Discrete System Simulation

Prepared
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Discrete System simulation

- The model used in discrete system simulation has a set of numbers to represent the state of the system.
- A number used to represent some aspect of the system state is called a *state descriptor*.

Representation of Time

- The passage of time is recorded by a number referred to as clock time.
- It is usually set to zero at the beginning of a simulation and subsequently indicates how many units of simulated time have passed since the beginning of the simulation.
- The term simulation time means the indicated clock time and not the time that a computer has taken to carry out the simulation.
- There is no direct connection between simulation time and the time taken to carry out the computations.

- Two basic methods exist for updating clock time. (Time advancement Mechanism)
- 1) one method is to advance the clock to the time at which the next event is due to occur. This is referred as event oriented method.
- 2) The other method is to advance the clock by small intervals of time and determine at each interval whether an event is due to occur at that time. This is referred as interval oriented method.

Generation of Arrival Patterns

- As aspect of discrete system simulation is the generation of exogenous arrivals.
- It is possible that exact sequence of arrivals has been specified for the simulation.
- Discrete system simulation is used for testing the design of logic circuit of digital computers and devices.
- The exogenous arrivals of an entity is defined as an event and the arrival time of the next entity is recorded as one of the event times.

- When the clock time reaches this event time, the event of entering into the system is executed, and the arrival time of the following entity is immediately calculated from the inter-arrival time distribution.
- The term **boot strapping** is often used to describe this process of making one entity create its successor.

Simulation of telephone System

- Lost call System :

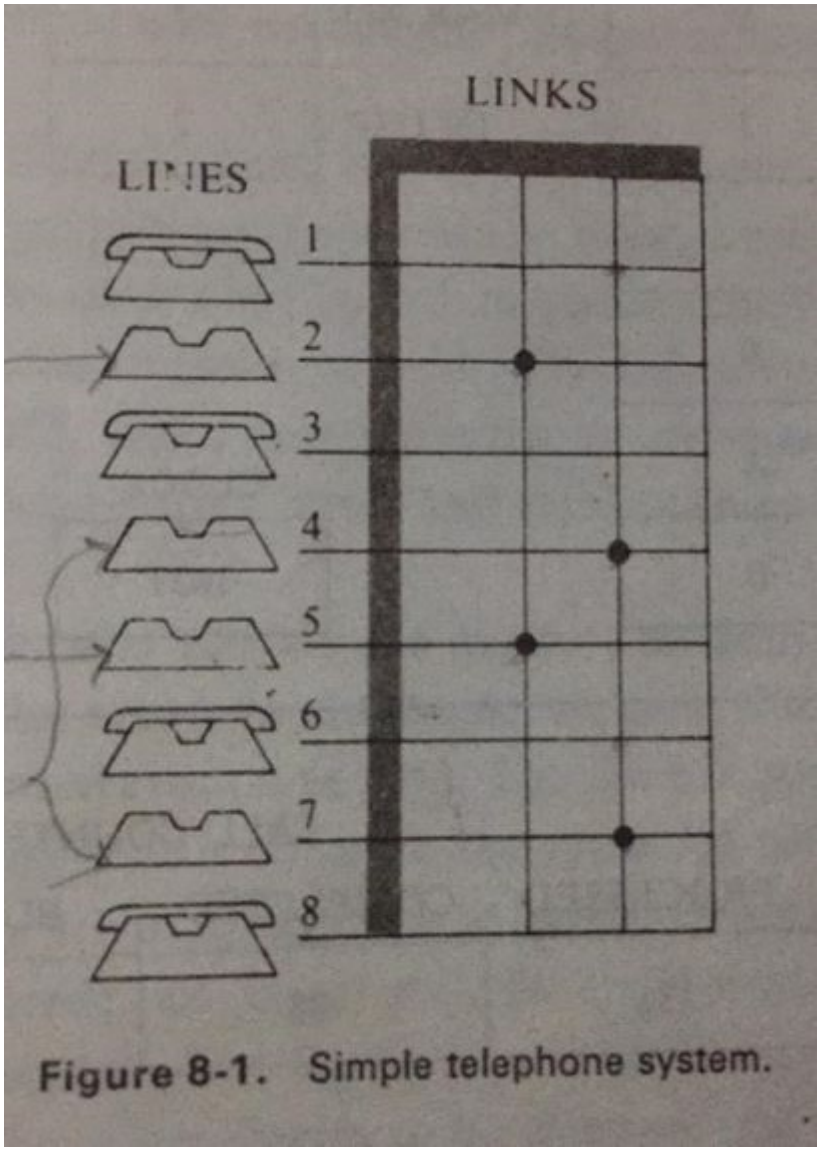

Figure 8-1. Simple telephone system.

