52.	When slide switches are used does the resistance gradually increase and then drop when the switch snaps into position? (DOE-STD-1062-DFT Dimensions: 5.2.6.3)					
53.	Are the slide switches incapable of stopping between positions? (DOE-STD-1062-DFT Dimensions: 5.2.6.3)					
54.	Where practicable are slide switches vertically oriented and horizontal only for compatibility with the controlled function or equipment location? (DOE-STD-1062-DFT Orientation: 5.2.6.4)					

CHECKLIST 9: HAND OPERATED CONTROLS

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
55.	Are slide switches involving more than two positions designed to provide positive indication of control setting? (DOE-STD-1062-DFT Positive Indication: 5.2.6.5)					
56.	Are push-pull controls used sparingly and for applications in which such configurations are typically expected? (DOE-STD-1062-DFT Application: 5.2.7.1)					
57.	Do push-pull control handles conform to criteria in Table 11 DOE STD-1062-DFT? (DOE-STD-1062-DFT Handle Dimensions: 5.2.7.2)					
58.	Are push-pull control handles keyed to a non-rotating shaft unless the control is to be used for special application such as a combination push-pull/rotate? (DOE-STD-1062-DFT Rotation: 5.2.7.3)					
59.	When a combination push-pull/rotate control is used with a round style knob is the rim of the knob serrated? (DOE-STD-1062-DFT Rotation: 5.2.7.3)					
60.	Are mechanical detents incorporated into push-pull controls to provide tactile indication of position? (DOE-STD-1062-DFT Detents: 5.2.7.4)					
61.	Is the use, location, and operating axis of push-pull controls precluded from the possibility of the operator's bumping a control getting into or out of position? (DOE-STD-1062-DFT Snagging and Inadvertent Contact: 5.2.7.5a)					
62.	Is the use, location, and operating axis of push-pull controls precluded from the possibility of the operator's snagging clothing, communications cables, or other equipment items on the control? (DOE-STD-1062-DFT Snagging and Inadvertent Contact: 5.2.7.5b)					
63.	Is the use, location, and operating axis of push-pull controls precluded from the possibility of the operator's inadvertently deactivating the control setting while reaching for another control? (DOE-STD-1062-DFT Snagging and Inadvertent Contact: 5.2.7.5c)					

CHECKLIST 9: HAND OPERATED CONTROLS

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
64.	Does the control pull towards the operator for ON and away for OFF with clockwise for actuation or increase for combination pull/rotary switches? (DOE-STD-1062-DFT Direction of Control Motion: 5.2.7.6)					
65.	Is the force required for pulling a panel control with fingers less than 4 lbs and for pulling a T-bar with four fingers less than 10 lbs? (DOE-STD-1062-DFT Resistance: 5.2.7.7)					
66.	Are rotary selector switches used for discrete functions when three or more detented positions are required? (DOE-STD-1062-DFT Use: 5.2.8.1)					
67.	Are the rotary selector switches designed with a moving pointer and a fixed scale? (DOE-STD-1062-DFT Moving Pointer: 5.2.8.2)					
68.	Are moving pointer knobs bar-shaped with parallel sides and with the index end tapered to a point? (DOE-STD-1062-DFT Shape: 5.2.8.3)					
69.	When a rotary switch is not visible to the operator during normal system operations is it designed to have no more than 12 positions? (DOE-STD-1062-DFT Positions: 5.2.8.4)					
70.	When a rotary switch is constantly visible to the operator during normal system operations is it designed to have no more than 24 positions? (DOE-STD-1062-DFT Positions: 5.2.8.4)					
71.	When rotary switch positions are placed opposite each other is the knob shaped to preclude confusion as to which end of the knob is the pointer? (DOE-STD-1062-DFT Positions: 5.2.8.4a)					
72.	Are rotary switches designed with resistance that is elastic, building up than decreasing as each position is approached so that the control snaps into position without stopping between adjacent positions? (DOE-STD-1062-DFT Positions: 5.2.8.4b)					

CHECKLIST 9: HAND OPERATED CONTROLS

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
73.	Is a reference line provided on rotary controls with at least 6:1 luminance contrast with the control color under all lighting conditions? (DOE-STD-1062-DFT Contrast: 5.2.8.5)					
74.	Is the knob pointer mounted sufficiently close to its scale to minimize parallax between the pointer and the scale markings? (DOE-STD-1062-DFT Parallax: 5.2.8.6)					
75.	Do the dimensions, resistance, displacement, and separation between adjacent edges of areas swept by rotary selector switches conform to the criteria in figure 16 of DOE STD-1062-DFT? (DOE-STD-1062-DFT Dimensions: 5.2.8.7)					
76.	Are key-operated switches (KOS) used primarily to prevent unauthorized operation? (DOE-STD-1062-DFT Use: 5.2.9.1)					
77.	Do dimensions, displacement, and resistance conform to the criteria in Figure 17 of DOE STD-1062-DFT? (DOE-STD-1062-DFT Dimensions: 5.2.9.2)					
78.	When illumination is adequate is color used to aid in identifying keys by function or location with red reserved for emergency functions? (DOE-STD-1062-DFT Color, Shape, and Size Coding: 5.2.9.3a)					
79.	When shape coding is used to identify a given key by feel are sharp corners avoided? (DOE-STD-1062-DFT Color, Shape, and Size Coding: 5.2.9.3b)					
80.	When size coding is used does it conform to the height limits of Figure 17 of DOE STD-1062-DFT and is it limited to no more than two sizes? (DOE-STD-1062-DFT Color, Shape, and Size Coding: 5.2.9.3c)					
81.	Does the keylock switch include appropriate positional markings and labels? (DOE-STD-1062-DFT Markings and Labeling: 5.2.9.4)					
82.	Do keys with teeth on both edges fit the lock with either side up or forward? (DOE-STD-1062-DFT Other: 5.2.9.5a)					

CHECKLIST 9: HAND OPERATED CONTROLS

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
83.	Are keys with a single row of teeth inserted into the lock with the teeth pointing up or forward? (DOE-STD-1062-DFT Other: 5.2.9.5b)					
84.	Are locks oriented so that the key's vertical position is the OFF position? (DOE-STD-1062-DFT Other: 5.2.9.5c)					
85.	Is the keylock switch designed so that normally the operator can not remove the key from the lock unless the switch is turned OFF? (DOE-STD-1062-DFT Other: 5.2.9.5d)					
86.	Is activation of an item accomplished by turning the key clockwise from the vertical OFF position? (DOE-STD-1062-DFT Other: 5.2.9.5e)					
87.	Are knobs used when low force or precise adjustments of a continuous variable are required? (DOE-STD-1062-DFT Use: 5.2.10.1)					
88.	Is amoving knob with a fixed scale used in preference to a moving scale with fixed index? (DOE-STD-1062-DFT Use: 5.2.10.1)					
89.	Are the dimensions of knobs within the limits specified in Figure 18 DOE STD-1062-DFT? (DOE-STD-1062-DFT Dimensions: 5.2.10.2)					
90.	When panel space is extremely limited do knobs approximate minimum values and is resistance as low as possible? (DOE-STD-1062-DFT Dimensions: 5.2.10.2)					
91.	Are the resistance and separation between adjacent edges of knobs within the limits specified in Figure 18 DOE STD-1062-DFT? (DOE-STD-1062-DFT Dimensions: 5.2.10.2)					
92.	Are rotating knobs easily distinguished from each other by sight and touch? (DOE-STD-1062-DFT Knob Style: 5.2.10.3)					

CHECKLIST 9: HAND OPERATED CONTROLS

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
93.	While ganged knob assemblies may be used if panel space is at a premium is their use avoided when accurate or rapid operations are required or frequent changes are necessary or gloves must be worn by the operator or equipment is exposed to weather or equipment is used under field conditions? (DOE-STD-1062-DFT Application: 5.2.11.1)					
94.	Do dimensions and separation conform to Figure 19 of DOE STD-1062-DFT? (DOE-STD-1062-DFT Dimensions: 5.2.11.2)					
95.	Does resistance conform to requirements in Figure 19 of DOE STD-1062-DFT and are the knobs serrated? (DOE-STD-1062-DFT Resistance: 5.2.11.3)					
96.	Is an indexing mark or pointer provided on each knob and is it clear which knob is associated? (DOE-STD-1062-DFT Marking: 5.2.11.4)					
97.	When each knob of a ganged assembly must be related to an array of visual displays does it conform to criteria in Figure 19 of DOE STD-1062-DFT? (DOE-STD-1062-DFT Knob/Display Relationship: 5.2.11.5)					
98.	When it is critical to prevent inadvertent activation of one knob as the other is being advanced is a secondary knob control moved designed into the operation? (DOE-STD-1062-DFT Inadvertent Operation: 5.2.11.6)					
99.	Are the thumbwheels oriented and moved in the directions specified in Figure 20 of DOE STD-1062-DFT? (DOE-STD-1062-DFT Orientation and Movement: 5.2.12.2)					
100.	Is the rim of the thumbwheel serrated or provided with a high-friction surface? (DOE-STD-1062-DFT Turning Aids: 5.2.12.3)					
101.	Do dimensions, separations, and resistance conform to criteria in Figure 20 of DOE STD-1062-DFT? (DOE-STD-1062-DFT Dimensions: 5.2.12.4)					

CHECKLIST 9: HAND OPERATED CONTROLS

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
102.	Does marking and labeling conform to requirements for visibility of markings and legibility of label alphanumerics? (DOE-STD-1062-DFT Labeling and Visibility: 5.2.12.5)					
103.	Is a detente position provided for continuous thumbwheels that have an OFF position? (DOE-STD-1062-DFT Position: 5.2.12.6)					
104.	Are keypads used when alphabetic or special function information is to be entered into a system? (DOE-STD-1062-DFT Use: 5.2.13.1)					
105.	Are numeric keypads designed to either the telephone or calculator style with the zero on the bottom row? (DOE-STD-1062-DFT Layout and Configuration: 5.2.13.2a)					
106.	Do alphanumeric keypads conform to the standard "QWERTY" arrangement? (DOE-STD-1062-DFT Layout and Configuration: 5.2.13.2b)					
107.	Are two-dimensional cursor controls provided for text processing applications? (DOE-STD-1062-DFT Layout and Configuration: 5.2.13.2c)					
108.	When systems contain more than one keypad is the same configuration for alphanumeric, numeric, and special function keys maintained throughout the system? (DOE-STD-1062-DFT Multiple Keypads: 5.2.13.3)					
109.	Do keypads provide feedback to inform the operator whether the key was activated, whether the intended key was pressed, and what the next operation may be (when applicable)? (DOE-STD-1062-DFT Feedback: 5.2.13.4)					
110.	Are the dimensions of actuators sufficiently high to permit error-free manipulation by the operator when using some commonly available stylus? (DOE-STD-1062-DFT Dimensions: 5.2.14.2a)					
111.	Is the resistance of the actuator sufficiently high to avoid inadvertent actuation under expected conditions? (DOE-STD-1062-DFT Dimensions: 5.2.14.2b)					

CHECKLIST 9: HAND OPERATED CONTROLS

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
112.	When actuators are slide-type do they have sufficient travel to permit easy recognition of switch setting with a minimum travel of twice the length of the actuator? (DOE-STD-1062-DFT Dimensions: 5.2.14.2c)					
113.	When actuators are rocker-type is the actuated wing flush with the surface of the module? (DOE-STD-1062-DFT Dimensions: 5.2.14.2c)					
114.	Do actuators have sufficient separation to permit error-free manipulation by the operator? (DOE-STD-1062-DFT Dimensions: 5.2.14.2d)					
115.	Is the surface of the actuator indented to accept the point of the stylus and is the indentation sufficiently deep to avoid slippage of the stylus during manipulation? (DOE-STD-1062-DFT Shape: 5.2.14.3)					
116.	Are levers used when large amounts of force or displacement are involved or when multidimensional movements of controls are required? (DOE-STD-1062-DFT Use: 5.2.15.1)					
117.	When several levers are grouped in proximity to each other are the lever handles coded? (DOE-STD-1062-DFT Coding: 5.2.15.2)					
118.	Are all levers labeled as to function and direction of motion? (DOE-STD-1062-DFT Labeling: 5.2.15.3)					
119.	When levers are used to make fine or continuous adjustments is support provided for the appropriate limb segment? (DOE-STD-1062-DFT Limb Support: 5.2.15.4)					
120.	Is the length of a lever determined by the mechanical advantage needed? (DOE-STD-1062-DFT Dimensions: 5.2.15.5)					
121.	When the lever or grip handle is spherical does its diameter conform to the criteria in Figure 21 of DOE STD-1062-DFT? (DOE-STD-1062-DFT Dimensions: 5.2.15.5)					

CHECKLIST 9: HAND OPERATED CONTROLS

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
122.	Is the resistance incorporated in a lever within the limits indicated in Figure 21 of DOE STD-1062-DFT? (DOE-STD-1062-DFT Resistance: 5.2.15.6)					
123.	Does the control displacement (for the seated operator) and separation conform to the criteria in Figure 21 of DOE STD-1062-DFT? (DOE-STD-1062-DFT Displacement and Separation: 5.2.15.7)					
124.	In general are controls requiring operator forces exceeding the strength limits of the lowest segment of the expected user population avoided? (DOE-STD-1062-DFT Use: 5.2.20.1)					
125.	Are high-force controls avoided except when the operator's nominal working position provides proper body or limb support? (DOE-STD-1062-DFT Use: 5.2.20.1)					
126.	Are sustained high-force requirements avoided? (DOE-STD-1062-DFT Use: 5.2.20.1)					
127.	When arm, hand, and thumb-finger controls requiring high control forces are used does the strength required conform to values in Figure 22 of DOE STD-1062-DFT? (DOE-STD-1062-DFT Arm, Hand, and Thumb-Finger Controls: 5.2.20.2)					
128.	Are miniature controls used only when severe space limitations exist? (DOE-STD-1062-DFT Use: 5.2.21.1)					
129.	Are miniature controls avoided when available space is adequate or when heavy gloves or mittens will be worn? (DOE-STD-1062-DFT Use: 5.2.21.1)					
130.	When design constraints dictate the use of miniature controls are the dimensions and separations of the controls the maximum permitted by the available space? (DOE-STD-1062-DFT Dimensions: 5.2.21.2)					

CHECKLIST 9: HAND OPERATED CONTROLS

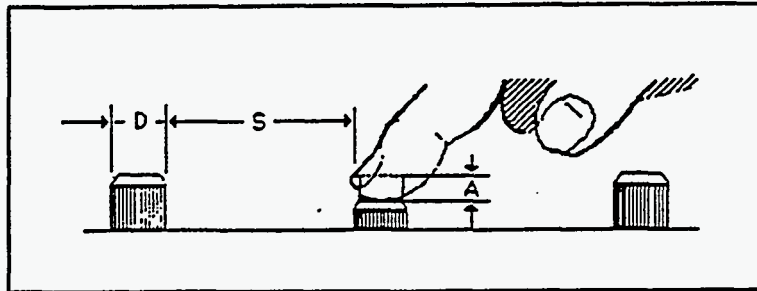
ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
131.	Does the resistance and displacement of miniature controls conform to the criteria specified for standard size of that type control? (DOE-STD-1062-DFT Dimensions: 5.2.21.2)					
132.	Do other design considerations (e.g. labeling, orientation) conform to the requirements specified for the standard size of the control? (DOE-STD-1062-DFT Other: 5.2.21.3)					
133.	Are cranks used for tasks requiring many rotations of a control particularly where high rates or large forces are involved? (DOE-STD-1062-DFT Use: 5.2.22.1)					
134.	Is the crank grip handle designed so that it turns freely around its shaft? (DOE-STD-1062-DFT Grip Handle: 5.2.22.2)					
135.	Do the dimensions, resistance, and separation between adjacent swept circular areas of cranks conform to the criteria in Figure 23 of DOE STD-1062-DFT? (DOE-STD-1062-DFT Dimensions: 5.2.22.3)					
136.	If a crank handle could become a hazard to persons passing by or it is critical that the handle not be inadvertently displaced is a folding handle type control used? (DOE-STD-1062-DFT Folding Handle: 5.2.22.4)					
137.	Are folding handle controls designed so that the handle is spring-loaded to keep it extended in the cranking position when in use and folded when not in use? (DOE-STD-1062-DFT Folding Handle: 5.2.22.4)					
138.	In applications where resistance is light is the crank balanced to prevent the handle weight from turning the crank from its last setting? (DOE-STD-1062-DFT Crank Balance: 5.2.22.5)					
139.	Are handwheels designed for nominal two-hand operation used when the breakout or rotational forces are too high to be easily overcome with a one-handed control? (DOE-STD-1062-DFT Use: 5.2.23.1)					

CHECKLIST 9: HAND OPERATED CONTROLS

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
140.	Is knurling, indentation, high-friction covering, or a combination of these built into the handwheel to facilitate operator grasp? (DOE-STD-1062-DFT turning aids: 5.2.23.2)					
141.	Are spinner handles avoided where the projecting handle is vulnerable to inadvertent displacement or it creates a safety hazard? (DOE-STD-1062-DFT Spinner Handles: 5.2.23.3)					
142.	Except for valves do handwheel controls rotate clockwise for ON or INCREASE and counterclockwise for OFF or DECREASE? (DOE-STD-1062-DFT Direction of Movement: 5.2.23.4)					
143.	Do control dimensions, resistance, displacement, and separation between edges of adjacent handwheels conform to the criteria in Figure 24 of DOE STD-1062-DFT? (DOE-STD-1062-DFT Dimensions: 5.2.23.5)					

CHECKLIST 9: HAND OPERATED CONTROLS

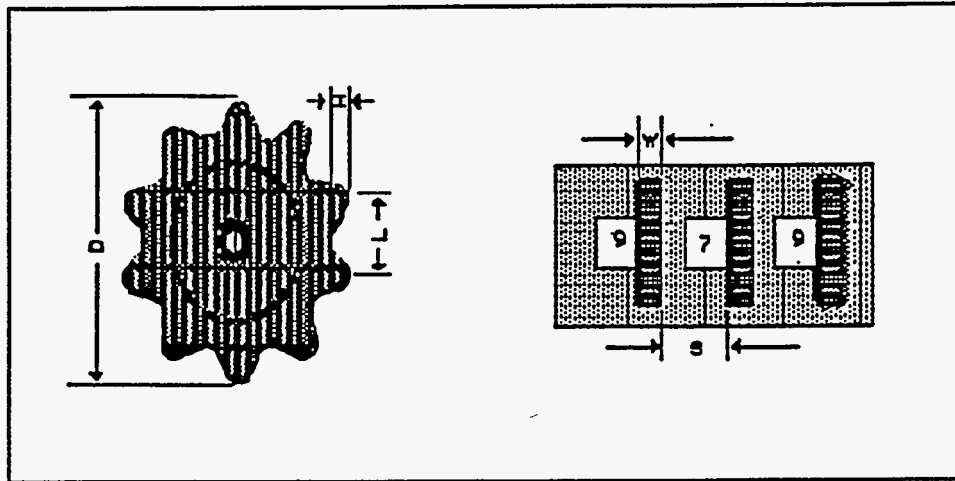
Figure 10: Pushbuttons (finger or hand operated).



	Fingertip	Single Finger	Single Finger Sequential	Different Fingers	Thumb or Palm
<i>D, Diameter</i>					
Minimum	10 mm (0.37 in.)	---	---	---	19 mm (0.75 in.)
Maximum	25 mm (1 in.)	---	---	---	---
<i>S, Separation</i>					
Minimum	---	13 mm (0.5 in.)	6 mm (0.25 in.)	6 mm (0.25 in.)	25 mm (1 in.)
Preferred	---	50 mm (2 in.)	13 mm (0.5 in.)	13 mm (0.5 in.)	150 mm (6 in.)
<i>Resistance</i>					
Minimum	---	2.8 N (10 oz)	---	1.4 N (5 oz)	2.8 N (10 oz)
Maximum	---	11 N (40 oz)	---	5.6 N (20 oz)	23 N (80 oz)
<i>A, Displacement</i>					
Minimum	2 mm (0.08 in.)	---	---	---	3 mm (0.12 in.)
Maximum	6 mm (0.25 in.)	---	---	---	3.8 mm (1.5 in.)

CHECKLIST 9: HAND OPERATED CONTROLS

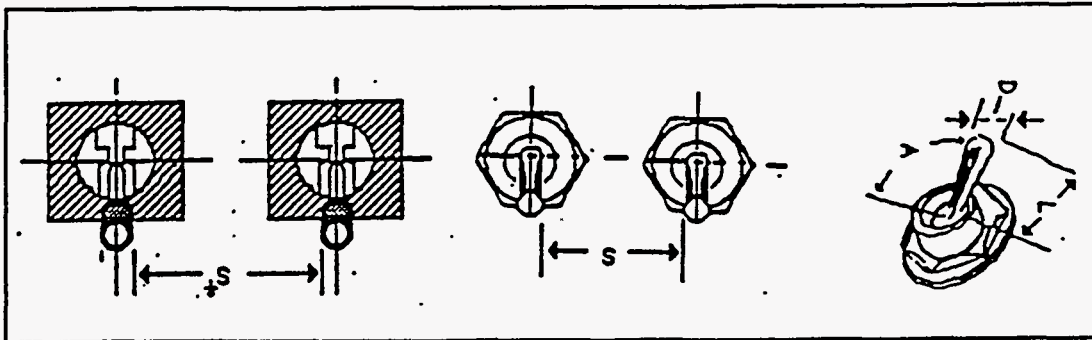
Figure 11: Discrete thumbwheel control.



	D Diameter	L Trough Distance	W Width	H Depth	S Separation	Resistance
Minimum	30 mm (1.13 in.)	11 mm (0.44 in.)	3 mm (0.13 in.)	3 mm (0.13 in.)	10 mm (0.41 in.)	1.7 N (6.oz)
Maximum	75 mm (3 in.)	19 mm (0.75 in.)	---	13 mm (0.5 in.)	---	5.6 N (20 oz)

CHECKLIST 9: HAND OPERATED CONTROLS

Figure 12: Toggle switches.



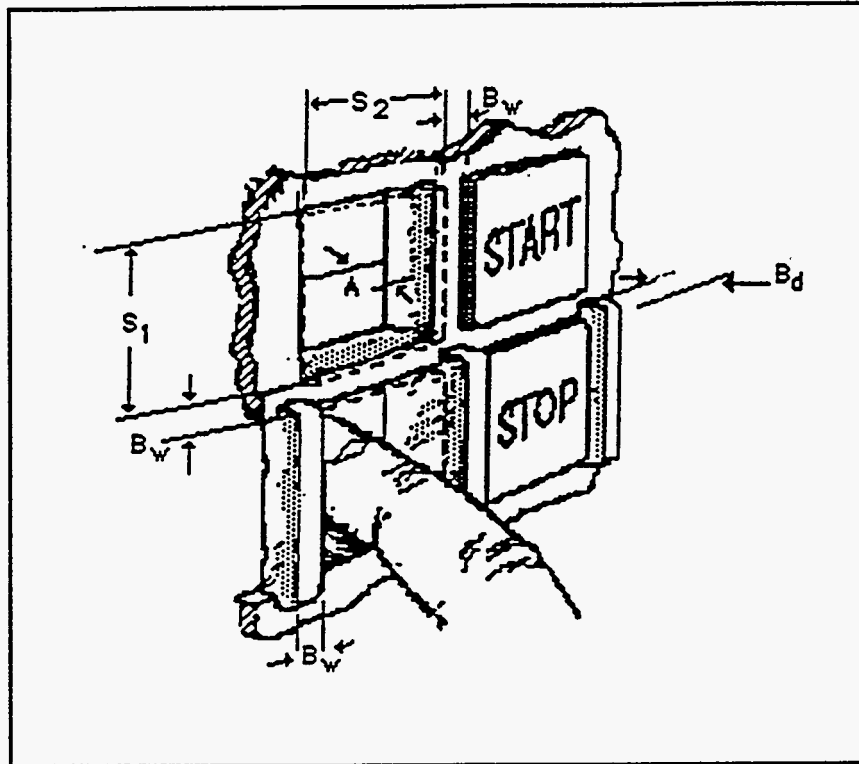
	Dimensions		Resistance		α Displacement between positions		
	L, Arm length * †	D, Control Tip	Small Switch	Large Switch	Two Positions	Three Positions	
Minimum	13 mm (0.5 in.)	38 mm (1.5 in.)	3 mm (0.13 in.)	2.8 N (10 oz)	2.8 N (10. oz)	30°	17°
Maximum	50 mm (2 in.)	50 mm (2 in.)	25 mm (1 in.)	4.5 N (16 oz)	11 N (40 oz)	80°	40°
Optimum	---	---	---	---	---	---	25°

S, Separation				
	Single finger operation ‡		Single finger Sequential Operation	Simultaneous Operation by Multiple Fingers
Minimum	19 mm (0.75 in.)	25 mm (1 in.)	13 mm (0.5 in.)	16 mm (0.63 in.)
Optimum	50 mm (2 in.)	50 mm (2 in.)	25 mm (1 in.)	19 mm (0.75 in.)

- * Use by bare finger
- † Use with heavy glove
- ‡ Using a lever lock toggle switch

CHECKLIST 9: HAND OPERATED CONTROLS

Figure 13: Legend Switch.



	S ₁ S ₂ Size	A, Displacement	Barriers		Resistance
			B _w	B _d	
Minimum	19 mm* (0.75 in.)	3 mm† (0.13 in.)	3 mm (0.13 in.)	5 mm (0.20 in.)	2.8 N‡ (10 oz)
Maximum	38 mm (1.5 in.)	6 mm (0.25 in.)	6mm (0.25 in.)	6mm (0.25 in.)	16.7 N (60 oz)

* 15 mm (0.60 in.) where switch is depressed below the panel

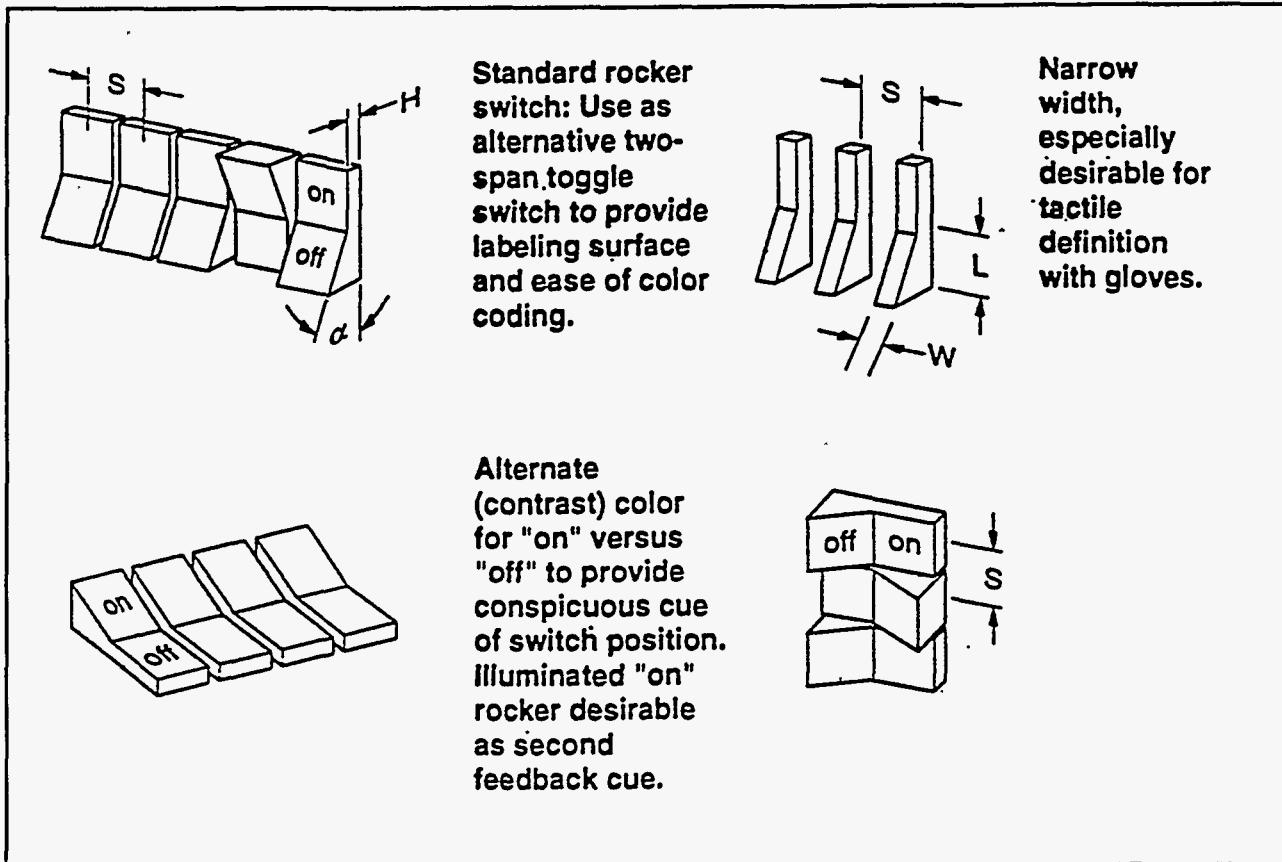
† 5 mm (0.20 in.) for positive position switches

‡ 5.6 N (20 oz) for use in moving vehicles

NOTE: B_w also refers to switch separation

CHECKLIST 9: HAND OPERATED CONTROLS

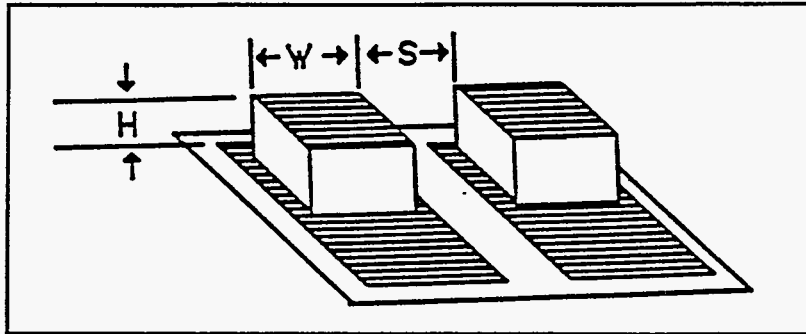
Figure 14. Rocker Switches.



	W, Width	L, Length	Resistance	H, Depressed Height	Angular Displace- ment α , Angle	Separation (center-to-center)	
						S, (bare hand)	S, (gloved hand)
Minimum	6 mm (0.25 in.)	13 mm (0.5 in.)	2.8 N (10 oz)	3 mm (0.125 in.)	30°	19 mm (0.75 in.)	32 mm (1.25 in.)
Maximum	—	—	11 N (40 oz)	—	—	—	—

CHECKLIST 9: HAND OPERATED CONTROLS

Figure 15: Slide Switches.



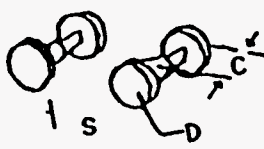


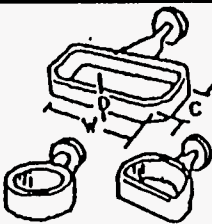
	Dimensions		Resistance	
	* H, Actuator height †	W, Actuator Width	Small Switch	Large Switch
Minimum	6 mm (2.35 in.)	13 mm (0.5 in.)	2.8 N (10 oz)	2.8 N (10 oz)
Maximum	---	---	4.5 N (16 oz)	11 N (40 oz)

	S. Separation		
	Single finger operation		Simultaneous operation by different fingers
	Discrete	Sequential	
Minimum	19 mm (0.75 in.)	13 mm (0.5 in.)	16 mm (0.63 in.)
Preferred	50 mm (2 in.)	25 mm (1 in.)	19 mm (0.75)

- * Use by bare finger.
- † Use with heavy handwear.

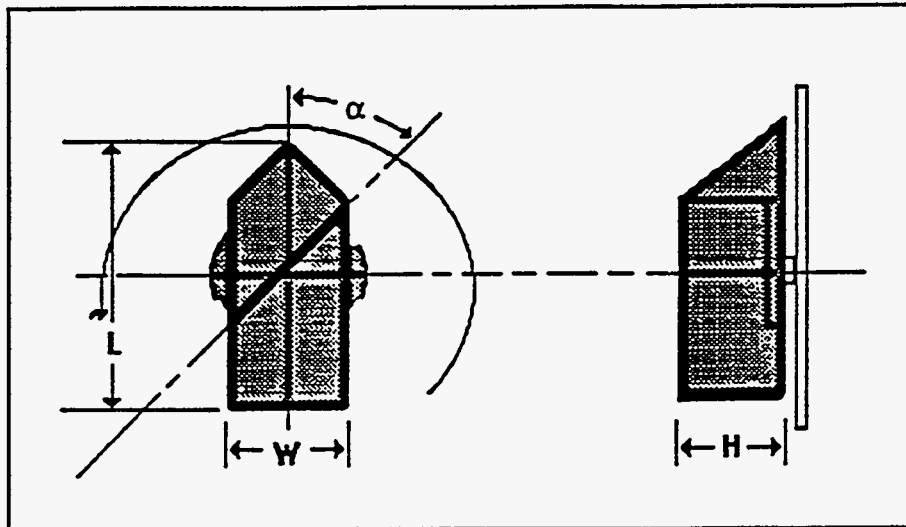
CHECKLIST 9: HAND OPERATED CONTROLS

Table 11: Push-Pull controls.

Configuration Example	Application Criteria	Design Criteria				
		Dimensions			Displacement	Separation
	<p>Push-pull control, low resistance, for two position. mechanical and/or electrical systems.</p> <p>Alternate three position plus rotary function acceptable for application such as vehicle headlight plus parking lights, panel and dome light provide serrated rim.</p>	<p>D. Min Diam: 19 mm (0.75 in.)</p>	<p>C. Min clearance: 25 mm (1 in.) add 13 mm (0.5 in.) for gloved hand</p>		<p>25 ± 13 mm (1 ± 0.5 in.)</p> <p>Min between pull positions: 13 mm (0.5 in.)</p>	<p>S, Minimum space between: 38 mm (1.5 in.) add 13 mm (0.5 in.) for gloved hand</p>
	<p>Alternate handle: Miniature electrical panel switch only, avoid glove use application.</p>	<p>D. Min Diam: 6 mm (0.25 in.)</p>	N/A	<p>L. minimum length 19 mm (0.75 in.)</p>	<p>Minimum 13 mm (0.5 in.)</p>	<p>S. Minimum space between 25 mm (1 in.)</p>
	<p>High force push-pull, for two position mechanical systems only.</p>	<p>W. min width 100 mm (4 in.)</p>	<p>D. depth: 16-38 mm (0.63-1.5 in.)</p>	<p>C. min clearance: 38 mm (1.5 in.) add 6 mm (0.25 in.) for gloved hand</p>	<p>Minimum 25 mm (1 in.)</p> <p>Preferred 50 mm (2 in.)</p>	
	<p>Same as above. Preferred where possible garment or cable snag possibility exists.</p> <p>Note: 1 and 2 finger pulls also acceptable for less than 18 m (4 lb) applications.</p>	<p>W. min Width 100 mm (4 in.) add 25 mm (1 in.) for gloved hand</p>	<p>D. depth: 16-38 mm (0.63-1.5 in.)</p>	<p>C. min Clearance: 32 mm (1.5 in.)</p>	<p>Minimum 25 mm (1 in.)</p> <p>Preferred 50 mm (2 in.)</p>	<p>S. Minimum space between: 13 mm (0.5 in.)</p>

CHECKLIST 9: HAND OPERATED CONTROLS

Figure 16: Rotary selector switch.



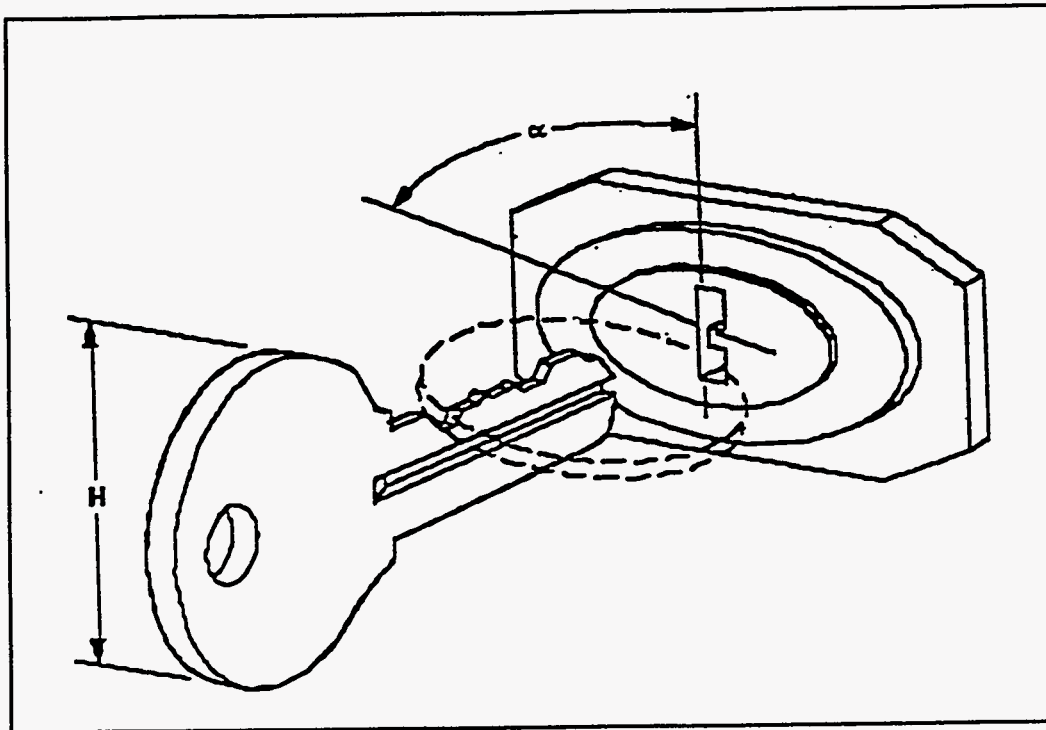
	Dimensions			Resistance
	L, Length	W, Width	H, Depth	
Minimum	25 mm (1in.)	---	16 mm (.64 in.)	115 mN-m (16 ozf-in.)
Maximum	100 mm (4 in.)	25 mm (1 in.)	75 mm (3 in.)	680 mN-m (96 Ozf-in.)
	Angular Displacement		Separation	
	α *	**	One-handed operation	Two-handed operation
Minimum	15°	30°	25 mm (1 in.)	75 mm (3 in.)
Maximum	40°	90°	---	---
Preferred	---	---	50 mm (2 in.)	127 mm (5 in.)

* For facilitating performance

** When special engineering requirements demand large separation or when tactually ("blind") position controls are required.

CHECKLIST 9: HAND OPERATED CONTROLS

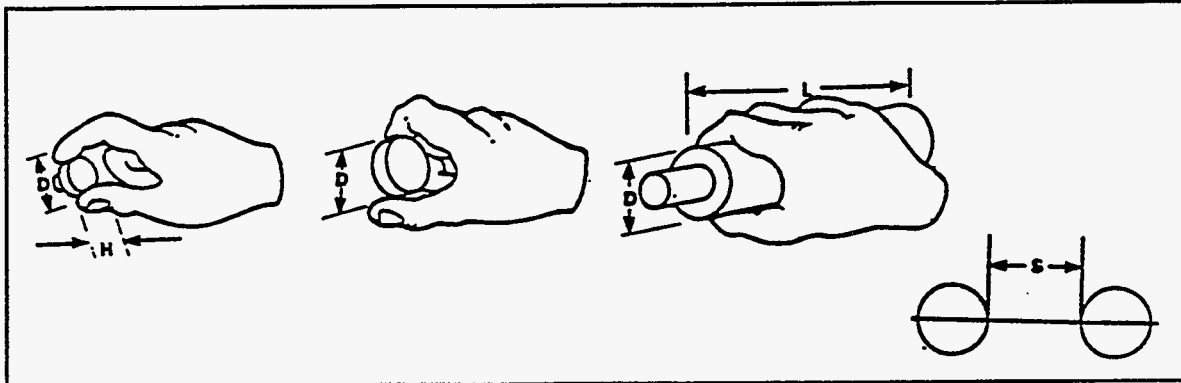
Figure 17: Key operated switch.



