



# Analog Rod Position Indication System “IRPI”

Section 8.2



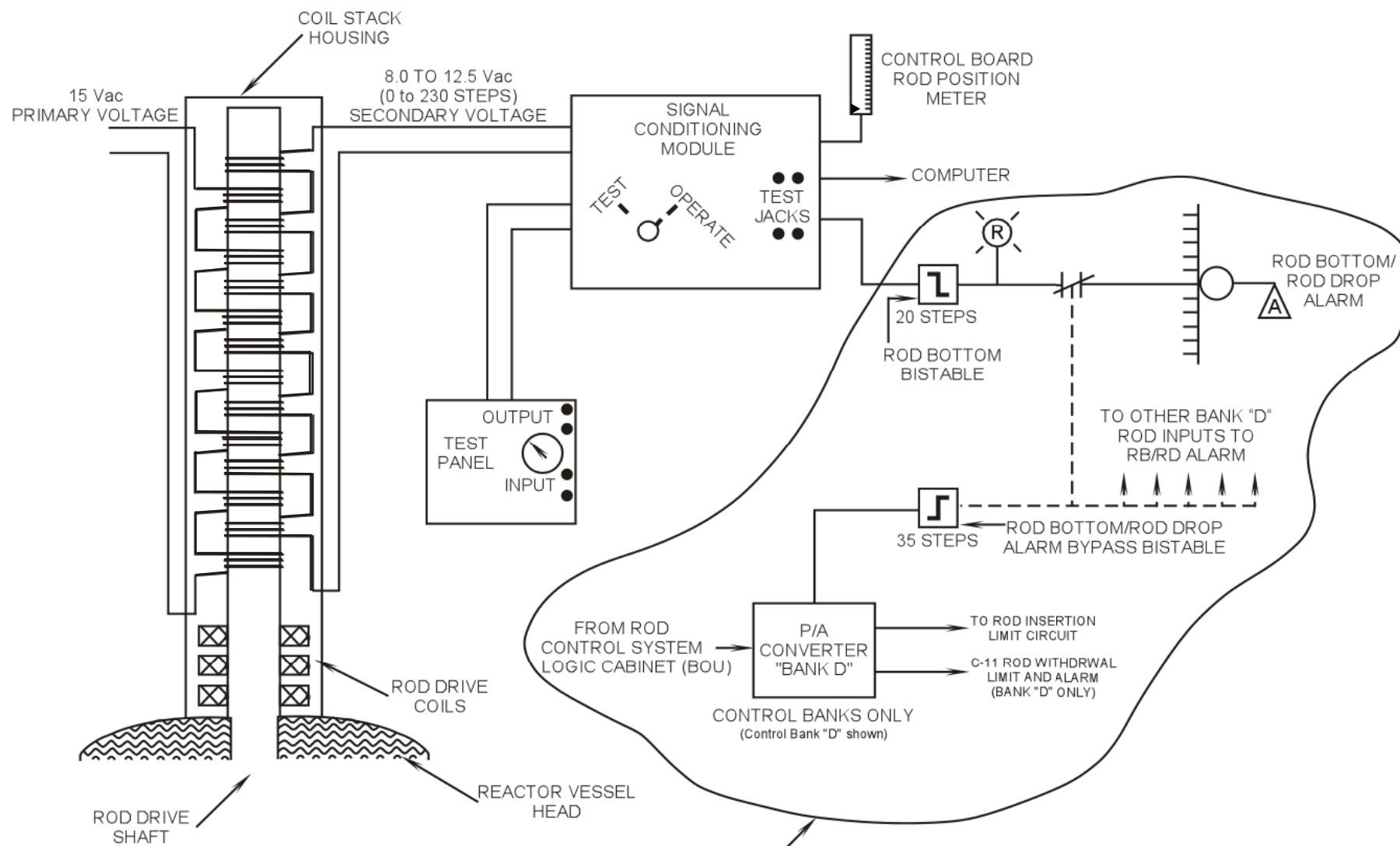
# Objectives (IRPI)

1. State the purpose of the rod position indication system.
2. Briefly describe the operation of the following:
  - a. Individual (analog) Rod Position Indication,
  - b. Group demand position indication, and
  - c. Bank demand position indication
3. List the conditions that will initiate a rod deviation alarm.

