

FIG 10–10 —Three dials illustrate the principles of parsimony Check readings (for one- or two-level operations), directional readings (qualitative reading, usually of three conditions), and quantitative readings (show exact quantity involved)

he should use an auditory or visual display Fig 10–11 compares the relative advantages of auditory and visual displays

Other considerations, though, are equally important The following principles can act as a guide

- SITUATIONALITY The design of auditory displays should consider other relevant characteristics of the environment in which the system is to function (e g , noise levels, types of responses controlled by the auditory signal)
- COMPATIBILITY Where feasible, signals should "explain" and exploit learned or natural relationships on the part of the users, such as high frequencies being associated with "up" or "high" and wailing signals indicating emergency
- APPROXIMATION Two-stage signals should be considered when complex information is to be displayed and a verbal signal is not feasible The two stages should consist of (*a*) attention-demanding signals to attract attention and identify a general category of information, and (*b*) designation signals to follow the attention-demanding signals to designate the precise information within the general category
- DISSOCIABILITY Auditory signals should be easily discernible from other sounds (be they meaningful or noise)
- PARSIMONY Input signals to an operator should not provide more information than is necessary to carry out the proper response
- FORCED ENTRY When more than one kind of information is to be presented, the signal must prevent the receiver from listening to just one aspect of the total signal
- INVARIANCE The same signal should designate the same information at all times

RELATIVE MERITS OF AUDITORY AND VISUAL PRESENTATIONS

Use Auditory Presentation if:	Use Visual Presentation if:
Message is simple	Message is complex
Message is short	Message is long
Message will not be referred to later	Message will be referred to later
Message deals with events in time	Message deals with location in space
Message calls for immediate action	Message does not call for immediate action
Receiving location is too bright	Receiving location is too noisy
Person's job requires him to move continually	Person's job allows him to remain in one position
Visual system of person is overburdened	Auditory system of person is overburdened

FIG 10–11