	Angular Displacement (α)	Height (H)	Resistance Torque
Minimum	30°	13 mm (0.5 in.)	115 mN-m (16 ozf in.)
Maximum	90°	75 mm (3 in.)	690 mN-m (96 ozf in.)

CHECKLIST 9: HAND OPERATED CONTROLS

Figure 18: Knobs.

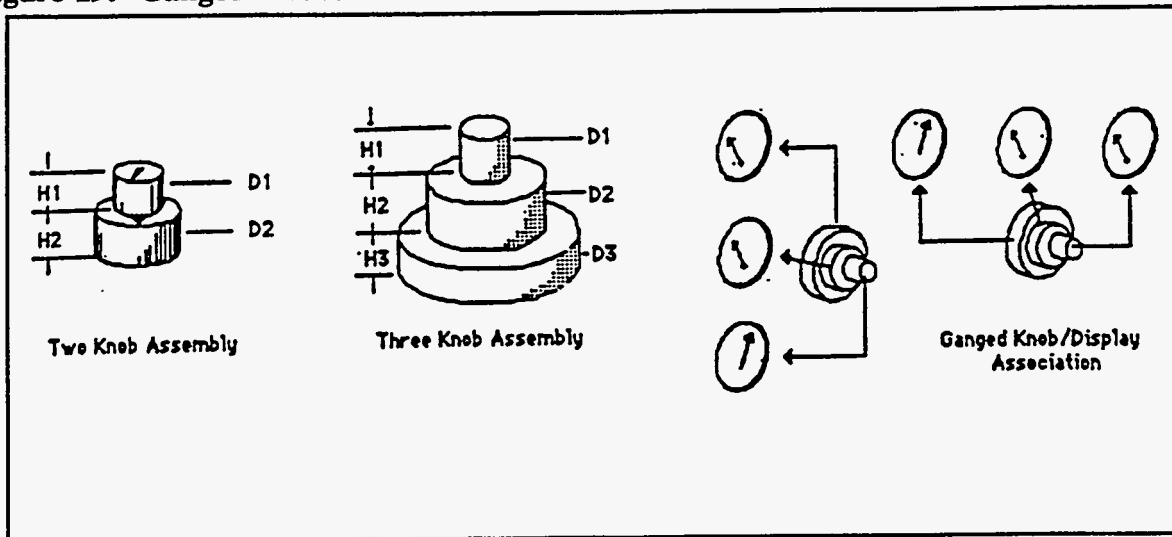


Dimensions					
	a) Fingertip Grasp		b) Thumb and finger Encircled	c) Palm Grasp	
	H, Height	D, Diameter	D, Diameter	D, Diameter	L, Length
Minimum	13 mm (0.5 in.)	10 mm (0.4 in.)	25 mm (1 in.)	38 mm (1.5 in.)	75 mm (3 in.)
Maximum	25 mm (1 in.)	100 mm (4 in.)	75 mm (3 in.)	75 mm (3 in.)	----

	Resistance (Torque)	
	*	†
Maximum	32 mN-m (4.5 ozf-in.)	42 mN-m (6 ozf-in.)
	S, Separation between widest portion of knobs	
	One hand individually	Two hands simultaneously
Minimum	25 mm (1 in.)	50 mm (2 in.)
Maximum	50 mm (2 in.)	125 mm (5 in.)

CHECKLIST 9: HAND OPERATED CONTROLS

Figure 19: Ganged Knobs.



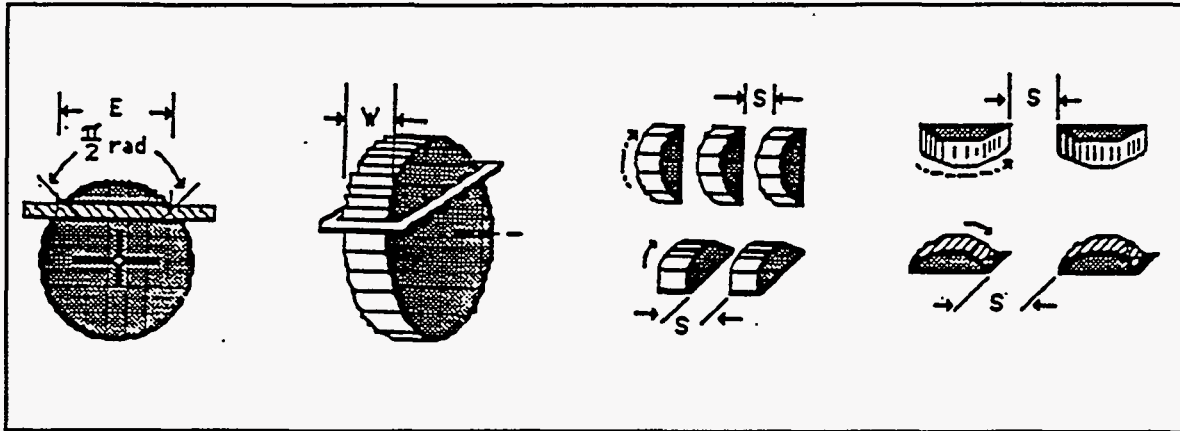
	Two knob assembly				Three knob assembly					
	H1	H2	D1	D2	H1	H2	H3	D1	D2	D3
Min	16 mm 0.6 in.	13 mm 0.5 in.	13 mm 0.5 in.	22 mm 0.9 in.	19 mm 0.8 in.	19 mm 0.8 in.	6 mm 0.3 in.	13 mm 0.5 in.	44 mm 1.8 in.	75 mm 3 in.
Max	---	---	---	100 mm 4 in.	---	---	---	---	---	100 mm 4 in.

	Resistance (Torque)		Separation			
	≤ 25 mm 1 in. knobs*	> 25 mm 1 in. knobs*	One hand individually		Two hands simultaneously	
			Bare	Gloved	Bare	Gloved
Minimum	---	---	25 mm (1 in.)	63 mm (2.5 in.)	50 mm (2 in.)	90 mm (3.5 in.)
Optimum	---	---	50 mm (2 in.)	90 mm (3.5 in.)	75 mm (3 in.)	100 mm (4 in.)
Maximum	32 mN-m 4.5 ozf-in.	42 mN-m 6 ozf-in.	---	---	---	---

* Diameter

CHECKLIST 9: HAND OPERATED CONTROLS

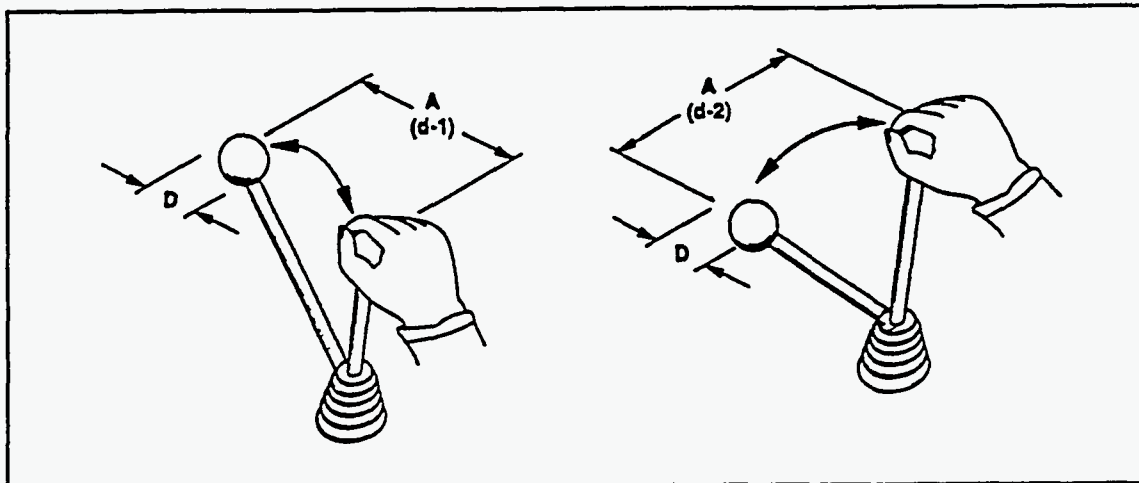
Figure 20: Thumbwheel adjustment controls.



	E, Rim exposure	W, Width	S, Separation		Resistance
			A	B	
Minimum	25 mm * (1 in.)	3 mm * (0.13 in.)	25 mm (1 in.) Add 13 mm (0.5 in.) for gloves.	50 mm (2 in.) Add 25 mm (1 in.) for gloves.	To minimize effects of inadvertent input if operator subject to motion.
Maximum	100 mm (4 in.)	22 mm (0.88 in.)	N/A	N/A	3.3 N (12 oz.)

CHECKLIST 9: HAND OPERATED CONTROLS

Figure 21: Levers.

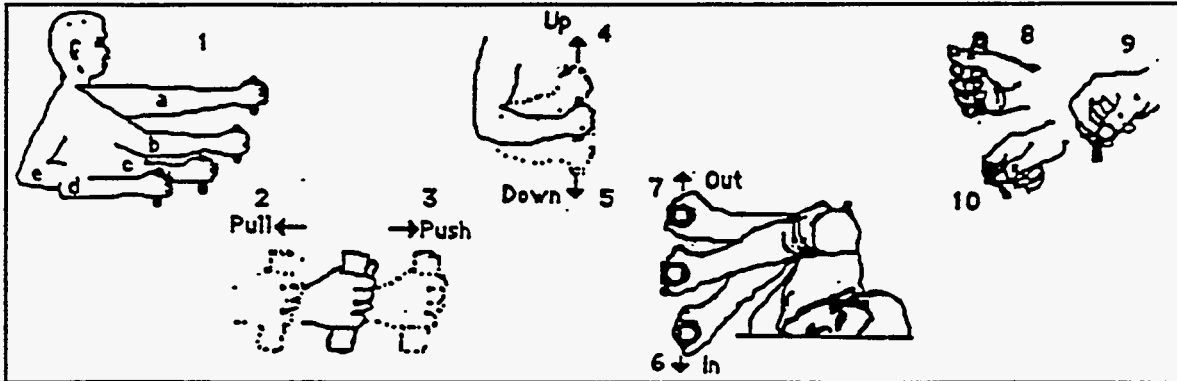


	Diameter		Resistance			
	D		(d - 1)		(d - 2)	
	Finger Grasp	Hand Grasp	One hand	Two hands	One hand	Two hands
Minimum	13 mm (0.5 in.)	38 mm (1.5 in.)	9 N (32 oz.)	9 N (32 oz.)	9 N (32 oz.)	9 N (32 oz.)
Maximum	38 mm (1.5 in.)	75 mm (3 in.)	135 N (480 oz.)	220 N (600 oz.)	90 N (320 oz.)	135 N (480 oz.)

	A, Displacement		Separation	
	Forward (d - 1)	Lateral (d - 2)	One hand random	Two hands simultaneous
Minimum	---	---	50 mm (2 in.)	75 mm (3 in.)
Preferred	---	---	100 mm (4 in.)	125 mm (5 in.)
Maximum	360 mm (14 in.)	970 mm (38 in.)	---	---

CHECKLIST 9: HAND OPERATED CONTROLS

Figure 22: Arm, hand, and thumb-finger strength (5th percentile male data).

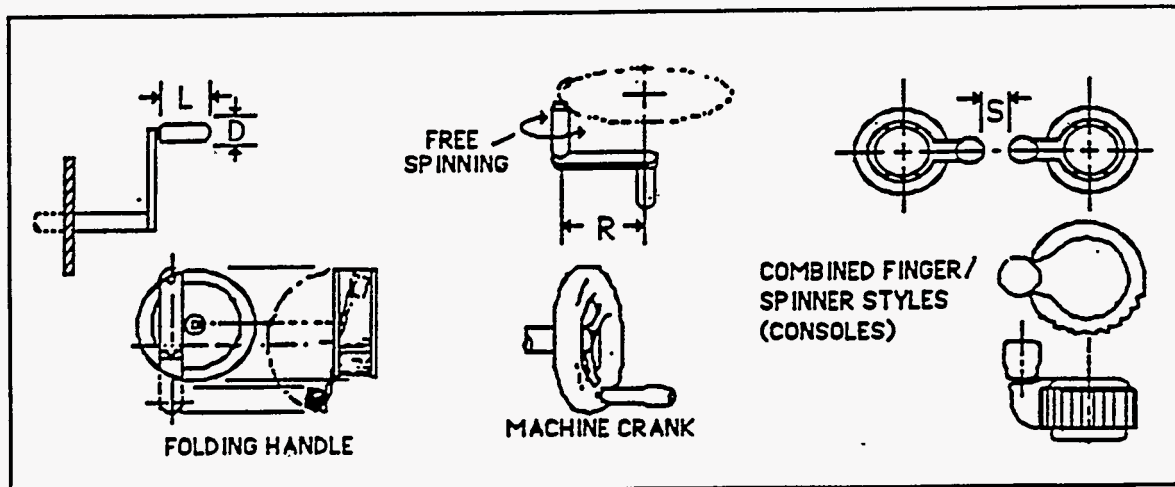


Arm strength in N (lbf)												
(1)			(2)		(3)		(4)		(5)		(6)	
Degree of Elbow Flexion in Degrees	Pull L** R**		Push L R		Up L R		Down L R		In L R		Out L R	
a = 180°	222 (50)	231 (52)	187 (42)	222 (50)	40 (9)	62 (14)	58 (13)	76 (17)	58 (13)	89 (20)	36 (8)	62 (14)
b = 150°	187 (42)	249 (56)	133 (30)	187 (42)	67 (15)	80 (18)	80 (18)	89 (20)	67 (15)	89 (20)	36 (8)	67 (15)
c = 120°	151 (34)	187 (42)	116 (26)	160 (36)	76 (17)	107 (24)	93 (21)	116 (26)	89 (20)	98 (22)	45 (10)	67 (15)
d = 90°	142 (32)	165 (37)	98 (22)	160 (36)	76 (17)	89 (20)	93 (21)	116 (26)	71 (16)	80 (18)	45 (10)	71 (16)
e = 60°	116 (26)	107 (24)	98 (22)	151 (34)	67 (15)	89 (20)	80 (18)	89 (20)	76 (17)	89 (20)	53 (12)	76 (17)

Hand and thumb-finger strength in N(lbf)				
	(8)		(9)	(10)
	Hand grip L R		Thumb-finger grip (palmer)	Thumb-finger grip (tips)
Momentary hold	250 (56)		260 (59)	60 (14)
Sustained hold	145 (33)		155 (35)	35 (8)

CHECKLIST 9: HAND OPERATED CONTROLS

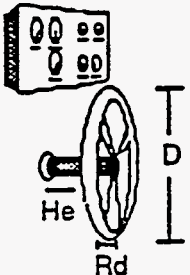
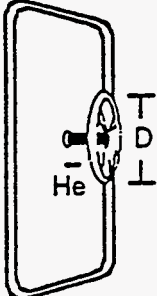
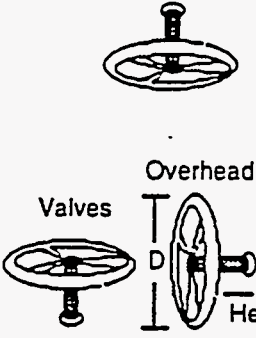
Figure 23: Cranks.



Load	Specification	Handle		R. Turning Radius	
		L, Length	D, Diameter	Rate above 100 rpm	Rate below 100 rpm
Light loads: less than 22 N. (wrist and finger movement)	Minimum	25mm (1in.)	10 mm (0.48 in.)	38 mm (1.5 in.)	13 mm (0.5 in.)
	Preferred	38 mm (1.5 in.)	13 mm (0.5 in.)	75 mm (3 in.)	65 mm (2.5 in.)
	Maximum	75 mm (3 in.)	16 mm (0.63 in.)	125 mm (5 in.)	115 mm (4.5 in.)
Heavy loads: more than 22 N. (arm movement)	Minimum	75 mm (3 in.)	25 mm (1 in.)	190 mm (7.5 in.)	125 mm (5 in.)
	Preferred	95 mm (3.75 in.)	25 mm (1 in.)	---	---
	Maximum	---	38 mm (1.5 in.)	510 mm (20 in.)	230 mm (9 in.)

CHECKLIST 9: HAND OPERATED CONTROLS

Figure 24: Handwheels.

Configuration Example	Application Criteria	Design Criteria			
		Dimensions			Separation
		D, Diameter	Rd, Rim diameter	He Min hand clearance	
	<p>Continuous adjustment for alternate slewing/precise positioning, using display reference. Resistance low [(e.g., below 110 N (400 oz.))]</p>	<p>200-500 mm (8-20 in.)</p>	<p>19-32 mm (0.75-1.25 in.)</p>	<p>75mm (3 in.) around rim</p>	<p>710 mm (28 in.) elbow-elbow clearance.</p>
	<p>Continuous lock-unlock operation</p>	<p>200 mm (8 in) for 22 N (5 lb) to 510 mm (20 in.) for 155 N (35 lb)</p>	<p>19-32 (0.75-1.25 in.)</p>	<p>75mm (3 in.) around rim</p>	<p>710 mm (28 in.) elbow-elbow clearance</p>
	<p>High torque valves</p>	<p>200-400 mm (8-16 in.) for overhead; 200-510 mm (8-20 in.) for other positions; 300-2520 mm (12-60 in.) above standing surface.</p>	<p>19-32 mm (0.75-1.13 in.)</p>	<p>75 mm (3 in.) around rim</p>	<p>710 mm (28 in.) elbow-elbow clearance</p>

CHECKLIST 10: FOOT OPERATED CONTROLS

DATE: _____

REVIEWER: _____

DESCRIPTION OF REVIEWED SYSTEM(S): _____

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
1.	Are foot-operated controls used when control operation requires either greater force than the upper body can provide or force close to an upper body fatigue threshold? (DOE-STD-1062-DFT Use: 5.3.1.1a)					
2.	Are foot-operated controls used when the operator's hands are generally occupied by other manual control tasks or an additional control action is required? (DOE-STD-1062-DFT Use: 5.3.1.1b)					
3.	Are foot-operated controls used when specific foot-operated controls are expected by the operator? (DOE-STD-1062-DFT Use: 5.3.1.1c)					
4.	Are foot-operated controls used when a safety "shut-down" control is required during an operation in which the operator's hands cannot be freed to reach a safety switch (Use: 5.3.1.1d)					
5.	Are foot-operated controls avoided when a standing operator would be confronted with a sensitive balancing requirement? (DOE-STD-1062-DFT Avoidance: 5.3.1.1.1a)					
6.	Are foot-operated controls avoided when precise control operations are required? (DOE-STD-1062-DFT Avoidance: 5.3.1.1.1b)					
7.	Are foot-operated controls avoided when selection from many separate controls is required? (DOE-STD-1062-DFT Avoidance: 5.3.1.1.1c)					
8.	Are foot controls located and designed so that they can be operated in as natural a pattern as practicable? (DOE-STD-1062-DFT Operation: 5.3.1.2)					

CHECKLIST 10: FOOT OPERATED CONTROLS

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
9.	Are foot controls designed to specifically avoid frequent, maximum reaching? (DOE-STD-1062-DFT Operation: 5.3.1.2a)					
10.	Are foot controls designed to specifically avoid the requirement to hold the leg or foot in an awkward position for extended periods of time? (DOE-STD-1062-DFT Operation: 5.3.1.2b)					
11.	Are foot controls designed to specifically avoid the requirement for the operator to operate a control frequently or for an extended period of time while sitting in a twisted position? (DOE-STD-1062-DFT Operation: 5.3.1.2c)					
12.	Are foot controls designed to specifically avoid frequent application of maximum force or extended duration? (Operation: 5.3.1.2d)					
13.	Are foot controls designed to specifically avoid the requirement that the operator search for a particular foot control in order to select the proper one? (DOE-STD-1062-DFT Operation: 5.3.1.2e)					
14.	Are foot controls designed to specifically avoid placement of a foot control where it might be stepped on and inadvertently actuated? (DOE-STD-1062-DFT Operation: 5.3.1.2f)					
15.	Are foot controls designed to specifically avoid the situation where typical shifting from one foot control to another creates conditions where the foot or clothing might be entrapped by an intervening control? (DOE-STD-1062-DFT Operation: 5.3.1.2f)					
16.	Does the configuration and placement of foot-operated controls accommodate the anthropometry of the operator's foot wearing operational shoes or boots? (DOE-STD-1062-DFT Configuration and Placement: 5.3.1.3)					
17.	Are foot operated controls located so that the actuation of a control by one foot does not interfere with the actuation of a control by another foot? (DOE-STD-1062-DFT Configuration and Placement: 5.3.1.3)					

CHECKLIST 10: FOOT OPERATED CONTROLS

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
18.	Are foot-operated switches used only where the operator is likely to have both hands occupied when switch actuation is required or when load sharing among limbs is desirable? (DOE-STD-1062-DFT Use: 5.3.2.1)					
19.	Is the use of foot-operated controls limited to non-critical or infrequent operations? (DOE-STD-1062-DFT Use: 5.3.2.1)					
20.	Are foot switches positioned for operation by the toe and the ball of the foot rather than by the heel? (DOE-STD-1062-DFT Operation: 5.3.2.2)					
21.	Are foot-operated switches located away from obstructions so that the operator can center the ball of the foot on the switch button? (DOE-STD-1062-DFT Operation: 5.3.2.2)					
22.	Does the switch cap possess a frictional surface in cases where the switch may become wet and slippery? (DOE-STD-1062-DFT Operation: 5.3.2.2)					
23.	Are foot switches guarded from unintentional activation in accordance with 19CFR1910.27(b)4 and 10CFR1910.212(a)1? (DOE-STD-1062-DFT Operation: 5.3.2.2)					
24.	Is the switch mechanism protected to prevent unintended operation from falling or moving objects or from accidentally stepping onto the switch? (DOE-STD-1062-DFT Error Protection: 5.3.2.3)					
25.	Is a pad with a non-slip contact area firmly attached to each switch? (DOE-STD-1062-DFT Error Protection: 5.3.2.3)					
26.	Are the dimensions, resistance, and displacement of foot-operated switches in conformance with the criteria in Figure 25 of DOE STD-1062-DFT? (DOE-STD-1062-DFT Dimensions: 5.3.2.4)					
27.	Is a positive indication of control actuation provided? (DOE-STD-1062-DFT Feedback: 5.3.2.5)					

CHECKLIST 10: FOOT OPERATED CONTROLS

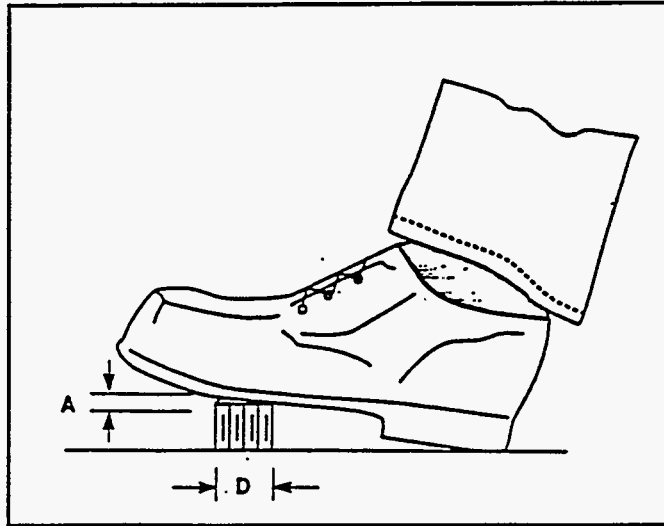
ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
28.	Are pedal controls used only where the operator is likely to have both hands occupied when control actuation is required or when control operation requires use of force too high for the manual force capability of the operator? (DOE-STD-1062-DFT Use: 5.3.3.1)					
29.	Are pedal controls located so that the operator can reach them easily without extreme stretching or torso twisting? (DOE-STD-1062-DFT Location: 5.3.3.2)					
30.	Are pedal controls located so that the operator can reach the maximally-displaced pedals within anthropometric limits and force-capabilities as stated in Figure 26 of DOE STD-1062-DFT? (DOE-STD-1062-DFT Location: 5.3.3.2)					
31.	Are pedals that may be held or adjusted located so the operator can "rest" and "steady the foot"? (DOE-STD-1062-DFT Location: 5.3.3.2)					
32.	Is the pedal located the appropriate critical distance above the floor or heel rest so that the operator's heel can rest while articulating the ankle/foot? (DOE-STD-1062-DFT Location: 5.3.3.2)					
33.	Do pedals return to the original null position without requiring operator assistance except for controls that generate a continuous output? (DOE-STD-1062-DFT Control Return: 5.3.3.3)					
34.	Where the operator may rest a foot on the pedal is sufficient resistance provided to prevent the weight of the foot from inadvertently actuating the control? (DOE-STD-1062-DFT Control Return: 5.3.3.3)					
35.	Is the pedal travel path compatible with the natural articulation path of the operator's limbs? (DOE-STD-1062-DFT Pedal Travel Path: 5.3.3.4)					

CHECKLIST 10: FOOT OPERATED CONTROLS

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
36.	When high forces are required to fully actuate a pedal are appropriate aids provided to assist the operator in applying maximum force (e.g. seat backrest, adjustable seats, double width pedals)? (DOE-STD-1062-DFT High-Force Application Aids: 5.3.3.5)					
37.	Does the pedal possess a frictional surface in cases where high-force is used or the pedal may become slippery? (DOE-STD-1062-DFT Non-Slip Pedal Surface: 5.3.3.6)					
38.	Do the dimensions, resistance, displacement and separation of pedals conform to the criteria in Figure 26 of DOE STD-1062-DFT? (DOE-STD-1062-DFT Dimensions: 5.3.3.7)					

CHECKLIST 10: FOOT OPERATED CONTROLS

Figure 25: Foot-operated switches.



	D, Diameter	Resistance		A, Displacement			
		Foot will not rest on control	Foot will rest on control	Normal Operation	Heavy Boot Operation	Ankle Flexion Only	Total Leg Movement
Minimum	12.7 (0.5 in.)	17.8 N (64 oz.)	44.5 N (160 oz.)	12.7 mm (0.5 in.)	25 mm (1.0 in.)	25 mm (1.0 in.)	25 mm (1.0 in.)
Maximum	---	89 N (320 oz.)	89 N (320 oz.)	63.5 mm (2.5 in.)	63.5 mm (2.5 in.)	63.5 mm (2.5 in.)	102 mm (4.0 in.)

CHECKLIST 10: FOOT OPERATED CONTROLS

Figure 26: Pedals.



	Dimensions		A-displacement				S-separation	
	L, Length	W, Width	Normal Operation	Heavy Boots	Ankle flexion	Total leg Movement	One foot random	One foot sequential
Minimum	25 mm (1 in.)	75 mm (3 in.)	13 mm (0.5 in.)	25 mm (1 in.)	25 mm (1 in.)	25 mm (1 in.)	100 mm (4 in.)	50 mm (2 in.)
Maximum	---	---	63 mm (2.5 in.)	63 mm (2.5 in.)	63 mm (2.5 in.)	180 mm (7 in.)	---	---
Optimum	---	---	---	---	---	---	150 mm (6 in.)	100 mm (4 in.)
Resistance								
	Foot not resting on pedal		Foot resting on pedal		Ankle flexion only		Total leg movement	
Minimum	18 N (64 oz.)		45 N (160 oz.)		---		45 N (160 oz.)	
Maximum	90 N (320 oz.)		90 N (320 oz.)		45 N (160 oz.)		800 N (2880 oz.)	

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CHECKLIST 11: USER-COMPUTER INTERFACE

DATE: _____

REVIEWER: _____

DESCRIPTION OF REVIEWED SYSTEM(S): _____

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
1.	Is the selection of controls for user-computer interface based on Table 12 of DOE STD-1092-DFT? (DOE-STD-1062-DFT Controls for User-Computer Interface: 5.4)					
2.	Is a keyboard used to enter alphabetic, numeric, and special characters into the system? (DOE-STD-1062-DFT Use: 5.4.1.1)					
3.	Is the slope of the keyboard between 0° and 15°, with a slope below 10° if possible? (DOE-STD-1062-DFT Keyboard Slope: 5.4.1.2)					
4.	Is the range of height adjustment of an adjustable keyboard support surface not less than 23 in. to 28 in. (585 mm to 710 mm)? (DOE-STD-1062-DFT Keyboard Height: 5.4.1.3)					
5.	When the keyboard support is not adjustable is the height set so that the seated user can adopt a posture with the forearm between $70 + Y/2^\circ$ and $90 + Y/2^\circ$ from the superior frontal plane, where Y is the seat back angle from the vertical in degrees? (DOE-STD-1062-DFT Keyboard Height: 5.4.1.3)					
6.	Does the keyboard height allow adequate knee and thigh clearance? (DOE-STD-1062-DFT Keyboard Height: 5.4.1.3)					
7.	Does the design of movable keyboards permit them to be easily positioned on the work surface? (DOE-STD-1062-DFT Keyboard Placement: 5.4.1.4)					
8.	Are alphanumeric characters on the keys a minimum of 0.1 in. (2.6 mm) in height with a minimum luminance contrast ratio of 3:1? (DOE-STD-1062-DFT Keyboard/Keypad Specification: 5.4.1.5)					
9.	Is the keyboard stable during keying operations? (Keyboard Stability: 5.4.1.6)					

CHECKLIST 11: USER-COMPUTER INTERFACE

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
10.	Is the actuation of a key accompanied by either tactile or auditory feedback or both? (DOE-STD-1062-DFT Feedback: 5.4.1.7)					
11.	Is data entered via keyboard displayed as it is keyed? (DOE-STD-1062-DFT Feedback: 5.4.1.7)					
12.	Where feasible do keyboards contain only those keys which are used by the keyboard operator? (DOE-STD-1062-DFT Relevant Keys: 5.4.1.8)					
13.	Is the amount of keying required minimized? (DOE-STD-1062-DFT Minimization of Keying: 5.4.1.9)					
14.	Is the use of key shifting functions minimized during data entry transactions? (DOE-STD-1062-DFT Minimization of Shift Keying: 5.4.1.10)					
15.	In keyed data entry is the user provided with a way to allow previous entries to be changed? (DOE-STD-1062-DFT Data Change: 5.4.1.11)					
16.	Are cursor movement keys arranged in a spatial configuration reflecting the direction of actual cursor movement? (DOE-STD-1062-DFT Cursor Movement Keys: 5.4.1.12)					
17.	Are fixed function keys used for time-critical, error-free, or frequently used control inputs? (DOE-STD-1062-DFT Use: 5.4.1.13.1)					
18.	Are fixed function keys standardized throughout the system? (DOE-STD-1062-DFT Standardization: 5.4.1.13.2)					
19.	Once a key has been assigned a given function does the design prevent reassignment to a different function for a given user? (DOE-STD-1062-DFT functional Consistency: 5.4.1.13.3)					
20.	Are fixed function keys selected to control functions that are continuously available? (DOE-STD-1062-DFT Availability: 5.4.1.13.4)					

CHECKLIST 11: USER-COMPUTER INTERFACE

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
21.	Are function keys which are not used for current inputs temporarily disabled under computer control are is the use of mechanical overlays avoided for this purpose? (DOE-STD-1062-DFT Availability: 5.4.1.13.4)					
22.	Are non-active fixed function keys replaced by a blank key on the keyboard? (DOE-STD-1062-DFT Non-Active Keys: 5.4.1.13.5)					
23.	Are fixed function keys logically grouped and placed in distinctive locations on the keyboard? Grouping: 5.4.1.13.6)					
24.	Do fixed function keys require only a single actuation to accomplish their function except when used to toggle between two opposing states? (DOE-STD-1062-DFT Actuation: 5.4.1.13.7)					
25.	When fixed function key activation does not result in an immediately observable natural response is the user given an acknowledgement indication by the system? (DOE-STD-1062-DFT feedback: 5.4.1.13.8)					
26.	Are key assignments displayed at all times with priority given to direct marking? (DOE-STD-1062-DFT Function Labels: 5.4.1.14)					
27.	When the effect of a function key varies is the status of the programmable key displayed? (DOE-STD-1062-DFT Status Display: 5.4.1.15.2)					
28.	Are programmable keys automatically relabeled as a change to software effecting labels is initiated? (DOE-STD-1062-DFT Status Display: 5.4.1.15.2)					
29.	When keys with labeled default functions are reprogrammed or turned off does a visual warning alert the user that the standard function is not currently accessible via that key? (DOE-STD-1062-DFT Reprogrammable: 5.4.1.15.3)					
30.	Has provision been made for easily relabeling variable function keys? (DOE-STD-1062-DFT Relabeling: 5.4.1.15.4)					

CHECKLIST 11: USER-COMPUTER INTERFACE

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
31.	Is the use of shift keys avoided as a requirement to operate variable function keys? (DOE-STD-1062-DFT Shifted Characters: 5.4.1.15.5)					
32.	Where the function assigned to a set of function keys change as a result of user selection is the user given an easy means to return to the initial base-level functions? (DOE-STD-1062-DFT Easy Return: 5.4.1.15.6)					
33.	When precise input functions are required is a joystick, trackball, or similar device used? (DOE-STD-1062-DFT Use: 5.4.2.1)					
34.	Is a discrete mechanism provided to allow the user to activate/deactivate directional controllers? (DOE-STD-1062-DFT Activation/Deactivation: 5.4.2.2)					
35.	When positioning accuracy is more critical than positioning speed are displacement joysticks selected over isometric joysticks? (DOE-STD-1062-DFT Use: 5.4.2.3.1)					
36.	In rate control applications, which allow the follower to transit beyond the edge of the display are indicators provided to aid the operator in bringing the follower back onto the display? (DOE-STD-1062-DFT Use: 5.4.2.3.1)					
37.	Are displacement joysticks that are used for rate control spring-loaded for return to center when the hand is removed? (DOE-STD-1062-DFT Use: 5.4.2.3.1)					
38.	Is the use of displacement joysticks which have a deadband near the center or hysteresis avoided with automatic sequencing of a CRT follower? (DOE-STD-1062-DFT Use: 5.4.2.3.1)					
39.	Upon termination of an automatic sequencing routine is the joystick center again registered to scope center? (DOE-STD-1062-DFT Use: 5.4.2.3.1)					

CHECKLIST 11: USER-COMPUTER INTERFACE

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
40.	Is the movement of hand-operated displacement joysticks less than 45° from the center position? (DOE-STD-1062-DFT Dynamic Characteristics: 5.4.2.3.2.2)					
41.	Is the movement of hand-operated displacement joysticks smooth in all directions while positioning of a follower is obtained without noticeable backlash, cross-coupling, or need for multiple corrective movements? (DOE-STD-1062-DFT Dynamic Characteristics: 5.4.2.3.2.2)					
42.	When using hand-operated displacement joysticks do control ratios, friction, and inertia meet the dual requirements of rapid gross positioning and precise fine positioning? (DOE-STD-1062-DFT Dynamic Characteristics: 5.4.2.3.2.2)					
43.	When using hand-operated displacement joysticks for generating free-drawn graphics is the refresher rate for the follower on the CRT sufficiently high to give the appearance of a continuous track? (DOE-STD-1062-DFT Dynamic Characteristics: 5.4.2.3.2.2)					
44.	When using hand-operated displacement joysticks is the delay between control movement and the confirming display response minimized and less than 0,1 second? (DOE-STD-1062-DFT Dynamic Characteristics: 5.4.2.3.2.2)					
45.	When using hand-operated displacement joysticks is the hand grip length in the range of 110-180 mm? (DOE-STD-1062-DFT Dimensions: 5.4.2.3.2.2)					
46.	When using hand-operated displacement joysticks is a clearance of 100 mm to the side and 50 mm to the rear provided? (DOE-STD-1062-DFT Dimensions: 5.4.2.3.2.2)					
47.	When using hand-operated displacement joysticks is the joystick mounted to provide forearm support? (DOE-STD-1062-DFT Dimensions: 5.4.2.3.2.2)					

CHECKLIST 11: USER-COMPUTER INTERFACE

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
48.	When using hand-operated displacement joysticks is the joystick mounted to allow actuation without slippage, movement, or tilting of the mounting base? (DOE-STD-1062-DFT Dimensions: 5.4.2.3.2.2)					
49.	When finger-operated displacement joysticks are used for free-drawn graphics is the resistance sufficient to maintain the handle position when the hand is removed? (DOE-STD-1062-DFT Specific Use: 5.4.2.3.3.1)					
50.	Is the movement of finger-operated displacement joysticks less than 45° from the center position? (DOE-STD-1062-DFT Dynamic Characteristics: 5.4.2.3.3.2)					
51.	Is the movement of finger-operated displacement joysticks smooth in all directions while positioning of a follower is obtained without noticeable backlash, cross-coupling, or need for multiple corrective movements? (DOE-STD-1062-DFT Dynamic Characteristics: 5.4.2.3.3.2)					
52.	When using finger-operated displacement joysticks do control ratios, friction, and inertia meet the dual requirements of rapid gross positioning and precise fine positioning? (DOE-STD-1062-DFT Dynamic Characteristics: 5.4.2.3.3.2)					
53.	When using finger-operated displacement joysticks for generating free-drawn graphics is the refresher rate for the follower on the CRT sufficiently high to give the appearance of a continuous track? (DOE-STD-1062-DFT Dynamic Characteristics: 5.4.2.3.3.2)					
54.	When using finger-operated displacement joysticks is the delay between control movement and the confirming display response minimized and less than 0,1 second? (DOE-STD-1062-DFT Dynamic Characteristics: 5.4.2.3.3.2)					
55.	When using finger-operated displacement joysticks are recessed mounting or pencil attachments used as indicated in Figure 29 of DOE STD-1092-DFT? (DOE-STD-1062-DFT Dynamic Characteristics: 5.4.2.3.3.2)					

CHECKLIST 11: USER-COMPUTER INTERFACE

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
56.	When using finger-operated displacement joysticks is the joystick mounted on a desk or self surface as shown in Figure 29 of DOE STD-1092-DFT? (DOE-STD-1062-DFT Dimensions: 5.4.2.3.3.3)					
57.	When using finger-operated displacement joysticks is the joystick mounted to provide forearm support? (DOE-STD-1062-DFT Dimensions: 5.4.2.3.3.3)					
58.	When using finger-operated displacement joysticks is the joystick mounted to allow actuation without slippage, movement, or tilting of the mounting base? (DOE-STD-1062-DFT Dimensions: 5.4.2.3.3.3)					
59.	When using thumbtip/fingertip operated joysticks is the hand grip prevented from simultaneously functioning as a joystick controller? (DOE-STD-1062-DFT Specific Use: 5.4.2.3.3.4.1)					
60.	When using thumbtip/fingertip operated joysticks is movement prevented from exceeding 45° from the center position? (DOE-STD-1062-DFT Dynamic Characteristics: 5.4.2.3.3.4.2)					
61.	When using thumbtip/fingertip operated joysticks is the joystick mounted to provide wrist or hand support? (DOE-STD-1062-DFT Dimensions: 5.4.2.3.3.4.3)					
62.	When using thumbtip/fingertip operated joysticks is the joystick mounted to allow actuation without slippage, movement, or tilting of the mounting base? (DOE-STD-1062-DFT Dimensions: 5.4.2.3.3.4.3)					
63.	Are isometric joysticks used for applications that require precise return to center after each use? (DOE-STD-1062-DFT Use: 5.4.2.4.1)					
64.	Are isometric joysticks used for applications where operator feedback is primarily visual rather than tactile feedback from the control? (DOE-STD-1062-DFT Use: 5.4.2.4.1)					