[redacted]s. The switchboard has a number of links which can be used to connect any two lines, subject to the condition that only one connection at a time can be made to each line. It will be assumed that the system is a lost-call system, that is, any call that cannot be connected at the time it arrives is immediately abandoned. A call may be lost because the called party is engaged, in which case the call is said to be a busy call; or it may be lost because no link is available, in which case it is said to be a blocked call. The object of the simulation will be to process a given number of calls and determine what proportion are successfully completed, blocked, or found to be busy calls.

The current state of the system, shown in Fig. 8-1, is that line 2 is connected to line 5, and line 4 is connected to line 7. [redacted]

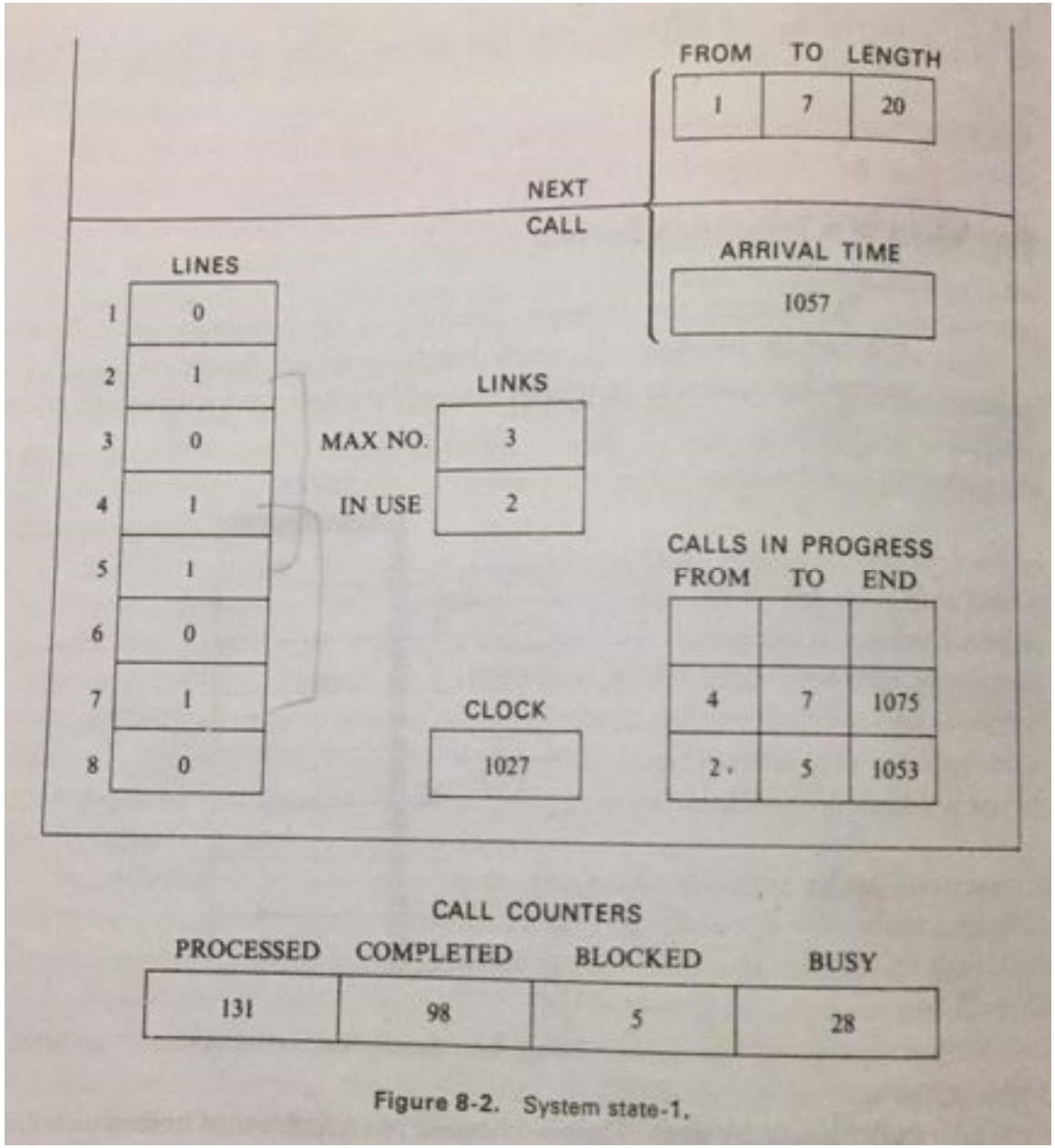

Figure 8-2. System state-1.

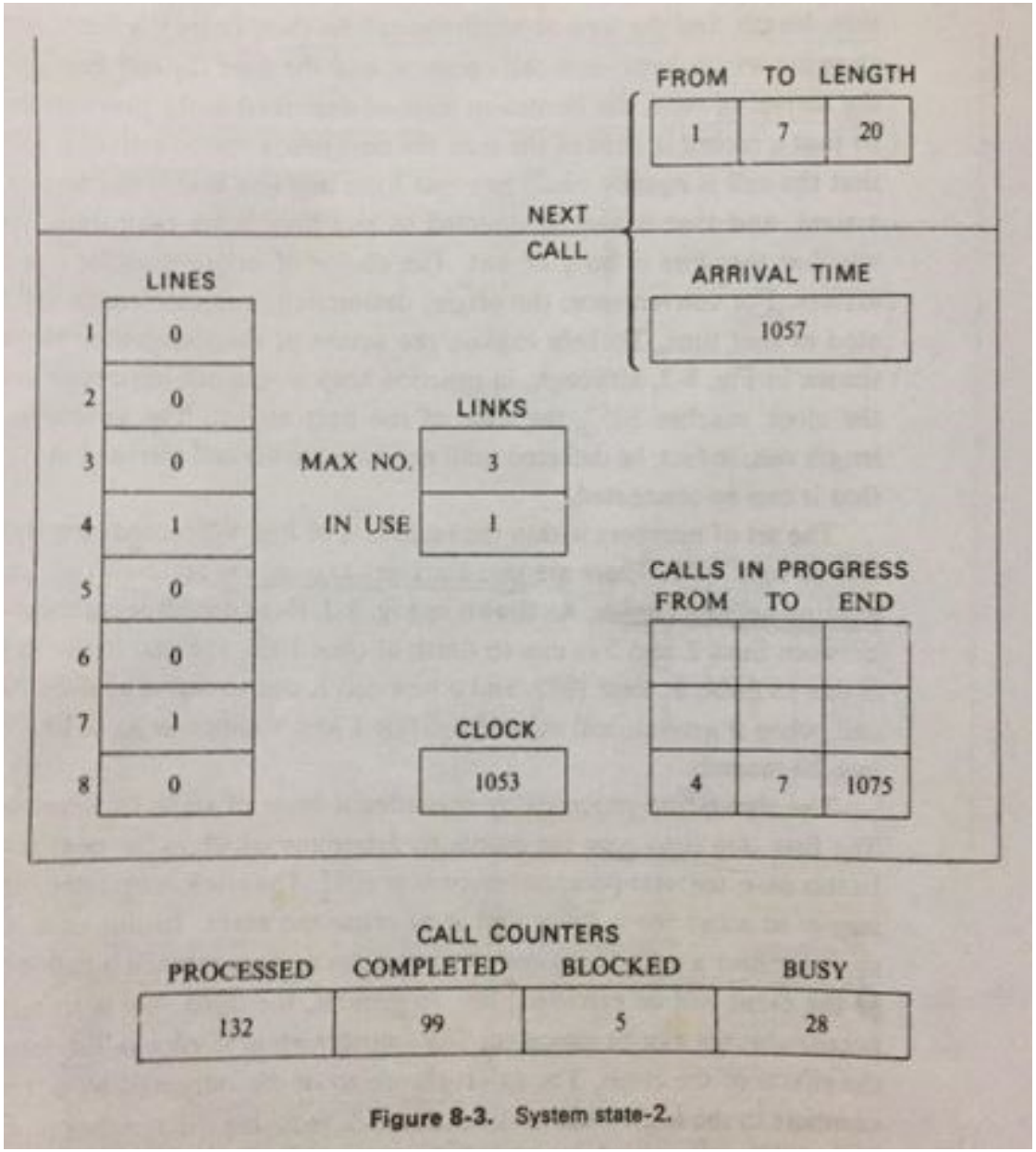

Figure 8-3. System state-2.