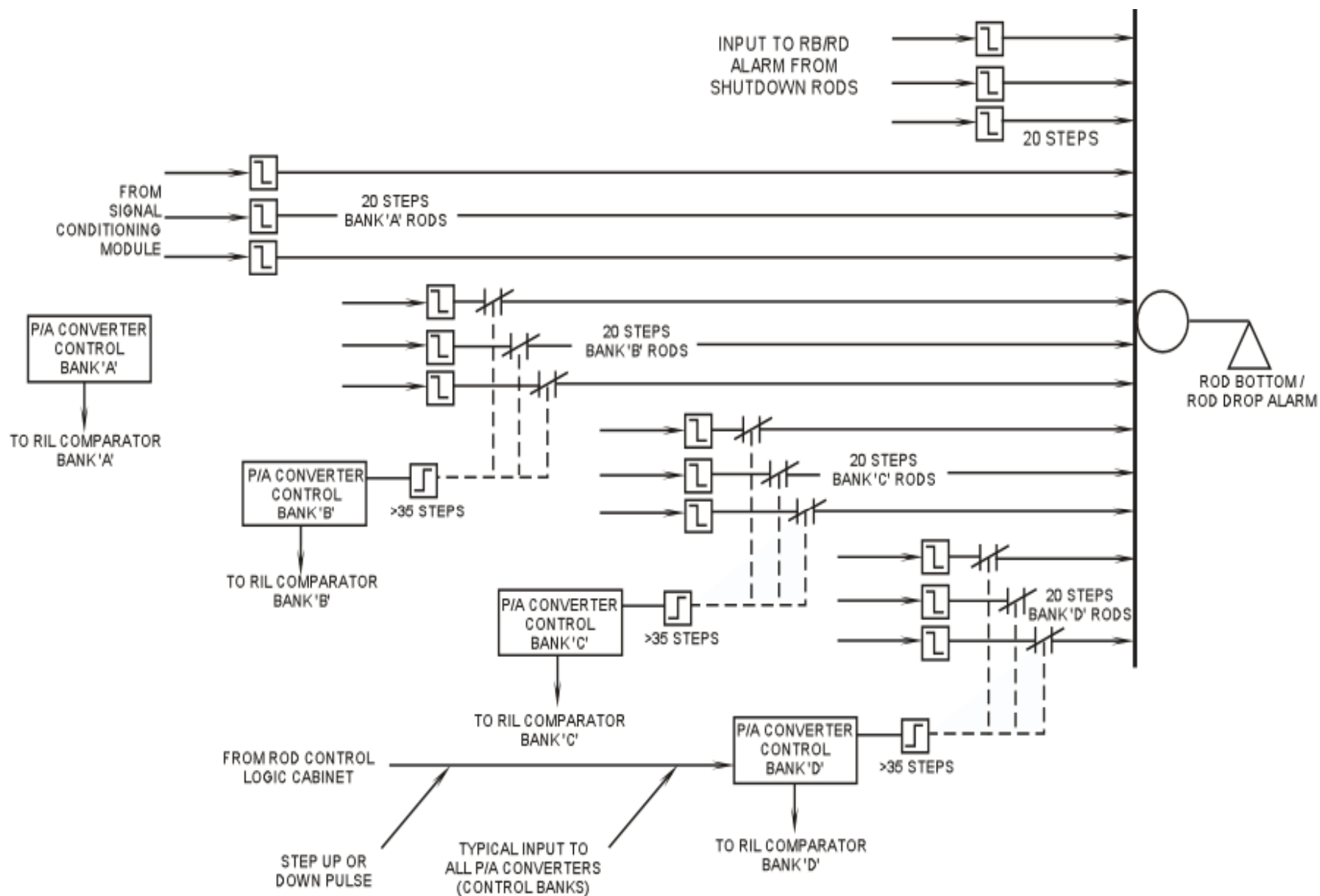
# Purpose(s)

- Provide indication of actual and demanded control rod position.
  - Actual: IRPI
  - Demanded: Step counters (Group)  
P/A converters (Bank)
- Provide alarms for misaligned rods.
- Provide alarms for excessive rod insertion to ensure shutdown margin.