CHECKLIST 11: USER-COMPUTER INTERFACE

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
65.	Are isometric joysticks used for applications where there is minimal delay and tight coupling between control and input and system reaction? (DOE-STD-1062-DFT Use: 5.4.2.4.1)					
66.	Are isometric joysticks not used for applications where it would be necessary for the operator to maintain a constant force on the control for a long period of time? (DOE-STD-1062-DFT Use: 5.4.2.4.1)					
67.	Are isometric joysticks not used for applications where there is no definitive feedback when maximum control inputs have been exceeded? (DOE-STD-1062-DFT Use: 5.4.2.4.1)					
68.	When positioning speed is more critical than positioning accuracy are isometric joysticks selected over displacement joysticks? (DOE-STD-1062-DFT Use: 5.4.2.4.1)					
69.	In rate control applications, which allow the follower to transit beyond the edge of the display are indicators provided to aid the operator in bringing the follower back onto the display? (DOE-STD-1062-DFT Use: 5.4.2.4.1)					
70.	When using isometric joysticks is the maximum force for full output less than 27.7 pounds? (DOE-STD-1062-DFT Dynamic Characteristics: 5.4.2.4.2.2)					
71.	Do isometric joysticks conform to the criteria for displacement joysticks found in questions 46-48 of this checklist? (DOE-STD-1062-DFT Dimensions: 5.4.2.4.2.3)					
72.	Do isometric thumbtip/fingertip operated joysticks conform to the criteria given in questions 59-62 of this checklist? Thumbtip/Fingertip: 5.4.2.4.3)					
73.	Are ball controls used only as position controls? (DOE-STD-1062-DFT Use: 5.4.2.5.1)					

CHECKLIST 11: USER-COMPUTER INTERFACE

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
74.	Do the dimensions, resistance, and clearances of trackball controls conform to the criteria in Figure 30 of DOE STD-1092-DFT? (DOE-STD-1062-DFT Dimensions: 5.4.2.5.2)					
75.	Are the smaller diameter ball controls used only where space availability is very limited and there is no need for precision? (DOE-STD-1062-DFT Dimensions: 5.4.2.5.2)					
76.	Are ball controls mounted in accordance with Figure 30 of DOE STD-1092-DFT? (DOE-STD-1062-DFT Dimensions: 5.4.2.5.2)					
77.	While manipulating the control is neither backlash nor cross-coupling apparent to the operator? (DOE-STD-1062-DFT Dynamic Characteristics: 5.4.2.5.3)					
78.	Do control ratios and dynamic features meet the dual requirement of rapid gross positioning and smooth precise fine positioning? (DOE-STD-1062-DFT Dynamic Characteristics: 5.4.2.5.3)					
79.	When trackball controls are used to make precise or continuous adjustments are wrist or arm supports or both provided? (DOE-STD-1062-DFT Limb Support: 5.4.2.5.4)					
80.	Is a mouse used for zero order control only where generation of x and y outputs by the controller result in proportional displacement of the follower? (DOE-STD-1062-DFT Application: 5.4.2.6.1)					
81.	Is the design of the controller (mouse) and placement of the maneuvering surface such to allow the operator to consistently orient the controller to within 10° of the correct orientation without visual reference to the controller? (DOE-STD-1062-DFT Dynamic Characteristics: 5.4.2.6.2)					
82.	Is the controller easily movable in any direction without a change of hand grasp and results in a smooth movement of the follower in the same direction? (DOE-STD-1062-DFT Dynamic Characteristics: 5.4.2.6.2)					

CHECKLIST 11: USER-COMPUTER INTERFACE

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
83.	In any applications, which allow the follower to transit beyond the edge of the display are indicators provided to aid the operator in bringing the follower back onto the display? (DOE-STD-1062-DFT Dynamic Characteristics: 5.4.2.6.2)					
84.	Are free-moving x-y controllers shaped to fit the hand (rectangular or oval) with no sharp edges? (DOE-STD-1062-DFT Dimensions: 5.4.2.6.3)					
85.	Are light pens used only when non-critical, imprecise input functions are required and item selection is the primary type of data entry? (DOE-STD-1062-DFT Use: 5.4.2.7.1)					
86.	When used as a two-axis controller do light pen dynamic characteristics conform to the same requirements as ball controllers? (DOE-STD-1062-DFT Dynamic Characteristics: 5.4.2.7.2)					
87.	Is the length of the light pen between 120-180 mm with a diameter between 7-20 mm and is it equipped with a convenient clip? (DOE-STD-1062-DFT Dimensions: 5.4.2.7.3)					
88.	Is the light pen equipped with a discrete actuating/de-actuating mechanism? (DOE-STD-1062-DFT Actuation: 5.4.2.7.4)					
89.	Is the user provided with feedback concerning the position of the light pen and informed the system is recognizing the presence of the pen? (DOE-STD-1062-DFT Feedback: 5.4.2.7.5)					
90.	Is the user provided feedback that the light pen has actuated and that the input has been received by the system? (DOE-STD-1062-DFT Feedback: 5.4.2.7.5)					
91.	When grid-and-stylus devices are used for data pickoff from a CRT is a follower presented on the display at the coordinate values selected by the stylus? (DOE-STD-1062-DFT Use: 5.4.2.8.1)					
92.	When grid-and-stylus devices are used for data pickoff from a CRT are they used only for zero order control functions? (DOE-STD-1062-DFT Use: 5.4.2.8.1)					

CHECKLIST 11: USER-COMPUTER INTERFACE

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
93.	Does discrete placement of the stylus at any point on the grid cause the follower to appear at the corresponding coordinates and to remain steadily in position provided the stylus is not moved? (DOE-STD-1062-DFT Stylus/Grid Correspondence: 5.4.2.8.3)					
94.	Does the movement of the stylus in any direction on the grid surface result in smooth movement of the follower in the same direction? (DOE-STD-1062-DFT Dynamic Characteristics: 5.4.2.8.4)					
95.	Is the refresh rate for the follower sufficiently high to ensure the appearance of a continuous track whenever the stylus is used for generating of free-drawn graphics? (DOE-STD-1062-DFT Dynamic Characteristics: 5.4.2.8.4)					
96.	When transparent grids are used as display overlays do they conform to the size of the display? (DOE-STD-1062-DFT Dimensions: 5.4.2.8.5)					
97.	When transparent grids are used as display overlays are they displaced from the display do they approximate the size and directional relationship of the display? (DOE-STD-1062-DFT Dimensions: 5.4.2.8.5)					
98.	When remote grids are used are they placed at an orientation that maximally preserves the directional relationship between them and the display without violating any anthropometric considerations? (DOE-STD-1062-DFT Remote Grid Placement: 5.4.2.8.6)					
99.	Are touch-sensitive screens or panels used where direct visual reference access and optimum direct control access are desired? (DOE-STD-1062-DFT Use: 5.4.2.9.1)					
100.	When used do touch-screen displays have sufficient luminance transmission so the display is clearly readable in the intended environment and so that it meets luminance requirements in DOE STD-1092-DFT? (DOE-STD-1062-DFT Luminance Transmission: 5.4.2.9.2)					

CHECKLIST 11: USER-COMPUTER INTERFACE

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
101.	Is a positive indication of touch-screen actuation provided to acknowledge the system response to the control action? (DOE-STD-1062-DFT Positive Indication: 5.4.2.9.3)					
102.	Do the dimensions and separation of response areas of the touch-screen conform to S1, S2 and Bw of Figure 13 in DOE STD-1092-DFT? (DOE-STD-1062-DFT Dimensions: 5.4.2.9.4)					
103.	Does the force requirement to operate the touch-screen conform to the alphanumeric resistance limits for keyboards and keypads? (DOE-STD-1062-DFT Resistance: 5.4.2.9.5)					
104.	Is the vocabulary used for spoken data entry and computer control structured so that only a minimum number of options are needed for any transaction? (DOE-STD-1062-DFT Limited Vocabulary: 5.4.2.10.1)					
105.	Are spoken entries needed for transactions phonetically distinct from one another and have they been tested on the system? (DOE-STD-1062-DFT phonetically Distinct: 5.4.2.10.2)					
106.	Are feedback and simple error correction procedures provided for speech input? (DOE-STD-1062-DFT Easy Error Correction: 5.4.2.10.3)					
107.	Is the contrast ratio maintained at 3:1 minimum; 5:1 to 10:1 preferred; and 15:1 maximum? (User-Computer Interface in Process Control (1989))					
108.	Is the regeneration rate for a particular CRT display above the critical frequency of fusion so that the occurrence of disturbing flicker is not perceptible? (User-Computer Interface in Process Control (1989))					
109.	Is the contrast ratio maintained at 3:1 minimum; 5:1 to 10:1 preferred; and 15:1 maximum? (User-Computer Interface in Process Control (1989))					
110.	Are the background levels 15 to 20 cd/m ² ? (User-Computer Interface in Process Control (1989))					

CHECKLIST 11: USER-COMPUTER INTERFACE

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
111.	Are the display luminances maintained at 45 cd/m ² minimum with 80 to 160 cd/m ² preferred? (User-Computer Interface in Process Control (1989))					
112.	Is the display luminance maintained at 10 cd/m ² minimum average level? (User-Computer Interface in Process Control (1989))					
113.	Is a green phosphor used? (User-Computer Interface in Process Control (1989))					
114.	Is a medium persistence phosphor used? (User-Computer Interface in Process Control (1989))					
115.	Is the screen positioned so that sources of light and/or bright objects do not reflect into the expected viewing position? (User-Computer Interface in Process Control (1989))					
116.	Is the surface of the VDT screen modified to reduce specular glare? (User-Computer Interface in Process Control (1989))					
117.	Regardless of whether the display is raster scanned or directly addressed, does the screen maintain the illusion of a continuous image? (User-Computer Interface in Process Control (1989))					
118.	Is the cursor easily seen but does not obscure the reading of the character or symbol it marks? (User-Computer Interface in Process Control (1989))					
119.	Is the cursor easy to move from one position to another? (User-Computer Interface in Process Control (1989))					
120.	Does the cursor blink at about 3 Hz if it is used to attract the operator's attention on a monitoring task? (User-Computer Interface in Process Control (1989))					
121.	Is the cursor designed to not be so distracting as to impair the searching of the display for information unrelated to the cursor? (User-Computer Interface in Process Control (1989))					

CHECKLIST 11: USER-COMPUTER INTERFACE

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
122.	Is a consistent format maintained from one display to another? (User-Computer Interface in Process Control (1989))					
123.	Is prose displayed conventionally, in mixed upper and lower case? (User-Computer Interface in Process Control (1989))					
124.	Are displayed paragraphs separated by at least one blank line? (User-Computer Interface in Process Control (1989))					
125.	Does every sentence end with a period in a textual display? (User-Computer Interface in Process Control (1989))					
126.	Are short, simple, concise sentences used in a textual display? (User-Computer Interface in Process Control (1989))					
127.	Do labels convey the basic information needed for proper identification, utilization, actuation, or manipulation of the item? (User-Computer Interface in Process Control (1989))					
128.	Are labels consistent with the accuracy of identification required? (User-Computer Interface in Process Control (1989))					
129.	Is time available for recognition or other responses? (User-Computer Interface in Process Control (1989))					
130.	Are labels consistent with the distance at which the labels must be read? (User-Computer Interface in Process Control (1989))					
131.	Are labels consistent with illuminance level and color? (User-Computer Interface in Process Control (1989))					
132.	Are labels consistent with the criticality of the function labeled? (User-Computer Interface in Process Control (1989))					
133.	Are labels consistent with the vibration/motion environment of the user? (User-Computer Interface in Process Control (1989))					

CHECKLIST 11: USER-COMPUTER INTERFACE

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
134.	Are the labels horizontal and read from left to right? (User-Computer Interface in Process Control (1989))					
135.	Are the labels placed on or very near the items which they identify? (User-Computer Interface in Process Control (1989))					
136.	Is the label placed to the left of the data field, for single data fields? (User-Computer Interface in Process Control (1989))					
137.	Is the label placed above the data fields, for repeating data fields? (User-Computer Interface in Process Control (1989))					
138.	Do the labels primarily describe the functions of items? (User-Computer Interface in Process Control (1989))					
139.	Does control labeling indicate the functional result of control movement (e.g. increase ON OFF)? (User-Computer Interface in Process Control (1989))					
140.	Do control and display labels convey verbal meaning in the most direct manner by using simple words and phrases. Abbreviations may be used when they are familiar to operators (e.g. psi km)? (User-Computer Interface in Process Control (1989))					
141.	Are words chosen on the basis of operator familiarity whenever possible provided the words express exactly what is intended? (User-Computer Interface in Process Control (1989))					
142.	Are similar names for different controls and displays avoided? (User-Computer Interface in Process Control (1989))					
143.	Are the units of measurement (e.g. volts meters) labeled on the screen or panel? (User-Computer Interface in Process Control (1989))					
144.	Are the labels printed in all capitals with periods not used after abbreviations? (User-Computer Interface in Process Control (1989))					

CHECKLIST 11: USER-COMPUTER INTERFACE

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
145.	When dealing with mechanical labeling to reduce confusion and operator search time, are labels graduated inside? (User-Computer Interface in Process Control (1989))					
146.	Are label names easily discriminated from surrounding labeled fields or messages? (User-Computer Interface in Process Control (1989))					
147.	Are labels for data fields distinctively worded or highlighted so that they will not be readily confused with data entries, labeled control options, guidance messages, or other displayed material? (User-Computer Interface in Process Control (1989))					
148.	Where entry fields are distributed across a display, is a consistent format adopted for relating labels to entry areas? (User-Computer Interface in Process Control (1989))					
149.	Where a dimensional unit (gpm cm deg) is consistently associated with a particular data field, is it part of the fixed label not entered by the user? (User-Computer Interface in Process Control (1989))					
150.	Is the computer capable of providing two levels of detail? (User-Computer Interface in Process Control (1989))					
151.	Are messages strictly factual and informative? (User-Computer Interface in Process Control (1989))					
152.	Is the message dialogue non-hostile to the user? (User-Computer Interface in Process Control (1989))					
153.	Are messages constructed using short, meaningful, and common words? (User-Computer Interface in Process Control (1989))					
154.	Does the message consider the prior knowledge of the user and the user's context? (User-Computer Interface in Process Control (1989))					
155.	Are sentences kept as simple in structure as possible? (User-Computer Interface in Process Control (1989))					

CHECKLIST 11: USER-COMPUTER INTERFACE

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
156.	Do messages require no transformations, computing interpolation, or reference searching? (User-Computer Interface in Process Control (1989))					
157.	Are messages stated in the affirmative and preferably in the active voice? (User-Computer Interface in Process Control (1989))					
158.	Are items to be remembered by the user placed at the beginning of the message? (User-Computer Interface in Process Control (1989))					
159.	Are items to be recalled by the user placed at the end of the message? (User-Computer Interface in Process Control (1989))					
160.	Are items of lesser importance placed in the middle of the message? (User-Computer Interface in Process Control (1989))					
161.	Are only standard and commonly accepted abbreviations used? (User-Computer Interface in Process Control (1989))					
162.	Are abbreviations short, meaningful and distinct? (User-Computer Interface in Process Control (1989))					
163.	Does the system permit abbreviations of inputted commands? (User-Computer Interface in Process Control (1989))					
164.	Whenever possible, are experienced users provided with a set of abbreviations for frequently used commands? (User-Computer Interface in Process Control (1989))					
165.	Are abbreviations consistent in form? (User-Computer Interface in Process Control (1989))					
166.	Is a dictionary of abbreviations available for on-line user reference? (User-Computer Interface in Process Control (1989))					
167.	Do abbreviations and acronyms not include punctuation? (User-Computer Interface in Process Control (1989))					

CHECKLIST 11: USER-COMPUTER INTERFACE

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
168.	Does the computer system contain prompting and structuring features by which an operator can request corrected information when an error is detected? (User-Computer Interface in Process Control (1989))					
169.	Are error messages worded as specifically as possible? (User-Computer Interface in Process Control (1989))					
170.	Is the wording of error messages appropriate to a user's task and level of knowledge? (User-Computer Interface in Process Control (1989))					
171.	When a data entry or a control entry must be made from a small set of alternatives, are those correct alternatives indicated in the error message displayed in response to a wrong entry? (User-Computer Interface in Process Control (1989))					
172.	Are error messages stated in polite but neutral wording without implications of blame to the user without personalization of the computer and without attempts at humor? (User-Computer Interface in Process Control (1989))					
173.	Following the output of simple error messages, does the user have the option of requesting more detailed explanation for errors (i.e., successively deeper levels of explanation provided in response to repeated user requests for HELP)? (User-Computer Interface in Process Control (1989))					
174.	When multiple errors are detected in a combined user entry, is some indication given to the user even though complete messages for all errors cannot be displayed together? (User-Computer Interface in Process Control (1989))					
175.	Are error messages outputs within 2 seconds after a user's entry has been completed? (User-Computer Interface in Process Control (1989))					
176.	Does system documentation include as a supplement to on-line guidance, a listing and explanation of all error messages? (User-Computer Interface in Process Control (1989))					

CHECKLIST 11: USER-COMPUTER INTERFACE

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
177.	Following error detection, are users prompted to reenter only the portion of a data/command entry that is not correct? (User-Computer Interface in Process Control (1989))					
178.	In addition to a clear text error message, does an error identification number (ID) precede each message? (User-Computer Interface in Process Control (1989))					
179.	Do the error messages always state or clearly imply at least a minimum of which error has been detected and what corrective action to take? (User-Computer Interface in Process Control (1989))					
180.	If an error is detected in a group of stacked entries, does the system process correct commands until the error is displayed? (User-Computer Interface in Process Control (1989))					
181.	When using alphanumeric codes, is a consistent convention adopted that all letters shall be either uppercase or lowercase? (User-Computer Interface in Process Control (1989))					
182.	When codes combine letters and numbers, are characters of each type grouped together rather than interspersed? (User-Computer Interface in Process Control (1989))					
183.	Are meaningful codes adopted in preference to arbitrary codes (e.g., a three-letter mnemonic code (DIR = directory) is easier to remember than a three-digit numeric code)? (User-Computer Interface in Process Control (1989))					
184.	When arbitrary codes must be remembered by the user, do they contain no longer than four to five characters? (User-Computer Interface in Process Control (1989))					
185.	Is code length and format constant throughout any single category? (User-Computer Interface in Process Control (1989))					
186.	Do the codes contain predictable letter sequences? (User-Computer Interface in Process Control (1989))					

CHECKLIST 11: USER-COMPUTER INTERFACE

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
187.	Are long codes (seven or more characters) broken into three- or four character groups; i.e., separate groups by a hyphen or blank space? (User-Computer Interface in Process Control (1989))					
188.	Is displayed data tailored to user needs, providing only necessary and immediately usable information at any step in a transaction sequence? (User-Computer Interface in Process Control (1989))					
189.	Is data displayed to the user in directly usable form? (User-Computer Interface in Process Control (1989))					
190.	Is data consistent, following standards and conventions familiar to the user? (User-Computer Interface in Process Control (1989))					
191.	When protection of displayed data is essential, is the system designed to prevent the user changing controlled items? (User-Computer Interface in Process Control (1989))					
192.	In general, is the system designed to not require the user to rely on memory, but recapitulate needed items on the succeeding display? (User-Computer Interface in Process Control (1989))					
193.	Is the detailed, internal format of frequently used data fields consistent from one display to another? (User-Computer Interface in Process Control (1989))					
194.	Are long data items of arbitrary alphanumeric characters displayed in groups of three or four separated by a blank? (User-Computer Interface in Process Control (1989))					
195.	In tabular displays, are columns and rows labeled following the same guideline's proposed for labeling the fields of data forms? (User-Computer Interface in Process Control (1989))					
196.	In tabular displays, are the units of displayed data consistently included in the column labels or following the first row of entry? (User-Computer Interface in Process Control (1989))					

CHECKLIST 11: USER-COMPUTER INTERFACE

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
197.	Are columns of numeric data without decimals displayed right-justified; numeric data with decimals justified with respect to the decimal point? (User-Computer Interface in Process Control (1989))					
198.	Are lists of alphabetic data vertically aligned with left- justification to permit rapid scanning; indentation can be used to indicate subordinate elements in hierarchic lists? (User-Computer Interface in Process Control (1989))					
199.	Are data lists organized in some recognizable order, whenever feasible, to facilitate scanning and assimilation; e.g., dates may be ordered chronologically, names alphabetically? (User-Computer Interface in Process Control (1989))					
200.	Is listed data distinctive from lists of menu options? (User-Computer Interface in Process Control (1989))					
201.	When listed items are labeled by number, does the numbering start with 1 and not 0? (User-Computer Interface in Process Control (1989))					
202.	For hierarchic lists with compound numbers, are the complete numbers used, rather than omitting the repeated elements; i.e.,					
203.	In dense tables with many rows, is a blank line (or some other distinctive feature) inserted after every fifth row as an aid for horizontal scanning? (User-Computer Interface in Process Control (1989))					
204.	When data are displayed in more than one column, are the columns separated by at least three to four spaces if right-justified and by at least five spaces otherwise? (User-Computer Interface in Process Control (1989))					
205.	When tables are used for referencing purposes such as an index, is the indexed material displayed in the left column, the material most relevant for user response in the next adjacent column, and associated but less significant material in columns further to the right? (User-Computer Interface in Process Control (1989))					

CHECKLIST 11: USER-COMPUTER INTERFACE

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
206.	Are longer series of strings or lists of data organized in columns to provide better legibility and faster scanning? (User-Computer Interface in Process Control (1989))					
207.	If data are to be entered from paper forms, the design of the input screen and the layout of the paper form correspond. This helps the user to find and keep a location while looking back and forth from the form to the terminal? (User-Computer Interface in Process Control (1989))					
208.	Does each list of selections have a heading that reflects the question for which an answer is sought? (User-Computer Interface in Process Control (1989))					
209.	In a list of options, is the most frequently used options placed at the top of the list? (User-Computer Interface in Process Control (1989))					
210.	Are selection numbers separated from text descriptors by at least one space? (User-Computer Interface in Process Control (1989))					
211.	When lists or data tables extend beyond one display page, is the user informed when a list is or is not complete? (User-Computer Interface in Process Control (1989))					
212.	Are labels for single data fields located to the left of the data field and separated from the data field by a unique symbol (such as a colon) and at least one space? (User-Computer Interface in Process Control (1989))					
213.	When caption sizes are relatively equal, are both captions and data fields justified left? (User-Computer Interface in Process Control (1989))					
214.	When caption sizes vary greatly, are captions right-justified and the data fields left-justified? (User-Computer Interface in Process Control (1989))					

CHECKLIST 11: USER-COMPUTER INTERFACE

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
215.	Is a field group heading centered above the captions to which it applies and is it completely spelled out and related to the captions? (User-Computer Interface in Process Control (1989))					
216.	When section headings are located on the line above related screen fields, are the captions indented a minimum of five spaces from the start of the heading? (User-Computer Interface in Process Control (1989))					
217.	When section headings are placed adjacent to the related fields, are they located to the left of the top most row of related fields and are the column of captions separated from the longest heading by a minimum of three blank spaces? (User-Computer Interface in Process Control (1989))					
218.	Do at least five spaces appear between the longest data field in one column and the right most caption in an adjacent column? (User-Computer Interface in Process Control (1989))					
219.	Where space constraints exist, are vertical lines substituted for spaces for separation of columns of fields? (User-Computer Interface in Process Control (1989))					
220.	For multiple-occurrence fields without group headings, are at least three spaces exist between the columns of fields? (User-Computer Interface in Process Control (1989))					
221.	For multiple-occurrence fields with group headings, are at least three spaces appear between columns of related fields and at least five spaces appear between groupings? (User-Computer Interface in Process Control (1989))					
222.	When form filling, is the user allowed to RESTART, CANCEL, or BACKUP and change any item before taking a final ENTER action? (User-Computer Interface in Process Control (1989))					

CHECKLIST 11: USER-COMPUTER INTERFACE

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
223.	Whenever possible, are multiple data items entered without the need for special separators or delimiters, either by keying into predefined entry fields or by including simple spaces between sequentially keyed items? (User-Computer Interface in Process Control (1989))					
224.	When a field delimiter must be used for data entry, is a standard character adopted for that purpose (a slash (/) is recommended)? (User-Computer Interface in Process Control (1989))					
225.	For all dialogue types involving prompting, are data entries prompted explicitly by displayed labels for data fields and/or by associated user guidance messages? (User-Computer Interface in Process Control (1989))					
226.	Do field labels consistently indicate what data items are to be entered? (User-Computer Interface in Process Control (1989))					
227.	Are field labels protected and transparent to keyboard control so that the cursor skips over them when spacing or tabbing? (User-Computer Interface in Process Control (1989))					
228.	Are special characters used to delineate each data field? (User-Computer Interface in Process Control (1989))					
229.	Does implicit prompting by field delineation indicate a fixed or maximum acceptable length of the entry; e.g.,					
230.	Do input prompts indicate which entries are mandatory and which are optional? (User-Computer Interface in Process Control (1989))					
231.	When item length is variable, does the user not have to justify an entry either right or left and not have to remove any unused underscores? (User-Computer Interface in Process Control (1989))					

CHECKLIST 11: USER-COMPUTER INTERFACE

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
232.	When multiple items (especially those of variable length) will be entered by a skilled touch typist, does each data field end with an extra (blank) character space and is the software designed to prevent keying into a blank space, and an auditory signal provided to alert the user when that happens? (User-Computer Interface in Process Control (1989))					
233.	Are labels for data fields distinctively worded so that they will not be readily confused with data entries, labeled control options, guidance messages, or other displayed material? (User-Computer Interface in Process Control (1989))					
234.	When displayed data forms are crowded, is auxiliary coding adopted to distinguish labels from data? (User-Computer Interface in Process Control (1989))					
235.	In labeling data fields, are only agreed terms, codes, and/or abbreviations used? (User-Computer Interface in Process Control (1989))					
236.	Does the label for each entry field end with a special symbol, signifying that an entry may be made? (User-Computer Interface in Process Control (1989))					
237.	Do labels for data fields incorporate additional cuing of data formats when that seems helpful? (User-Computer Interface in Process Control (1989))					
238.	When a measurement unit is consistently associated with a particular data field, is it displayed as part of the fixed label rather than entered by the user? (User-Computer Interface in Process Control (1989))					
239.	Is data entered in units that are familiar to the user? (User-Computer Interface in Process Control (1989))					
240.	When data entry involves transcription from source documents, does the sequence of entry match the data sequence in source documents? (User-Computer Interface in Process Control (1989))					

CHECKLIST 11: USER-COMPUTER INTERFACE

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
241.	If no source document or external information is involved, does the ordering of multiple-item data entries follow the logical sequence in which the user is expected to think of them? (User-Computer Interface in Process Control (1989))					
242.	When a form for data entry is displayed, is the cursor positioned automatically in the first entry field? (User-Computer Interface in Process Control (1989))					
243.	When sets of data items must be entered sequentially in a repetitive series, is a tabular format where data sets are keyed row by row used? (User-Computer Interface in Process Control (1989))					
244.	Is justification of tabular data entries handled automatically by the computer? (User-Computer Interface in Process Control (1989))					
245.	Is it possible for the user to make numeric entries (e.g., dollars and cents) as left-justified, but they are automatically justified with respect to a fixed decimal point when a display of the data is subsequently regenerated for review by the user? (User-Computer Interface in Process Control (1989))					
246.	For dense tables (those with many row entries), are some extra visual cues provided to guide the user accurately across columns? (User-Computer Interface in Process Control (1989))					
247.	Is software for automatic data validation incorporated to check any item whose entry and/or correct format or content is required for subsequent data processing? (User-Computer Interface in Process Control (1989))					
248.	In a repetitive data entry task, is data validation for one transaction completed and the user allowed to correct errors before another transaction begins? (User-Computer Interface in Process Control (1989))					

CHECKLIST 11: USER-COMPUTER INTERFACE

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
249.	When helpful values for data entry cannot be predicted by user system interface (USI) designers, which is often the case, does the user (or perhaps some authorized supervisor) have a special transaction to define, change, or remove default values for any data entry field? (User-Computer Interface in Process Control (1989))					
250.	On initiation of a data entry transaction, are currently defined default values displayed automatically in their appropriate data fields? (User-Computer Interface in Process Control (1989))					
251.	Is user acceptance of a displayed default value for entry accomplished by simple means, such as by a single confirming key action or simply by tabbing past the default field? (User-Computer Interface in Process Control (1989))					
252.	Is a user not required to enter bookkeeping data that the computer could determine automatically? (User-Computer Interface in Process Control (1989))					
253.	Is a user not required to enter redundant data already accessible to the computer? (User-Computer Interface in Process Control (1989))					
254.	Whenever needed, is automatic cross-file updating provided so that the user does not have to enter the same data twice? (User-Computer Interface in Process Control (1989))					
255.	When data entry requirements change, which is often the case, is some means provided for the user (or an authorized supervisor) to make necessary changes to data entry procedures, entry formats, data validation topic, and other associated data processing? (User-Computer Interface in Process Control (1989))					
256.	Are areas of the screen not containing entry fields (i.e., protected fields) inaccessible to the operators and not require repeated key depressions to step through? (User-Computer Interface in Process Control (1989))					

CHECKLIST 11: USER-COMPUTER INTERFACE

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
257.	Are space lines incorporated where visual breaks or spaces occur on the source document? (User-Computer Interface in Process Control (1989))					
258.	Is a section heading located directly above its associated fields? (User-Computer Interface in Process Control (1989))					
259.	Is the user able to alter input during and after entry? (User-Computer Interface in Process Control (1989))					
260.	In a variable-length entry, is the user required to enter only the relevant input data? (User-Computer Interface in Process Control (1989))					
261.	Does the system recognize common misspellings of a command and execute the command as if it had been spelled correctly? (User-Computer Interface in Process Control (1989))					
262.	Does misspelling of similar commands not cause errors? (User-Computer Interface in Process Control (1989))					
263.	Is keying minimized? (User-Computer Interface in Process Control (1989))					
264.	Is the user not required to reenter parameters that have not changed since the previous interaction? (User-Computer Interface in Process Control (1989))					
265.	Are words in instructions meaningful to the user? (User-Computer Interface in Process Control (1989))					
266.	Are short words used in instructions? (User-Computer Interface in Process Control (1989))					
267.	Is active voice and the affirmative case used in instructions? (User-Computer Interface in Process Control (1989))					
268.	Are instructions patterned? (User-Computer Interface in Process Control (1989))					
269.	Are illustrations appropriate for the type of information to be conveyed? (User-Computer Interface in Process Control (1989))					

CHECKLIST 11: USER-COMPUTER INTERFACE

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
270.	Are illustrations placed close to the corresponding text? (User-Computer Interface in Process Control (1989))					
271.	Is wording on illustrations minimized? (User-Computer Interface in Process Control (1989))					
272.	Are tables and graphs captioned? (User-Computer Interface in Process Control (1989))					
273.	When instructions must be rapidly accessed, is a table of contents and/or an index provided? (User-Computer Interface in Process Control (1989))					
274.	Is the literary style of a set of instructions appropriate to its intended use? (User-Computer Interface in Process Control (1989))					
275.	Do instructions have a clearly stated beginning and a well-developed summary? (User-Computer Interface in Process Control (1989))					
276.	Are paragraphs of text short and contain a single idea? (User-Computer Interface in Process Control (1989))					
277.	Are instructions simple? (User-Computer Interface in Process Control (1989))					
278.	Do instructions state important items more than once? (User-Computer Interface in Process Control (1989))					
279.	Do instructions contain only essential information? (User-Computer Interface in Process Control (1989))					
280.	Is the amount of detail appropriate to the experience of the user? (User-Computer Interface in Process Control (1989))					
281.	Does the sequence of the instructions follow the sequence of actions required? (User-Computer Interface in Process Control (1989))					
282.	Does the main topic of the instruction appear at the beginning of the sentence? (User-Computer Interface in Process Control (1989))					

CHECKLIST 11: USER-COMPUTER INTERFACE

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
283.	Are all instructions tested on naive users before being finalized? (User-Computer Interface in Process Control (1989))					
284.	Do many-step instructions use a two-column format? (User-Computer Interface in Process Control (1989))					
285.	In a list of specifications for service or supply, is more than a part number given? (User-Computer Interface in Process Control (1989))					
286.	Are warning and caution notices accurate and concise and contain only the information relevant to the warning or caution? (User-Computer Interface in Process Control (1989))					
287.	Do warnings and cautions immediately precede the steps to which they refer? (User-Computer Interface in Process Control (1989))					
288.	In designing a visual display character set, is each character designed so that fine differences in stroke length, curvature, etc., are preserved in order to avoid similarity? (User-Computer Interface in Process Control (1989))					
289.	Is the character height between 16 min of arc to 26.8 min of arc, with 20 min of arc preferred? (User-Computer Interface in Process Control (1989))					
290.	Is the ratio between character height and width from 1:1 to 5:3? (User-Computer Interface in Process Control (1989))					
291.	Is the ratio between character height and stroke width from 5:1 to 8:1? (User-Computer Interface in Process Control (1989))					
292.	Is the minimum spacing between characters one stroke width? (User-Computer Interface in Process Control (1989))					
293.	Is the minimum spacing between words one character width? (User-Computer Interface in Process Control (1989))					

CHECKLIST 11: USER-COMPUTER INTERFACE

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
294.	Is spacing between lines from 50 to 150% of the character height? (User-Computer Interface in Process Control (1989))					
295.	Are labels or statements in upper case? (User-Computer Interface in Process Control (1989))					
296.	Is text displayed in both uppercase and lowercase? (User-Computer Interface in Process Control (1989))					
297.	Is the screen the smallest size which will allow required information to be seen clearly and easily by the viewer? (User-Computer Interface in Process Control (1989))					
298.	Does the screen take into account the distance of the operator from the screen (e.g., large screen overviews)? (User-Computer Interface in Process Control (1989))					
299.	Is information that is continually being transmitted or received sequentially grouped? (User-Computer Interface in Process Control (1989))					
300.	Is information grouped in the order of its frequency of use? (User-Computer Interface in Process Control (1989))					
301.	If frequency of use is not a major concern, is information functionally grouped? (User-Computer Interface in Process Control (1989))					
302.	When some items are more critical than others to the success of the systems, is the information grouped by Importance? (User-Computer Interface in Process Control (1989))					
303.	Are grouped data arranged in the display with consistent placement of items so that user detection of similarities, differences, trends and relationships is facilitated? (User-Computer Interface in Process Control (1989))					
304.	When there is no appropriate logic for grouping data (sequence, function, frequency, or importance), is some other principle adopted, such as alphabetical or chronological grouping? (User-Computer Interface in Process Control (1989))					

CHECKLIST 11: USER-COMPUTER INTERFACE

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
305.	Is similar information displayed in groups according to the left-to-right or top-to-bottom rules? (User-Computer Interface in Process Control (1989))					
306.	Is all displayed data necessary to support an operator activity or sequence of activities grouped together? (User-Computer Interface in Process Control (1989))					
307.	Do screens provide cohesive groupings of screen elements so that people perceive large screens as consisting of smaller identifiable pieces? (User-Computer Interface in Process Control (1989))					
308.	Does screen packing density not exceed 50% and preferably less than 25%? (User-Computer Interface in Process Control (1989))					
309.	Are display screens perceived as uncluttered? (User-Computer Interface in Process Control (1989))					
310.	Do screens provide information that is only essential to making a decision or performing an action? (User-Computer Interface in Process Control (1989))					
311.	Is all data related to one task placed on a single screen? (User-Computer Interface in Process Control (1989))					
312.	For critical task sequences, is screen packing density minimized? (User-Computer Interface in Process Control (1989))					
313.	Where user information requirements cannot be accurately determined in advance of interface design or are variable, are on-line user options provided for data selection display coverage, and suppression? (User-Computer Interface in Process Control (1989))					
314.	Are screens divided into windows that are clearly perceptible to the user? (User-Computer Interface in Process Control (1989))					
315.	On large uncluttered screens, are windows separated using three to five rows or columns of blank space? (User-Computer Interface in Process Control (1989))					

CHECKLIST 11: USER-COMPUTER INTERFACE

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
316.	Are specific areas of the screen reserved for information such as commands, status messages, and input fields, and are those areas consistent on all screens? (User-Computer Interface in Process Control (1989))					
317.	When a display window must be used for data scanning, is the window size greater than one line? (User-Computer Interface in Process Control (1989))					
318.	Is the screen not divided into a large number of small windows? (User-Computer Interface in Process Control (1989))					
319.	When the body of the display is used for data output, is the screen coherently formatted and not partitioned into several small windows? (User-Computer Interface in Process Control (1989))					
320.	Is the number of overlapping windows minimized? (User-Computer Interface in Process Control (1989))					
321.	If possible, are program windows' size expandable by the user? (User-Computer Interface in Process Control (1989))					
322.	Are specific areas of the screen reserved for information such as commands status messages and input fields, and are those areas consistent on all screens? (User-Computer Interface in Process Control (1989))					
323.	Are both the items on display and the displays themselves standardized? (User-Computer Interface in Process Control (1989))					
324.	Is an invariant field including the page title an alphanumeric designator, the time, and the date, placed at the top of each display page? (User-Computer Interface in Process Control (1989))					
325.	Are the last four lines (at least) of each display page reserved for variant fields? (User-Computer Interface in Process Control (1989))					

CHECKLIST 11: USER-COMPUTER INTERFACE

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
326.	Does each display frame have a unique identification (ID)? (User-Computer Interface in Process Control (1989))					
327.	Does every frame have a title on a line by itself? (User-Computer Interface in Process Control (1989))					
328.	Is status information displayed near the top-right corner of the screen? (User-Computer Interface in Process Control (1989))					
329.	Is location coding employed to reduce operator information search time? (User-Computer Interface in Process Control (1989))					
330.	Is all data relevant to the user's current transaction included in one display page (or frame)? (User-Computer Interface in Process Control (1989))					
331.	When the requested data exceed the capacity of a single display frame, is the user provided easy means to move back and forth among relevant displays either by paging or scrolling? (User-Computer Interface in Process Control (1989))					
332.	When a list of numbered items exceeds one display page and must be paged/scrolling for its continuation, are items numbered continuously in relation to the first item in the first display and indicate the present maximum location? (User-Computer Interface in Process Control (1989))					
333.	When lists or tables are of variable length and may extend beyond the limits of a single display page, is their continuation and ending explicitly noted on the display? (User-Computer Interface in Process Control (1989))					
334.	When display output contains more than one page, does the notation "page x of y" appear on each display? (User-Computer Interface in Process Control (1989))					
335.	Do the parameters of roll/scroll functions refer to the data being reviewed, not to the window? (User-Computer Interface in Process Control (1989))					

CHECKLIST 11: USER-COMPUTER INTERFACE

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
336.	When the user may be exposed to different systems adopting different usage, does any reference to scroll functions consistently use functional terms such as forward and back (or next and previous) to refer to movement within a displayed data set rather than words implying spatial orientation (e.g., up and down)? (User-Computer Interface in Process Control (1989))					
337.	When using a menu system, does the user at all times have access to the main menu? (User-Computer Interface in Process Control (1989))					
338.	Do displays indicate how to continue? (User-Computer Interface in Process Control (1989))					
339.	Are user-terminal interaction tasks that are repetitive, time-consuming, or complex assigned dedicated functions? (User-Computer Interface in Process Control (1989))					
340.	Are required or frequently used data elements included on the earliest screens in the application transaction? (User-Computer Interface in Process Control (1989))					
341.	Does page design and content planning minimize requirements for operator memory? (User-Computer Interface in Process Control (1989))					
342.	When pages are organized in a hierarchical fashion containing a number of different paths through the series, is a visual audit trail of the choices available upon operator request? (User-Computer Interface in Process Control (1989))					
343.	Are sectional coordinates used when large schematics must be panned or magnified? (User-Computer Interface in Process Control (1989))					
344.	If the message is a variable option list, do common elements maintain their physical relationship to other recurring elements? (User-Computer Interface in Process Control (1989))					