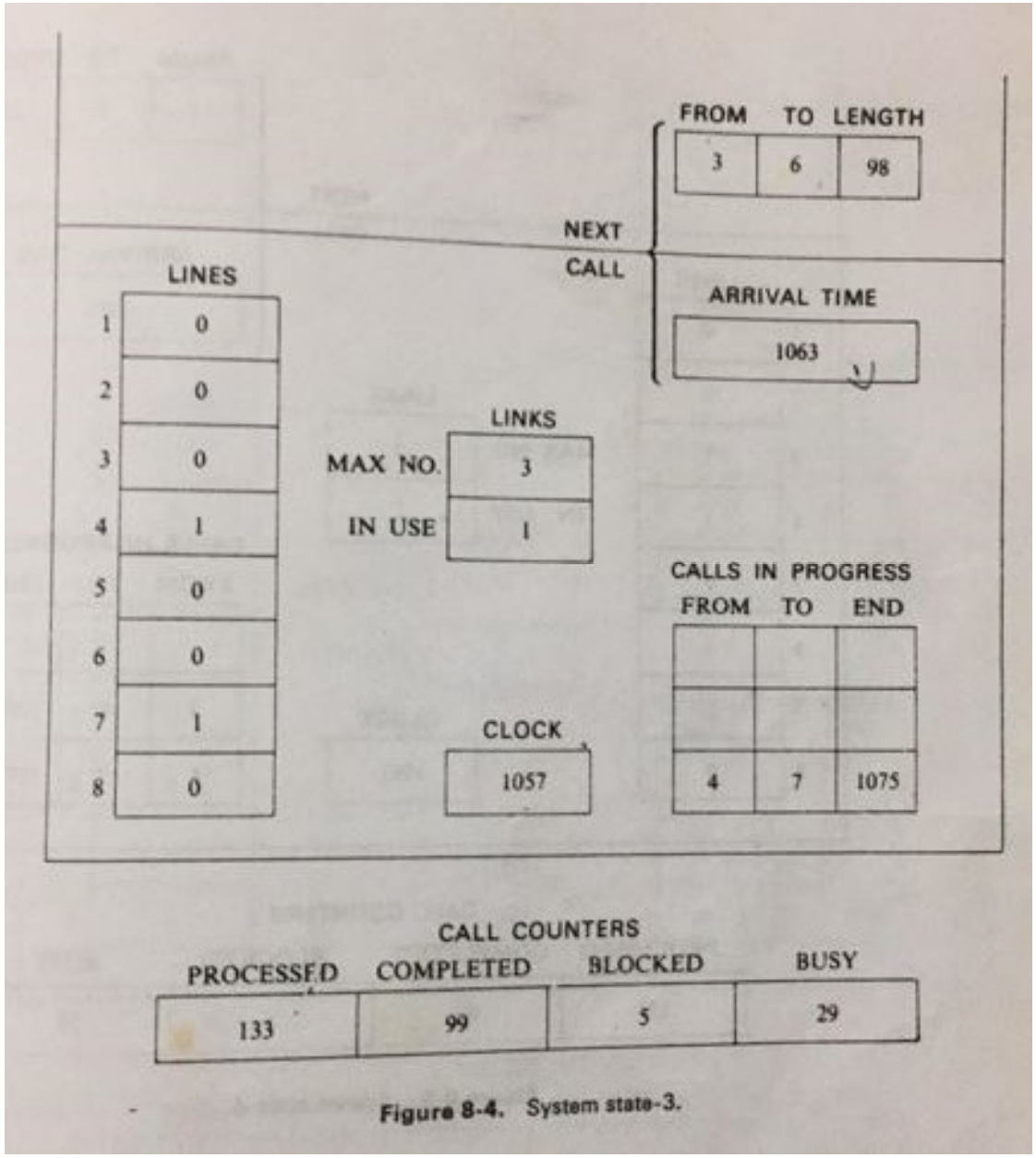

Figure 8-4. System state-3.