SEE FIGURE 8.2-2



**Fig. 8.2-2: Rod Bottom / Rod Drop Alarm**

## 8.2.3.8 Rod Deviation Monitor

(Main Plant Computer Program) OBJ -3

- Rods within bank  $> \pm 12$  steps from demand
- Any 2 rods within bank  $> 12$  steps from each other
- S/D bank rod  $< 220$  steps
- Control banks not in proper sequence



# Digital Rod Position Indication System “DRPI”

Section 8.3



# Objectives (DRPI)

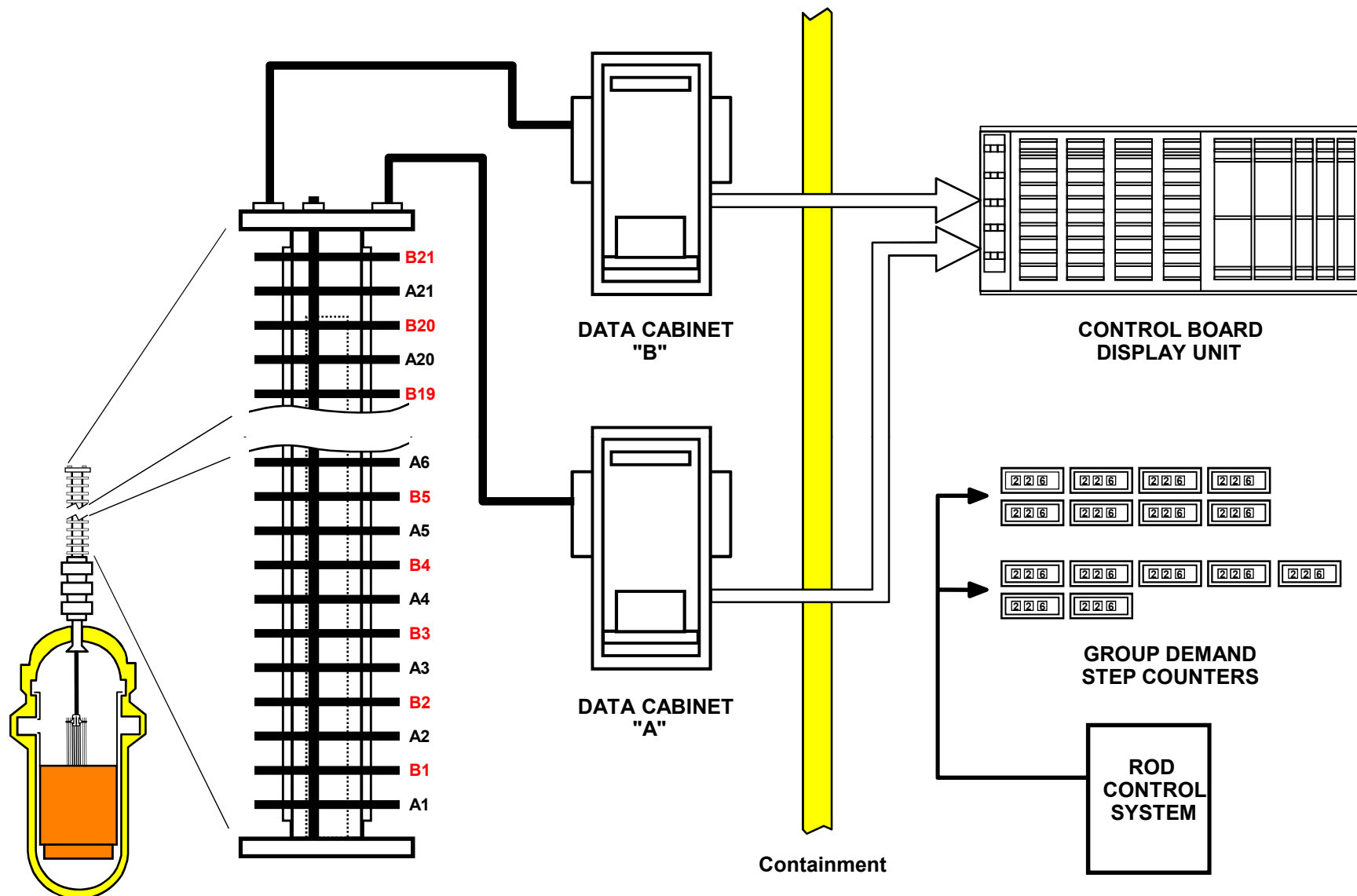
1. State the purpose of the rod position indication system.
2. Briefly describe the operation of the following:
  - a. Individual (digital) Rod Position Indication,
  - b. Group demand position indication, and
  - c. Bank demand position indication
3. List the conditions that will initiate a rod deviation alarm.