CHECKLIST 11: USER-COMPUTER INTERFACE

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
345.	Is a message available that provides explicit information to the user on how to move from one frame to another or how to select a different display? (User-Computer Interface in Process Control (1989))					
346.	When the operator must step through multiple display levels, is priority access provided to the more critical display levels? (User-Computer Interface in Process Control (1989))					
347.	When the operator must step through multiple display levels, is he or she provided with information identifying the current position within the sequence of levels? (User-Computer Interface in Process Control (1989))					
348.	Is a similar display format used at each level of a multiple-level display? (User-Computer Interface in Process Control (1989))					
349.	When the operator is required to accurately comprehend previously learned items appearing with a new list, is the list kept small (about four to six items)? (User-Computer Interface in Process Control (1989))					
350.	Are frequently appearing/disappearing commands/subcommands placed in the same place on the screen? (User-Computer Interface in Process Control (1989))					
351.	Does the system not allow for more than three applications to be run at a time? (User-Computer Interface in Process Control (1989))					
352.	Once you quit a program (application), does that window close promptly? (User-Computer Interface in Process Control (1989))					
353.	Are windows consistent in their use of drop-down menus and/or icons? (User-Computer Interface in Process Control (1989))					
354.	Do windows give the user feedback whenever he/she is in the process of combining applications? (User-Computer Interface in Process Control (1989))					
355.	Are dialogue boxes provided when necessary to assist in defining menu options? (User-Computer Interface in Process Control (1989))					

CHECKLIST 11: USER-COMPUTER INTERFACE

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
356.	Are actions necessary for changing the size of a window consistent between windows? (User-Computer Interface in Process Control (1989))					
357.	Are active windows so labeled? (User-Computer Interface in Process Control (1989))					
358.	Are window labels located at the top of the window border? (User-Computer Interface in Process Control (1989))					
359.	Does keyboard input only affect the active window? (User-Computer Interface in Process Control (1989))					
360.	Is color used as a formatting aid to assist in structuring a screen and as a code to categorize information or data? (User-Computer Interface in Process Control (1989))					
361.	Does color coding not create unplanned or obvious new patterns on the screen? (User-Computer Interface in Process Control (1989))					
362.	Is color coding applied as an additional aid to the user on displays that have already been formatted as effectively as possible on a single color? (User-Computer Interface in Process Control (1989))					
363.	When color coding is used, is it redundant with some other feature in data display, such as symbology? (User-Computer Interface in Process Control (1989))					
364.	Is the unit as a minimum provided with a foreground intensity control separate from the background intensity control? (User-Computer Interface in Process Control (1989))					
365.	Is the unit as a minimum provided with a capability for making grid lines half as intense as the rest of the display? (User-Computer Interface in Process Control (1989))					
366.	Is the unit as a minimum provided with enough intensity control variable to accommodate very low ambient illumination and the higher levels (5 to 150 fc)? (User-Computer Interface in Process Control (1989))					

CHECKLIST 11: USER-COMPUTER INTERFACE

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
367.	Are color meanings consistent with traditional color expectancies? (User-Computer Interface in Process Control (1989))					
368.	Is color coding consistent within a frame, from frame to frame and with other color-coded systems in the control room? (User-Computer Interface in Process Control (1989))					
369.	Do color codes conform to color meanings that already exist in the user's job? (User-Computer Interface in Process Control (1989))					
370.	Are the most generally used colors red green yellow and blue. Other acceptable colors are orange yellow-green blue-green and violet? (User-Computer Interface in Process Control (1989))					
371.	Are blue headings numbers or alphabetic characters not used on a black background? (User-Computer Interface in Process Control (1989))					
372.	Is yellow not used on a white background because of the very low contrast? (User-Computer Interface in Process Control (1989))					
373.	Is yellow not used on a green background due to a vibrating effect to the eye? (User-Computer Interface in Process Control (1989))					
374.	Do the selected colors yield satisfactory color contrast for color deficient users? (User-Computer Interface in Process Control (1989))					
375.	Is the user able to discriminate the selected color on an absolute basis? (User-Computer Interface in Process Control (1989))					
376.	Are selected colors usable in all control room applications (e. g., panel surfaces, labels CRTs indicator light bulbs or filters console surfaces)? (User-Computer Interface in Process Control (1989))					
377.	Is blue used only for background features in a display, not for critical data? (User-Computer Interface in Process Control (1989))					

CHECKLIST 11: USER-COMPUTER INTERFACE

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
378.	Whenever possible, are red and green not be used in combination? (User-Computer Interface in Process Control (1989))					
379.	Is the use of red symbols/characters on a green background especially avoided? (User-Computer Interface in Process Control (1989))					
380.	If a pattern of color is intended to display a function, do the selected colors indicate the state of the system? (User-Computer Interface in Process Control (1989))					
381.	Are colors with high contrast selected for parameters and features that must "catch" the operator's attention? (User-Computer Interface in Process Control (1989))					
382.	Are backgrounds not brighter than foregrounds? (User-Computer Interface in Process Control (1989))					
383.	Are extreme color contrasts avoided? (User-Computer Interface in Process Control (1989))					
384.	Are colors specified as a precise wavelength rather than a hue (red, green, violet, etc.)? (User-Computer Interface in Process Control (1989))					
385.	If difference in brightness (intensity) is used as a coding mechanism, is perceived brightness used rather than absolute brightness? (User-Computer Interface in Process Control (1989))					
386.	Does each color represent only one category of displayed data? (User-Computer Interface in Process Control (1989))					
387.	If color discrimination is required, are less than eight colors used with alpha-numeric screen displays using no more than four colors at one time? (User-Computer Interface in Process Control (1989))					
388.	Is colored ambient lighting not used in conjunction with color-coded CRTs? (User-Computer Interface in Process Control (1989))					

CHECKLIST 11: USER-COMPUTER INTERFACE

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
389.	If ambient illumination cannot be controlled, are hoods provided that block out light and glare? (User-Computer Interface in Process Control (1989))					
390.	Is high-pressure sodium not used as an ambient-light medium for CRT viewing? (User-Computer Interface in Process Control (1989))					
391.	Are color displays periodically adjusted to maintain proper registration of images? (User-Computer Interface in Process Control (1989))					
392.	Do mimics incorporate color to differentiate process flow paths? (User-Computer Interface in Process Control (1989))					
393.	Is a monochromatic format used if the flash is twice as intense as the rest of the display? (User-Computer Interface in Process Control (1989))					
394.	Is color capability used conservatively in the design of display screens? (User-Computer Interface in Process Control (1989))					
395.	Is the use of color not distracting to the user? (User-Computer Interface in Process Control (1989))					
396.	Are geometric shapes considered for discriminating different categories of data on graphic displays? (User-Computer Interface in Process Control (1989))					
397.	Are alphabets of geometric shapes limited to a maximum of 15 different symbols? (User-Computer Interface in Process Control (1989))					
398.	When geometric shape (symbol) coding is used, do the basic symbols vary widely in shape? (User-Computer Interface in Process Control (1989))					
399.	Do symbols subtend a minimum of 20 min of arc? (User-Computer Interface in Process Control (1989))					

CHECKLIST 11: USER-COMPUTER INTERFACE

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
400.	Is the stroke width-to-height ratio 1:8 or 1:10 for symbols of 0.4 in. or larger viewed up to a distance of 7 ft? (User-Computer Interface in Process Control (1989))					
401.	When efficiency of decoding is important, are redundant cues (such as size difference) used? (User-Computer Interface in Process Control (1989))					
402.	When rate of comprehension and detection is important, is graphical coding used rather than word messages? (User-Computer Interface in Process Control (1989))					
403.	Is the assignment of shape codes consistent for all displays and based upon an established standard? (User-Computer Interface in Process Control (1989))					
404.	Do pictographs have obvious meanings, and is the meaning tested in the user population? (User-Computer Interface in Process Control (1989))					
405.	Are symbols consistently applied? (User-Computer Interface in Process Control (1989))					
406.	Are words and symbols not used alternately? (User-Computer Interface in Process Control (1989))					
407.	Are symbols used to represent equipment components and process flow or signal paths, along with numerical or coded data reflecting inputs and outputs associated with equipment? (User-Computer Interface in Process Control (1989))					
408.	Do symbols used to represent equipment components not vary widely in shape and similar to those used in piping and instrumentation drawings? (User-Computer Interface in Process Control (1989))					
409.	Are about six different symbols, with 20 being an upper limit, used? (User-Computer Interface in Process Control (1989))					
410.	When iconic symbols are used, are solid forms without unnecessary detail used? (User-Computer Interface in Process Control (1989))					

CHECKLIST 11: USER-COMPUTER INTERFACE

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
411.	Is the visual saliency of those features that must remain redundant across members of a symbol set minimized? (User-Computer Interface in Process Control (1989))					
412.	Does a closed figure enhance the perceptual process and is it used unless there is reason for the outline to be discontinuous? (User-Computer Interface in Process Control (1989))					
413.	When letters are used, perhaps to annotate geometric display symbols, are lower case letters used to improve discriminability? (User-Computer Interface in Process Control (1989))					
414.	For search and identification tasks or whenever there is any doubt as to whether some observers will be able to understand the pictorial, are both pictorial and word labels used? (User-Computer Interface in Process Control (1989))					
415.	Given that a sufficient number of dimensions are available to portray required information parameters, are multidimensional display codes used? (User-Computer Interface in Process Control (1989))					
416.	To minimize distortion (especially under degraded viewing conditions), are well-learned or unitized symbol designs used? (User-Computer Interface in Process Control (1989))					
417.	Are the symbols as simple as possible, consistent with the inclusion of features that are necessary? (User-Computer Interface in Process Control (1989))					
418.	Is the pictorial pattern identifiable from the maximum viewing distance and/or under minimal ambient lighting conditions? (User-Computer Interface in Process Control (1989))					
419.	Are pictorial symbols always oriented "upright."					
420.	Are icons not used when display resolution is low? (User-Computer Interface in Process Control (1989))					

CHECKLIST 11: USER-COMPUTER INTERFACE

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
421.	Is a label associated with each icon? (User-Computer Interface in Process Control (1989))					
422.	Are abstracts (icons) either literal, functional, or operations type? (User-Computer Interface in Process Control (1989))					
423.	Do icons concur with existing population or industry stereotypes? (User-Computer Interface in Process Control (1989))					
424.	When symbol size is used for coding, are the intermediate symbols spaced logarithmically between the two extremes (largest and smallest)? (User-Computer Interface in Process Control (1989))					
425.	When the symbol size is to be proportional to the data value; is the scaled parameter the symbol area rather than a linear dimension such as diameter? (User-Computer Interface in Process Control (1989))					
426.	For area coding, is the maximum number of code steps six, with three recommended? (User-Computer Interface in Process Control (1989))					
427.	For length coding, is the maximum number of code steps six, with three recommended? (User-Computer Interface in Process Control (1989))					
428.	Is size coding used only when displays are not crowded? (User-Computer Interface in Process Control (1989))					
429.	When size coding is used, is a larger symbol at least 1.5 times the height of the next smaller symbol? (User-Computer Interface in Process Control (1989))					
430.	Are no more than three levels of brightness coding used, with two levels preferred. For example, a data form might combine bright data items with dim labels to facilitate display scanning? (User-Computer Interface in Process Control (1989))					

CHECKLIST 11: USER-COMPUTER INTERFACE

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
431.	Is brightness coding employed only to differentiate between an item of information and adjacent information? (User-Computer Interface in Process Control (1989))					
432.	Are high brightness levels used to signify information of primary importance and lower levels to signify information of secondary interest? (User-Computer Interface in Process Control (1989))					
433.	Is brightness coding not used in conjunction with shape or size coding? (User-Computer Interface in Process Control (1989))					
434.	When an operation is to be performed on a single item on a display, is the item highlighted? (User-Computer Interface in Process Control (1989))					
435.	In a list, are the option(s) selected by the user highlighted? (User-Computer Interface in Process Control (1989))					
436.	Is maximum contrast provided between those items highlighted and those not? (User-Computer Interface in Process Control (1989))					
437.	When graphical items are close together on the screen, is successive brightening of graphical items and user selection by button activation considered? (User-Computer Interface in Process Control (1989))					
438.	Is blink coding limited to small fields? (User-Computer Interface in Process Control (1989))					
439.	Does the blink rate lie in the range of 0.1 to 5 Hz, with 2 to 3 Hz preferred? (User-Computer Interface in Process Control (1989))					
440.	Is the minimum "on" time 50 ms? (User-Computer Interface in Process Control (1989))					
441.	To avoid interference with reading performance, is the blink rate such that the user can match the operator's scan rate to the blink rate? (User-Computer Interface in Process Control (1989))					

CHECKLIST 11: USER-COMPUTER INTERFACE

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
442.	If difference in blink rate is used as a coding method, is no more than two steps used? (User-Computer Interface in Process Control (1989))					
443.	When two blink rates are used, does the fast blink take approximate four per second and the slow rate one blink per second? (User-Computer Interface in Process Control (1989))					
444.	When two blink rates are used, does the higher rate apply to the most critical information? (User-Computer Interface in Process Control (1989))					
445.	When two blink rates are used, is the "on-off" ratio approximate 50%? (User-Computer Interface in Process Control (1989))					
446.	Is a means provided for suppressing the blink action once the coded data have been located? (User-Computer Interface in Process Control (1989))					
447.	Is an "off" condition never used to attract attention to a message? (User-Computer Interface in Process Control (1989))					
448.	Is blinking reserved for emergency conditions or similar situations requiring immediate operator action? (User-Computer Interface in Process Control (1989))					
449.	When blink coding is used to mark a data item that must be read, is an extra symbol (such as an asterisk) added as a blinking marker rather than blinking the item itself? (User-Computer Interface in Process Control (1989))					
450.	Is blink coding used for target detection tasks, particularly with high density displays? (User-Computer Interface in Process Control (1989))					
451.	Is blink coding not used with long-persistence phosphor displays? (User-Computer Interface in Process Control (1989))					
452.	Is image reversal (e.g., dark characters on a light background) used primarily for highlighting in dense data field? (User-Computer Interface in Process Control (1989))					

CHECKLIST 11: USER-COMPUTER INTERFACE

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
453.	Is image reversal can be used to code annunciator information that requires immediate response? (User-Computer Interface in Process Control (1989))					
454.	Os maximum contrast provided between highlighted and non-highlighted items? (User-Computer Interface in Process Control (1989))					
455.	Is audio displays provided when the information to be processed is short, simple, and transitory, requiring immediate or time-based response? (User-Computer Interface in Process Control (1989))					
456.	Is an audio display used if the common mode of visual display is restricted by overburdening; ambient light variability or limitation; operator mobility; degradation of vision by vibration, high g-forces, hypoxia, or other environmental considerations; or anticipated operator inattention? (User-Computer Interface in Process Control (1989))					
457.	Does the criticality of transmission response makes supplementary or redundant transmission desirable? (User-Computer Interface in Process Control (1989))					
458.	Does the system warn, alert, or cue the operator to subsequent additional response? (User-Computer Interface in Process Control (1989))					
459.	Are graphic coding methods used to present standardized qualitative information to the operator or to draw the operator's attention to a particular portion of the display? (User-Computer Interface in Process Control (1989))					
460.	Is extra spacing, horizontal and vertical lines of differing widths, and perhaps color used to set off and highlight data? (User-Computer Interface in Process Control (1989))					
461.	Are special symbols (e.g., bullets or arrows) used to indicate position and to direct attention? (User-Computer Interface in Process Control (1989))					

CHECKLIST 11: USER-COMPUTER INTERFACE

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
462.	Are other methods of coding which considered for graphic displays and computer-generated drawings include motion, focus, distortion, and line orientation on the display surface? (User-Computer Interface in Process Control (1989))					
463.	Is a border used to improve the readability of a single block of numbers or letters? (User-Computer Interface in Process Control (1989))					
464.	If several labels or messages are clustered in the same area, are distinctive borders placed around the critical ones only? (User-Computer Interface in Process Control (1989))					
465.	When a special symbol is used to mark a word, is it separated from the beginning of the word by a space? (User-Computer Interface in Process Control (1989))					
466.	Are auxiliary methods of line coding considered for graphics applications, including variation in line type (solid, dashed, dotted) and width (boldness)? (User-Computer Interface in Process Control (1989))					
467.	When a line is added simply to mark or emphasize a displayed item, is it placed under the designated item? (User-Computer Interface in Process Control (1989))					
468.	Are visual dimensions for special display coding applications include variation in texture, focus, and motion? (User-Computer Interface in Process Control (1989))					
469.	Are related data which are distributed about the screen and data to be updated, etc., highlighted in white? (User-Computer Interface in Process Control (1989))					
470.	Is the speed of a graphic showing fluid flow in a pipe greater than 7.28 mm/s (0.29 in./s) but less than 295 mm/s (11.8 in./s)? (User-Computer Interface in Process Control (1989))					

CHECKLIST 11: USER-COMPUTER INTERFACE

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
471.	Are changing values which the operator uses to identify rate of change or to read gross values not updated faster than 5 s nor slower than 2 s when the display is to be considered as real time? (User-Computer Interface in Process Control (1989))					
472.	Is a display freeze mode provided to allow close scrutiny of any selected frame? (User-Computer Interface in Process Control (1989))					
473.	Are display formats designed to optimize information transfer to the operator by means of information coding, grouping, and appropriate information density? (User-Computer Interface in Process Control (1989))					
474.	Does the rate of motion not exceed 60 deg/s of visual angle change with 20 deg/s preferred? (User-Computer Interface in Process Control (1989))					
475.	Do numerals not follow each other faster than 2/s when the operator is expected to read the numerals consecutively? (User-Computer Interface in Process Control (1989))					
476.	Are changing digital values which the operator must reliably read not updated faster than 1/s, with a 2/s minimum time preferred? (User-Computer Interface in Process Control (1989))					
477.	Are analog displays not be used when quick, accurate readings are a criterion? (User-Computer Interface in Process Control (1989))					
478.	Do numbers increase clockwise, left to right, or bottom to top, depending on the display design and orientation? (User-Computer Interface in Process Control (1989))					
479.	For one-revolution circular scales, is zero at 7 o'clock and the maximum value at 5 o'clock, with a 10-degree break in the arc? (User-Computer Interface in Process Control (1989))					
480.	When check-reading positive and negative values, is the zero or null position at 12 o'clock or 9 o'clock? (User-Computer Interface in Process Control (1989))					

CHECKLIST 11: USER-COMPUTER INTERFACE

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
481.	Are all numbers oriented upright? (User-Computer Interface in Process Control (1989))					
482.	Are zones color coded by edge lines or wedges with red, yellow, and green used? (User-Computer Interface in Process Control (1989))					
483.	Is shape coding or striping used when red lighting or blackout station conditions prevail? (User-Computer Interface in Process Control (1989))					
484.	Is information in a directly usable form (for example, percent, RPM)? (User-Computer Interface in Process Control (1989))					
485.	Does each digital display have a label to identify its meaning? (User-Computer Interface in Process Control (1989))					
486.	Do digital displays include the appropriate number of significant figures for the required level of accuracy? (User-Computer Interface in Process Control (1989))					
487.	Do digital displays accommodate the full range of the variable (i.e., highest and lowest values)? (User-Computer Interface in Process Control (1989))					
488.	Do digital displays change slowly enough to be readable? (User-Computer Interface in Process Control (1989))					
489.	Are digital displays provided with arrows to indicate the direction of change (if that is likely to be needed)? (User-Computer Interface in Process Control (1989))					
490.	If more than four digits are required, are they grouped and the groupings separated as appropriate by commas, a decimal point, or additional space? (User-Computer Interface in Process Control (1989))					
491.	Are multidigit counters oriented to read horizontally from left to right? (User-Computer Interface in Process Control (1989))					
492.	Are simple character fonts used? (User-Computer Interface in Process Control (1989))					

CHECKLIST 11: USER-COMPUTER INTERFACE

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
493.	Is horizontal spacing between numerals between one-quarter and one-half the numeral width? (User-Computer Interface in Process Control (1989))					
494.	Are binary indicators clearly labeled and understood? (User-Computer Interface in Process Control (1989))					
495.	For quantitative measurements, are binary indicators used only for check-reading purposes? (User-Computer Interface in Process Control (1989))					
496.	Where meaning is not apparent, is labeling provided close to the status indicator? (User-Computer Interface in Process Control (1989))					
497.	When monochrome is not used, is the color of the indicator clearly identifiable? (User-Computer Interface in Process Control (1989))					
498.	Are symbolic legends clear and unambiguous as to their meaning? (User-Computer Interface in Process Control (1989))					
499.	Is the legend text short, concise, and unambiguous? (User-Computer Interface in Process Control (1989))					
500.	Are legend nomenclature and abbreviations standard and consistent with usage throughout the control room and in the procedures? (User-Computer Interface in Process Control (1989))					
501.	Are legends worded to tell the status indicated by the display? (User-Computer Interface in Process Control (1989))					
502.	Are the legends of illuminated indicators readily distinguishable from legend push buttons by form, size, or other factors? (User-Computer Interface in Process Control (1989))					
503.	Does each bar on the display have a unique identification label? (User-Computer Interface in Process Control (1989))					
504.	Do bar charts contain reference(s) to the normal operating condition(s)? (User-Computer Interface in Process Control (1989))					

CHECKLIST 11: USER-COMPUTER INTERFACE

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
505.	Are column charts used when the direction of change of the measurement is to be emphasized or when time is represented by one of the axes of the chart? (User-Computer Interface in Process Control (1989))					
506.	Are stroke type charts used as alternatives to conventional full bars? (User-Computer Interface in Process Control (1989))					
507.	Are all items on a band chart related to the total? (User-Computer Interface in Process Control (1989))					
508.	Is a horizontal line representing normal operating conditions superimposed on the display? (User-Computer Interface in Process Control (1989))					
509.	Is the area below the profile line shaded to provide a more distinguishable profile? (User-Computer Interface in Process Control (1989))					
510.	Are labels provided along the bottom to identify each parameter? (User-Computer Interface in Process Control (1989))					
511.	Are linear profile charts used in applications where detection of abnormal events is important? (User-Computer Interface in Process Control (1989))					
512.	Is the chart designed so that it forms recognizable geometric patterns for specific abnormal conditions? (User-Computer Interface in Process Control (1989))					
513.	Are differential line widths used to code flow paths (e.g., significance, volume, level)? (User-Computer Interface in Process Control (1989))					
514.	Do mimic lines not overlap? (User-Computer Interface in Process Control (1989))					
515.	Are flow directions clearly indicated by distinctive arrowheads? (User-Computer Interface in Process Control (1989))					
516.	Are all mimic origin points labeled or begin at labeled components? (User-Computer Interface in Process Control (1989))					

CHECKLIST 11: USER-COMPUTER INTERFACE

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
517.	Are all mimic destination or terminal points labeled or end at labeled components? (User-Computer Interface in Process Control (1989))					
518.	Are component representations on mimic lines identified? (User-Computer Interface in Process Control (1989))					
519.	Are symbols used consistently? (User-Computer Interface in Process Control (1989))					
520.	Is an indication of control activation provided (e.g., snap feel, audible click, or associated or integral light)? (User-Computer Interface in Process Control (1989))					
521.	Is the force required for key displacement 0.25 to 1.5 N? (User-Computer Interface in Process Control (1989))					
522.	Is the force required for key displacement 0.3 to 0.75 N for repetitive keying tasks? (User-Computer Interface in Process Control (1989))					
523.	Is a n-key rollover capability implemented for the reduction of keying errors? (User-Computer Interface in Process Control (1989))					
524.	Is key displacement 0.03 to 0.19 in. for numeric keys and 0.05 to 0.25 in. for alphanumeric keys? (User-Computer Interface in Process Control (1989))					
525.	Is displacement variability between keys minimized? (User-Computer Interface in Process Control (1989))					
526.	Are all controls appropriately and clearly labeled in the simplest and most direct manner possible? (User-Computer Interface in Process Control (1989))					
527.	Is functional highlighting of the various key groups accomplished through the use of color-coding techniques? (User-Computer Interface in Process Control (1989))					
528.	Are key symbols etched to resist wear and colored with high contrast lettering? (User-Computer Interface in Process Control (1989))					

CHECKLIST 11: USER-COMPUTER INTERFACE

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
529.	Is the color of alphanumeric keys neutral (e.g., beige, grey) rather than black or white or one of the spectral colors (red, yellow, green, or blue.)					
530.	Are the keys matt finished? (User-Computer Interface in Process Control (1989))					
531.	Are keys labeled with a nonstylized font? (User-Computer Interface in Process Control (1989))					
532.	Does the linear dimensions of the key tops from 0.385 to 0.75 in., with 0.5 in. preferred? (User-Computer Interface in Process Control (1989))					
533.	Is the separation between adjacent key tops 0.25 inch? (User-Computer Interface in Process Control (1989))					
534.	Is a push-button height for decimal entry keypads from 1/4 to 3/8 inch? (User-Computer Interface in Process Control (1989))					
535.	Does key height for alphanumeric keyboards from 3/8 to 1/2 inch? (User-Computer Interface in Process Control (1989))					
536.	Do keyboards have a slope of 15 to 25 degrees from the horizontal, with 12 to 18 degrees preferred? (User-Computer Interface in Process Control (1989))					
537.	Is the keyboard slope adjustable ? (User-Computer Interface in Process Control (1989))					
538.	Is the thickness of the keyboard, i.e., base to the home row of keys, less than 50 mm (acceptable) with 30 mm or less preferred? (User-Computer Interface in Process Control (1989))					
539.	When dedicated controls are used to initiate/activate functions, are the keys grouped together? (User-Computer Interface in Process Control (1989))					
540.	Are function controls easily distinguished from other types of keys on the computer console? (User-Computer Interface in Process Control (1989))					

CHECKLIST 11: USER-COMPUTER INTERFACE

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
541.	Is each function control clearly labeled to indicate its function to the operator? (User-Computer Interface in Process Control (1989))					
542.	When function keys are included with an alphanumeric keyboard, are the function keys physically separate? (User-Computer Interface in Process Control (1989))					
543.	Are keys with major or total effects located so that inadvertent operation is unlikely? (User-Computer Interface in Process Control (1989))					
544.	Are commands consistent throughout PDP procedures? (User-Computer Interface in Process Control (1989))					
545.	Does the system use blink coding when there is an urgent need for the subject's attention? (User-Computer Interface in Process Control (1989))					
546.	Does the system allow users to step backward or forward through menus or procedures? (User-Computer Interface in Process Control (1989))					
547.	Are PDPs not used in complex applications such as the sole display and control, e.g., use in conjunction with CRT? (User-Computer Interface in Process Control (1989))					
548.	Are PDPs used as the sole device with simple applications such as camera control? (User-Computer Interface in Process Control (1989))					
549.	Do PDPs contain abbreviations which are easily recognized by the user (in many cases there is a six letter limit on a button for labels)? (User-Computer Interface in Process Control (1989))					
550.	Are terminals which are often used as calculators provided with an auxiliary numeric key set? (User-Computer Interface in Process Control (1989))					
551.	Is the configuration of a keyboard used to enter solely numeric information a 3 x 3 x 1 matrix with the zero digit centered on the bottom row? (User-Computer Interface in Process Control (1989))					

CHECKLIST 11: USER-COMPUTER INTERFACE

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
552.	Is the layout of keyboard numeric pads either telephone or calculator style? (User-Computer Interface in Process Control (1989))					
553.	Are light pens used for cursor placement text selection and command construction? (User-Computer Interface in Process Control (1989))					
554.	Do tasks involving light pens not require frequent alternating use of the light pen and the keyboard? (User-Computer Interface in Process Control (1989))					
555.	Do tasks involving light pens not require long continuous intervals of light pen use? (User-Computer Interface in Process Control (1989))					
556.	Is the light pen 12 to 18 cm (4.7 to 5.1 in.) long and 0.7 to 2 cm (0.3 to 0.8 in.) in diameter? (User-Computer Interface in Process Control (1989))					
557.	Are convenient clips provided at the lower right side of the CRT to hold the pen when it is not in use? (User-Computer Interface in Process Control (1989))					
558.	Does the movement of the pen in any direction on the screen result in smooth movement of the follower in the same direction? (User-Computer Interface in Process Control (1989))					
559.	Does discrete placement of the stylus at any point on the screen cause the follower to appear at that point and remain steady in position so long as the pen is not moved? (User-Computer Interface in Process Control (1989))					
560.	Is refresh rate for the follower sufficiently high to ensure the appearance of a continuous track whenever the pen is used for generation of free-drawn graphics? (User-Computer Interface in Process Control (1989))					
561.	Are joystick controls used for tasks that require precise or continuous control in two or more related dimensions? (User-Computer Interface in Process Control (1989))					

CHECKLIST 11: USER-COMPUTER INTERFACE

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
562.	In rate-control applications which allow the follower to transit beyond the edge of the display, are indicators provided to aid the operator in bringing the follower back onto the display? (User-Computer Interface in Process Control (1989))					
563.	Are isotonic joysticks which are used for rate control spring-loaded for return to center when the hand is removed? (User-Computer Interface in Process Control (1989))					
564.	Are isotonic joysticks not used in connection with automatic sequencing of a CRT follower unless they are instrumented for null return or are zeroed to the instantaneous position of the stick at the time of sequencing.? (User-Computer Interface in Process Control (1989))					
565.	Are isotonic/displacement joysticks 1/4 to 5/8 inch in diameter and 3 to 6 inches long? (User-Computer Interface in Process Control (1989))					
566.	Is the resistance force of the joystick 12 to 32 ounces? (User-Computer Interface in Process Control (1989))					
567.	Does the full displacement of the joystick not exceed 45 degrees? (User-Computer Interface in Process Control (1989))					
568.	Are isotonic/displacement joysticks provided with the following clearances: display to stick—15-3/4 in., around stick—4 in., stick to shell front— 4-3/4 in. to 9-7/8 in? (User-Computer Interface in Process Control (1989))					
569.	Is the movement smooth in all directions, and rapid positioning of the follower on the display attainable without noticeable backlash cross-coupling or need for multiple corrective movements? (User-Computer Interface in Process Control (1989))					
570.	Do control ratios friction and inertia meet the dual requirements of rapid gross positioning and precise line positioning? (User-Computer Interface in Process Control (1989))					

CHECKLIST 11: USER-COMPUTER INTERFACE

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
571.	Are recessed mounting or pencil attachments utilized to provide greater precision of control? (User-Computer Interface in Process Control (1989))					
572.	When used for generation of freedrawn graphics, is the refresh rate for the follower on the CRT sufficiently high to ensure the appearance of a continuous track? (User-Computer Interface in Process Control (1989))					
573.	Is delay between control movement and the confirming display response minimized and not exceed 0.1 s? (User-Computer Interface in Process Control (1989))					
574.	When positioning accuracy is more critical than positioning speed, are isotonic displacement joysticks selected over isometric joysticks? (User-Computer Interface in Process Control (1989))					
575.	Is an isotonic displacement joystick used for such functions as data pickoff and generation of free-drawn graphics? (User-Computer Interface in Process Control (1989))					
576.	is the isometric joystick used for such functions as data pickoff? (User-Computer Interface in Process Control (1989))					
577.	Are isometric joysticks ordinarily not used in any application where it would be necessary for the operator to maintain a constance/force on the stick to generate a constant output over a sustained period of time? (User-Computer Interface in Process Control (1989))					
578.	Do finger-grasped isometric joysticks comply with the same dimensional criteria isotonic joysticks? (User-Computer Interface in Process Control (1989))					
579.	Are hand-grasped isometric joysticks used when integral switching is required between 4.3 to 7.1 inch long and have a maximum grip diameter of 2 inches? (User-Computer Interface in Process Control (1989))					

CHECKLIST 11: USER-COMPUTER INTERFACE

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
580.	Do hand-grasped isometric joysticks have minimum clearances of 4 in. at the sides and 2 in. at the rear? (User-Computer Interface in Process Control (1989))					
581.	Do hand grasped isometric joysticks have a maximum resistance force of 26.7 lb for full output? (User-Computer Interface in Process Control (1989))					
582.	Does the isometric stick deflect minimally in response to applied force but deflect perceptibly against a stop at full applied force? (User-Computer Interface in Process Control (1989))					
583.	Is the X and Y output proportional to the magnitude of the applied force as perceived by the operator? (User-Computer Interface in Process Control (1989))					
584.	Is a ball control used for such tasks as data pickoff? (User-Computer Interface in Process Control (1989))					
585.	When tracker ball controls are used to make precise or continuous adjustments, are wrist support or arm support or both provided? (User-Computer Interface in Process Control (1989))					
586.	Is the tracker ball control capable of rotation in any direction so as to generate any combination of X and Y output values? (User-Computer Interface in Process Control (1989))					
587.	When moved in either the X or Y directions alone, is there no apparent cross-coupling (follower movement in the orthogonal direction)? (User-Computer Interface in Process Control (1989))					
588.	While manipulating the control, are neither backlash nor cross-coupling apparent to the operator? (User-Computer Interface in Process Control (1989))					
589.	Do control ratios and dynamic features meet the dual requirement of rapid press positioning and smooth precise line positioning? (User-Computer Interface in Process Control (1989))					

CHECKLIST 11: USER-COMPUTER INTERFACE

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
590.	Are tracker balls used in graphic applications requiring position and selection? (User-Computer Interface in Process Control (1989))					
591.	Are grid and stylus devices used for data pickoff entry of points on a display generation of free-drawn graphics and similar control applications? (User-Computer Interface in Process Control (1989))					
592.	Do transparent grids which are used as display overlays conform to the size of the display? (User-Computer Interface in Process Control (1989))					
593.	Do grids which are displaced from the display approximate the display size and are they mounted below the display in an orientation to preserve directional relationships to the maximum extent? (User-Computer Interface in Process Control (1989))					
594.	Does movement of the stylus in any direction on the grid surface result in smooth movement of the follower in the same direction? (User-Computer Interface in Process Control (1989))					
595.	Does discrete placement of the stylus at any point on the grid cause the follower to appear at the corresponding coordinates and to remain steady in position so long as the stylus is not moved? (User-Computer Interface in Process Control (1989))					
596.	Is the refresh rate for the follower sufficiently high to ensure the appearance of a continuous track whenever the stylus is used in generation of free-drawn graphics? (User-Computer Interface in Process Control (1989))					
597.	Is the mouse controller used for main item selection scrolling data retrieval, and data entry? (User-Computer Interface in Process Control (1989))					
598.	Does the controller have physical dimensions of 1.5 to 3 in. width 3 to 5 in. length and 1 to 2 in. thickness? (User-Computer Interface in Process Control (1989))					

CHECKLIST 11: USER-COMPUTER INTERFACE

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
599.	Does the design of the controller and placement of the maneuvering surface allow the operator to consistently orient the controller to within ± 175 mrad (10°) of the correct orientation without visual reference to the controller? (User-Computer Interface in Process Control (1989))					
600.	Is the controller easily movable in any direction without a change of hand grasp and result in smooth movement of the follower in the same direction ± 175 mrad (10°)? (User-Computer Interface in Process Control (1989))					
601.	Is automatic speech recognition (voice input devices) limited to relatively simple input tasks? (User-Computer Interface in Process Control (1989))					
602.	Are touch screens used for main item selection scrolling data retrieval and data entry? (User-Computer Interface in Process Control (1989))					
603.	Does the terminal recognize a person's touch in approximately 100 ms? (User-Computer Interface in Process Control (1989))					
604.	Does the system accept only one command at a time indicate that the command has been accepted and respond in a time commensurate with the activity? (User-Computer Interface in Process Control (1989))					
605.	Are the sensitive areas large enough to allow entry using fingers and allow for parallax due to CRT screen curvature? (User-Computer Interface in Process Control (1989))					
606.	To avoid alteration of color codes, are touch screens toned with a neutral tint? (User-Computer Interface in Process Control (1989))					
607.	Are touch screens are not recommended if task requires holding arm up to the screen for long periods of time? (User-Computer Interface in Process Control (1989))					

CHECKLIST 11: USER-COMPUTER INTERFACE

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
608.	Are discriminable audible beeps used to supply feedback when more than one touch screen will be installed at more than one workstation? (User-Computer Interface in Process Control (1989))					
609.	Is a question-and-answer dialogue used primarily for routine data entry tasks where the user has little or no training? (User-Computer Interface in Process Control (1989))					
610.	Are the data items known and their ordering constrained? (User-Computer Interface in Process Control (1989))					
611.	Is the computer response moderately fast? (User-Computer Interface in Process Control (1989))					
612.	Is selection accomplished by keyed entry of corresponding codes or by other means such as programmed multifunction keys labeled in the display margin? (User-Computer Interface in Process Control (1989))					
613.	When menu selection is accomplished by code, is that code keyed into a standard command entry area (window) in a fixed location on all displays? (User-Computer Interface in Process Control (1989))					
614.	When control entries will be selected from a discrete set of options, are those options displayed at the time of selection? (User-Computer Interface in Process Control (1989))					
615.	Are displayed options worded in terms of recognized commands or command elements? (User-Computer Interface in Process Control (1989))					
616.	If menu selections must be made by keyed codes, does each code the initial letter (or letters) of the displayed option label rather than an arbitrary number? (User-Computer Interface in Process Control (1989))					
617.	If letter codes are used, are those codes used consistently in designating options at different steps in a transaction sequence? (User-Computer Interface in Process Control (1989))					

CHECKLIST 11: USER-COMPUTER INTERFACE

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
618.	Are menus used to minimize training needs? (User-Computer Interface in Process Control (1989))					
619.	Are menus used when users have little or no typing skills? (User-Computer Interface in Process Control (1989))					
620.	Are menus used when the system has a limited keyboard? (User-Computer Interface in Process Control (1989))					
621.	Does each menu display require just one selection by the user? (User-Computer Interface in Process Control (1989))					
622.	Are displayed menu options listed in a logical order; if no logical structure is apparent then options displayed in order of their expected frequency of use with the most frequent listed first? (User-Computer Interface in Process Control (1989))					
623.	Are displayed menu lists formatted to indicate the hierarchic structure of logically related groups of options rather than as an undifferentiated string of alternatives? (User-Computer Interface in Process Control (1989))					
624.	If menu options are grouped in logical sub-units, are those groups displayed in order of their expected frequency of use? (User-Computer Interface in Process Control (1989))					
625.	Is the same color for menus used within the same group? (User-Computer Interface in Process Control (1989))					
626.	When hierarchic menus are used, is the user given some displayed indication of current position in the menu structure? (User-Computer Interface in Process Control (1989))					
627.	When hierarchic menus are used, does a single key action permit the user to return to the next higher level? (User-Computer Interface in Process Control (1989))					
628.	Are menus provided in different displays designed so that option lists are consistent in terminology and ordering? (User-Computer Interface in Process Control (1989))					

CHECKLIST 11: USER-COMPUTER INTERFACE

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
629.	Are experienced users provided means to bypass a series of menu selections and make an equivalent command entry directly? (User-Computer Interface in Process Control (1989))					
630.	When a user can anticipate menu selections before they are presented, is a means provided to enter several stacked selections at one time? (User-Computer Interface in Process Control (1989))					
631.	Do menu displays for a system still under development indicate future options not yet implemented? (User-Computer Interface in Process Control (1989))					
632.	When command language is used for control entry, is an appropriate entry area provided in a consistent location on every display preferably at the bottom? (User-Computer Interface in Process Control (1989))					
633.	Are the words chosen for a command language reflect the user's point of view and not the programmer's? (User-Computer Interface in Process Control (1989))					
634.	Is abbreviation of entered commands (i.e. entry of the first 1 to 3 letters) permitted to facilitate entry by experienced users? (User-Computer Interface in Process Control (1989))					
635.	Is the user able to request display of a file by name alone without having to enter any further information such as file location in computer storage? (User-Computer Interface in Process Control (1989))					
636.	Is the user able to request prompts as necessary to determine required parameters in a command entry or to determine available options for an appropriate next command entry? (User-Computer Interface in Process Control (1989))					
637.	Is the user able to enter commands without punctuation? (User-Computer Interface in Process Control (1989))					

