Activity: watching an (r, Q) item

Chapter 8, Continuous and Periodic Review Systems

Manuel D. Rossetti

Work in pairs. 20 minutes.

Names: _____

The item. The utility storeroom that carries the pad-mount transformer also carries a recloser control. Crews draw about **30** a year, one at a time, and a crew that finds the shelf empty waits for the next delivery (backordered, first come first served). The supplier's lead time is **8 weeks**. The storekeeper runs $r = 3$ and $Q = 4$, and at week 0 there are **5** controls on the shelf, none on order and nothing owed.

Conventions. An order placed in week w arrives at the start of week $w + 8$, before any demand that week, and fills backorders before it reaches the shelf. The position is checked after every transaction; whenever it is at or below r, order Q. Record each row after its event is processed.

Notation. I is on hand, IO on order, B backordered, $IN = I - B$ the net inventory and $IP = I + IO - B$ the inventory position.

The demands. One control is drawn in each of these weeks, and in no others:

1, 3, 4, 6, 7, 9, 10, 12, 14, 15, 18, 20

Part A. Predict

Before you start: which values can the inventory position take at the end of a row while this policy runs? And can the shelf be empty while the position is 7?

Part B. Keep the ledger

Work week 0 through week 20. Add a row for each delivery, in the week it arrives, and mark each order in the last column with the week it is due.

Week	Event	I	IO	B	IN	IP	Order (due week)
0	start	5	0	0	5	5	

Part C. Read the ledger

1. List the value of IP at the end of every row. Which values occur, and how often each? Compare with your prediction.
2. Check $IP = I + IO - B$ on every row where both IO and B are positive.
3. What is the largest number of orders ever outstanding at once, and in which weeks?
4. What fraction of the twelve demands was filled from the shelf? How many orders did the ledger place, and how many does λ/Q predict for 20 weeks?

Part D, if you have time. A crew takes three

Rework the ledger from week 14, but now the crew at week 14 draws **three** controls at once. Every other demand is unchanged. Where does the position land before the order, and where after? Which values of the band does it skip? What does the order placed at week 14 start with, compared with the orders placed at weeks 3 and 9?

Exit ticket (tear off and hand in)

Name: _____

1. At week 7 the shelf is empty and no order goes out. In one sentence, why is that the right decision?

2. True or false, and why: a delivery raises the inventory position.