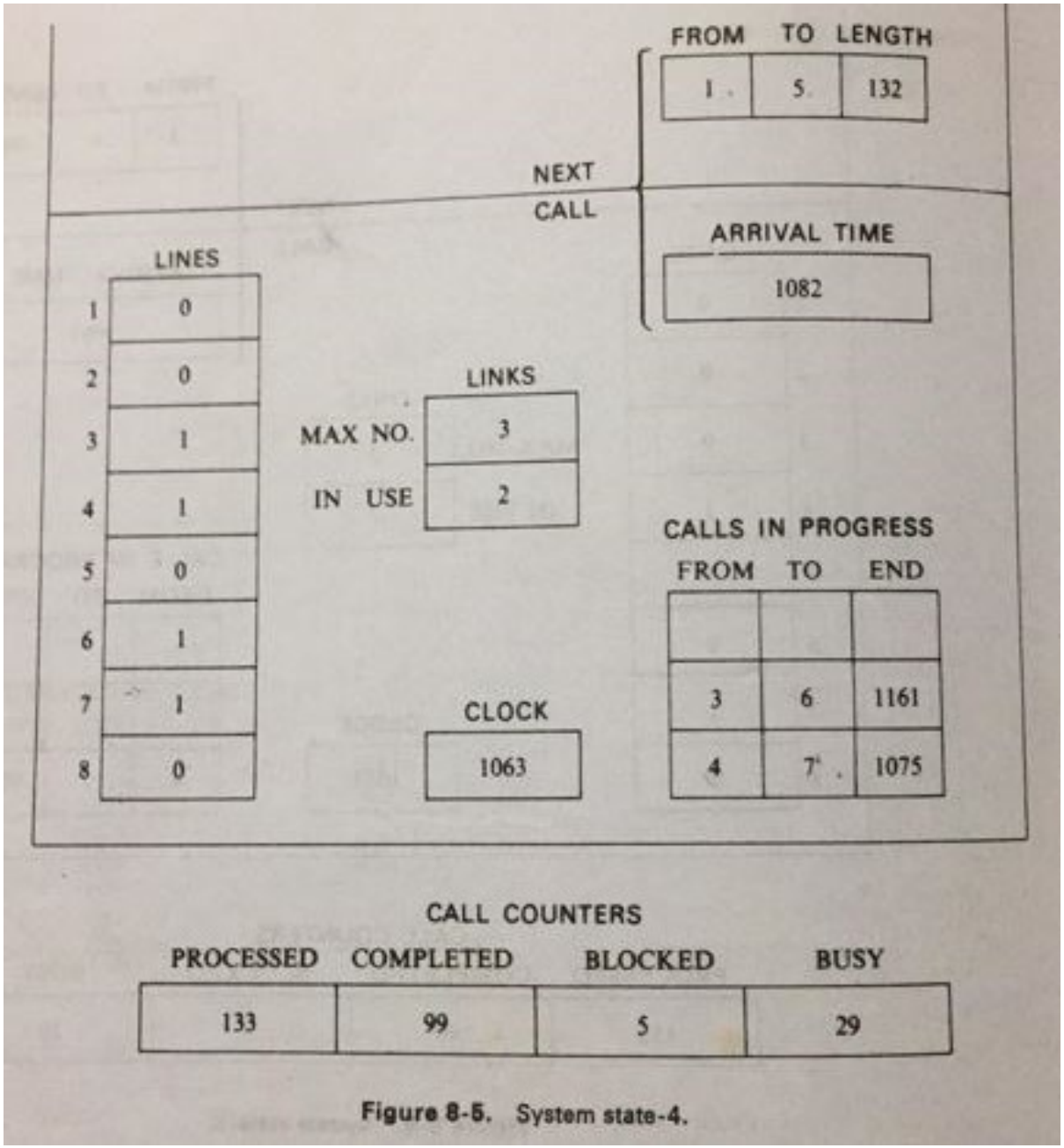

Figure 8-5. System state-4.