CHECKLIST 11: USER-COMPUTER INTERFACE

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
638.	Does neither the user nor the computer program have to distinguish between single and multiple blanks in a command entry? (User-Computer Interface in Process Control (1989))					
639.	Is the computer programmed to recognize common misspellings of commands and to display inferred correct commands for user confirmation rather than requiring reentry? (User-Computer Interface in Process Control (1989))					
640.	When a command entry is not recognized, does the computer initiate a clarification dialogue rather than rejecting the command outright? (User-Computer Interface in Process Control (1989))					
641.	Does the system accept user input without discriminating between upper and lower case? (User-Computer Interface in Process Control (1989))					
642.	Does command language assume highly experienced users? (User-Computer Interface in Process Control (1989))					
643.	Is query language dialogue used as a specialized subcategory of general command language for tasks emphasizing unpredictable information retrieval (as in many analysis and planning tasks)? (User-Computer Interface in Process Control (1989))					
644.	Does the organization of the query language match the data structure perceived by users to be natural? (User-Computer Interface in Process Control (1989))					
645.	Is one single representation of the data organization established for use in query formulation, rather than multiple representations? (User-Computer Interface in Process Control (1989))					
646.	Is the need for quantificational terms in query formulation minimized or eliminated? (User-Computer Interface in Process Control (1989))					

CHECKLIST 11: USER-COMPUTER INTERFACE

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
647.	Is the use of terms subject to frequent semantic confusion, such as "or more" and "or less," minimized? (User-Computer Interface in Process Control (1989))					
648.	Does the system make it easy and natural for a user to inquire about any details desired? (User-Computer Interface in Process Control (1989))					
649.	Does the system support a flexible dialogue that permits either the user or the expert system to initiate an action or request for information without cancelling an ongoing transaction? (User-Computer Interface in Process Control (1989))					
650.	Is the user-expert system dialogue flexible in terms of the type and sequencing of user input it will accept? (User-Computer Interface in Process Control (1989))					
651.	Is the system capable of supporting speculative analysis (e.g., what if scenarios) by providing a "reconnoiter mode" that allows the user to investigate the effects of an action without actually implementing the action? (User-Computer Interface in Process Control (1989))					
652.	Is the knowledge required to perform all functions allocated to the expert system directly accessible by the expert system? (User-Computer Interface in Process Control (1989))					
653.	Is the capability for the user to supersede the current request for information from the expert system in order to input information related to a different transaction provided? (User-Computer Interface in Process Control (1989))					
654.	Does the expert system have the capability to graphically represent its rules network? (User-Computer Interface in Process Control (1989))					

CHECKLIST 11: USER-COMPUTER INTERFACE

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
655.	Does the expert system automatically record all rules invoked during a consultation. Following a consultation the explanation facility capable of recalling each involved rule and associating it with a specific event (i.e., question or conclusion) to explain the rationale for the event? (User-Computer Interface in Process Control (1989))					
656.	Is the expert system able to respond to user requests to clarify or restate questions and assertions? (User-Computer Interface in Process Control (1989))					
657.	At any point during a transaction, is the expert system able to explain which problem-solving strategy is being employed why a particular strategy was selected and the current status of the application? (User-Computer Interface in Process Control (1989))					
658.	Is the level of detail of information presented as part of an explanation or justification under the control of the user. As a minimum the user able to specify three levels of detail: rules only brief explanations and detailed explanations? (User-Computer Interface in Process Control (1989))					
659.	Are update rates for continuous real-time tracking tasks not exceed 0.5 s? (User-Computer Interface in Process Control (1989))					
660.	Do update rates not exceed 3 s? (User-Computer Interface in Process Control (1989))					
661.	Are response time deviations less than one-half the mean response time? (User-Computer Interface in Process Control (1989))					
662.	Is an indication that the computer or control panel is functioning normally provided on the CRT display? (User-Computer Interface in Process Control (1989))					
663.	When system functioning requires the operator to standby, is periodic feedback provided to the operator to indicate normal system operation and the reason for the delay? (User-Computer Interface in Process Control (1989))					

CHECKLIST 11: USER-COMPUTER INTERFACE

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
664.	When a process or sequence is completed by the system, is positive indication presented to the operator concerning the outcome of the process and requirements for subsequent operator actions? (User-Computer Interface in Process Control (1989))					
665.	If at any time the keyboard is locked or the terminal is otherwise disabled, is that condition signaled by disappearance of the cursor from the display and (especially if infrequent) by some more specific indicator such as an auditory signal? (User-Computer Interface in Process Control (1989))					
666.	Is status information available indicating current load (multiple users assumed) and/or current system performance? (User-Computer Interface in Process Control (1989))					
667.	Is relevant status information for external systems available to the user? (User-Computer Interface in Process Control (1989))					
668.	When time tagging information is important, are date-time signals available to users as an annotation on displays? (User-Computer Interface in Process Control (1989))					
669.	Does every user input consistently produce some perceptible response output from the computer? (User-Computer Interface in Process Control (1989))					
670.	Is computer response to user entries rapid, with consistent timing as appropriate to different types of transactions? (User-Computer Interface in Process Control (1989))					
671.	Following user interrupt of data processing, is an advisory message displayed assuring the user that the system has returned to its previous status? (User-Computer Interface in Process Control (1989))					
672.	Is specific user guidance information available for display at any point in a transaction sequence? (User-Computer Interface in Process Control (1989))					

CHECKLIST 11: USER-COMPUTER INTERFACE

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
673.	To serve as a home base or consistent starting point at the beginning of a transaction sequence, is a general menu of control options always be available for user selection? (User-Computer Interface in Process Control (1989))					
674.	Are hierarchic menus organized and labeled to guide the user within the hierarchic structure? (User-Computer Interface in Process Control (1989))					
675.	Are control options that are generally available at any step in a transaction sequence treated as implicit options, i.e., need not be included in a display of step-specific options? (User-Computer Interface in Process Control (1989))					
676.	Is the computer programmed to provide prompting, i.e., to display advisory messages to guide users in entering required data and/or command parameters? (User-Computer Interface in Process Control (1989))					
677.	When users vary in experience, is prompting an optional guidance feature that can be selected by novice users but can be omitted by experienced users? (User-Computer Interface in Process Control (1989))					
678.	When the results of a user entry are contingent upon context established by previous entries, is some indication of that context displayed to the user? (User-Computer Interface in Process Control (1989))					
679.	Are implicit cues for data entry provided by consistent and distinctive formatting of data fields? (User-Computer Interface in Process Control (1989))					
680.	Following computer generation of display output, is the cursor automatically be positioned on the display in a location consistent with the type of transaction? (User-Computer Interface in Process Control (1989))					
681.	Is reference material available for on-line display to the user describing system capabilities and procedures? (User-Computer Interface in Process Control (1989))					

CHECKLIST 11: USER-COMPUTER INTERFACE

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
682.	In applications where a user may employ command entry, does the computer provide an on-line command index to help guide user selection and composition of commands? (User-Computer Interface in Process Control (1989))					
683.	Is a complete dictionary of abbreviations used for data entry, data display, and command entry available for on-line user reference and in system documentation? (User-Computer Interface in Process Control (1989))					
684.	When codes are assigned special meaning in a display, is a definition provided at the bottom of the display? (User-Computer Interface in Process Control (1989))					
685.	In system applications where it is warranted, is the user able to request a displayed record of past transactions in order to review prior actions? (User-Computer Interface in Process Control (1989))					
686.	In addition to explicit aids (labels, advisory messages), and implicit aids (cuing) provided in user interface design, is there also a capability for a user to request further on-line guidance by a request for HELP? (User-Computer Interface in Process Control (1989))					
687.	When an initial HELP display provides only summary information, is more detailed explanations available in response to repeated user requests for HELP? (User-Computer Interface in Process Control (1989))					
688.	Are novice users able to browse on-line HELP displays, just like a printed manual, to gain familiarity with system functions and operating procedures? (User-Computer Interface in Process Control (1989))					
689.	For many system applications, is an online training capability provided to introduce new users to system capabilities and to permit simulated hands-on experience in data handling tasks? (User-Computer Interface in Process Control (1989))					

CHECKLIST 11: USER-COMPUTER INTERFACE

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
690.	Is data security protected by automatic measures whenever possible, rather than by administrative procedures? (User-Computer Interface in Process Control (1989))					
691.	Does the user interface design provide consistent procedures for data transactions, including data entry and error correction, data change, and deletion? (User-Computer Interface in Process Control (1989))					
692.	Do inputs to the computer, including data entries and control entries, require explicit user actions? (User-Computer Interface in Process Control (1989))					
693.	When the result of user action is contingent upon prior selection among differently defined operational modes, is mode selection continuously indicated to the user, particularly when user inputs in that mode might result in unintended data loss? (User-Computer Interface in Process Control (1989))					
694.	Does the user interface design deal appropriately with all possible control entries, correct and incorrect, without introducing unwanted data change? (User-Computer Interface in Process Control (1989))					
695.	For both data entry and control entry, is the user able to edit composed material before initial entry and also before any required reentry? (User-Computer Interface in Process Control (1989))					
696.	For both data entry and control entry, is the user required to resolve any detected ambiguity requiring computer interpretation? (User-Computer Interface in Process Control (1989))					
697.	Is the user warned of potential threats to data security by appropriate messages and/or alarm signals? (User-Computer Interface in Process Control (1989))					
698.	Are computer security procedures understood by all staff? (User-Computer Interface in Process Control (1989))					

CHECKLIST 11: USER-COMPUTER INTERFACE

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
699.	Are computer security policies strongly supported by management? (User-Computer Interface in Process Control (1989))					
700.	Does design documentation explicitly delegate controls to be used? (User-Computer Interface in Process Control (1989))					
701.	Is the policy established whereby employees do not discuss security procedures outside of the job environment? (User-Computer Interface in Process Control (1989))					
702.	Unbeknownst to the user, does the computer automatically log the user ID and keeps record of file access and work performed? (User-Computer Interface in Process Control (1989))					
703.	Is the system is kept free of "Shareware" and other programs which may contain viruses? (User-Computer Interface in Process Control (1989))					
704.	Are appropriate personnel conspicuous by virtue of the fact that they are required to wear a badge? (User-Computer Interface in Process Control (1989))					
705.	Are visitors are required to wear identification? (User-Computer Interface in Process Control (1989))					
706.	Are passwords are employed by all users? (User-Computer Interface in Process Control (1989))					
707.	Are passwords are changed every 90 days? (User-Computer Interface in Process Control (1989))					
708.	Are passwords are changed every two weeks (high security access)? (User-Computer Interface in Process Control (1989))					
709.	Are physical key locks are provided? (User-Computer Interface in Process Control (1989))					
710.	Are internal and external security audits are conducted on a regular basis? (User-Computer Interface in Process Control (1989))					

CHECKLIST 11: USER-COMPUTER INTERFACE

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
711.	Commensurate with review of security, is reliability of the system as a whole calculated? (User-Computer Interface in Process Control (1989))					
712.	Are data conversion procedures are subject to scrutiny? (User-Computer Interface in Process Control (1989))					
713.	Are standards are in place which call for the use of controls? (User-Computer Interface in Process Control (1989))					
714.	Do construction practices promote a fireproof and waterproof environment? (User-Computer Interface in Process Control (1989))					
715.	Is the keyboard base height for a seated workplace from 56 to 77 cm (22 to 30 in.)? (User-Computer Interface in Process Control (1989))					
716.	Is the keyboard base height for a standing or a sitting/standing workplace from 90 to 93 cm (35.5 to 36.5 in.)? (User-Computer Interface in Process Control (1989))					
717.	Is the working level height for a sitting workplace from 66 to 81 cm (26 to 32 in.)? (User-Computer Interface in Process Control (1989))					
718.	Is the working level height for a standing workplace from 90 to 107 cm (35.5 to 42 in.),					
719.	Is the working level height for a sitting/standing workplace from 90 to 102 cm (35.5 to 40 in.)? (User-Computer Interface in Process Control (1989))					
720.	Is the working level width from 61 to 76.5 cm (24.4 in. to 30.6 in), 76.5 cm preferred? (User-Computer Interface in Process Control (1989))					
721.	Is the working level depth from 41 to 64 cm (16.4 in. to 25.6 in.), 64 cm preferred? (User-Computer Interface in Process Control (1989))					
722.	Is the keyboard home row height 66 to 78 cm (26 to 30.5 in.)? (User-Computer Interface in Process Control (1989))					

CHECKLIST 11: USER-COMPUTER INTERFACE

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
723.	Is the screen height for a seated workplace from 15 to 117 cm (6 to 46 in.), with 99 cm (39 in.) preferred? (User-Computer Interface in Process Control (1989))					
724.	Is the screen height for a standing workplace from 104 to 178 cm (41 to 70 in.)? (User-Computer Interface in Process Control (1989))					
725.	Is the screen viewing angle within 35 degrees of the horizontal line of sight, with about 15 degrees below the horizontal line of sight preferred? (User-Computer Interface in Process Control (1989))					
726.	Is the viewing distance 33 to 80 cm (13 to 30 in.), with 46 to 61 cm (18 to 24 in.) preferred? (User-Computer Interface in Process Control (1989))					
727.	Is the footrest 18 in. below the level of the seat and adjustable in 2-in. increments of height? (User-Computer Interface in Process Control (1989))					
728.	Are rectangular footrests 30 cm (12 in.) deep by 41 cm (16 in.) wide? (User-Computer Interface in Process Control (1989))					
729.	Do circular footrests have a diameter of 18 in? (User-Computer Interface in Process Control (1989))					
730.	Is the footrest circular if it is part of the chair? (User-Computer Interface in Process Control (1989))					
731.	Is the functional reach envelope from 64 to 88 cm (25.2 to 34.6 in.)? (User-Computer Interface in Process Control (1989))					
732.	Is the normal inclination angle of the head from 16 to 22 degrees? (User-Computer Interface in Process Control (1989))					
733.	Is a document holder provided to reduce head movement while keying data from a document? (User-Computer Interface in Process Control (1989))					

CHECKLIST 11: USER-COMPUTER INTERFACE

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
734.	Is screen orientation no greater than 45 degrees away from or toward the operator, with 15 degrees away from the operator preferred? (User-Computer Interface in Process Control (1989))					
735.	Is screen orientation adjustable? (User-Computer Interface in Process Control (1989))					
736.	Does the chair design allow the user to maintain the following posture: knees flexed at an angle $\geq 90^\circ$, elbows flexed at an angle $\geq 90^\circ$, and torso at an angle slightly greater than 90° (100° to 155°)? (User-Computer Interface in Process Control (1989))					
737.	Is seat height adjustable from 35 to 55 cm (14 to 22 in.)? (User-Computer Interface in Process Control (1989))					
738.	When the chair is provided with a footrest, is it adjustable from 51 to 76 cm (20 to 30 in.), with the footrest a constant 46 cm (18 in.) below the seat? (User-Computer Interface in Process Control (1989))					
739.	Is the seat width 43 to 51 cm (17 to 20 in.)? (User-Computer Interface in Process Control (1989))					
740.	Is the seat depth 38 to 46 cm (15 to 18 in.)? (User-Computer Interface in Process Control (1989))					
741.	Is the backrest height 15 to 23 cm (6 to 9 in.)					
742.	Is the backrest width 30 to 36 cm (12 to 14 in.)? (User-Computer Interface in Process Control (1989))					
743.	Is the seat cushion at least 1-in. thick? (User-Computer Interface in Process Control (1989))					
744.	Are the armrests 5 cm (2 in.) wide, 20 cm (8 in.) long, and 19 to 28 cm (7.5 to 11 in.) above the compressed sitting surface? (User-Computer Interface in Process Control (1989))					
745.	Is hard-finish, matt paper used to avoid smudged copy and glare? (User-Computer Interface in Process Control (1989))					

CHECKLIST 11: USER-COMPUTER INTERFACE

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
746.	Is there a positive indication of the remaining supply of recording materials? (User-Computer Interface in Process Control (1989))					
747.	Are instructions for reloading paper, ribbon, ink, etc. appear on an instruction plate attached to the printer? (User-Computer Interface in Process Control (1989))					
748.	Are printers part of the process computer system and be located in the primary operating area? (User-Computer Interface in Process Control (1989))					
749.	Are control room printers provide the capability to record alarm data, trend data, and plant status data? (User-Computer Interface in Process Control (1989))					
750.	Is the system designed to provide hard copy of any page appearing on the CRT at the request of the operator? (User-Computer Interface in Process Control (1989))					
751.	Does printer operation not alter screen content? (User-Computer Interface in Process Control (1989))					
752.	Is a takeup device for printed materials provided which requires little or no operator attention and which has a capacity at least equal to the feed supply? (User-Computer Interface in Process Control (1989))					
753.	Is it possible to annotate the print copy while it is still in the machine? (User-Computer Interface in Process Control (1989))					
754.	Is the operator always able to read the most recently printed line? (User-Computer Interface in Process Control (1989))					
755.	Does printed material have an adequate contrast ratio to ensure easy operator reading? (User-Computer Interface in Process Control (1989))					
756.	When the printer is down during reloading, is data and information which would normally be printed not lost? (User-Computer Interface in Process Control (1989))					

CHECKLIST 11: USER-COMPUTER INTERFACE

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
757.	Is the recorded matter not obscured, masked, or otherwise hidden in a manner which prevents direct reading of the material? (User-Computer Interface in Process Control (1989))					
758.	If the copy will be printed remote to the operator, is a print confirmation or denial message displayed? (User-Computer Interface in Process Control (1989))					
759.	Is printed information presented in a directly usable form with minimal requirements for decoding, transposing, and interpolating? (User-Computer Interface in Process Control (1989))					
760.	Does a printer used for recording trend data, computer alarms, and critical status information have a high-speed printing capability of at least 300 lines a minute to permit printer output to keep up with computer output? (User-Computer Interface in Process Control (1989))					
761.	Is the VDT provided with implosion safeguards? (User-Computer Interface in Process Control (1989))					

CHECKLIST 11: USER-COMPUTER INTERFACE

Table 12: Computer input devices, advantages and disadvantages.

Controls	Advantages	Disadvantages
A. Keyboard	Good device for rapidly inputting text and numeric data.	Relatively difficult and time consuming to position cursor. Difficult to use for direct manipulation and drawing. May distract attention from display.
B. Directional Controllers (joystick and ball control)	Can be used comfortably with minimum arm fatigue. Do not cover parts of the screen in use. Expansion or contraction of cursor movement is possible. Ball control is an efficient use of pace. Gain may be varied.	Slower than a light pen and other "point-to devices" for simple input and option selection. Must be attached, but not to the display. Unless there is a large joystick, an inadequate control/display ratio will result for positional control. The displacement of the stick controls both the direction and the speed of the cursor movement. Ball and joystick difficult to use for accurate free-hand graphic input. Difficult to integrate activate switch with ball.
C. Mouse	Relatively fast. Has low error rates for large targets. Allows user to concentrate attention on VDT screen.	Requires additional flat work surface. Difficult to use for free-hand graphic input. High error rates with small targets. Lost time when mouse held backwards or sideways. Some training needed. Wheels slipping sometimes a problem.
D. Light Pen	Fast for simple input. Good for tracking moving objects. Minimal perceptual motor skill needed. Good for gross drawing. Efficient for successful multiple selection. User does not have to scan to find a cursor somewhere on the screen. May be adaptable to bar coding.	May not feel natural to user, like a real pen or pencil. May lack precision because of the aperture, distance from the CRT screen surface, and parallax. Contact with the computer may be lost unintentionally. Frequently required simultaneous button depression may cause slippage and inaccuracy. Must be attached to terminal, which may be inconvenient. Glare problem if pen tilted to reduce arm fatigue. Fatiguing if pen is held

CHECKLIST 11: USER-COMPUTER INTERFACE

Table 12: Computer input devices, advantages and disadvantages (continued).

Controls	Advantages	Disadvantages
D. Light Pen Continued		<p>perpendicular to work surface. If pointed to dark area, may require user to flash the screen to find pen. One-to-one input only (zero order control). May be cumbersome to use with alternate, incompatible entry methods, like the keyboard. Tends to be used for purposes other than originally intended, e.g., for key depression. Tends to be fragile. Hand may obstruct a portion of screen when in use. Care must be taken to provide adequate "activate" are around choice of point. Cannot be used on gas panel.</p>
E. Stylus and grid	<p>Excellent choice for graphic entry. Can be designed so the user recognizes "—" symbol as horizontal surface. Multipurpose input device. Minimal difficulty going from graphic input if character is built into the system, and the tablet is used for the input. Spatial correspondence between displays and control movement.</p>	<p>Extra space required or work surface. Displacement of visual feedback from motor activity may cause coordination problems. Entering handprinted characters to be recognized by the system is relatively very slow compared to keyboard entry.</p>
F. Touch screen	<p>Input device is also output device. Direct eye-hand coordination and a direct relationship between user's input and the displayed output. All valid inputs displayed on the screen. No memorization of commands is required. Training is minimized. Useful in menu selection. Beneficial in high workload areas or high stress situation. Useful where it is time consuming or dangerous to divert attention from the display.</p>	<p>Inefficient for inputting new graphics information. Selection or entry of single character is slow and may be beyond the resolution capability of the device. User must sit within arm's reach of the display. Limited target resolution due to size of operator's finger. Inappropriate for selection of small items. Problem with retrofit.</p>

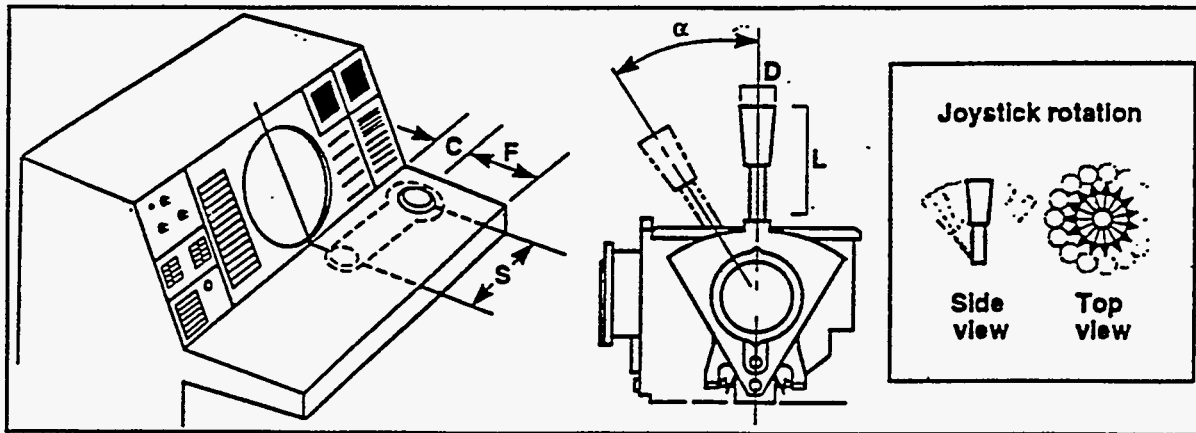
CHECKLIST 11: USER-COMPUTER INTERFACE

Table 12: Computer input devices, advantages and disadvantages (continued).

Controls	Advantages	Disadvantages
G. Voice activation	Does not require hands. Does not require user to shift gaze. Useful for no light or no light conditions. Allows simultaneous activation of more than one control mode. Can be used in lieu of a translator, allowing natural, conversational version of different languages to control complicated systems.	Entry can be slow. Must use specified vocabulary. Some systems must be individualized to specific user. If individual's voice changes (e.g., become stressed) system may not respond. May require headset. Speaker dependent systems require template loading time.

CHECKLIST 11: USER-COMPUTER INTERFACE

Figure 29: Joysticks.

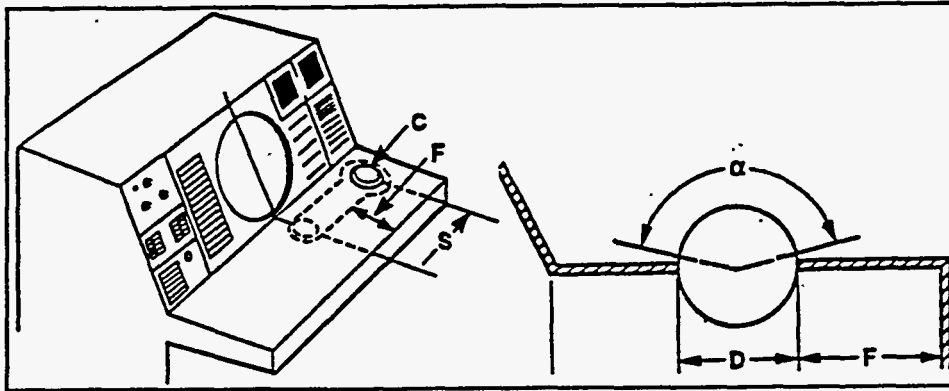


	Dimensions		Resistance	Angular Displacement	Clearance		
	D, Diameter	L, Length			S, Display CL* to stick CL	C, Around stick	F, Stick CL to shelf front
Minimum	6 mm (0.25 in.)	75 mm (3 in.)	3.3 N (12 oz.)	---	0	**	120 mm (4.75 in.)
Maximum	16 mm (0.63 in.)	150 mm (6 in.)	8.9 N (32 oz.)	45°	400 mm (15.75 in.)	---	250 mm (9.88 in.)

** Maximum stick excursion + 100 mm (4 in.)

CHECKLIST 11: USER-COMPUTER INTERFACE

Figure 30: Ball Controls.

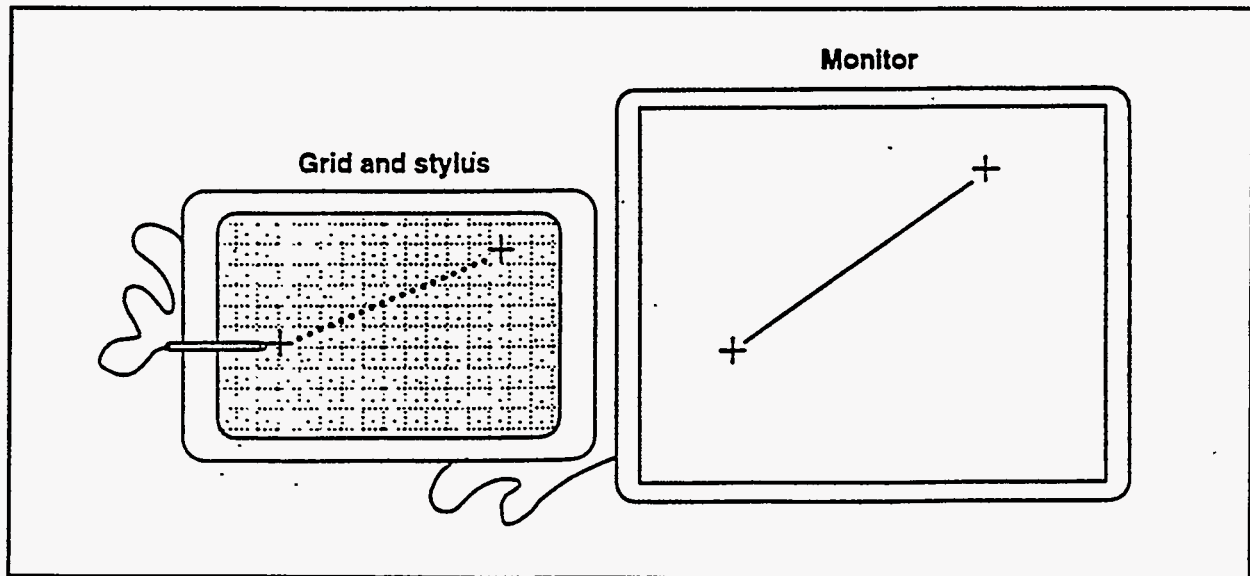


	Dimensions		Resistance		Clearance		
	D, Diameter	α Exposed surface	Precision required	Vibration or accel conditions	S, Display CL* to ball CL	C, Around ball	F, Ball to shelf front
Minimum	50 mm (2 in.)	1745mrad (100°)	---	---	0	50 mm (2 in.)	120 mm (4.75 in.)
Maximum	150 mm (6 in.)	2445mrad (140°)	1.0 N (3.6 oz.)	1.7 N (6 oz.)	320 mm (12.63 in.)	---	250 mm (9.75 in.)
Preferred	100 mm (4 in.)	2095mrad (120°)	0.3 N (1.1 oz.)	---	---	---	---

* CL stands for center line

CHECKLIST 11: USER-COMPUTER INTERFACE

Figure 32: Grid and stylus device.



CHECKLIST 12: LABELING

DATE: _____

REVIEWER: _____

DESCRIPTION OF REVIEWED SYSTEM(S): _____

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
1.	Are labels, legends, placards, signs or markings, or a combination of these provided whenever it is necessary for personnel to locate and identify controls, displays, and equipment items. Are they also provided to help personnel interpret and follow procedures, or to avoid hazards? (DOE-STD-1062-DFT Application: 6.1.1)					
2.	Are label characteristics consistent with providing the accuracy of identification required? (DOE-STD-1062-DFT Label Characteristics: 6.1.2a)					
3.	Are label characteristics consistent with time available for recognition or other responses? (DOE-STD-1062-DFT Label Characteristics: 6.1.2b)					
4.	Are label characteristics consistent with distance at which the labels must be read? (DOE-STD-1062-DFT Label Characteristics: 6.1.2c)					
5.	Are label characteristics consistent with illumination level and color? (DOE-STD-1062-DFT Label Characteristics: 6.1.2d)					
6.	Are label characteristics consistent with criticality of the function labeled? (DOE-STD-1062-DFT Label Characteristics: 6.1.2e)					
7.	Are label characteristics consistent with label design within and between systems? (DOE-STD-1062-DFT Label Characteristics: 6.1.2f)					
8.	Are all labeling additions and modifications governed by administrative procedures? (DOE-STD-1062-DFT Administrative Control of Labels: 6.1.3)					
9.	Is the use of makeshift or impromptu labeling avoided? (DOE-STD-1062-DFT Administrative Control of Labels: 6.1.3)					

CHECKLIST 12: LABELING

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
10.	Do labels for both prototype and production equipment meet the criteria specified in DOE STD-1062-DFT for labels? (DOE-STD-1062-DFT Prototype and Production Equipment Labels: 6.1.3.1)					
11.	Is the criteria for duration of production equipment labels met? (DOE-STD-1062-DFT Prototype and Production Equipment Labels: 6.1.3.1)					
12.	Are the labels for prototype equipment simply and easily affixed, altered, and removed? (DOE-STD-1062-DFT Prototype and Production Equipment Labels: 6.1.3.1)					
13.	Are temporary labels used when necessary to identify out-of-service equipment, accommodate unique or rare activities, or improve operator understanding and efficiency? (DOE-STD-1062-DFT Temporary Labels: 6.1.3.2)					
14.	Is the use of temporary labels administratively controlled? (DOE-STD-1062-DFT Controlled Use of Temporary Labels: 6.1.3.3)					
15.	Is there a final step in plant maintenance procedures that calls for a check to ensure that label tags and placards are in place after components or units are replaced? (DOE-STD-1062-DFT Label Check: 6.1.3.4)					
16.	In attaching temporary tags to components is care taken to ensure the tag will not damage the component, interfere with operational features, or obscure necessary information? (DOE-STD-1062-DFT Use: 6.1.3.5)					
17.	Are labels oriented horizontally so that they read left to right with vertical orientation used only when labels are not critical for personnel safety or performance? (DOE-STD-1062-DFT Label Orientation: 6.2.1)					
18.	Are tags hung so that the information is displayed horizontally and is the information on both sides? (DOE-STD-1062-DFT Tag Orientation: 6.2.1.1)					
19.	Are labels placed where they can easily be read? (DOE-STD-1062-DFT location: 6.2.2)					

CHECKLIST 12: LABELING

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
20.	Are labels located so as not to obscure any other information needed by the operator? (DOE-STD-1062-DFT location: 6.2.2)					
21.	Are labels placed so that controls and other panel elements do not obscure labels in any control position? (DOE-STD-1062-DFT location: 6.2.2)					
22.	Are labels located in a consistent manner throughout the equipment system, and facility? (DOE-STD-1062-DFT Standardization: 6.2.3)					
23.	Are labels affixed securely in place in a manner to prevent their loss, damage, slippage, or accidental removal? (DOE-STD-1062-DFT Label Mounting: 6.2.4)					
24.	Do the means used to mount the label permit their removal when necessary without damage to the surface it was attached to? (DOE-STD-1062-DFT Label Mounting: 6.2.4)					
25.	Are tags attached securely to equipment with stranded stainless steel cable, clamps, or chains? (DOE-STD-1062-DFT Tag Mounting: 6.2.4.1)					
26.	Do labels primarily describe equipment functions with engineering characteristics, nomenclature, or parts numbering given secondary consideration? (DOE-STD-1062-DFT Equipment Functions: 6.3.1)					
27.	Is a list of standard names, acronyms, abbreviations, and part/system numbers available and administratively controlled? (DOE-STD-1062-DFT Abbreviations: 6.3.2)					
28.	When new abbreviations are required is the meaning obvious to the intended reader? (DOE-STD-1062-DFT Abbreviations: 6.3.2)					
29.	When using abbreviations are capital letters used with periods omitted and the same abbreviation used for all tenses and for singular and plural? (DOE-STD-1062-DFT Abbreviations: 6.3.2)					

CHECKLIST 12: LABELING

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
30.	Are labels consistent in the use of words, acronyms, abbreviations, and part/system numbers within and across similar facilities and equipment? (DOE-STD-1062-DFT Consistency: 6.3.3)					
31.	Is the nomenclature used in procedures consistent with that printed on labels? (DOE-STD-1062-DFT Consistency: 6.3.4)					
32.	While labels should have information critical to task-relevant identification are trade names and other irrelevant information avoided? (DOE-STD-1062-DFT Irrelevant Information: 6.3.5)					
33.	Are labels concise and unambiguous? (DOE-STD-1062-DFT Brevity: 6.4.1)					
34.	Is redundancy minimized? (DOE-STD-1062-DFT Brevity: 6.4.1)					
35.	Whenever possible and provided they express exactly what is intended are words chosen on the basis of operator familiarity? (DOE-STD-1062-DFT Familiarity: 6.4.2)					
36.	When the results will be unfamiliar to operating personnel is brevity avoided? (DOE-STD-1062-DFT Familiarity: 6.4.2)					
37.	Are abstract symbols used only when they have an accepted meaning to all intended readers? (DOE-STD-1062-DFT Familiarity: 6.4.2)					
38.	Are labels and placards designed to be read easily and accurately at the anticipated operational reading distances, vibration/motion environment, and illumination? (DOE-STD-1062-DFT Visibility and Legibility: 6.4.3)					
39.	Are labels and placards designed to accommodate the use of protective clothing/equipment which might affect vision? (DOE-STD-1062-DFT Visibility and Legibility: 6.4.3)					
40.	Does the character size approach 20' visual angle from the furthest viewing distance? (DOE-STD-1062-DFT Visibility and Legibility: 6.4.3)					

CHECKLIST 12: LABELING

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
41.	Are labels visible to an operator during control actuation and not covered or obscured by other units in the equipment assembly? (DOE-STD-1062-DFT Access: 6.4.4)					
42.	Are labels, markings, and signs positioned so that they are clearly visible to the shortest and tallest operators from normal work positions? (DOE-STD-1062-DFT Access: 6.4.4)					
43.	Is redundant labeling used for equipment such as pipes that take several turns and which are viewed from several planes or motors that can be viewed from two sides? (DOE-STD-1062-DFT Redundant Labeling: 6.4.5)					
44.	Are labels clear and distinct, with high contrast and mounted to minimize wear or obscurement by grease, grime, or dirt? (DOE-STD-1062-DFT Label Life: 6.4.6)					
45.	Do labels remain legible for the overhaul interval of the equipment on which they are mounted? (DOE-STD-1062-DFT Label Life: 6.4.6)					
46.	Are labels constructed of non-reflective materials? (DOE-STD-1062-DFT Label Reflectance: 6.4.7)					
47.	Where the ambient illumination will be above 10 lux are label characters dark on a light background? (DOE-STD-1062-DFT Contrast: 6.5.1)					
48.	Where dark adaptation is required are the displayed label letters or numerals visible without interfering with night vision requirements? (DOE-STD-1062-DFT Dark Adaptation: 6.5.2)					
49.	Are fonts selected in which letters and numerals are simple without flourishes and serifs? (DOE-STD-1062-DFT Style or Font: 6.5.3)					
50.	Are labels printed all capitals except abbreviations were lower case may clarify meaning? (DOE-STD-1062-DFT Labels: 6.5.4.1)					

CHECKLIST 12: LABELING

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
61.	Are periods omitted after abbreviations except where needed to prevent misinterpretation? (DOE-STD-1062-DFT Labels: 6.5.4.1)					
62.	Are legends printed in all capitals with no periods or commas? (DOE-STD-1062-DFT legends: 6.5.4.2)					
63.	Do instructional material placards upper and lower case as well as all capitals to enhance readability and clarity? (DOE-STD-1062-DFT Placards: 6.5.4.3)					
64.	Are signs all-capitals except when the sign is instructional and when the sign has several lines of extended sentences? (DOE-STD-1062-DFT Signs: 6.5.4.4)					
65.	Is the width-to-height ratio of letters between 1:1 and 3:5 with 3:5 preferred for most letters? (DOE-STD-1062-DFT letter Width: 6.5.5)					
66.	Is the width-to-height ratio of numerals 3:5 except for the "4" with a ratio of 4:5 and the "1" which is one stroke wide? (DOE-STD-1062-DFT Numeral Width: 6.5.6)					
67.	For black characters on a light background is the stroke width 1/6 to 1/7 of the height? (DOE-STD-1062-DFT Stroke Width, Normal: 6.5.7.1)					
68.	When dark adaptation is required or legibility at night is a critical factor are white characters on a black background used and is the character stroke width 1/7 to 1/10? (DOE-STD-1062-DFT Stroke Width, Dark Adaptation: 6.5.7.2)					
69.	Is the stroke width the same for all letters and numerals of equal height? (DOE-STD-1062-DFT Stroke Width, Dark Adaptation: 6.5.7.2)					
70.	For transilluminated characters is the stroke width between 1/8 and 1/12 with 1/10 preferred? (DOE-STD-1062-DFT Stroke Width, Transilluminated Characters: 6.5.7.3)					
71.	Are left and right margins a minimum width of one character? (DOE-STD-1062-DFT Margin Separation: 6.5.8)					

CHECKLIST 12: LABELING

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
72.	Is the minimum space between characters one stroke width? (DOE-STD-1062-DFT Character Spacing: 6.5.9)					
73.	Is the minimum space between words the width of one character? (DOE-STD-1062-DFT Width Spacing: 6.5.10)					
74.	Is the minimum space between lines one-half character height? (DOE-STD-1062-DFT Line Spacing: 6.5.11)					
75.	Is the height of letters and numerals determined by the required reading distance and luminance as stated in Table 14 DOE STD-1062-93? (DOE-STD-1062-DFT Label Size vs Luminance: 6.5.12)					
76.	For general dial and panel label design with luminance above 1 fL is the minimum character height six one thousandth of the viewing distance with a visual angle of at least 5.8 mrad? (DOE-STD-1062-DFT Character Height and Viewing Angle: 6.5.13)					
77.	Are stamped metal labels and stenciled labels avoided? (DOE-STD-1062-DFT Stenciled and Stamped Labels: 6.5.14)					
78.	Is each unit, assembly, subassembly, and user-interface part labeled with a clearly visible, legible, and meaningful name, number, code, mark, or symbol, as applicable? (DOE-STD-1062-DFT General Requirements: 6.6.1.1)					
79.	Is the gross identifying label on a unit, assembly or major subassembly located externally in a position not obscured by adjacent items on the flattest, most uncluttered surface available on the main chassis of the equipment in a way that minimizes wear or obscurement by grease, grime or dirt and in a way that precludes accidental removal, obstruction, or handling damage? (DOE-STD-1062-DFT Location: 6.6.1.2)					
80.	Do letters and numerals used on equipment labels correspond to sizes in Table 14 DOE STD-1062-DFT? (DOE-STD-1062-DFT Label Size vs Luminance: 6.6.2)					