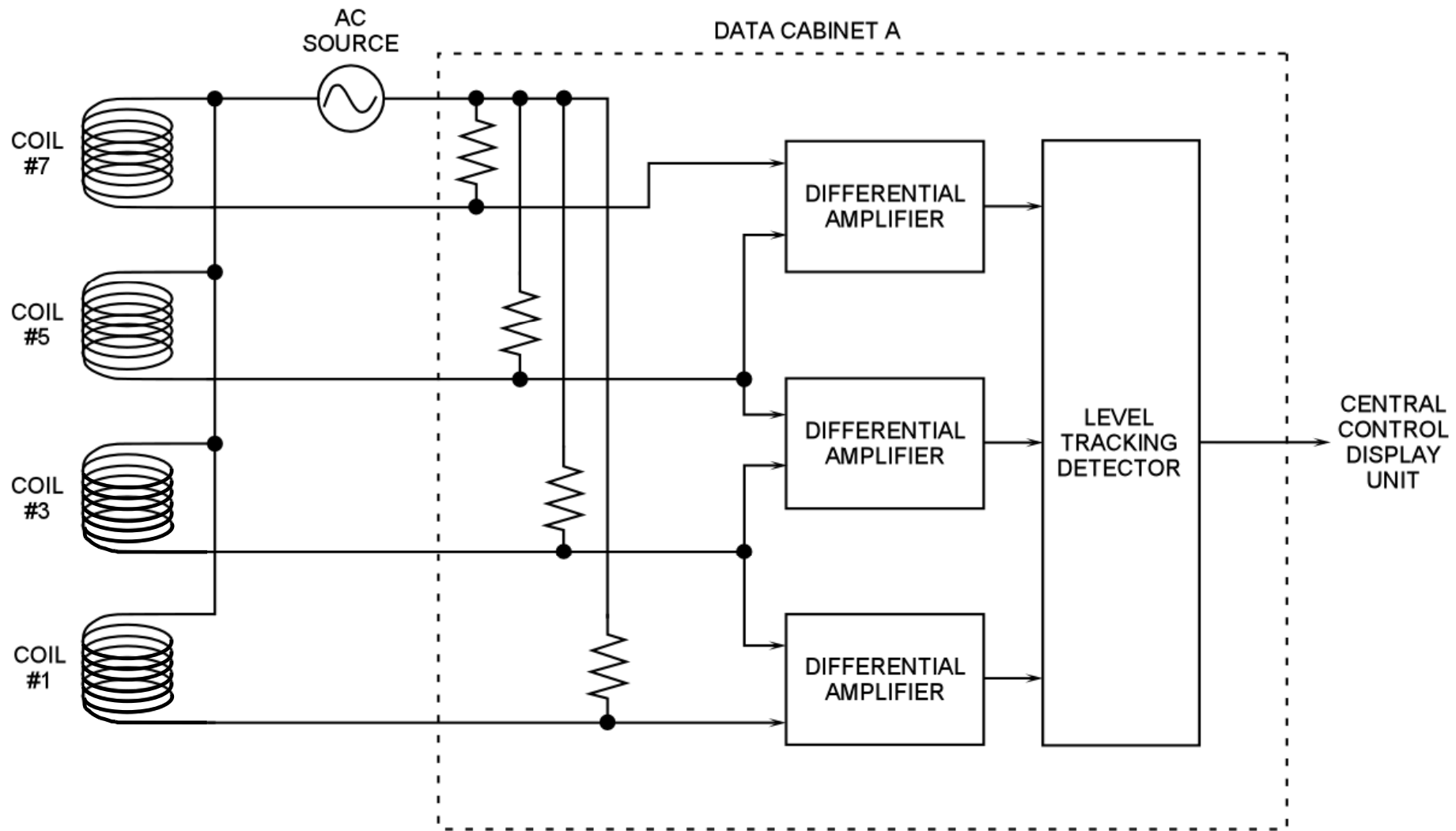


# Purpose(s)

- Provide indication of actual and demanded control rod position.
  - Actual: DRPI
  - Demanded: Step counters (Group)  
P/A converters (Bank)
- Provide alarms for misaligned rods.
- Provide alarms for excessive rod insertion to ensure shutdown margin.