Delay call

Suppose the telephone system is modified so that calls that cannot be connected are not lost. Instead, they wait until they can be connected. This is not characteristic of a normal telephone system involving human beings talking to each other. However, it can happen to messages in a switching system that has store-and-forward capability. We will continue, however, to describe the transactions as calls.

To keep records of the delayed calls, it is necessary to build another list like the calls-in-progress list. Recomputing the simulation, the system moves through

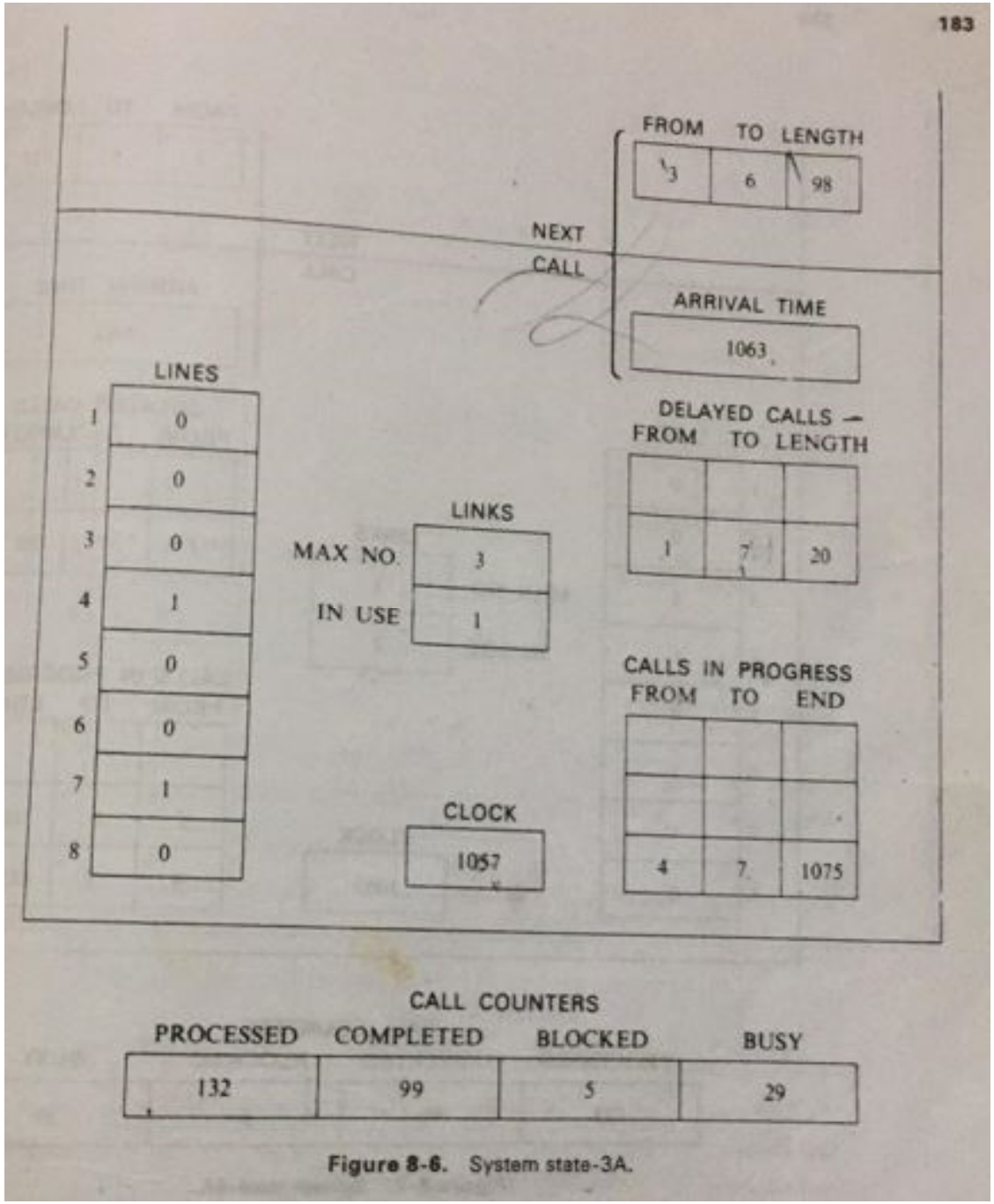

Figure 8-6. System state-3A.