CHECKLIST 12: LABELING

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
81.	Is equipment labeled with terms descriptive of the test or measurement applicable to their test points? (DOE-STD-1062-DFT Terms: 6.6.3)					
82.	Are controls and displays appropriately and clearly labeled with the basic information needed for proper identification, utilization, actuation, or manipulation of the element? (DOE-STD-1062-DFT General Requirements: 6.6.4.1)					
83.	Do control and display labels convey verbal meaning in the most direct manner using simple words and phrases and using only abbreviations familiar to operators? (DOE-STD-1062-DFT Simplicity: 6.6.4.2)					
84.	Is each control and display labeled according to equipment type, purpose, or function with names for different controls and displays distinct and according to a facility specific nomenclature? (DOE-STD-1062-DFT Functional Labeling: 6.6.4.3)					
85.	Are instruments labeled in terms of what is being measured and controlled, taking into account the user and the instrument's purpose? (DOE-STD-1062-DFT Functional Labeling: 6.6.4.3)					
86.	Does control labeling indicate the functional result of control movement and is the information visible during normal operation of the control? (DOE-STD-1062-DFT Functional Labeling: 6.6.4.3)					
87.	When controls and displays must be used together are appropriate labels provided indicating their functional relationship and is the selection and use of terminology consistent? (DOE-STD-1062-DFT Functional Labeling: 6.6.4.3)					
88.	Is ease of control operation given priority over visibility of control position labels? (DOE-STD-1062-DFT Location: 6.6.4.4)					
89.	Are labels normally placed above the controls and displays they describe? (DOE-STD-1062-DFT Location: 6.6.4.4)					

CHECKLIST 12: LABELING

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
91.	Are adjacent labels separated by sufficient space so that they are not read as one continuous label? (DOE-STD-1062-DFT Location: 6.6.4.4)					
92.	Are units of measurement labeled on the panel? (DOE-STD-1062-DFT Location: 6.6.4.4)					
93.	Are labels used to identify functionally grouped controls and displays? (DOE-STD-1062-DFT Location: 6.6.4.4)					
94.	Are labels for functional groups located above the groups? (DOE-STD-1062-DFT Location: 6.6.4.4)					
95.	When a line is used to enclose a functional group is the label centered above the group either in a break in the line or just below the line and when colored pads are used is the label centered at the top of the pad area? (DOE-STD-1062-DFT Location: 6.6.4.4)					
96.	Is label location throughout a system and within panel groupings uniform? (DOE-STD-1062-DFT Location: 6.6.4.4)					
97.	Is a hierarchical labeling scheme used on panels to reduce confusion and operator search time? (DOE-STD-1062-DFT Hierarchical Labeling: 6.6.4.5)					
98.	Are labels graduated in size by level with the dimensions of each character at least 25% larger than those of the next smaller label? (DOE-STD-1062-DFT Size Graduation: 6.6.4.6)					
99.	When label size graduation is used are components functionally grouped and demarcated or spaced to reveal system and subsystem grouping? (DOE-STD-1062-DFT Demarcation: 6.6.4.6.1)					
100.	Are components and other items located overhead and out of view identified by labels on walls with an arrow pointing in the direction of the item or by a label on the floor directly below the item? (DOE-STD-1062-DFT Overhead Items: 6.6.4.7)					

CHECKLIST 12: LABELING

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
101.	Are the contents of storage cabinets labeled on the outside of the cabinet? (DOE-STD-1062-DFT Storage Cabinets: 6.7.1)					
102.	Where useful are area maps used to show the location of rarely used protective gear and emergency safety equipment? (DOE-STD-1062-DFT Storage Cabinets: 6.7.1)					
103.	For large storage cabinets are labels centered about 61 in. (1560 mm) above floor level? (DOE-STD-1062-DFT Placement of Labels: 6.7.2)					
104.	Is a prominent redundant label that identifies the cabinet visible when the door is open so that the contents are still apparent? (DOE-STD-1062-DFT Placement of Labels: 6.7.2)					
105.	Are signs placed so that they fall within a $150 \pm 5^\circ$ angle from the normal line of sight commensurate with population height? (DOE-STD-1062-DFT Location of Signs: 6.8.1)					
105.	When a source of danger can be approached from different directions are multiple signs used? (DOE-STD-1062-DFT Location of Signs: 6.8.1)					
106.	Are most signs mounted securely in a fixed location? (DOE-STD-1062-DFT Location of Signs: 6.8.1)					
107.	Do safety signs indicate the level or seriousness of the hazard and its nature? (DOE-STD-1062-DFT Content of Signs: 6.8.2)					
108.	Do safety signs indicate the consequences of ignoring the sign if consequences are not obvious? (DOE-STD-1062-DFT Content of Signs: 6.8.2)					
109.	Are informal warning signs devised as quick expedients replaced as quickly as possible with attention-commanding signs? (DOE-STD-1062-DFT Use of Informal Warning Signs: 6.8.3)					
110.	Are safety signs formatted to command the observer's attention? (DOE-STD-1062-DFT Format: 6.8.4)					

CHECKLIST 12: LABELING

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
111.	Do caution signs use black on yellow? (DOE-STD-1062-DFT Format: 6.8.4)					
112.	Are warning signs white on red or red on white except when these signs are already standardized for the environment? (DOE-STD-1062-DFT Format: 6.8.4)					
113.	Is safety equipment, including first aid supplies, identified using green letters and symbols on a white background or vice versa? (DOE-STD-1062-DFT Format: 6.8.4)					
114.	Are nuclear radiation hazards identified using magenta characters and symbols on a yellow background? (DOE-STD-1062-DFT Format: 6.8.4)					
115.	Are general advisory signs formed with white on black and black on white character/background combinations? (DOE-STD-1062-DFT Format: 6.8.4)					
116.	In addition to labeling is operator performance enhanced through the use of location aids such as demarcation, color, and mimics? (DOE-STD-1062-DFT General: 6.9.1)					
117.	When lines of demarcation are used are they visually distinctive from the panel background? (DOE-STD-1062-DFT Demarcation: 6.9.2)					
118.	When used is color dedicated to specific functions throughout a control room or panel series? (DOE-STD-1062-DFT Color: 6.9.3)					
119.	Is color used to differentiate units in multiunit control rooms? (DOE-STD-1062-DFT Color: 6.9.3)					
120.	Is color used to differentiate trains and channels? (DOE-STD-1062-DFT Color: 6.9.3)					
121.	Is color used to differentiate vital busses? (DOE-STD-1062-DFT Color: 6.9.3)					
122.	Is color used to differentiate pipes? (DOE-STD-1062-DFT Color: 6.9.3)					

CHECKLIST 12: LABELING

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
123.	When mimics are used are flow paths color coded with mimic colors discriminably different from each other and contrasting adequately with the panel? (DOE-STD-1062-DFT Mimic Diagrams: 6.9.4)					
124.	Do mimic lines have differential line widths to code flow paths and is flow direction clearly indicated by distinctive arrowheads? (DOE-STD-1062-DFT Mimic Lines: 6.9.4.1)					
125.	Are all mimic origin and destination points labeled and component representations identified? (DOE-STD-1062-DFT Mimic Lines: 6.9.4.1)					
126.	Are graphic symbols used in mimics readily understood and do they use symbols and color consistently? (DOE-STD-1062-DFT graphic Symbols: 6.9.4.2)					
127.	When appropriate is bar coding used for inventory and management of parts, components, tools, and measuring & test Equipment along with document control and ID badges? (DOE-STD-1062-DFT Use: 6.10.1)					
128.	When bar coding is used are bar codes placed on materials in a conspicuous and readily accessible position? (DOE-STD-1062-DFT Placement: 6.10.2)					

CHECKLIST 12: LABELING

Table 14: Label size vs luminance.

Markings	Height*	
	3.5 cd.m ² (1 fL) or below	Above 3.5 cd/m ² (1 fL)
For critical markings, with position variable (e.g., numerals on counters and set table or movable scales)	5-8 mm (0.20-0.31 in.)	3-5 mm (0.12-0.20 in.)
For critical markings, with position fixed (e.g., numerals on fixed scales, controls, and switch markings, or emergency instructions)	4-8 mm (0.16-0.31 in.)	2.5-5 mm (0.10-0.20 in.)
For noncritical markings (e.g., identification labels, routine instructions, or markings required only for familiarization)	1.3-5 mm (0.05-0.20 in.)	1.3-5 mm (0.05-0.20 in.)

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CHECKLIST 13: REMOTE HANDLING

DATE: _____

REVIEWER: _____

DESCRIPTION OF REVIEWED SYSTEM(S): _____

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
1.	Are self-alignment devices provided for components which must be joined remotely? (MIL-STD-1472D: 5.10.1.1 Alignment)					
2.	Are quick-disconnect devices provided to reduce remote-handling difficulties? (MIL-STD-1472D: 5.10.1.1 Disconnect)					
3.	Are all fasteners captive and readily replaceable by remote-handling techniques? (MIL-STD-1472D: 5.10.1.3 Fasteners)					
4.	Are each lock or latching mechanism operable from a single point, have a positive catch, and provide a clear visual indication of the latch position? (MIL-STD-1472D: 5.10.1.4 Lock and Latching Mechanisms)					
5.	Is provisions provided for transmitting information from remote work areas to the operator of the remote-handling system? Visual information shall be regarded as most critical, followed, in order, by kinesthetic, tactual, and auditory feedback. (MIL-STD-1472D: 5.10.2 Feedback)					
6.	Are power manipulators provided with positive stops to prevent accidents? (MIL-STD-1472D: 5.10.3.1 Manipulators - Safety)					
7.	For tasks requiring manipulative dexterity and load capacities of less than 10 kg (22 lb.) are manipulators with position control (i.e. zero-order control in which the operator's control output directly determines the machine output) provided? (MIL-STD-1472D: 5.10.3.2.a Characteristics - Position Control)					
8.	For tasks requiring manipulative dexterity and load capacities of less than 10 kg (22 lb.) are manipulators with mutual force reflection between control and effector provided? (MIL-STD-1472D: 5.10.3.2.b Characteristics - Mutual Force Reflection)					

CHECKLIST 13: REMOTE HANDLING

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
9.	For tasks requiring manipulative dexterity and load capacities of less than 10 kg (22 lb.) are manipulators with seven degrees of freedom in motion and force control (i.e., three for translation, three for rotation, and one for gripping). (MIL-STD-1472D: 5.10.3.2.c Characteristics - Degrees of Freedom)					
10.	For tasks involving gross positioning of loads heavier than 10 kg (22 lb), are electrically or hydraulically powered manipulators with rate control provided (i.e., the operator's control output directly determines the rate of change of the machine output)? (MIL-STD-1472D: 5.10.3..3 Power Assist)					
11.	Is a viewing system provided which gives the operator of a remote manipulator adequate information with respect to the three spatial coordinates of the workspace? (MIL-STD-1472D: 5.10.4.1 Viewing Equipment - General)					
12.	When permitted by shielding requirements, are provisions made for the operator to view the work directly through shielding windows? (MIL-STD-1472D: 5.10.4.2 Viewing Equipment - Direct Viewing)					
13.	In order to avoid distortion, are requirements minimized for direct viewing of objects either near the viewing window or at line-of-sight angles at incidences greater than 60 degrees? (MIL-STD-1472D: 5.10.4.3 Viewing Equipment - Viewing Angle					
14.	Are viewing systems such as closed circuit television systems, periscopes, and microscopes, provided to supplement direct viewing, where required by specific remote-handling situations? (MIL-STD-1472D: 5.10.4.4 Viewing Equipment - Indirect Viewing)					
15.	Are symbol or pattern-coding used in preference to color-coding for television viewing? (MIL-STD-1472D: 5.10.4.5 Viewing Equipment - Coding)					

CHECKLIST 13: REMOTE HANDLING

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
16.	Are letters, numbers, and important details which must be viewed by means of television light against a dark background? Are glazed or reflecting surfaces avoided? (MIL-STD-1472D: 5.10.4.6 Viewing Equipment - Lettering)					
18.	Does the lighting provided in remote work areas such that reflected light, as measured at the operator's work station (in direct viewing), conform with the requirements of this MIL Standard, or as specified by the procuring activity? (MIL-STD-1472D: 5.10.5.1 Illumination - Reflected Light)					
19.	Is monochromatic lighting provided when viewing conditions are near threshold, when high magnification powers are required, or when the operator is required to view the work at high angles of incidence through refractive materials? (MIL-STD-1472D: 5.10.5.2 Illumination - Threshold Viewing)					

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CHECKLIST 14: ENVIRONMENT

DATE: _____

REVIEWER: _____

DESCRIPTION OF REVIEWED SYSTEM(S): _____

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
1.	When mobile personnel enclosures are used for detail work or occupied for extended periods of time is heating and air conditioning provided to maintain interior dry bulb temperature above 10°C and below 28°C? (DOE-STD-1062-DFT Heating/Air Conditioning: 8.1.1)					
2.	Within permanent and semi-permanent facilities is provision made to maintain temperature within the acceptable range of operative temperatures and humidity as defined in figure 45 DOE STD-1062-DFT? (DOE-STD-1062-DFT Heating/Air Conditioning: 8.1.1)					
3.	Are heating and air conditioning systems designed such that air is not directly discharged on personnel? (DOE-STD-1062-DFT Heating/Air Conditioning: 8.1.1)					
4.	Is the temperature difference between floor and head level less than 5.5°C? (DOE-STD-1062-DFT Temperature Uniformity: 8.1.1.1 & 8.1.5)					
5.	Is adequate ventilation assured by introducing fresh air into any personnel enclosure? (DOE-STD-1062-DFT ventilation: 8.1.2)					
6.	If the enclosure volume is ≤ to 4.25 m ³ per person is a minimum of 0.85 m ³ per minute of air ventilation introduced into the enclosure? (DOE-STD-1062-DFT ventilation: 8.1.2)					
7.	Is the velocity of ventilation air moving past personnel less than 60 m per minute and where manuals or loose papers are used is airspeed less than 30 m per minute? (DOE-STD-1062-DFT ventilation: 8.1.2)					

CHECKLIST 14: ENVIRONMENT

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
8.	Is ventilation or other protective measures provided to keep gases, vapors, dust, and fumes within the permissible exposure limits specified by 29CFR1910? (DOE-STD-1062-DFT ventilation: 8.1.2)					
9.	Is the effective temperature within personnel enclosures used for detail work and/or for extended periods of time maintained at or below 29.5°C and are air conditioning systems designed so that cold-air discharge is not directed on personnel? (DOE-STD-1062-DFT Air Conditioning: 8.1.3)					
10.	Is the humidity regulated so that approximately 45% relative humidity is provided at 21°C? (DOE-STD-1062-DFT Humidity: 8.1.4)					
11.	When special protective clothing or personnel equipment is required and worn is a micro-climate between 20°C, 14 mm Hg ambient water vapor pressure and 35°C, 3 mm Hg ambient water vapor pressure maintained? (DOE-STD-1062-DFT Personal Equipment Thermal Control: 8.1.6)					
12.	Are temperature and humidity exposure controlled so that they do not exceed effective temperature limits when corrected for air velocity? (DOE-STD-1062-DFT Thermal Tolerance and Comfort Zones: 8.1.7)					
13.	Where hard physical work is to be required for more than two hours is an environment provided that does not exceed a wet bulb or Wet Dry index of 25°C? (DOE-STD-1062-DFT Limited Thermal Tolerance Zones: 8.1.8)					
14.	Where the wearing of protective clothing systems is required is the Wet Dry index reduced by 5°C for complete chemical and radiation protective clothing and 4°C for intermediate clothing systems? (DOE-STD-1062-DFT Limited Thermal Tolerance Zones: 8.1.8)					

CHECKLIST 14: ENVIRONMENT

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
15.	Where equipment is to be used in enclosures and is not subject to blackout or special low-level lighting requirements do illumination levels conform to table 17 of DOE STD-1062-DFT? (DOE-STD-1062-DFT Illuminance: 8.2.1)					
16.	Is the capability for dimming illumination provided? (DOE-STD-1062-DFT Illuminance: 8.2.1)					
17.	Is adequate illumination provided for maintenance tasks? (DOE-STD-1062-DFT Illuminance: 8.2.1)					
18.	Is both general and supplemental lighting used as appropriate to ensure that illumination is compatible with each task situation? (DOE-STD-1062-DFT Illuminance: 8.2.1)					
19.	Is portable lighting provided for personnel performing visual tasks in areas where fixed illumination is not provided? (DOE-STD-1062-DFT Illuminance: 8.2.1)					
20.	Does display lighting conform to recommendations in table 18 of DOE STD-1062-DFT? (DOE-STD-1062-DFT Illuminance: 8.2.1)					
21.	Wherever it is necessary for personnel to remain at their machines or station to run or shut down equipment is emergency lighting provided to conform with 29CFR1910.261(b)7? (DOE-STD-1062-DFT emergency Lighting: 8.2.2a)					
22.	Is emergency lighting provided at stairways, passageways, or aisle ways to be used by personnel for emergency exit? (DOE-STD-1062-DFT emergency Lighting: 8.2.2b)					
23.	Is emergency lighting provided in all first aid and medical facilities? (DOE-STD-1062-DFT emergency Lighting: 8.2.2c)					
24.	For low levels of illumination requiring dark adaptation do labels use white marking on a dark background and for luminance levels below 3.5 cd/m ² is stroke width and letter height increased? (DOE-STD-1062-DFT Label Design: 8.2.3)					

CHECKLIST 14: ENVIRONMENT

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
25.	Are personnel provided with an acoustical environment that will not cause personnel injury; will not interfere with communications; will not cause fatigue; or in any way degrade overall system effectiveness? (DOE-STD-1062-DFT Noise General: 8.3.1)					
26.	If hazardous noise conditions exist are warnings posted and hearing protection provided? (DOE-STD-1062-DFT Noise General: 8.3.1)					
27.	Is exposure time to noise over 90 dB(A) limited in accordance with table 19 of DOE STD-1062-DFT? (DOE-STD-1062-DFT Hazardous Noise: 8.3.2)					
28.	Whenever personnel noise exposure equals or exceeds an 8-hour average of 85 dB(A) is there a monitoring program and is hearing protection provided in accordance with OSHA 29CFR1910-95? (DOE-STD-1062-DFT Hazardous Noise: 8.3.2)					
29.	Does the noise level in the workspace permit necessary direct (person-to-person) and telephone communication (reference figure 46 DOE STD-1062-DFT)? (DOE-STD-1062-DFT Non-Hazardous Noise: 8.3.3)					
30.	Is the noise level compatible with an acceptable acoustical work environment? (DOE-STD-1062-DFT Non-Hazardous Noise: 8.3.3)					
31.	Is the noise level less than 75 dB(A) in areas requiring occasional telephone use or occasional direct communication at distances up to 5 ft. (1.5 m)? (DOE-STD-1062-DFT General Workspaces: 8.3.4)					
32.	Is the noise level less than 65 dB(A) in areas requiring frequent telephone use or occasional direct communication at distances up to 5 ft. (1.5 m)? (DOE-STD-1062-DFT Operational Areas: 8.3.5)					
33.	Is the noise level less than 55 dB(A) in areas requiring no difficulty with telephone use or occasional direct communication at distances up to 15 ft. (4.6 m)? (DOE-STD-1062-DFT Large Workspaces: 8.3.6)					

CHECKLIST 14: ENVIRONMENT

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
34.	Is the noise level less than 45 dB(A) in areas requiring no difficulty with direct communication? (DOE-STD-1062-DFT Special Areas: 8.3.7)					
35.	Is the noise level less than 35 dB(A) in areas requiring extreme quiet? (DOE-STD-1062-DFT Extreme Quiet Areas: 8.3.8)					
36.	In the design of a work space or facility is the ambient noise level controlled to the extent feasible through effective sound reduction or attenuation to meet the criteria? (DOE-STD-1062-DFT Facility Design: 8.3.9)					
37.	Are acoustic materials with high sound absorption coefficients provided as necessary in the construction of floors, walls, and ceiling to affect the required sound control? (DOE-STD-1062-DFT Attenuation: 8.3.9.1)					
38.	In the physical design and layout of rooms and work stations is excessive noise attenuated by staggering walls, doors in corridors or between rooms, and by using thick-paned or double-paned windows? (DOE-STD-1062-DFT Attenuation: 8.3.9.1)					
39.	Where speech communication is a consideration is the acoustical treatment of facilities sufficient to reduce reverberation time to the limits in figure 47 of DOE STD-1062-DFT? (DOE-STD-1062-DFT Reduction of Reverberation Time: 8.3.9.2)					
40.	Are vehicles designed to control the transmission of whole body vibrations to levels that will permit safe operation and maintenance as given in figure 48 of DOE STD-1062-DFT? (DOE-STD-1062-DFT Vehicular Vibration: 8.4.1.1)					
41.	In order to protect human health is the whole body vibration less than twice the acceleration values shown in figure 48 of DOE STD-1062-DFT? (DOE-STD-1062-DFT Safety Level: 8.4.1.2)					

CHECKLIST 14: ENVIRONMENT

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
42.	Where proficiency is required for operational and maintenance tasks is the whole body vibration within the values shown on figure 48 of DOE STD-1062-DFT? (DOE-STD-1062-DFT Proficiency Level: 8.4.1.3)					
43.	Where comfort is to be maintained are the acceleration values in figure 48 of DOE STD-1062-DFT reduced by dividing by 3.15? (DOE-STD-1062-DFT Comfort Level: 8.4.1.4)					
44.	Are buildings intended for occupation by humans designed/located to control the transmission of whole body vibration levels as specified by ISO 2631? (DOE-STD-1062-DFT Building Vibrations: 8.4.2)					
45.	Where whole body vibrations of the operator or parts of the are not a factor are equipment oscillations controlled so that they do not impair human performance with respect to control manipulations or with respect to the legibility of numerals or letters? (DOE-STD-1062-DFT Equipment Vibration: 8.4.3)					

CHECKLIST 14: ENVIRONMENT

Table 17: Specific task illumination requirements.

Illumination levels		
Work area or type of task	Luc* fc	
	Recommended	Minimum
Bench work		
rough	540 (50)	325 (30)
medium	810 (75)	540 (50)
fine	1615 (150)	1075 (100)
extra fine	3230 (300)	2155 (200)
Business machine operation (calculator, digital, input, etc.)	1075 (100)	540 (50)
Console surface	540 (50)	325 (30)
Corridors	215 (20)	110 (10)
Circuit diagram	1075 (100)	540 (50)
Dials	540 (50)	325 (30)
Electrical equipment testing	540 (50)	325 (30)
Emergency lighting	NA	30 (3)
Gages	504 (50)	320 (30)
Hallways	215 (20)	110 (10)
Inspection tasks, general		
rough	540 (50)	325 (30)
medium	1075 (100)	540 (50)
Meters	540 (50)	325 (30)
Office work, general	755 (70)	540 (50)
Ordinary seeing tasks	540 (50)	325 (30)
Panels:		
front	540 (50)	325 (30)
rear	325 (30)	110 (10)
Passageways	215 (20)	110 (10)

CHECKLIST 14: ENVIRONMENT

Table 17: Specific task illumination requirements (continued).

Illumination levels		
Work area or type of task	Luc* fc	
	Recommended	Minimum
Reading:		
large print	325 (30)	110 (90)
newsprint	540 (50)	325 (30)
handwritten reports, in pencil	755 (70)	540 (50)
small type	755 (70)	540 (50)
prolonged reading	755 (70)	540 (50)
Recording	755 (70)	540 (50)
Repair work:		
general	540 (50)	325 (30)
instrument	2155 (200)	1075 (100)
Scales	540 (50)	325 (30)
Stairways	215 (20)	110 (10)
Storage:		
inactive or dead	55 (5)	30 (3)
general warehouse	110 (10)	55 (5)
live, rough or bulk	110 (10)	55 (5)
live, medium	325 (30)	215 (20)
live, fine	540 (50)	325 (30)
Switchboards	540 (50)	325 (30)
Tanks, containers	215 (20)	110 (10)
Testing:		
rough	540 (50)	325 (30)
fine	1075 (100)	540 (50)
extra fine	2155 (200)	1075 (100)
Transcribing and tabulation	1075 (100)	540 (50)

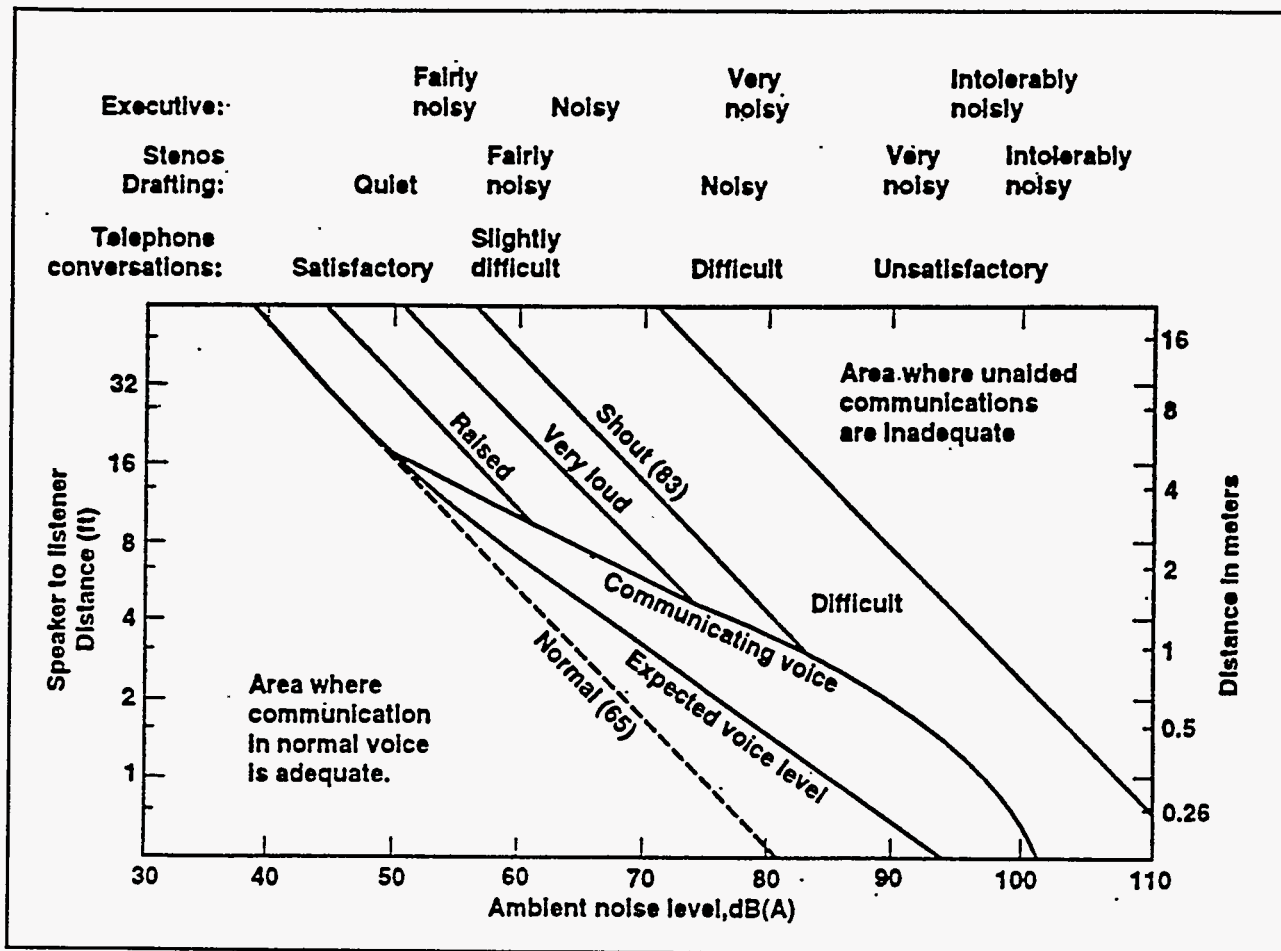
CHECKLIST 14: ENVIRONMENT

Table 19: Permissible noise exposures.

Duration per day, hours	Sound level dBA slow response
8	90
6	92
4	95
3	97
2	100
1-1/2	102
1	105
1/2	110
1/4	115

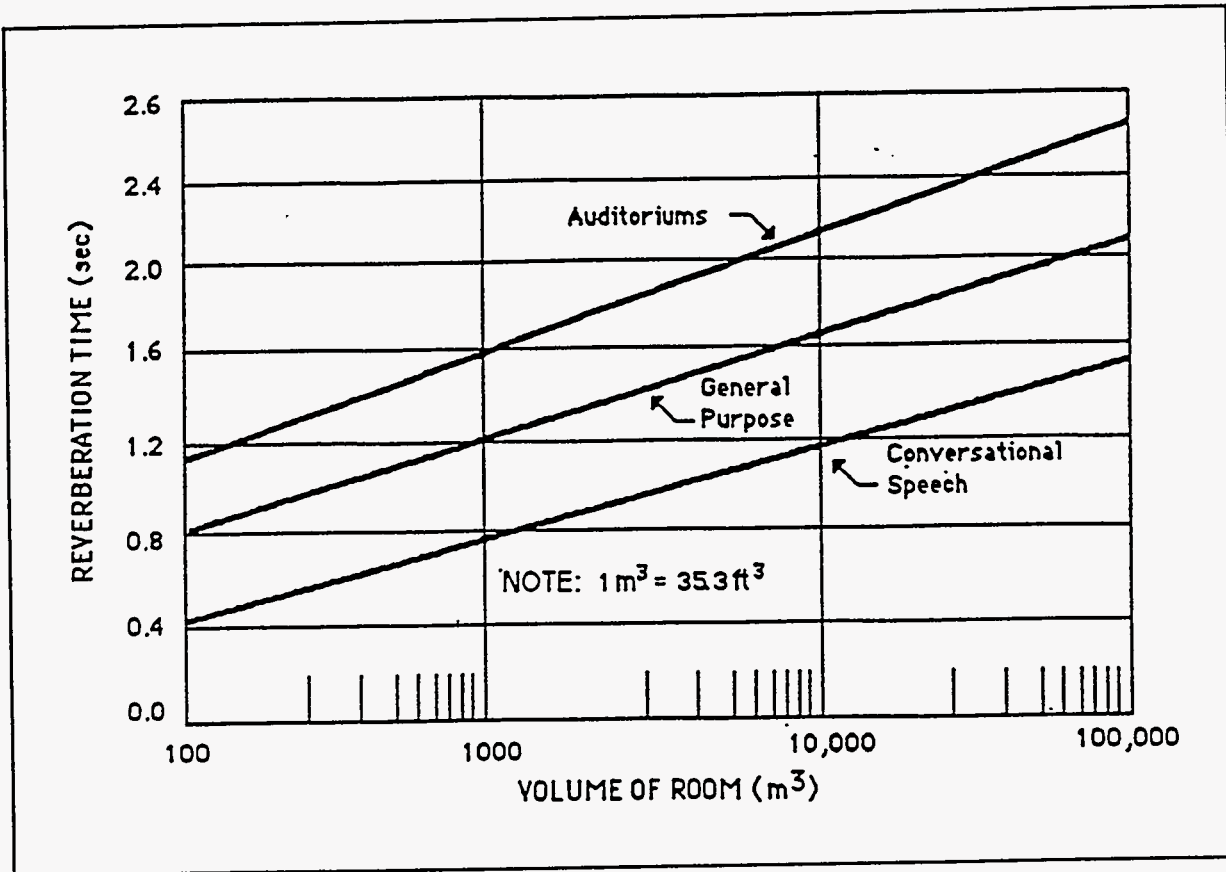
CHECKLIST 14: ENVIRONMENT

Figure 46: Permissible distance between speaker and listener.



CHECKLIST 14: ENVIRONMENT

Figure 47: Range of acceptable reverberation time.



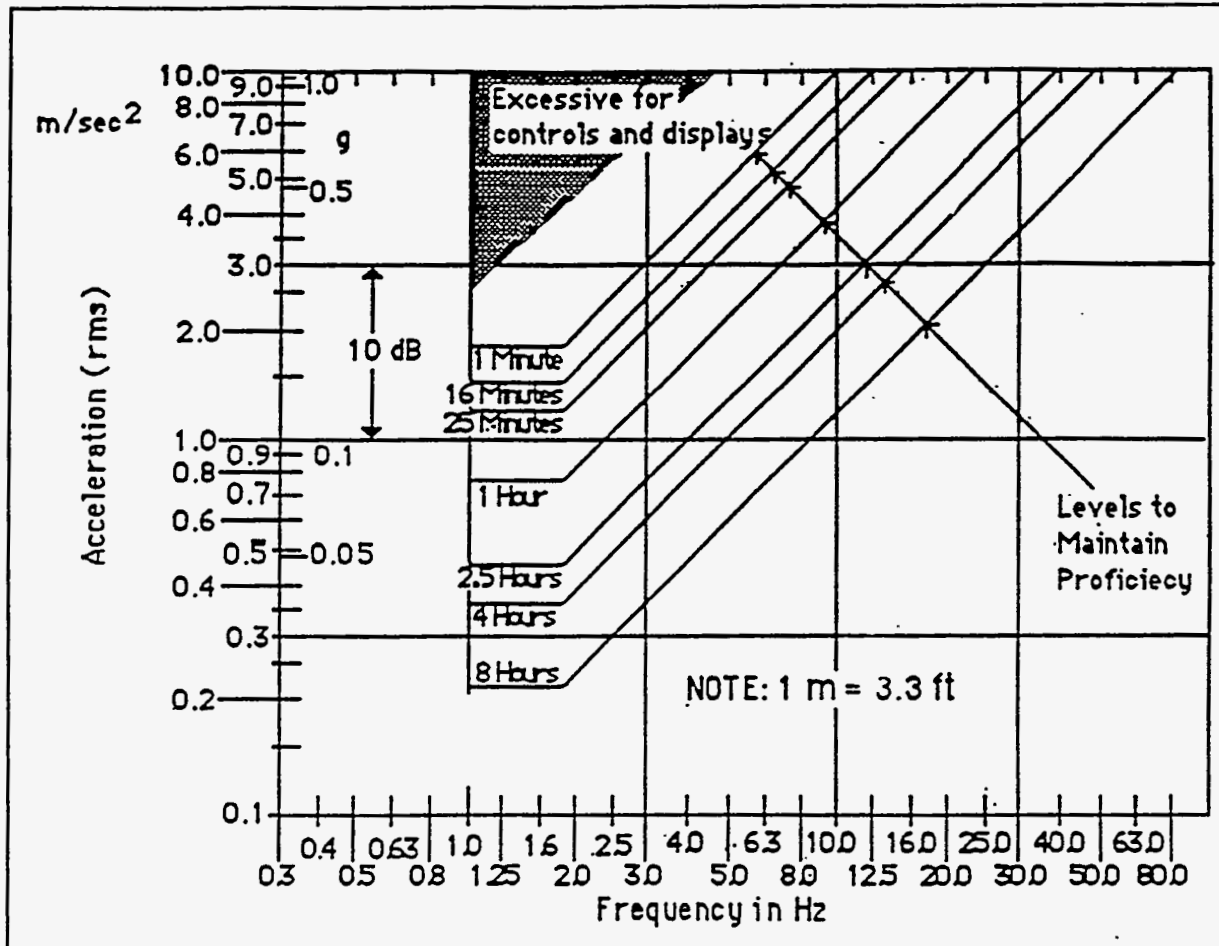
CHECKLIST 14: ENVIRONMENT

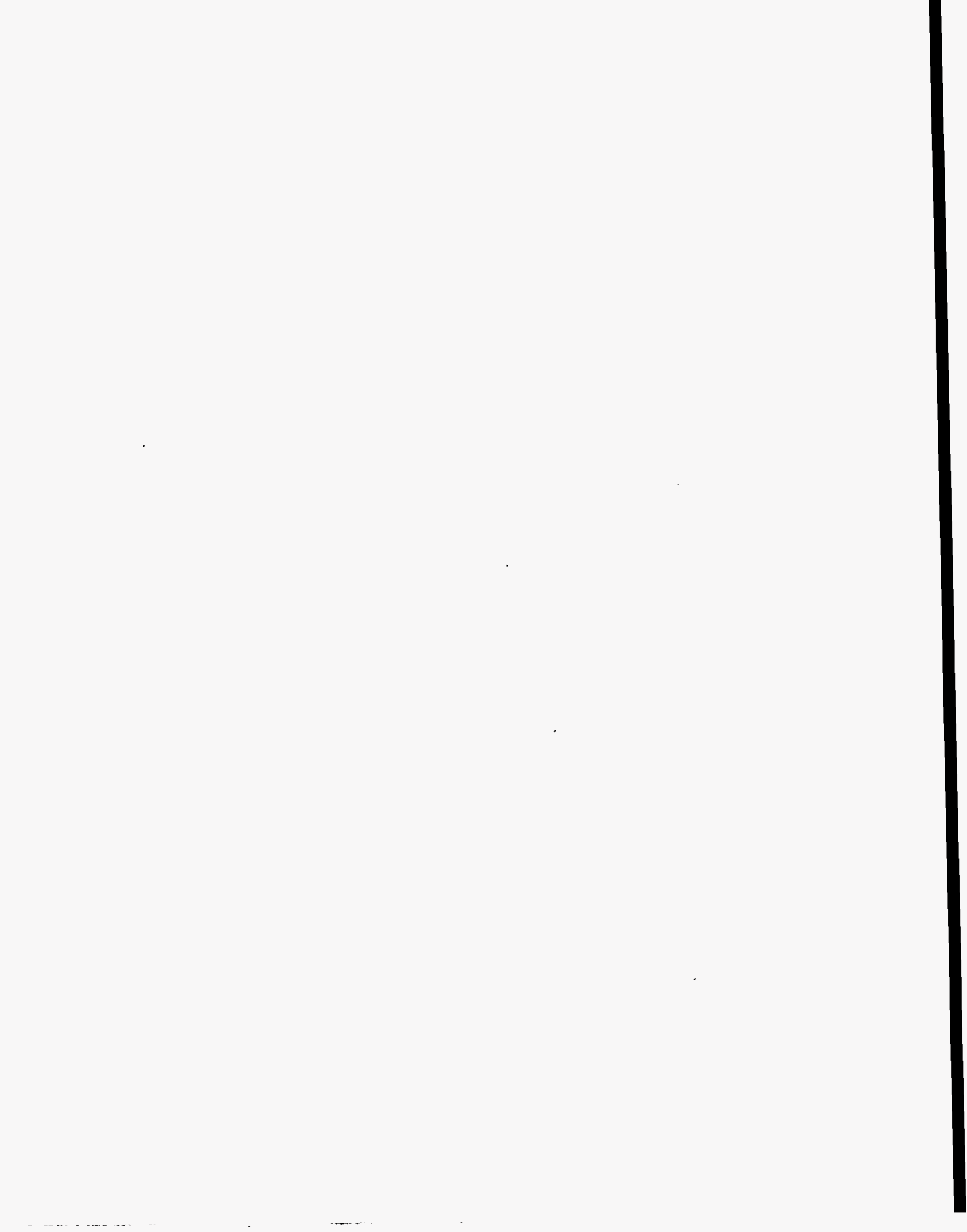
Table 20: Temperature limits.