**Ref to Figure 8.3-1**  
**DRPI AND GROUP DEMAND SYSTEMS**





**Fig. 8.3-1**

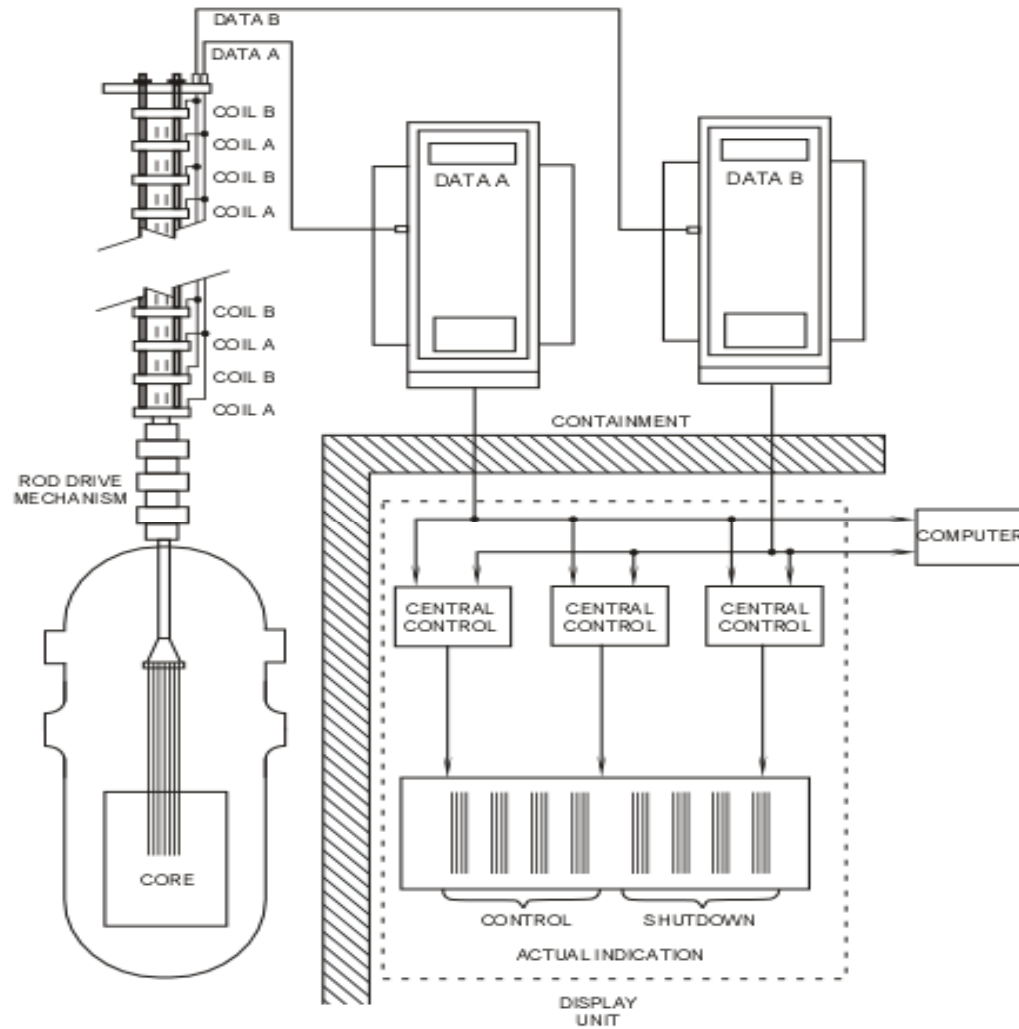
