Arrangement of Components within a Physical Space

Principles of Arranging Components
A. Importance
B. Frequency-of-Use
C. Functional
D. Sequence-of-Use

Locating components in general area in workspace: use (A) and (B)
Arrangement of components within a general area
- Use (C) and (D)
- Evidence of sequence-of-use superiority

Methodologies for Arranging Components

Data Types
- Basic data about human beings
- Task analysis data
- Environment data

Two broad classes of task-related information
- Information on the use of components individually
- Information on the relationships between components as they are used

Information Dealing with Components Individually
- Determine frequency of use and criticality of components
- Composite frequency-importance indices
  - Ex. Control accessibility index

Information Dealing with Relationships between Components
- Links: relationships between components
- Communication links
- Control links
- Movement links

Link Representations
- Link table
- Graphical Representations
  - Adjacency layout diagrams
  - Spatial Operational-Sequence Diagrams
Methodologies for Arranging Components

Arranging Components
- Quantitative solutions
  - Linear programming: optimizing utility costs
- Simpler solution
  1. Put control with highest frequency in area with lowest error
  2. Put control with second highest frequency in area with second lowest error
  3. Continue for all controls

General Location of Controls and Displays

Visual Displays
- Line of sight ~15° below the horizon
- Critical displays should be placed within a reasonably moderate oval around normal line of sight

Hand controls that require force
- Max pulling force exerted from 57-66 cm forward from seat reference point
- Best location for cranks and levels is in front of operator

Controls on panels
- General guidelines (Figures 14-11 and 14-12)
- Time to activate controls minimum for controls about 25° from center
- Avoid imposing response-time requirements on operators in which small differences are critical

Two-hand controls
Place push buttons at waist-level rather than eye-level if possible

Foot Controls
- If considerable force required, place pedal well forward (toe-operated)
- Forces greatest when foot angle on pedal between 10-35° from the vertical

Guiding principles
- sequence-of-use
- group by function if no fixed or common sequences found
- Avoid mirror imaging
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Spacing of Control Devices
Dependent on anthropometric factors and precision of psychomotor movements
Recommended separation (Figure 14-21)

General Guidelines in Designing Individual Workplaces
Priorities:
1. Primary visual tasks
2. Primary controls interacting with primary visual tasks
3. Control-display relationships
4. Arrangement of elements in sequence of use
5. Convenient location of frequently-used elements
6. Consistent layout within system