Exposure	Metal	Glass	Plastic or Wood
Momentary contact	60°C (140°F)	68°C (154°F)	85°C (185°F)
Prolonged contact	49°C (120°F)	59°C (138°F)	69°C (156°F)
Momentary contact	0°C (32°F)	0°C (32°F)	0°C (32°F)
Prolonged contact	0°C (32°F)	0°C (32°F)	0°C (32°F)

CHECKLIST 14: ENVIRONMENT

Figure 48: Vibration exposure criteria for transverse direction with respect to body axis.





CHECKLIST 15: OPERATION & MAINTENANCE: VEHICLES

DATE: _____

REVIEWER: _____

DESCRIPTION OF REVIEWED SYSTEM(S): _____

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
1.	Are handles, levers, pedals, knobs, and work space dimensions designed to enhance effective vehicle operation by suitably clothed and equipped users? (DOE-STD-1062-DFT General Dimensions: 9.1)					
2.	Do seats adjust at least 150 mm in the fore-aft direction? (DOE-STD-1062-DFT Horizontal Adjustment: 9.2.1)					
3.	Is the back-rest angle less than 110° from horizontal and if only the lumbar area is supported is the tilt angle between 95 and 100°? (DOE-STD-1062-DFT Back-Rest Angle: 9.2.2)					
4.	Is the seat pan flat and made from rigid material with a backward slope of 5-8° from horizontal? (DOE-STD-1062-DFT Seat Pan: 9.2.3)					
5.	Is the seat padding minimum with resiliency to keep the operator's body from contacting the seat bottom during severe vibration? (DOE-STD-1062-DFT Seat Padding: 9.2.4)					
6.	When seat padding is made of foam-type material is it adequately ventilated? (DOE-STD-1062-DFT Seat Padding: 9.2.4)					
7.	Are seat belts installed on all vehicles except when they interfere with safety of operational tasks? (DOE-STD-1062-DFT Seat Belts: 9.2.5)					
8.	Are controls designed so they cannot be adversely affected by distortion, shock, or vibration of the vehicle? (DOE-STD-1062-DFT Design: 9.3.1)					
9.	Except for established uses where maximum wheel deflection does not exceed 120° are all steering wheels round? (DOE-STD-1062-DFT Steering Wheel Shape: 9.3.2.1)					

CHECKLIST 15: OPERATION & MAINTENANCE: VEHICLES

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
10.	Are steering systems designed so that the maximum turning limits of the vehicle can be achieved with no more than 3½ turns if the steering systems are consistent with force limits of figure 24 in DOE STD-1062-DFT? (DOE-STD-1062-DFT Steering Ratio: 9.3.2.2)					
11.	Is the steering system designed with sufficient mechanical advantage to meet the force requirements of figure 24 in DOE STD-1062-DFT even in the event of a power failure? (DOE-STD-1062-DFT Power Steering Failure: 9.3.2.3)					
12.	Are foot pedals designed to accept the weight of the operator's foot without initiating control action? (DOE-STD-1062-DFT Pedals: 9.3.3)					
13.	Does the operation of switches or controls that initiate hazardous operations require the prior operation of a locking control? (DOE-STD-1062-DFT Control of Hazardous Operation: 9.3.4)					
14.	Are operating instructions provided for all vehicles and vehicle equipment except where the mode of operation is obvious to all potential operators? (DOE-STD-1062-DFT Provision of Operating Instructions: 9.4.1)					
15.	Are operating instructions placed so that they are easily read from the user's normal operating position without obscuring user visibility or build in vehicular displays? (DOE-STD-1062-DFT Provision of Operating Instructions: 9.4.1)					
16.	Is information presented in the form of diagrams whenever possible? (DOE-STD-1062-DFT Format: 9.4.2)					
17.	Is maximum permissible road speeds in each gear and range indicated? (DOE-STD-1062-DFT Speed Notice: 9.4.3)					
18.	On vehicles in which road speeds are limited by engine speed is there a red line on the tachometer? (DOE-STD-1062-DFT Speed Notice: 9.4.3)					

CHECKLIST 15: OPERATION & MAINTENANCE: VEHICLES

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
19.	Are the operating positions of shift handles illustrated? (DOE-STD-1062-DFT Shift Handle Positions: 9.4.4)					
20.	Are control movements shown in planes parallel to the movement of the actual controls? (DOE-STD-1062-DFT Control Movement: 9.4.4)					
21.	Do identification and instruction markings conform to the criteria for labeling in DOE STD-1062-DFT? (DOE-STD-1062-DFT General Labeling Criteria: 9.4.6)					
22.	Are indicators required by vehicle operators during night operation illuminated? (DOE-STD-1062-DFT Night Operation: 9.5.1)					
23.	Is display luminance adjustable from 0.1 to 3.5 cd/m ² ? (DOE-STD-1062-DFT Night Operation: 9.5.1)					
24.	When blackout lighting systems are required are they designed to preclude accidental operation of external lights and signals? (DOE-STD-1062-DFT Night Operation: 9.5.1)					
25.	Does the operator have forward visibility through a lateral visual field of at least 180° and preferably 220°? (DOE-STD-1062-DFT Visual Field: 9.5.2)					
26.	Are trucks designed to enable the operator in the normal operating position to view the ground at all distances beyond 3 m in front of the vehicle and have upward visibility of at least 15° above the horizontal? (DOE-STD-1062-DFT Ground View: 9.5.3)					
27.	Are side and rear enclosures designed to permit the operator to view the rear of the vehicle to observe the load and to facilitate trailer attachment and backing maneuvers? (DOE-STD-1062-DFT Rear View: 9.5.4)					
28.	Are DOT approved mirror and spotter rear view mirror provided on each side of the cab and located in a manner that affords the operator rearward vision from the normal operating position? (DOE-STD-1062-DFT Rear View: 9.5.5)					

CHECKLIST 15: OPERATION & MAINTENANCE: VEHICLES

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
29.	Are visors or other appropriate means used to preclude performance degradation due to glare from external sources? (DOE-STD-1062-DFT Glare: 9.5.6)					
30.	Tinting or coloring is not used on windshields or other transparent areas through which high acuity vision is required? (DOE-STD-1062-DFT Glare: 9.5.6)					
31.	Is the transparent material used for windshields and windows shatter-proof and does it neither distort nor obscure vision? (DOE-STD-1062-DFT Windshields and Windows: 9.5.7)					
32.	Are windshield wipers and washers provided and do the blades return to the stored position when turned OFF and is there provision for manual operation in the event of power failure? (DOE-STD-1062-DFT Windshield Wipers and Washers: 9.5.8)					
33.	Does the configuration of fork lift mechanisms and fork lift truck cabs permit the operator to have direct view of the tips of the forks in all typical modes of material loading and in all likely operator positions? (DOE-STD-1062-DFT Fork Lifts: 9.5.9)					
34.	Are all special purpose DOE vehicles equipped with an operable horn at the operator's station that is distinguishable from the surrounding noise? (DOE-STD-1062-DFT Horns: 9.6.1)					
35.	Are all special purpose DOE vehicles equipped with an audible back-up alarm that is distinguishable from the surrounding noise? (DOE-STD-1062-DFT Back-Up Alarms: 9.6.2)					
36.	Is the positioning of equipment and loads facilitated by using center-of-gravity identification, matching guidelines, identification of attaching points, and detachable probes? (DOE-STD-1062-DFT General: 9.7.1)					
37.	The use of latches on control levers does not cause delay in operation? (DOE-STD-1062-DFT General: 9.7.1)					

CHECKLIST 15: OPERATION & MAINTENANCE: VEHICLES

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
38.	Are all controls used with lifting equipment labeled as to function and direction of movement and do they conform to normal movement relationships? (DOE-STD-1062-DFT Control Labels: 9.7.2)					
39.	Are controls placed within convenient reach of the seated operator and does the placement afford optimum visibility of the load at all times? (DOE-STD-1062-DFT Control Placement: 9.7.3)					
40.	Is the use of foot-operated controls avoided for precise adjustments or movements? (DOE-STD-1062-DFT Foot-Operated Controls: 9.7.4)					
41.	Do foot operated brake pedals that require locking lock by foot action alone? (DOE-STD-1062-DFT Foot-Operated Controls: 9.7.4)					
42.	For ease of operation do pedals rise from the depressed position in a backward as well as vertical movement? (DOE-STD-1062-DFT Foot-Operated Controls: 9.7.4)					
43.	Is the load capacity of the equipment indicated using a substantial and durable rating chart that is clearly legible and easily visible to the operator while seated at has control station? (DOE-STD-1062-DFT Load Capacity: 9.7.5)					
44.	Are load-indicating devices used for all loads where it is possible the maximum or rated capacity of any portion of the lifting system could be exceeded? (DOE-STD-1062-DFT Load-Indicating Devices: 9.7.6)					
45.	Are audible warning devices provided to indicate that allowable load is being exceeded? (DOE-STD-1062-DFT Load-Indicating Devices: 9.7.6)					
46.	Is a maximum unobstructed view of the work visible to a suitably clothed and equipped user with relevant body dimensions varying between 5th and 95th percentiles? (DOE-STD-1062-DFT Visibility: 9.7.7)					

CHECKLIST 15: OPERATION & MAINTENANCE: VEHICLES

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
47.	Are holding brakes on hoists applied automatically when power is removed with at least one holding brake applied directly to the motor shaft or some part of the gear train? (DOE-STD-1062-DFT Brakes for Hoists: 9.7.6)					
48.	When power-operated brakes with no continuous mechanical linkage between actuating and braking are used is an automatic mechanism provided to set the brake when power is removed? (DOE-STD-1062-DFT Brakes for Hoists: 9.7.6)					
49.	Are cranes provided with an overtravel-limit switch in the hoisting direction to stop the hoisting motion? (DOE-STD-1062-DFT Brakes for Hoists: 9.7.6)					
50.	Are lower-travel limit switches used for all hoists where the load block enters pits or hatchways? (DOE-STD-1062-DFT Brakes for Hoists: 9.7.6)					
51.	Do access dimensions for construction machinery conform to SAE J925 as applicable? (DOE-STD-1062-DFT Access: 9.7.10)					
52.	For cab operated cranes are there at least two means of egress from the crane, remote from each other, to permit departure under emergency conditions? (DOE-STD-1062-DFT Egress: 9.7.11)					
53.	Are suitable handholds and footholds provided to facilitate personnel access and movement? (DOE-STD-1062-DFT Handholds and Footholds: 9.7.12)					

CHECKLIST 16: HAZARDS & SAFETY

DATE: _____

REVIEWER: _____

DESCRIPTION OF REVIEWED SYSTEM(S): _____

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
1.	Does the design reflect the safety-related human ergonomics/factors engineering criteria in DOE STD-1062-DFT and conform to OSHA 19CFR1910? (DOE-STD-1062-DFT General: 10.1)					
2.	Are conspicuous placards mounted adjacent to any equipment that presents a hazard to personnel? (DOE-STD-1062-DFT Warning Placards: 10.2.1)					
3.	Where applicable is the center of gravity and the weight of equipment distinctly marked? (DOE-STD-1062-DFT Center-of-Gravity and Weight: 10.2.2)					
4.	Is the weight capacity indicated on stands, hoists, lifts, jacks, and similar weight-bearing equipment to prevent overloading? (DOE-STD-1062-DFT Weight Capacity: 10.2.3)					
5.	Are areas of operation or maintenance where special protective clothing, tools, or equipment are necessary specifically identified? (DOE-STD-1062-DFT Identification of Protective Items: 10.2.4)					
6.	Are "NO-STEP" markings provided when necessary to prevent injury to personnel or damage to equipment? (DOE-STD-1062-DFT "NO-STEP" Markings: 10.2.5)					
7.	Are all receptacles marked with their voltage, phase, and frequency characteristics as appropriate? (DOE-STD-1062-DFT Electrical Labels: 10.2.6)					
8.	Does all electrical equipment have on it descriptive markings by which the organization responsible for the product can be identified? (DOE-STD-1062-DFT Electrical Labels: 10.2.6)					

CHECKLIST 16: HAZARDS & SAFETY

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
9.	Does all electrical equipment have on it markings giving voltage, current, wattage, or other ratings as necessary? (DOE-STD-1062-DFT Electrical Labels: 10.2.6)					
10.	Are disconnect and overcurrent devices legibly marked to indicate their purpose? (DOE-STD-1062-DFT Electrical Labels: 10.2.6)					
11.	Do the markings retain their legibility and location in the item's operating environment? (DOE-STD-1062-DFT Electrical Labels: 10.2.6)					
12.	Are hand grasp areas conspicuously and unambiguously identified on the equipment? (DOE-STD-1062-DFT Hand Grasp Areas: 10.2.7)					
13.	Are pipe, hose, and tube lines for liquids, gas, steam, etc. clearly and unambiguously labeled or coded as to contents, pressure, heat, cold, or other specific hazardous properties? (DOE-STD-1062-DFT Pipe, Hose, and Tube line Identification: 10.3)					
14.	Is a hazard alerting device provided to warn personnel of impending danger or existing hazards? (DOE-STD-1062-DFT Alerting Device: 10.4.1)					
15.	Are emergency doors and exits constructed in accordance with OSHA 29CFR1910.147? (DOE-STD-1062-DFT emergency Doors and Exits: 10.4.2)					
16.	Are emergency doors and exits simple to operate? (DOE-STD-1062-DFT Emergency Doors and Exits: 10.4.2a)					
17.	Are emergency doors and exits readily accessible? (DOE-STD-1062-DFT Emergency Doors and Exits: 10.4.2b)					
18.	Are emergency doors and exits clearly designated? (DOE-STD-1062-DFT Emergency Doors and Exits: 10.4.2c)					
19.	Are emergency doors and exits unobstructed? (DOE-STD-1062-DFT Emergency Doors and Exits: 10.4.2d)					

CHECKLIST 16: HAZARDS & SAFETY

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
20.	Are emergency doors and exits simple to locate and operate in the dark? (DOE-STD-1062-DFT Emergency Doors and Exits: 10.4.2e)					
21.	Do emergency doors and exits require between 44-133 N of operating force to open? (DOE-STD-1062-DFT Emergency Doors and Exits: 10.4.2f)					
22.	Emergency doors and exits do not themselves or in operation constitute a safety hazard? (DOE-STD-1062-DFT Emergency Doors and Exits: 10.4.2g)					
23.	Are emergency doors and exits quick opening in five seconds or less? (DOE-STD-1062-DFT Emergency Doors and Exits: 10.4.2h)					
24.	Do emergency doors and exits permit one person egress in 5 seconds or less? (DOE-STD-1062-DFT Emergency Doors and Exits: 10.4.2i)					
25.	Do emergency doors and exits push to open to exit with the exception of reactor containment and similar special purpose areas? (DOE-STD-1062-DFT Emergency Doors and Exits: 10.4.2j)					
26.	Do stairs, including incline, step risers, and treads, conform to standard safe design practice including skid-proof flooring, stair, and step treads? (DOE-STD-1062-DFT Stairs: 10.4.3)					
27.	Is the workspace around areas where maintenance is performed free of obstructions which could cause injury to personnel? (DOE-STD-1062-DFT Obstructions: 10.4.4)					
28.	Is adequate illumination provided in all areas? (DOE-STD-1062-DFT Illumination: 10.4.5)					
29.	Are warning placards, stairways, and all hazardous areas illuminated in accordance with table 17 of DOE STD-1062-DFT? (DOE-STD-1062-DFT Illumination: 10.4.5)					

CHECKLIST 16: HAZARDS & SAFETY

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
30.	When normal equipment operation exposes personnel to surface temperature greater or less than those shown in table 20 in DOE STD-1062-DFT is the equipment guarded? (DOE-STD-1062-DFT Thermal Contact Hazards: 10.4.6)					
31.	If the workplace contains hazardous confined spaces are personnel informed of these spaces by posting danger signs or by any other equally effective means of the existence and location of the danger posed by these spaces? (DOE-STD-1062-DFT Danger Signs: 10.5.1)					
32.	Is access to hazardous spaces controlled to prevent unauthorized access and has a written hazardous space entry program been developed? (DOE-STD-1062-DFT Space Entry Program: 10.5.2)					
33.	Does the hazardous space entry program ensure personnel and equipment safety by qualifying personnel before entering hazardous spaces and examining/monitoring personnel who enter the space, and by developing and implementing procedures for rescue and emergency services? (DOE-STD-1062-DFT Space Entry Program: 10.5.2)					
34.	Are the following types of safety equipment provided as necessary for conditions in the confined space: a. Testing and monitoring equipment b. Ventilating or purging equipment c. Personal protective equipment d. Lighting equipment e. Barriers and shields f. Ingress and egress equipment (i.e. ladders) g. Rescue and emergency equipment (Safety Equipment: 10.5.3)					
35.	Are personnel who will be entering the hazardous confined space given training so that they will acquire the necessary understanding, knowledge, and skills to qualify for work assignments in the subject area? (DOE-STD-1062-DFT Personnel Qualifications: 10.5.4)					

CHECKLIST 16: HAZARDS & SAFETY

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
36.	Where applicable do personnel receive a physical examination for know effects of work in this space when they exit from the hazardous space? (DOE-STD-1062-DFT Personnel Examination: 10.5.5)					
37.	Do workspaces that may be potentially contaminated have a specified access control area and is there space for clean and contaminated waste containers, step-off pads, boundary markers or mounts, a frisking and air sampling station, status posting, anti-contamination clothing and supplies, paperwork, a writing area, and appropriate lighting? (DOE-STD-1062-DFT Access Control Points: 10.6.1)					
38.	Is unnecessary placement of non-contaminated system components inside potentially contaminated workspaces avoided? (DOE-STD-1062-DFT Component Access: 10.6.2)					
39.	Is adequate access, pull space, and other safety precautions for all components provided inside potentially contaminated workspaces? (DOE-STD-1062-DFT Component Access: 10.6.2)					
40.	Are equipment trains of radioactive systems separated by sufficient space to accommodate temporary shielding and still provide adequate personnel and equipment clearance? (DOE-STD-1062-DFT temporary Shielding: 10.6.3)					
41.	Are workspace drains arranged to minimize the potential for the spread of contamination? (DOE-STD-1062-DFT Drains: 10.6.4)					
42.	Is floor drainage away from aisles, traffic paths, and open areas and do equipment drain lines drain directly to floor drain connections? (DOE-STD-1062-DFT Drains: 10.6.4)					
43.	Is insulation and lagging in and near potentially contaminated systems designed for easy removal with little or no creation of hazardous dust particles? (DOE-STD-1062-DFT Insulation and Lagging: 10.6.5)					

CHECKLIST 16: HAZARDS & SAFETY

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
44.	Are separate storage arrangements provided for tools and equipment used for contaminated maintenance activities and are such tools clearly and permanently marked as contaminated? (DOE-STD-1062-DFT Contaminated Tools: 10.6.6)					
45.	Are terminal boards and connecting hardware for electrical and I&C components specified for use in potentially contaminated workspaces physically oversized to facilitate handling by technicians wearing rubber gloves? (DOE-STD-1062-DFT Terminal Boards: 10.6.7)					
46.	Are ladders into contaminated spaces at least 1.8 in. (45.7 mm) in width to accommodate anti-contamination booted feet? (DOE-STD-1062-DFT Ladders: 10.6.8)					
47.	Does the operation of switches or controls that initiate hazardous operations require the prior operation of a related or locking control and where practicable does the critical position of such a control activate a visual and auditory warning device in the affected work area? (DOE-STD-1062-DFT Interlocks and Alarms: 10.7.1)					
48.	Are units located and mounted so that access to them can be achieved without danger to personnel from electrical charge, heat, moving parts, chemical contamination, radiation, and other hazards? (DOE-STD-1062-DFT Access: 10.7.2)					
49.	Where access areas must be located over dangerous mechanical or electrical components is the access door or cover designed to actuate an internal light when opened and is a highly visible warning label provided on the outside of the door or cover? (DOE-STD-1062-DFT Hazardous Access: 10.7.3)					
50.	Where applicable are all exposed edges and corners rounded to a minimum of 0.03 in. (0.75 mm) radius? (DOE-STD-1062-DFT Edge Rounding: 10.7.4)					

CHECKLIST 16: HAZARDS & SAFETY

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
51.	Are sharp edges and corners that present a personal safety hazard or that may damage equipment during usage are protected or rounded to a minimum radius of 0.5 in. (13 mm)? (DOE-STD-1062-DFT Edge Rounding: 10.7.4)					
52.	Are safety pins and streamers clearly visible and accessible during maintenance? (DOE-STD-1062-DFT Safety Pins and Streamers: 10.7.5)					
53.	Does protective clothing conform to requirements specified by DOE-EH standards and/or does it conform to system specifications identified in the procuring activity? (DOE-STD-1062-DFT Protective Clothing: 10.8)					

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CHECKLIST 17: PHYSICAL ACCESS

DATE: _____

REVIEWER: _____

DESCRIPTION OF REVIEWED SYSTEM(S): _____

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
1.	Are accesses designed so that the removal of any replaceable unit requires opening of only one access, unless the accesses are of the latched or hinged door type? (UCRL 15673 1.4.3.6)					
2.	Are items that require visual inspection (e.g., hydraulic reservoirs, gauges) located so they can be observed without the removal of panels or other components? (UCRL 15673 1.4.3.7)					
3.	Are access covers that are not completely removable self-supporting in the open position? (UCRL 15673 1.4.3.8)					
4.	Do access covers that serve as stress-bearing structural members use large screws rather than small ones? (UCRL 15673 1.4.3.9)					
5.	Is the hinge on hinged access doors placed on the bottom or a prop should be provided so that the door will stay open without being held if unfastened? (UCRL 15673 1.4.3.10)					
6.	Is the manner in which a cover is opened obvious from its structure or labeled with appropriate instructions? (UCRL 15673 1.4.3.11)					
7.	Is a conspicuous label used to show how the pins on the tube or plug will line up with the holes in the socket when a tube or plug has to be put through a small hole? (UCRL 15673 1.4.3.12)					
8.	Is an access labeled with a number, letter, or other symbol that identifies it in the maintenance instructions? (UCRL 15673 1.4.3.13)					
9.	Are labels to indicate items that can be reached through an access and the service equipment, if any, to be used there? (UCRL 15673 1.4.3.14)					

CHECKLIST 17: PHYSICAL ACCESS

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
10.	Is equipment left exposed (without coverings or housings) for maintenance whenever permitted by structural, environmental, operational, and safety conditions? (UCRL 15673 1.4.3.15)					
11.	Is the size of accesses determined by what the maintenance technician will have to do and should depend on factors such as: (1) Size and shape of the part, component, or assembly to which access is desired; (2) Whether or not the object must be removed and replaced through the openings; (3) Movements of the human body member or members required once access is gained (turning, pulling, pushing, etc.); (4) The size of the body member or members required to enter through the access? (UCRL 15673 1.4.4.1a)					
12.	Are the edges of accesses that might injure the technician's hands or arms protected with internal fillers or other protection? (UCRL 15673 1.4.4.4a)					
13.	Do the handles have rounded corners and edges to minimize the possibility of injuries and equipment damage, access covers, cases? (UCRL 15673 1.4.4.4b)					
14.	Are accesses that lead to equipment with high voltages equipped with safety interlocks so that electrical circuits will be opened when the access cover is removed? If the technician must work on the equipment with the power on, is a "cheater" switch that automatically resets to its safety-protection position when the access cover is replaced provided? (UCRL 15673 1.4.4.4c)					
15.	Are conspicuous warning labels provided on all accesses leading to high voltages, rotating machinery, or other hazards? (UCRL 15673 1.4.4.4d)					
16.	Are positive indications designed to show that access covers are unsecured, even when they are in place? (UCRL 15673 1.4.4.4e)					
17.	Are screwdriver guides provided to adjustment points which must be operated near high voltages? (UCRL 15673 1.4.4.4f)					

CHECKLIST 17: PHYSICAL ACCESS

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
18.	Is visual access provided to the technician for all maintenance operations which require visual control, especially where hazards are present within the access? (UCRL 15673 1.4.4.4g)					
19.	Are the following should be provided at the workplace whenever practical to assist the technician in performing the required maintenance: (a) Auxiliary hooks, holders, lights, outlets, etc; (b) Auxiliary stands/shelves built into equipment to support test equipment, removable units, or items to be repaired; (c) Lattice work, low cabinets, mirrors, open space, etc. as necessary to allow observation of related displays, moving parts, fasteners, test points, etc; and (d) Communication aids? (UCRL 15673 2.1.3.2)					
20.	Does the workspace allow the technician to change posture if the maintenance task being performed requires prolonged kneeling, crawling, or crouching? (UCRL 15673 2.1.3.1)					
21.	Are non-skid treads, expanded metal flooring, or abrasive coatings provided on all surfaces which may be used for walking, climbing, or footholds? (UCRL 15673 2.1.3.3)					
22.	Whenever possible, does workspace design allow routine, frequent, and/or short-term maintenance to be performed from a standing position? (UCRL 15673 2.1.4.1)					
23.	Are displays, markings, etc. which must be read from the standing position within the following distances from the floor: (a) Maximum limits: 40-70" for all visual displays on vertical panels; and (b) Optimum limits: 40-55" for critical or highforce controls? (UCRL 15673 2.1.4.1a.1)					
24.	Are controls, test points, fasteners, etc, which require manipulation from a standing position within the following distances from the floor: (a) Maximum limits: 30-70" for all controls; and (b) Optimum limits: 40-55" for critical or highforce controls or fasteners? (UCRL 15673 2.1.4.1a.2)					

CHECKLIST 17: PHYSICAL ACCESS

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
25.	<p>Is the work area length for standing work limited by time to move between points and/or requirements for reaching or visual contact between points? For work performed at a given position, distances from the center line should be:</p> <ul style="list-style-type: none"> • 22.5" for all related work points. • 17.0" for critical manipulation points. • 11.5" for critical visual work points? (UCRL 15673 2.1.4.1a.3) 					
26.	<p>Whenever personnel are required to perform in the sitting position for more than one hour at a time or more than 20% of the time, are chairs provided? Stools or benches will suffice for other sitting operations. (UCRL 15673 2.1.4.2)</p>					
27.	<p>Are maintenance workshops located and integrated into the overall facility layout in a manner that minimizes the time required for maintenance personnel to go back and forth between the shops and work areas within the facility? (UCRL 15673 2.1.4.4a)</p>					
28.	<p>In multiunit facilities, where units contain different major systems, are separate maintenance organizations and workshops available for each unit? (UCRL 15673 2.1.4.4b)</p>					
29.	<p>Does the facility offer convenient spaces and support facilities for temporary or permanent outside contractor personnel? (UCRL 15673 2.1.4.4c)</p>					
30.	<p>Are lockers or cabinets available for personal storage so that workbenches and seats stay free of clutter? (UCRL 15673 2.1.4.4d)</p>					
31.	<p>Are entry and exit routes through the maintenance workshops maintained free of impediments to the passage of personnel, carts, vehicles, and moving and lifting devices? (UCRL 15673 2.1.4.4e)</p>					
32.	<p>Are workshop areas not used as major thoroughfares for all facility personnel? (UCRL 15673 2.1.4.4f)</p>					

CHECKLIST 17: PHYSICAL ACCESS

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
33.	Are maintenance activities that generate heat, smoke, sparks, or noxious odors conducted in separated, screened-in, and well-ventilated areas? (UCRL 15673 2.1.4.4g)					
34.	Are appropriate cranes, monorails, forklifts, carts, and other movement aids available within the workshop to allow for moving of heavy equipment and hardware? (UCRL 15673 2.1.4.4h)					
35.	Is the tool room integrated within the maintenance shop area or be in proximity to the shop area? (UCRL 15673 2.1.4.4i)					
36.	Is the warehouse located close to the maintenance workshop? (UCRL 15673 2.1.4.4j)					
37.	Are maintenance workshops properly shielded from plant noise? (UCRL 15673 2.1.4.4k)					
38.	Are workshops designed to be free of drafts that may cause discomfort or affect the availability of maintenance technicians to maintain close tolerances in operating plant machinery? (UCRL 15673 2.1.4.4l)					
39.	Is the thermal/humidity environment within the workshop maintained at a comfortable level year round? (UCRL 15673 2.1.4.4m)					
40.	Are separate "hot shops" available in normally contaminated areas to prevent the necessity for working on contaminated hardware in normally "clean" shops? Expedients such as tents, portable walls, plastic, fabric, or wood barriers may be used. (UCRL 15673 2.1.4.4n)					
41.	Do workbench surfaces for standing positions conform to the following dimensions: <ul style="list-style-type: none"> • Height: 36-40" above the floor • Width: 30" maximum • Length: As required? (UCRL 15673 2.1.4.4o) 					
42.	Do workbenches offer illumination aids; space and supports for accommodating procedures, prints, and manuals; access to power sources; magnifiers as required; and built-in test equipment as needed? (UCRL 15673 2.1.4.4p)					

CHECKLIST 17: PHYSICAL ACCESS

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
43.	Are "hot" shops fully enclosed or glove boxes provided to avoid spreading contaminated particles that may result when maintenance machines are used to repair contaminated components? (UCRL 15673 2.1.4.4q)					
44.	Are work surfaces for supporting job instruction manuals, worksheets, etc., 36" above the floor? (UCRL 15673 2.1.4.4r)					
45.	For tasks requiring force, are the work surfaces 36" above the floor? (UCRL 15673 2.1.4.4s)					
46.	Are tasks requiring precision done on surfaces 40" above the floor? (UCRL 15673 2.1.4.4t)					
47.	Are the following factors considered when determining workbench height and design: <ul style="list-style-type: none"> • Characteristics of the equipment that will be placed on the surface. • How technicians will perform tasks. • Lifting problems (size or weight) for equipment to be placed on surface. • Uniqueness of tasks to be completed? (UCRL 15673 2.1.4.4u) 					
48.	For sitting/standing work stations, are adjustable seats to accommodate technicians of various heights and body dimensions provided? (UCRL 15673 2.1.4.4v)					
49.	Are organized storage facilities available for seasonally used items such as fans and heaters? (UCRL 15673 2.1.4.5a)					
50.	Is adequate storage provided for materials and spares used on a recurrent basis that are not kept in a warehouse? (UCRL 15673 2.1.4.5b)					
51.	Is special storage provided for tools and special equipment used during overhauls or outages? (UCRL 15673 2.1.4.5c)					
52.	Is special storage provided for contaminated equipment that is used during outages? (UCRL 15673 2.1.4.5d)					
53.	Are items stored in special locations controlled and inventoried? (UCRL 15673 2.1.4.5e)					

CHECKLIST 17: PHYSICAL ACCESS

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
54.	Are seasonally or infrequently used items stored so as not to interfere with normal entrance and exit pathways, vehicular traffic paths, and emergency escape routes? (UCRL 15673 2.1.4.5f)					
55.	Are instrument and control facilities located near the control room? (UCRL 15673 2.1.4.6a)					
56.	Do maintenance technicians have easy access to a well-organized and controlled technical library which includes procedures, vendors' manuals, plant schematics, etc? (UCRL 15673 2.1.4.6b)					
57.	Are Health Physics facilities located as conveniently as possible for maintenance technicians so delays in making transitions from "clean" to "hot" areas and vice versa can be avoided? (UCRL 15673 2.1.4.6c)					
58.	Is the selection of stairs, stair-ladders, fixed ladders, or ramps for specific applications based on the angle of ascent required and the criteria in Figure 33? (MIL-STD-1472D 5.7.7.1.1)					
59.	Are ramps, elevators, or equivalent means provided when equipment must be hand carried? Ladders shall not be selected in such cases, since both hands should be free to grasp the ladder. Stairs and steps should not be used where hand-carrying bulky loads or loads in excess of 13 kg (29 lbs) is required. (MIL-STD-1472D 5.7.7.1.2)					
60.	Are stairs, stair-ladders, fixed ladders, and ramps equipped with a handrail on each side? Where one or both sides are open, appropriate intermediate guardrails shall be provided to prevent personnel injury. Non-fixed vehicular-boarding ladders are neither stair ladders nor fixed ladders and are exempt from this requirement. Ladders shall not be selected in such cases, since both hands should be free to grasp the ladder. Stairs and steps should not be used where hand-carrying bulky loads or loads in excess of 13 kg (29 lbs) is required. (MIL-STD-1472D 5.7.7.1.3)					

CHECKLIST 17: PHYSICAL ACCESS

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
61.	Do stair dimensions conform with the recommended values and within the minimum and maximum limits of Figure 34? (MIL-STD-1472D 5.7.7.2)					
62.	Do stair ladder dimensions conform with the recommended values and within the specified minimum and maximum limits of Figure 35? The tread rise shall be open at the rear. Landings should be provided every tenth or twelfth tread. The surface of treads on exterior stair ladders should be constructed of open grating material or should be treated with nonskid material conforming with specification MIL-W-5044 applied in accordance with specification MIL-W-5050. Stair ladders shall be of metal construction. Handrails shall have nonslip surfaces. (MIL-STD-1472D 5.7.7.3)					
63.	Do fixed ladder dimensions conform with the recommended values and within the specified minimum and maximum limits of Figure 36? Fixed ladders which are used to provide access to multiple levels should be offset at each successive level. Guardrails should be provided around the opening at the top of each fixed ladder. All fixed ladders more than 6 m (20 ft) high shall be equipped with, or include provision for, a safety device to provide positive protection from falls. (MIL-STD-1472D 5.7.7.4)					
64.	Where special environmental conditions require cleating of pedestrian ramps, are the cleats spaced 360 mm (14 in) apart and extend from handrail to handrail at right angles to the line of traffic? (MIL-STD-1472D 5.7.7.5.1)					
65.	When a ramp is required for both pedestrian and vehicle traffic, is the vehicle bearing surface located in the center of the ramp, with the pedestrian surface next to the handrails (a vehicle ramp with an adjacent pedestrian stairway is preferred for this situation)? (MIL-STD-1472D 5.7.7.5.2)					

CHECKLIST 17: PHYSICAL ACCESS

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
66.	<p>Are the surfaces of exterior personnel platforms and work areas constructed of open metal grating? Exterior personnel platforms, for which utilization of open grating is impractical, and interior walkways shall be treated with nonskid material conforming to specification MIL-W-5044, applied in accordance with specification MIL-W-5050. All open sides of personnel platforms shall be equipped with guardrails (with intermediate rails), with a top rail height not less than 1.070 m (42 inches) and a toeboard or guard screen height not less than 75 mm (3 inches). Hand holds shall be furnished where needed. The distance between the platform edge and the centerline of the railing should not exceed 65 mm (2.5 inches). (MIL-STD-1472D 5.7.7.6)</p>					
67.	<p>Are clearance dimensions (e.g., for passageways and accesses) which must accommodate or allow passage of the body or parts of the body, based upon the 95th percentile values for applicable body dimensions? (MIL-STD-1472D 5.6.3.2)</p>					
68.	<p>Are limiting dimensions (reaching distance, control movement, displays, test points, handrails, etc.) which restrict or are limited by extensions of the body based upon the 5th percentile values for applicable body dimensions? (MIL-STD-1472D 5.6.3.3)</p>					
69.	<p>Are seats, restraint systems, safety harnesses, belts, controls or any equipment that must be adjusted for the comfort or performance of the individual user adjustable over the range of the 5th to 95th percentile values for the applicable body member(s)? (MIL-STD-1472D 5.6.3.4)</p>					

CHECKLIST 17: PHYSICAL ACCESS

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
70.	Are clothing and personal equipment (including protective or specialized equipment worn or carried by the individual) designed and sized to accommodate at least the 5th through the 95th percentile values of body dimensions? Pertinent dimensions of essential or critical equipment (e.g., aviators' helmets) shall be based on the 1st and 99th percentile values. Where two or more dimensions are used simultaneously as design parameters, appropriate multivariate data and techniques shall be utilized. (MIL-STD-1472D 5.6.3.5)					
71.	Do all cabinet, consoles, and work surfaces that require an operator to stand or sit close to their front surfaces contain a kick space at the base at least 100 mm deep and 100 mm high to allow for protective or specialized apparel? (MIL-STD-1472D 5.7.1.1)					
72.	Are handles on cabinets and consoles recessed whenever practicable, to eliminate projections on the surface? If handles cannot be recessed, they shall be designed such that they shall neither injure personnel nor entangle clothing or equipment. (MIL-STD-1472D 5.7.1.2)					
73.	Is free floor space of at least 1.220 m (4 feet) provided in front of each console? (MIL-STD-1472D 5.7.1.3)					
74.	Is clearance from the front of the rack to the nearest facing surface or obstacle not less than 1.070 m (42 inches)? (MIL-STD-1472D 5.7.1.4)					

CHECKLIST 17: PHYSICAL ACCESS

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
75.	<p>Is the minimum lateral workspace for racks having drawers or removable equipment designed as follows (measured from the drawers or equipment in the extended position):</p> <p>a. for racks having drawers or removable items weighing less than 20 kg (44 pounds): 460 mm (18 inches) on one side and 100 mm (4 inches) on the other,</p> <p>b. for racks having drawers or removable items weighing less than 20 kg (44 pounds): 460 mm (18 inches) on each side. The minimum space between rows of cabinets shall be 200 mm (8 inches) greater than the depth of the deepest drawer or cabinet? (MIL-STD-1472D 5.7.1.3.2)</p>					
76.	Is adequate and suitable space provided on consoles or immediate work space for the storage of manuals, worksheets, and other materials that area required for use by the operational or maintenance personnel? (MIL-STD-1472D 5.7.1.3.4)					
77.	Are work surfaces that support documents such as job instruction manuals or worksheets 915 ± 15 mm (36 ± 0.6 inches) above the floor? (MIL-STD-1472D 5.7.2.1)					
78.	Are visual displays mounted on vertical panels and used in normal equipment operation placed between 1.040 m (41 inches) and 1.780 m (70 inches) above the standing surface? (MIL-STD-1472D 5.7.2.2)					
79.	Are displays requiring precise and frequent reading placed between 1.270 m (50 inches) and 1.550 m (65 inches) above the standing surface? (MIL-STD-1472D 5.7.2.3)					
80.	Are all controls mounted on a vertical surface and used in normal equipment operation located between 860 mm and 1.780 m (34 and 70 inches) above the standing surface? (MIL-STD-1472D 5.7.2.4)					

CHECKLIST 17: PHYSICAL ACCESS

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
81.	Are controls requiring precise or frequent operation and emergency controls shall be mounted between 860 mm and 1.350 m (34 and 53 inches) above the standing surface and no farther than 530 mm (21 inches) laterally from the centerline? (MIL-STD-1472D 5.7.2.5)					
82.	Desk tops and writing tables shall be 740 to 790 mm (29 to 31 inches) above the floor, unless otherwise specified? (MIL-STD-1472D 5.7.3.2)					
83.	Where a writing surface is required on equipment consoles, is it at least 400 mm (16 inches) deep and 610 mm (24 inches) wide, when consistent with operator reach requirements? (MIL-STD-1472D 5.7.3.3)					
84.	Is work seating provided as an adequate supporting framework for the body relative to the activities that must be carried out? Chairs to be used with sit down consoles shall be designed to be operationally compatible with the console configuration. (MIL-STD-1472D 5.7.3.4.1)					
85.	Are provisions made for vertical seat adjustments from 380 to 535 mm (15 to 21 inches) in increments of no more than 25 mm (1 inch) each? (MIL-STD-1472D 5.7.3.4.2)					
86.	Is a supporting backrest that reclines between 1745 and 2005 mrad (100 and 115 degrees) provided. The backrest shall engage the lumbar and thoracic regions of the back, and shall support the torso in such a position that the operator's eyes can be brought to the "Eye Line" with no more than 75 mm (3 inches) of forward body movement. (MIL-STD-1472D 5.7.3.4.3)					
87.	Are both the backrest and seat cushioned with at least 25 mm (1 inch) of compressible material and provided with a smooth surface? (MIL-STD-1472D 5.7.3.4.4)					