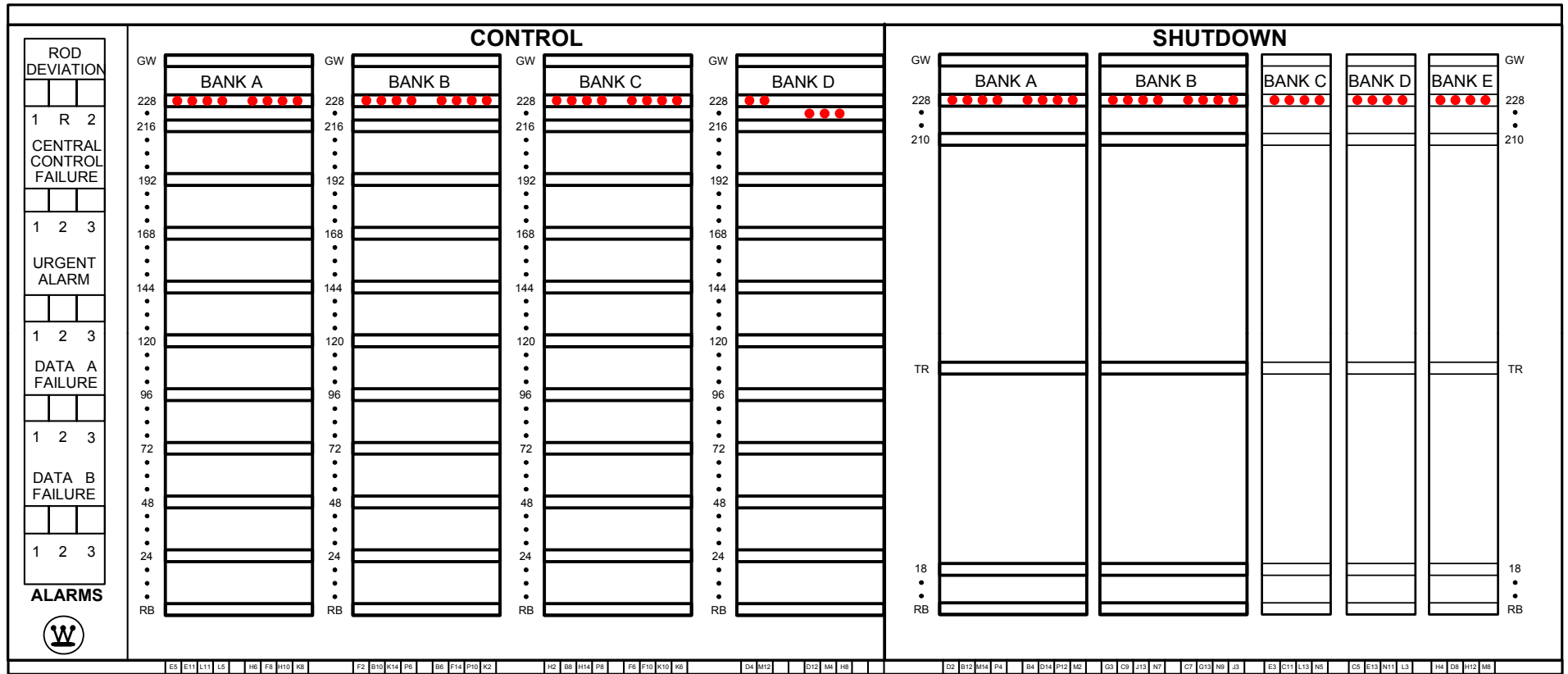
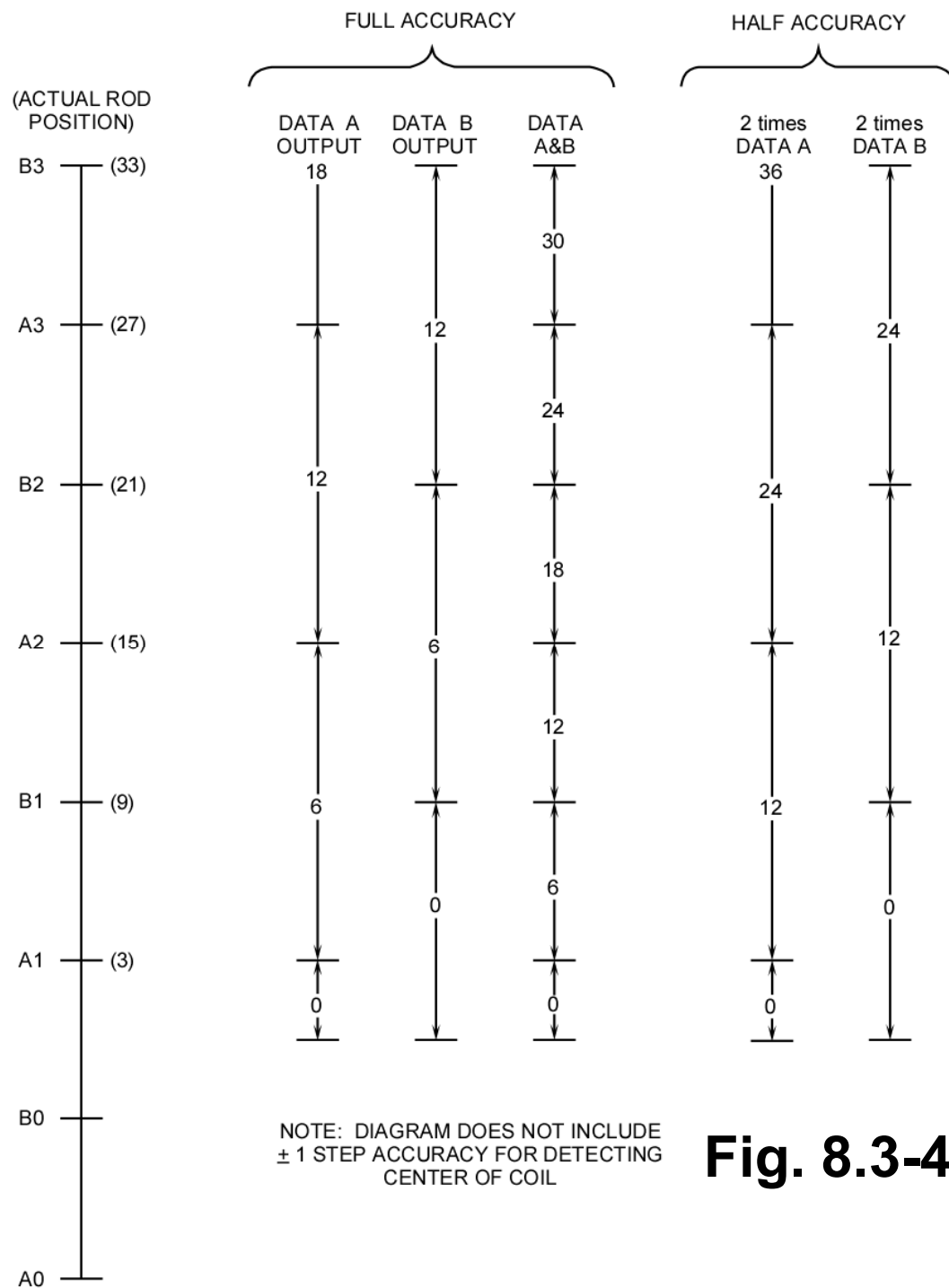


Figure 8.3-1 Digital Rod Position Indication

# Figure 8.3-3





**Fig. 8.3-4**

## 8.3.4 Rod Deviation Monitor

(Main Plant Computer Program) OBJ -3

- Rods within bank  $> \pm 12$  steps from demand
- Any 2 rods within bank  $> 12$  steps from each other
- S/D bank rod  $< 220$  steps
- Rods operating out of sequence



# Rod Insertion Limits

## Section 8.4





# Objectives

1. State the purposes of the control rod insertion limits (RILs).
2. List the inputs into the rod insertion limit computers and comparators.
3. Explain why the rod insertion limits increase with increasing reactor power.

# Purposes

- Maintain an adequate shutdown margin,
- Maintain nuclear peaking factors within limits,  
and
- Minimize the reactivity effects on the core  
due to an ejected rod.

Figure 8.4-1 Rod Insertion Limit Circuit

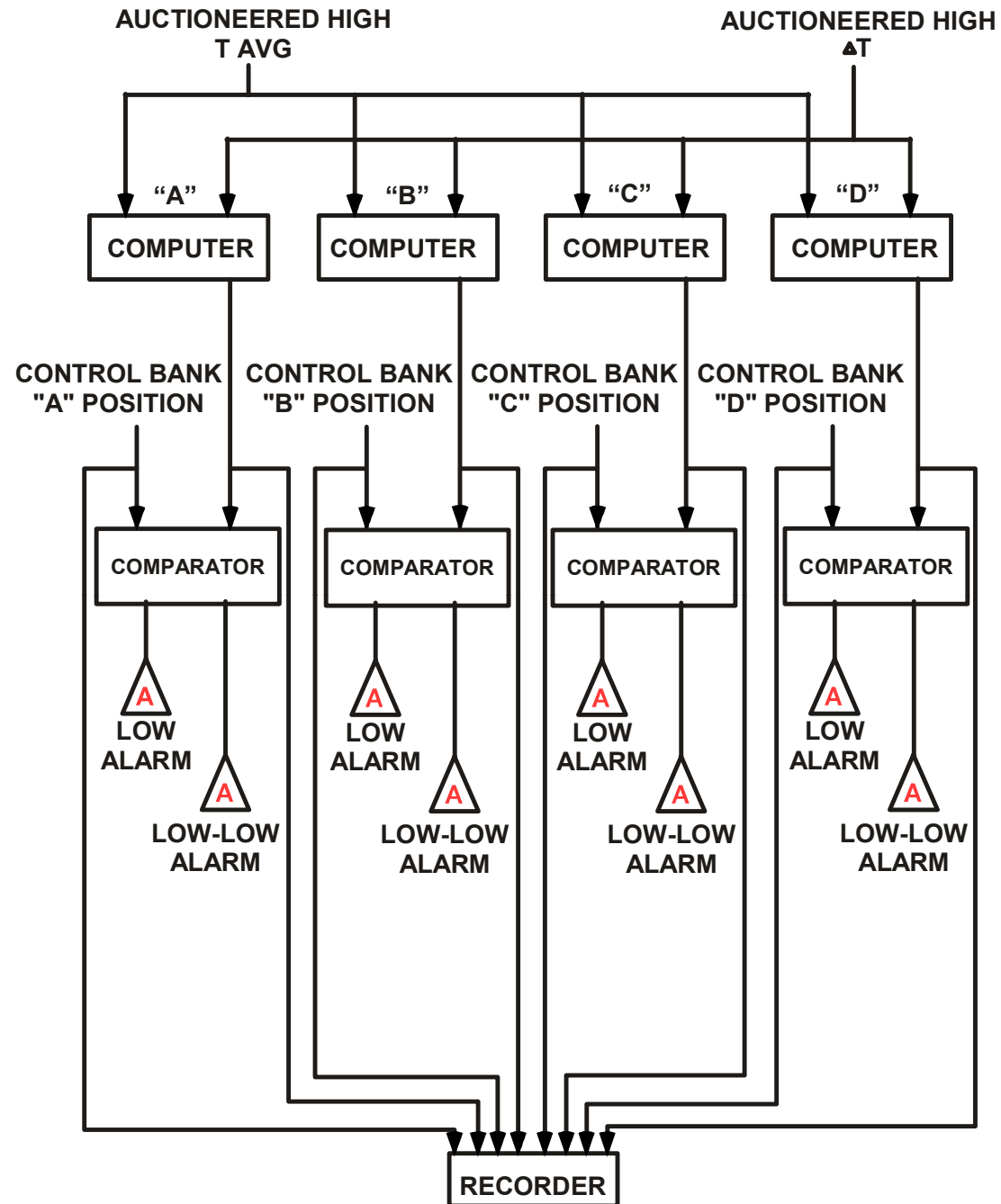


Figure 8.4-2 Rod Insertion Limits vs. Thermal Power