CHECKLIST 17: PHYSICAL ACCESS

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
88.	Are armrests provided? Armrests that are integral with operators' chairs shall be at least 50 mm (2 inches) wide and 200 mm (8 inches) long. Modified or retractable armrests shall be provided when necessary to maintain compatibility with an associated console and shall be adjustable from 190 to 280 mm (7.5 to 11 inches) above the compressed above the compressed sitting surface. (MIL-STD-1472D 5.7.3.4.5)					
89.	Is the knee and foot room that equals or exceeds the following minimum dimensions provided beneath work surfaces: a. Height: 640 mm (25 inches). If a fixed footrest or a foot-operated control is provided, this dimension shall be increased accordingly. b. Width: 510 mm (20 inches) c. Depth: 460 mm (18 inches)? (MIL-STD-1472D 5.7.3.5)					
90.	Are visual displays mounted on vertical panels and used in normal equipment operation placed in an area between 150 and 1170 mm (6 and 46 inches) above the sitting surface? (MIL-STD-1472D 5.7.3.6)					
91.	Are indicators that must be read precisely and frequently placed in an area between 360 and 890 mm (14 and 35 inches) above the sitting surface, and no further than 530 mm (21 inches) laterally from the centerline? (MIL-STD-1472D 5.7.3.7)					
92.	For "sit" consoles requiring horizontal vision over the top, are critical visual warning displays mounted at least 22.5 inches above the sitting surface? (MIL-STD-1472D 5.7.3.8)					
93.	Are all controls mounted on a vertical surface and used in normal equipment operation located between 200 and 860 mm (8 and 34 inches) above the sitting surface? (MIL-STD-1472D 5.7.3.9)					
94.	Are controls requiring precise or frequent operation mounted between 200 and 740 mm (8 and 23 inches) above the sitting surface? (MIL-STD-1472D 5.7.3.10)					

CHECKLIST 17: PHYSICAL ACCESS

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
95.	Is the total required left-to-right viewing angle less than 190 degrees? This angle should be reduced whenever possible through appropriate control-display layout. (MIL-STD-1472D 5.7.6.1.5)					
96.	Where direct forward vision over the top of the console is not required by a seated operator, and when lateral space is limited, is the panel divided into three vertical/stacked segments whose surfaces should be perpendicular to the operator's line of sight with little or no head movement? (MIL-STD-1472D 5.7.6.2.1)					
97.	Is the center of the central segment located 800 mm (31.5 inches) above the seat reference point? The height of this segment shall not exceed 530 mm (21 inches). (MIL-STD-1472D 5.7.6.2.2)					
98.	Are the following provided where appropriate: <ul style="list-style-type: none"> a. Maximum load signs, located where they can be easily seen. b. Guards, to prevent accidental operation of the lift. c. Limit stops, to prevent injury to personnel and damage to equipment. d. An automatic failsafe brake or other self-locking device in case of lift mechanism failure. e. Provision for manually lowering the platform or elevator when feasible. f. Surface construction or treatment of open platforms? (MIL-STD-1472D 5.7.7.7) 					
99.	Are sliding doors installed as the only personnel exit from a compartment? When a sliding door is used, a separate hinged door in the sliding door should be provided for personnel use. Fixed equipment shall be at least 75 mm (3 inches) from the swept area of hinged doors. (MIL-STD-1472D 5.7.8.1)					
100.	Are wall hatches flush with the floor where structural considerations will permit this arrangement? Hatches shall open with a single motion of the hand or foot. (MIL-STD-1472D 5.7.8.2.1)					

CHECKLIST 17: PHYSICAL ACCESS

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
101.	When a handle is used for unlocking a hatch, does the unlocking force required exceed 90 N (20 pounds)? Hatches placed in the overhead position shall require no more than 220 N (50 lb) force for opening and closing and shall be operable by a suitably equipped and clothed user with 5th percentile arm and hand strength. The force of gravity should be used, where possible, for ease of opening. (MIL-STD-1472D 5.7.8.2.2)					
102.	Do hatches accommodate suitably equipped and clothed user personnel in terms of limiting dimensions for location and operability, and clearance dimensions for size and passage factors? Where personnel must carry equipment through the hatch, allowance shall be made for clearance of suitably clothed 95th percentile hands and/or arms, as applicable. (MIL-STD-1472D 5.7.8.2.3)					
103	Are dimensions for rectangular access openings for body passage greater than those dimensions shown in Figure 37? Minimum diameter for circular hatches shall be 760 mm (30 in). Diameters of oval hatches in armored vehicles shall not be less than 430 and 710 mm (17 and 28 inches). Where rescue of personnel may be required because of environmental hazards (e.g., toxic fumes) within the work place, larger access openings for two-person ingress and egress may be necessary. Where "step down" through a top access exceeds 690 mm (27 in), appropriate foot rests or steps shall be provided. (MIL-STD-1472D 5.7.8.3)					
104.	Are boundaries of contaminated "hot" areas clearly marked and labeled? (UCRL 2.1.4.4n)					

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CHECKLIST 18: PROTECTIVE CLOTHING

DATE: _____

REVIEWER: _____

DESCRIPTION OF REVIEWED SYSTEM(S): _____

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
1.	Protective equipment, including personal protective equipment for eyes, face, head, and extremities, protective clothing, respiratory devices, and protective shields and barriers, shall be provided, used, and maintained in a sanitary and reliable condition wherever it is necessary by reason of hazards of processes or environment, chemical hazards, radiological hazards, or mechanical irritants encountered in a manner capable of causing injury or impairment in the function of any part of the body through absorption, inhalation or physical contact. (OSHA 29 CFR 1910.132a)					
2.	Where employees provide their own protective equipment, the employer shall be responsible to assure its adequacy, including proper maintenance, and sanitation of such equipment. (OSHA 29 CFR 1910.132b)					
3.	All personal protective equipment shall be of safe design and construction for the work to be performed. (OSHA 29 CFR 1910.132c)					
4.	Protective eye and face equipment shall be required where there is a reasonable probability of injury that can be prevented by such equipment. (OSHA 29 CFR 1910.133a.1)					
5.	Employers shall make conveniently available a type of protector suitable for the work to be performed, and employees shall use such protectors. (OSHA 29 CFR 1910.133a.1)					
6.	No unprotected person shall knowingly be subjected to a hazardous environmental condition. (OSHA 29 CFR 1910.133a.1)					
7.	Suitable eye protectors shall be provided where machines or operations present the hazard of flying objects, glare, liquids, injurious radiation, or a combination of these hazards. (OSHA 29 CFR 1910.133a.1)					

CHECKLIST 18: PROTECTIVE CLOTHING

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
8.	<p>Protectors shall meet the following minimum requirements:</p> <ul style="list-style-type: none"> • They shall provide adequate protection against the particular hazards for which they are designed. • They shall be reasonably comfortable when worn under the designated conditions. • They shall fit snugly and shall not unduly interfere with the movements of the wearer. • They shall be durable. • They shall be capable of being disinfected. • They shall be easily cleanable. • Protectors should be kept clean and in good repair. (OSHA 29 CFR 1910.133a.2) 					
9.	<p>Persons whose vision requires the use of corrective lenses in spectacles, and who are required by this standard to wear eye protection, shall wear goggles or spectacles of one of the following types:</p> <ul style="list-style-type: none"> • Spectacles whose protective lenses provide optical correction. • Goggles that can be worn over corrective spectacles without disturbing the adjustment of the spectacles. • Goggles that incorporate corrective lenses mounted behind the protective lenses. (OSHA 29 CFR 1910.133a.3) 					
10.	<p>Every protector shall be distinctly marked to facilitate identification only of the manufacturer. (OSHA 29 CFR 1910.133a.4)</p>					
11.	<p>When limitations or precautions are indicated by the manufacturer, they shall be transmitted to the user and care taken to see that such limitations and precautions are strictly observed. (OSHA 29 CFR 1910.133a.5)</p>					

CHECKLIST 18: PROTECTIVE CLOTHING

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
12.	In the control of those occupational diseases caused by breathing air contaminated with harmful dusts, fogs, fumes, mists, gases, smokes, sprays, or vapors, the primary objective shall be to prevent atmospheric contamination. This shall be accomplished as far as feasible by accepted engineering control measures (for example, enclosure or confinement of the operation, general and local ventilation, and substitution of less toxic materials). When effective engineering controls are not feasible, or while they are being instituted, appropriate respirators shall be used pursuant to the following requirements. (OSHA 29 CFR 1910.133a.1)					
13.	Respirators shall be provided by the employer when such equipment is necessary to protect the health of the employee. (OSHA 29 CFR 1910.133a.2)					
14.	The employer shall provide the respirators which are applicable and suitable for the purpose intended. (OSHA 29 CFR 1910.133a.2)					
15.	The employee shall use the provided respiratory protection in accordance with instructions and training received. (OSHA 29 CFR 1910.133a.3)					
16.	Written standard operating procedures governing the selection and use of respirators shall be established. (OSHA 29 CFR 1910.133b.1)					
17.	Respirators shall be selected on the basis of hazards to which the worker is exposed. (OSHA 29 CFR 1910.133b.2)					
18.	The user shall be instructed and trained in the proper use of respirators and their limitations. (OSHA 29 CFR 1910.133b.3)					
19.	Respirators shall be regularly cleaned and disinfected. Those used by more than one worker shall be thoroughly cleaned and disinfected after each use. (OSHA 29 CFR 1910.133b.5)					

CHECKLIST 18: PROTECTIVE CLOTHING

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
20.	Respirators shall be stored in a convenient, clean, and sanitary location. (OSHA 29 CFR 1910.133b.6)					
21.	Respirators used routinely shall be inspected during cleaning. Worn or deteriorated parts shall be replaced. Respirators for emergency use such as self-contained devices shall be thoroughly inspected at least once a month and after each use. (OSHA 29 CFR 1910.133b.7)					
22.	Appropriate surveillance of work area conditions and degree of employee exposure or stress shall be maintained. (OSHA 29 CFR 1910.133b.8)					
23.	There shall be regular inspection and evaluation to determine the continued effectiveness of the program. (OSHA 29 CFR 1910.133b.9)					
24.	Persons should not be assigned to tasks requiring use of respirators unless it has been determined that they are physically able to perform the work and use the equipment. (OSHA 29 CFR 1910.133b.10)					
25.	The local physician shall determine what health and physical conditions are pertinent. The respirator user's medical status should be reviewed periodically (for instance, annually). (OSHA 29 CFR 1910.133b.10)					
26.	The respirator furnished shall provide adequate respiratory protection against the particular hazard for which it is designed in accordance with standards established by competent authorities. (OSHA 29 CFR 1910.133b.11)					
27.	Proper selection of respirators shall be made according to the guidance of American National Standard Practices for Respiratory Protection Z88.2-1969. (OSHA 29 CFR 1910.133c)					

CHECKLIST 18: PROTECTIVE CLOTHING

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
28.	Compressed air, compressed oxygen, liquid air, and liquid oxygen used for respiration shall be of high purity. Oxygen shall meet the requirements of the United States Pharmacopoeia for medical or breathing oxygen. Breathing air shall meet at least the requirements of the specification for Grade D breathing air as described in Compressed Gas Association Commodity Specification G7.1-1966. Compressed oxygen shall not be used in supplied air respirators or in open circuit self-contained breathing apparatus that have previously used compressed air. Oxygen must never be used with air line respirators. (OSHA 29 CFR 1910.133d.1)					
29.	Breathing air may be supplied to respirators from cylinders or air compressors. (OSHA 29 CFR 1910.133d.2)					
30.	Cylinders shall be tested and maintained as prescribed in the Shipping Container Specification Regulations of the Department of Transportation (49 CFR part 178). (OSHA 29 CFR 1910.133d.2i)					
31.	The compressor for supplying air shall be equipped with necessary safety and standby devices. A breathing air-type compressor shall be used. (OSHA 29 CFR 1910.133d.2ii)					
32.	Compressors shall be constructed and situated so as to avoid entry of contaminated air into the system and suitable in-line air purifying absorbent beds and filters installed to further assure breathing air quality. (OSHA 29 CFR 1910.133d.2ii)					
33.	A receiver of sufficient capacity to enable the respirator wearer to escape from a contaminated atmosphere in event of compressor failure, and alarms to indicate compressor failure and overheating shall be installed in the system. If an oil-lubricated compressor is used, it shall have a high-temperature or carbon monoxide alarm, or both. If only a high-temperature alarm is used, the air from the compressor shall be frequently tested for carbon monoxide. (OSHA 29 CFR 1910.133d.2ii)					

CHECKLIST 18: PROTECTIVE CLOTHING

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
34.	Air line couplings shall be incompatible with outlets for other gas systems to prevent inadvertent servicing of air line respirators with non-respirable gases or oxygen. (OSHA 29 CFR 1910.133d.3)					
35.	Breathing gas containers shall be marked in accordance with American National Standard Method of Marking Portable Compressed Gas Containers to Identify the Material Contained, Z48.1-1954; Federal Specification BB-A-1034a, June 21, 1968, Air, Compressed for Breathing Purposes; or Interim Federal Specification GG-B-00675b, April 27, 1965, Breathing Apparatus, Self-Contained. (OSHA 29 CFR 1910.133d.4)					
36.	Standard procedures shall be developed for respirator use. These should include all information and guidance necessary for their proper selection, use, and care. Possible emergency and routine uses of respirators should be anticipated and planned for. (OSHA 29 CFR 1910.133e.1)					
37.	The correct respirator shall be specified for each job. The respirator type is usually specified in the work procedures by a qualified individual supervising the respiratory protective program. The individual issuing them shall be adequately instructed to insure that the correct respirator is issued. (OSHA 29 CFR 1910.133e.2)					
38.	Written procedures shall be prepared covering safe use of respirators in dangerous atmospheres that might be encountered in normal operations or in emergencies. Personnel shall be familiar with these procedures and the available respirators. (OSHA 29 CFR 1910.133e.3)					
39.	In areas where the wearer, with failure of the respirator, could be overcome by a toxic or oxygen-deficient atmosphere, at least one additional man shall be present. (OSHA 29 CFR 1910.133e.3i)					
40.	Communications (visual, voice, or signal line) shall be maintained between both or all individuals present. (OSHA 29 CFR 1910.133e.3i)					

CHECKLIST 18: PROTECTIVE CLOTHING

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
41.	Planning shall be such that one individual will be unaffected by any likely incident and have the proper rescue equipment to be able to assist the other(s) in case of emergency. (OSHA 29 CFR 1910.133e.3i)					
42.	When self-contained breathing apparatus or hose masks with blowers are used in atmospheres immediately dangerous to life or health, standby men must be present with suitable rescue equipment. (OSHA 29 CFR 1910.133e.3ii)					
43.	Persons using air line respirators in atmospheres immediately hazardous to life or health shall be equipped with safety harnesses and safety lines for lifting or removing persons from hazardous atmospheres or other and equivalent provisions for the rescue of persons from hazardous atmospheres shall be used. A standby man or men with suitable self-contained breathing apparatus shall be at the nearest fresh air base for emergency rescue. (OSHA 29 CFR 1910.133e.3iii)					
44.	Respiratory protection is no better than the respirator in use, even though it is worn conscientiously. Frequent random inspections shall be conducted by a qualified individual to assure that respirators are properly selected, used, cleaned, and maintained. (OSHA 29 CFR 1910.133e.4)					
45.	For safe use of any respirator, it is essential that the user be properly instructed in its selection, use, and maintenance. Both supervisors and workers shall be so instructed by competent persons. Training shall provide the men an opportunity to handle the respirator, have it fitted properly, test its face-piece-to-face seal, wear it in normal air for a long familiarity period, and, finally, to wear it in a test atmosphere. (OSHA 29 CFR 1910.133e.5)					
46.	Every respirator wearer shall receive fitting instructions including demonstrations and practice in how the respirator should be worn, how to adjust it, and how to determine if it fits properly. (OSHA 29 CFR 1910.133e.5i)					

CHECKLIST 18: PROTECTIVE CLOTHING

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
47.	<p>A proper seal cannot be established if the temple bars of eye glasses extend through the sealing edge of the full facepiece. As a temporary measure, glasses with short temple bars or without temple bars may be taped to the wearer's head. Wearing of contact lenses in contaminated atmospheres with a respirator shall not be allowed. Systems have been developed for mounting corrective lenses inside full facepieces. When a workman must wear corrective lenses as part of the facepiece. The facepiece and lenses shall be fitted by qualified individuals to provide good vision, comfort, and a gas-tight seal. (OSHA 29 CFR 1910.133e.5ii)</p>					
48.	<p>If corrective spectacles or goggles are required, they shall be worn so as not to affect the fit of the facepiece. Proper selection of equipment will minimize or avoid this problem. (OSHA 29 CFR 1910.133e.5iii)</p>					
49.	<p>A program for maintenance and care of respirators shall be adjusted to the type of plant, working conditions, and hazards involved, and shall include the following basic services:</p> <ul style="list-style-type: none"> • Inspection for defects (including a leak check), • Cleaning and disinfecting, • Repair, • Storage (OSHA 29 CFR 1910.133f.1) 					
50.	<p>Equipment shall be properly maintained to retain its original effectiveness. (OSHA 29 CFR 1910.133f.1)</p>					
51.	<p>All respirators shall be inspected routinely before and after each use. A respirator that is not routinely used but is kept ready for emergency use shall be inspected after each use and at least monthly to assure that it is in satisfactory working condition. (OSHA 29 CFR 1910.133f.2i)</p>					
52.	<p>Self-contained breathing apparatus shall be inspected monthly. (OSHA 29 CFR 1910.133f.2ii)</p>					

CHECKLIST 18: PROTECTIVE CLOTHING

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
53.	A record shall be kept of inspection dates and findings for respirators maintained for emergency use. (OSHA 29 CFR 1910.133f.2iv)					
54.	Routinely used respirators shall be collected, cleaned, and disinfected as frequently as necessary to insure that proper protection is provided for the wearer. Respirators maintained for emergency use shall be cleaned and disinfected after each use. (OSHA 29 CFR 1910.133f.3)					
55.	Replacement or repairs shall be done only by experienced persons with parts designed for the respirator. No attempt shall be made to replace components or to make adjustment or repairs beyond the manufacturer's recommendations. Reducing or admission valves or regulators shall be returned to the manufacturer or to a trained technician for adjustment or repair. (OSHA 29 CFR 1910.133f.4)					
56.	After inspection, cleaning, and necessary repair, respirators shall be stored to protect against dust, sunlight, heat, extreme cold, excessive moisture, or damaging chemicals. Respirators placed at stations and work areas for emergency use should be quickly accessible at all times and should be stored in compartments built for the purpose. The compartments should be clearly marked. Routinely used respirators, such as dust respirators, may be placed in plastic bags. Respirators should not be stored in such places as lockers or tool boxes unless they are in carrying cases or cartons. (OSHA 29 CFR 1910.133f.5i)					
57.	Respirators should be packed or stored so that the facepiece and exhalation valve will rest in a normal position and function will not be impaired by the elastomer setting in an abnormal position. (OSHA 29 CFR 1910.133f.5ii)					

CHECKLIST 18: PROTECTIVE CLOTHING

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
58.	Instructions for proper storage of emergency respirators, such as gas masks and self-contained breathing apparatus, are found in "use and care" instructions usually mounted inside the carrying case lid. (OSHA 29 CFR 1910.133f.5iii)					
59.	The primary means of identifying a gas mask canister shall be by means of properly worded labels. The secondary means of identifying a gas mask canister shall be by a color code. (OSHA 29 CFR 1910.133g.1)					
60.	All who issue or use gas masks falling within the scope of this section shall see that all gas mask canisters purchased or used by them are properly labeled and colored in accordance with these requirements before they are placed in service and that the labels and colors are properly maintained At All times thereafter until the canisters have completely served their purpose. (OSHA 29 CFR 1910.133g.2)					
61.	Canisters having a special high-efficiency filter for protection against radionuclides and other highly toxic particulates shall be labeled with a statement of the type and degree of protection afforded by the filter. (OSHA 29 CFR 1910.133g.4)					
62.	Each canister shall have a label warning that gas masks should be used only in atmospheres containing sufficient oxygen to support life (at least 16 percent by volume), since gas mask canisters are only designed to neutralize or remove contaminants from the air. (OSHA 29 CFR 1910.133g.5)					
63.	Each gas mask canister shall be painted a distinctive color or combination of colors indicated in Table II. All colors used shall be such that they are clearly identifiable by the user and clearly distinguishable from one another. The color coating used shall offer a high degree of resistance to chipping, scaling, peeling, blistering, fading, and the effects of the ordinary atmospheres to which they may be exposed under normal conditions of storage and use. Appropriately colored pressure sensitive tape may be used for the stripes. (OSHA 29 CFR 1910.133g.6)					

CHECKLIST 18: PROTECTIVE CLOTHING

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
64.	Employee acceptance of a particular respirator model within a class shall be considered in selecting a respirator since this may determine whether or not he wears the respirator properly. Acceptance factors to be considered include discomfort, breathing resistance, weight, and interference with vision or the work to be performed. If the results of respirator-fitting tests show that the person can obtain an acceptable fit with two or more respirator models of the selected class of respirator, then the person should be permitted to use the respirator model which he or she prefers. (ANSI Z88.2.6.15)					

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CHECKLIST 19: COMMUNICATIONS

DATE: _____

REVIEWER: _____

DESCRIPTION OF REVIEWED SYSTEM(S): _____

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
1.	Does the powered telephone system provide good frequency response in that it is intelligible to that portion of the auditory spectrum which allows individuals to hear clearly? (NUREG 0700 6.2.1.2a)					
2.	Is the size and shape of the handset compatible with the operator's hand size and mouth-ear distance? (NUREG 0700 6.2.1.2b1)					
3.	Is the operator able to maintain firm ear contact by the receiver while the transmitter is positioned to receive voice waves directly from the operator's mouth? (NUREG 0700 6.2.1.2b2)					
4.	Are cords made of the non-kink or self-retracting type? (NUREG 0700 6.2.1.2b3)					
5.	Are the cords of sufficient length to permit reasonable operator mobility? (NUREG 0700 6.2.1.2b4)					
6.	Are cords positioned so as to avoid entangling critical controls or endangering passing traffic? (NUREG 0700 6.2.1.2b5)					
7.	Are vertically mounted handset cradles designed and located to prevent the handset from being knocked out of the cradle by passing traffic? (NUREG 0700 6.2.1.2b6)					
8.	Where multiple telephone instruments are located close together (e.g., on a single desk) are they coded to indicate circuit or function? (NUREG 0700 6.2.1.2b7)					
9.	Is the switching mechanism designed and/or programmed to minimize delay in making desired connections under both normal and emergency conditions? (NUREG 0700 6.2.1.2c1)					

CHECKLIST 19: COMMUNICATIONS

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
10.	Is switching programmed to give the control room automatic priority of access to the switching system? (NUREG 0700 6.2.1.2c2)					
11.	Is the loudness of telephone ringing adjustable at the individual telephone station? (NUREG 0700 6.2.1.2 d)					
12.	When transmitters within the powered telephone system are used as the microphone input to the announcing system, is the transmitter compatible with the rest of the announcing system? (NUREG 0700 6.2.1.2 e)					
13.	Within Walkie-Talkie Radio Transceivers, and within the engineering constraints imposed by radio frequency spectrum availability and by design for easy portability, do walkie-talkies realize the same quality desired throughout all of the communications systems? (NUREG 0700 6.2.1.4 a)					
14.	Is good frequency response, preferably to telephone standards of 200 to 3300 hz achieved in walkie-talkie use? (NUREG 0700 6.2.1.4 a1)					
15.	Is sufficient dynamic range and gain provided to handle instantaneous pressures, found in speech, and to allow for the necessary signal level at the headphone or loudspeaker, to accommodate reception? (NUREG 0700 6.2.1.4 a2)					
16.	Is modulation and radio frequency chosen, as FCC regulations permit, to provide broad-area walkie-talkie communication to the control room? One consideration for frequency selection should be radio-wave penetration of metal or reinforced concrete barriers, which at certain frequencies would tend to attenuate or bounce the signal. NUREG 0700 6.2.1.4 b1)					
17.	If a press-to-talk button is used, is the button convenient to both left and right hand operation? (NUREG 0700 6.2.1.2b8)					

CHECKLIST 19: COMMUNICATIONS

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
18.	Is the use of walkie-talkies provided in areas close to low-level analog or digital equipment unless EMI noise susceptibility tests have been conducted that demonstrate that equipment is not affected by the frequency bands used? (NUREG 0700 6.2.1.4 b2)					
19.	To the extent permitted by design for effective electrical/RF function, are walkie-talkies small, light, and easy to carry? (NUREG 0700 6.2.1.4 c1)					
20.	Does their use allow for one hand, or preferably both hands, free to do other tasks during their operation? (NUREG 0700 6.2.1.4 c2)					
21.	Is the microphone integrated into the transceiver package? (NUREG 0700 6.2.1.4 c3)					
22.	When there are more than two parties on a channel operating at separate locations, do procedures provide for unambiguous identification of the speaker? (NUREG 0700 6.2.1.4 d)					
23.	Is a supply of fresh replacement batteries stowed in an accessible, well marked place? (NUREG 0700 6.2.1.4 e1)					
24.	Is the stock of batteries kept large enough to support long periods of continuous operation in case of an emergency? (NUREG 0700 6.2.1.4 e2)					
25.	Does the intelligibility of the announcing system require the integration of carefully selected components (microphones, amplifiers, and loudspeakers) into an overall system providing good frequency response in the audio band which is critical for intelligibility? Is a minimum telephone quality required (200 to 3300 Hz) provided ? (Higher intelligibility is achieved by a band of 200 to 6100 Hz) (NUREG 0700 6.2.1.6 a1)					
26.	Does adequate coverage exist where loudspeakers are placed so that they are available in all necessary areas and that there are no "dead spots" within any areas? (NUREG 0700 6.2.1.6 a2)					

CHECKLIST 19: COMMUNICATIONS

ITEM	CRITERIA/ITEM	EQPT/AREA	YES	NO	N/A	COMMENTS
27.	If the telephone system is attached to the announcement system, is the telephone system microphone input compatible with the announcement system? (NUREG 0700 6.2.1.6 b2)					
28.	Do the microphones have high sensitivity to speech signals? (NUREG 0700 6.2.1.6 b3)					
29.	Does the microphone permit a dynamic range of 50 dB variations in signal input? (NUREG 0700 6.2.1.6 b4)					
30.	Is the microphone input provided within a control room? (NUREG 0700 6.2.1.6 b5)					
31.	Are speakers provided in the control room and other areas where control room personnel operations might be located? (NUREG 0700 6.2.1.6 c1)					
32.	Are the speakers placed to allow an intelligible level of signal throughout the control room? (NUREG 0700 6.2.1.6 c2)					
33.	Are operators familiarized with the proper way to speak on the announcing system? (NUREG 0700 6.2.1.6 d)					
34.	Is the speaker volume adjusted to ensure that speaker communications will not prevent detection of auditory alarms? (NUREG 0700 6.2.1.6 e1)					
35.	Are audio gain controls (if provided) limited to preclude reducing volume below an audible level? (NUREG 0700 6.2.1.6 e2)					
36.	Is the control room input capable of overriding an announcement in progress or of bypassing queued announcements? (NUREG 0700 6.2.1.6 f)					

GLOSSARY OF TERMS

After-images	Visual image that persists after a visual stimulus ceases.
Ambient Illumination	Lighting which is appropriate for other visual functions, (e.g. setting controls, reading instruments, maintenance) but which does not degrade the visibility of signals or the CRT display.
Analog Display	Display which presents data in continuous forms such as temperature variation or voltage measurement, or analogous physical magnitudes or electrical signals.
Annotated	Provided with a critical commentary or explanatory notes.
Annunciators	Electrical signaling devices used to indicate the source of an alarm or other activity such as a telephone switchboard.
Anthropometry	The study and technique of human body measurement for use in classification and comparison to a set of physical standards or guidelines.
Auxiliary	Secondary or reserve component, alarm, control etc. Such equipment is available as a backup or reserve to the main system equipment.
Bracketing	Used to locate a maximum or minimum rather than a specific value (as in tuning a transmitter), the control knob swings through an arc of not less than 10° nor more than 30° on either side of the target value in order to make the peak or dip associated with that value clearly noticeable.
Coaxial	Having or mounted on a common axis.
Collimated Displays	Parallel displays or those positioned in the line of sight.
Counters	Counters are used to count the units within the rotation of a knob such that one revolution of the knob produces approximately 50 counts (when the units are 0 through 9, the drum rotates five times).
Cursor Controls	Controls such as arrow keys on a keyboard, which allow the operator to manipulate the computer cursor in a direction left or right, or up or down.
Cranks	Controls used for tasks requiring many rotations, particularly where high rates or large forces are involved. Cranks may utilize various assemblies such as extended arms with handles mounted on the end, to circular wheels with a protruding handle for operator use. (For a pictorial description of cranks see Figure 23.)
db(A)	The unit used to express sound level measured through the A-weighting network of a sound level meter.

GLOSSARY OF TERMS

Dead Man Controls	Controls which result in system shut-down to a non-critical operation state when operator input is removed. These controls shall be used whenever operator incapacity can produce critical system conditions.
Detents	Used to provide tactile indication of positions.
Diffuse Reflection	Reflection patterns that spread out freely, scatter or disseminate. This process makes the illumination less brilliant or softened.
Digital	Displayed material, utilizing numerical characters, expressed in digits.
Displacement Joysticks	A joystick whose output is proportional to and in the same direction as the displacement of the joystick from its null point. These are also known as Isotonic Joysticks.
Dull Matte Finish	A non-glossy finish with a dull appearance, exhibiting primarily or only diffuse reflections.
Electro-Luminescent Displays	Displays such as those used to look at x-rays and 35mm slides, only with embedded displays used in conditions where transilluminated displays would not be appropriate.
Ergonomics	Field of study conducting research regarding human psychological, social, physical, and biological characteristics, and utilizing the information obtained, and working to apply that information with respect to design, operation, or use of products or systems for optimizing human performance, health, safety, and/or habitability.
Flash Rate	A flash rate is consistent with 3 to 5 flashes per second with approximately equal amounts of ON and OFF time. In many cases if the indicator is energized and the flasher fails, the light shall illuminate and burn steadily.
Folding Handle Controls	If a crank handle could become hazardous to persons passing by, a folding crank handle is utilized. In these controls the handle which protrudes during use, is folded back against the main crank assembly out of the way. Such a device should be designed so that the handle is spring-loaded to keep it extended in the cranking position when in use and folded when not in use.
Free-moving X-Y Controllers	Commonly referred to as a mouse or trackball device.
Grid and Stylus Devices	Flat plane surface used with a light pen for data pickoff from a CRT, entry of points on a display, generation of free-drawn graphics, and similar control applications. The grid may be on transparent medium allowing stylus placement directly over corresponding points on the display, or it may be displaced from the display in a convenient position for manipulation. (For a pictorial description of a grid and stylus device see figure 32.)

GLOSSARY OF TERMS

Hand Wheel	Circular controls used for such tasks as steering, latch securing, valve opening/closing and direct-linkage adjustments. (For a pictorial description of a handwheel see Figure 24.)
Hierarchical Grouping	Grouping of controls by function, system and sub-system to provide maximum ease in locating more critical or commonly used controls.
High-persistence Phosphors	A highly susceptible substance that can be stimulated to emit light by incident radiation. These phosphors have a higher brightness intensity and longer duration than other phosphors.
Horizontal	Parallel to or in the plane of the horizon.
Incandescent	Emitting visible light as a result of being heated, shining brilliantly, or characterized by ardent intensity or brilliance.
Isometric Joysticks	These computer operation controls are used in applications that require precise return to center after each use, where operator feedback is primarily visual rather than tactile, from the control itself, and where there is minimal delay and tight coupling between control and input and system reaction. Since the control automatically returns to the center position when not in use, these controls should not be used where operator must maintain a constant force on the control for a long period of time, or where there is no definitive feedback when maximum control inputs have been exceeded. (For a pictorial description of joystick, see Figure 29.)
Key Operated Switches (KOS)	Controls utilizing a key to activate the control on a console, panel, or other control application. KOS use a key which has teeth on one edge or on both edges such as in a house key or vehicle key. KOS should include appropriate positional markings and labels. (For a pictorial description of KOS see Figure 17.)
Keystone Effect	Distortion of projected data proportions due to non-perpendicularity between projector and screen.
Knurling, or Indentation	Turning aids built into handwheels to facilitate operator grasp for applying maximum torque and to reduce the possibility of the wheel being jerked from the operator's hands. High-friction covering may also be used for this purpose.
Knob	Circular controls which allow for adjustments in control setting by either turning the control clockwise or counterclockwise. Knobs may also be used as pull on and push off controls with the same surface design. (For a pictorial and textual description of knobs see Figures 18 and 19.)
Legend Light	Lights arranged in a labeled group which identifies to the operator the type of condition that exists by the flashing light

GLOSSARY OF TERMS

Legend Switches	Switches which are clearly labeled as to their function and utilize pushbutton controls. These switches may be further identified by use of color coding, light actuation indication, label markings or a combination of all three. (For a pictorial description of a legend switch see Figure 13.)
Lever	Controls which have an extended handle and ball head which are used when large amounts of force or displacement are involved or when multidimensional movements of controls are required. Levers can be used to make fine or continuous adjustments, but should provide support for the limb segment which is directly effected. (For a pictorial description of a lever see Figure 21.)
Light Emitting Diodes (LED)	A semiconductor diode that converts applied voltage to light and that is used in digital displays such as a calculator or computer display.
Light Pens	A pen shaped control used when imprecise input functions are required. The light pen shall be 120-180 mm long with a diameter of 7-20mm. A convenient clip shall be provided on the CRT to hold the light pen when not in use. Light pens are used on a grid-and stylus device to provide the data pickoff from the CRT, entry of points on a display, generation of free-drawn graphics, and similar control applications. They should be used when item selection is the primary type of data entry.
Linear Control	Control resembling or being actuated in a straight line, or having only one dimension. Shape could be narrow or elongated.
Linear Scales	Scales which are presented in a straight line or having only one dimension.
Low-persistence Phosphors	A highly susceptible substance that can be stimulated to emit light by incident radiation. These phosphors have a lower brightness intensity and shorter light duration than other phosphors.
Lux	The international system unit of illumination, equal to one lumen per square meter.
Mean Time Before Failure	The average time to the first failure of a component or system. (Also denoted as MTBF)
Mimics	Used to integrate system components into functionally oriented diagrams that reflect relationships between components. Flow paths should be color coded with mimic colors discriminably different from each other and contrasting adequately with the panel.
Miniature Controls	In conditions where severe space limitations exist, these controls are used to accommodate the needed control settings. These controls are smaller scale controls which may be in the form of pushbuttons, rocker switches, knobs and toggle switches.

GLOSSARY OF TERMS

Mirror Image	An image that reflects or gives a true image of the original image.
Monochromatic	Having or producing light of only one wave length.
Monochrome	Having different shades of a single color. In computer displays this is usually black and white, and devoid of multi-color schematics.
Moving Pointer, Circular Scales	When the parameter varies directly with the control movement, clockwise movement of a rotary control or movement of a linear control forward, up, or to the right shall produce a clockwise movement of circular scale pointers and an increase in the magnitude of the setting
Moving Pointer, Linear Scales	When the parameter varies directly with the control movement, clockwise movement of a rotary control or movement of a linear control forward, up, or to the right shall produce a movement up or to the right for horizontal and vertical scale pointers and in increase in the magnitude of the reading.
Moving Tape Scale	When the scale length required for acceptable readout accuracy exceeds the limits of the space available, moving tape scales are used.
Multirevolution	The circumference of a rotating control can be move more than one revolution such as a handwheel in opening a valve.
Non-linear Scales	Scales which are not in a straight line or single dimension plane.
Off-scale	Portion of scale information which is no directly in the line of sight in the null position, but comes into view as the scale indicator is moved in that direction. A moving tape scale is an example.
Optimum Visual Zone	The concept of locating displayed material at the optimum level or line of sight for the operator to use without strain.
Parallax	The apparent displacement of the difference in apparent direction of an object as seem from two different points not on a straight line with the object.
Personal Protective Equipment	Clothing and other protective personal apparatuses which protect a worker from exposure to bright lights, (eye wear), loud noise (ear protection) radiation (clothing and respirators), and airborne particulate.
Phosphor Excitation	The process of stimulating the highly susceptible substance in phosphors which is stimulated to emit light by incident radiation.
Pictorial Graphic Panels	Lighting panels which use luminous symbols on a dark background to express a condition, needed action or emergency action. The picture or graphic immediately identifies the condition using pictorial form.

GLOSSARY OF TERMS

Pixels	The smallest resolution point on a crt display or vidicon-type detector.
Push Buttons	Finger or hand operated controls utilizing light force. The top surface would be concaved to fit the finger, or when not practical, have a high-degree of frictional resistance to prevent slipping. A push button should also provide a positive indication of activation such as a snap, click or integral light.
Push-Pull Controls	Controls which resemble vehicle headlight switches, choke, or emergency brake release. These controls, which adapt to various handle dimensions, displacements and clearances, are used for low resistance, or high force control settings. (For pictorial and textual descriptions of the various types of push-pull controls see Table 11.)
QWERTY Arrangement	A keyboard arrangement with a letter distribution patten of QWERTY on the left side of the top row of alphabetic chacters.
Rocker Switches	Used in conditions where toggle switch handle protrusions might snag an operator's sleeve or phone cord. Rocker switches should be vertically oriented. The winged ends shall be such that the right wing shall turn the equipment or component on, cause the quantity to increase, or cause the equipment or component to move forward, clockwise, to the right or up. (For a pictorial description of a rocker switch see figure 14.)
Rotary Controls	Wheel shaped knobs used to open the valves with a counterclockwise motion. Valve controls shall be provided with double-ended arrows showing the direction of operations; they shall be labeled at each end to indicate the functional result.
Rotary Selector Switch	Used for discrete functions where three or more detended positions are required. (For a pictorial description of a rotary selector switch, see figure 16.)
Simple Indicator Lights	When design precludes the use of legend lights, simple indicator lights are lights which indicate to the operator a specific warning, condition, or need for action. These lights are color coding based on function.
Slide Switches	Used for functions which require two discrete positions, or for functions that require a higher number of discrete positions wherein the switches are arranged in a matrix to permit easy recognition or the settings. (For a pictorial description of slide switches see figure 15.)
Spinner Handles	In applications where a handwheel may be rotated rapidly through several rotations, a spinner handle is used. These handles allow the operator gripping them to keep a firm grip while the protruding handle spins to accommodate rotation.

GLOSSARY OF TERMS

Tactile	Perceptual to the sense of touch.
Tactually	Physically operating through touch.
Thumbwheel	Circular control which is wheel shaped and provides detents around the exterior circumference to assist the operator in turning the control.
Toggle Switches	Switches which are considered to be discrete position controls. These switches required two discrete positions and are used where space limitations are severe. (For a pictorial description of a toggle switch see figure 12.)
Trackballs	Ball shaped control mounted on a mouse type base which allows the operator to manipulate the computer cursor by rotating the ball in the desired direction. The operator generally uses the palm of the hand to manipulate the ball in the desired direction. The ball control is suspended on low-friction bearings and should be only used for position controls. (For a pictorial description of a Trackball see Figure 30.)
Transillumination	Light passed through, rather than reflected off, an element to be viewed, e.g., illumination used on console panels or indicators utilizing edge and/or black lighting techniques on clear, translucent, fluorescent, or sandwich type plastic materials.
Trend Information	Information that is updated providing a historical or over time presentation of information.
Vertical	Positioned in an upright posture, at right angles to the horizon.

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