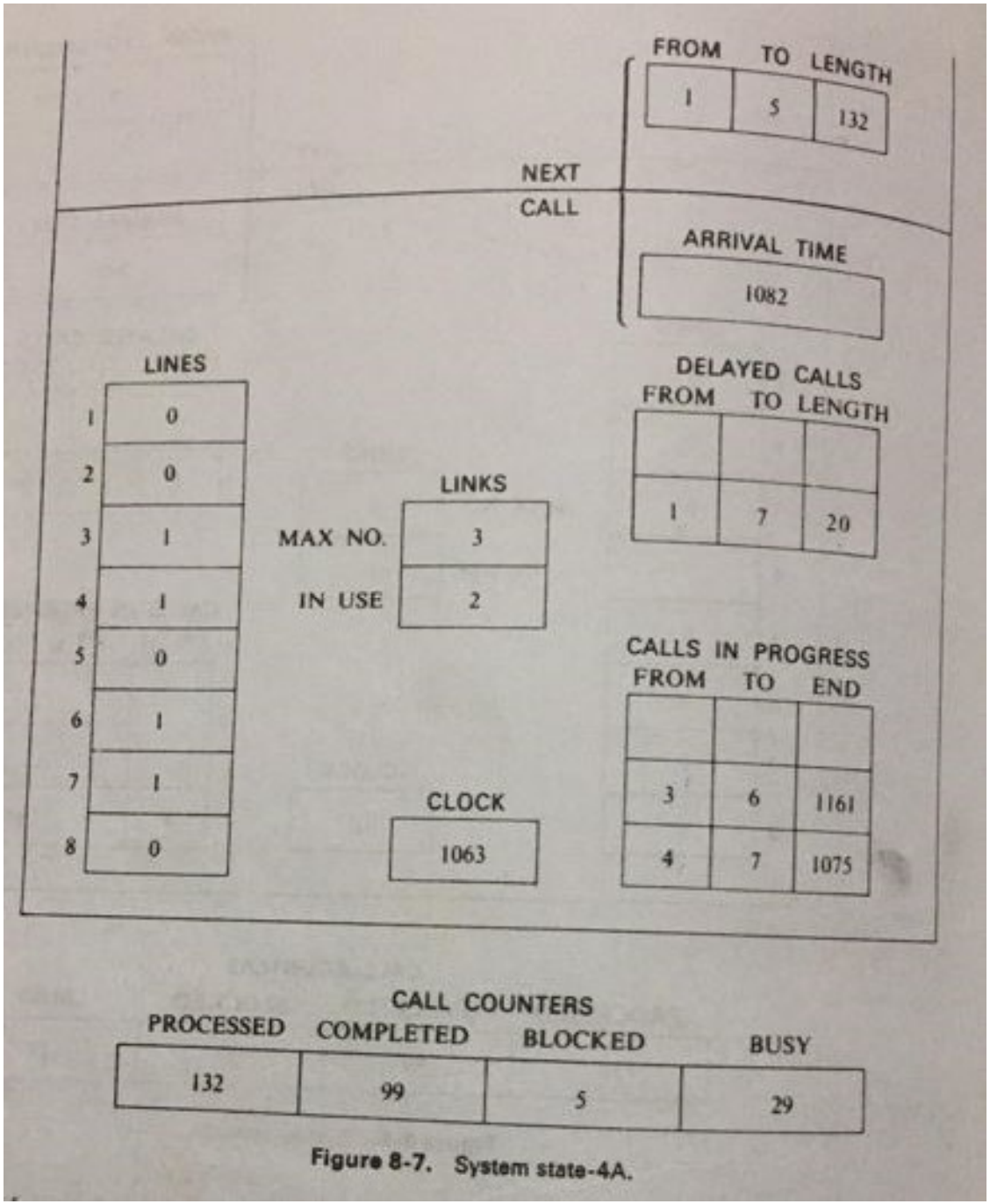

Figure 8-7. System state-4A.

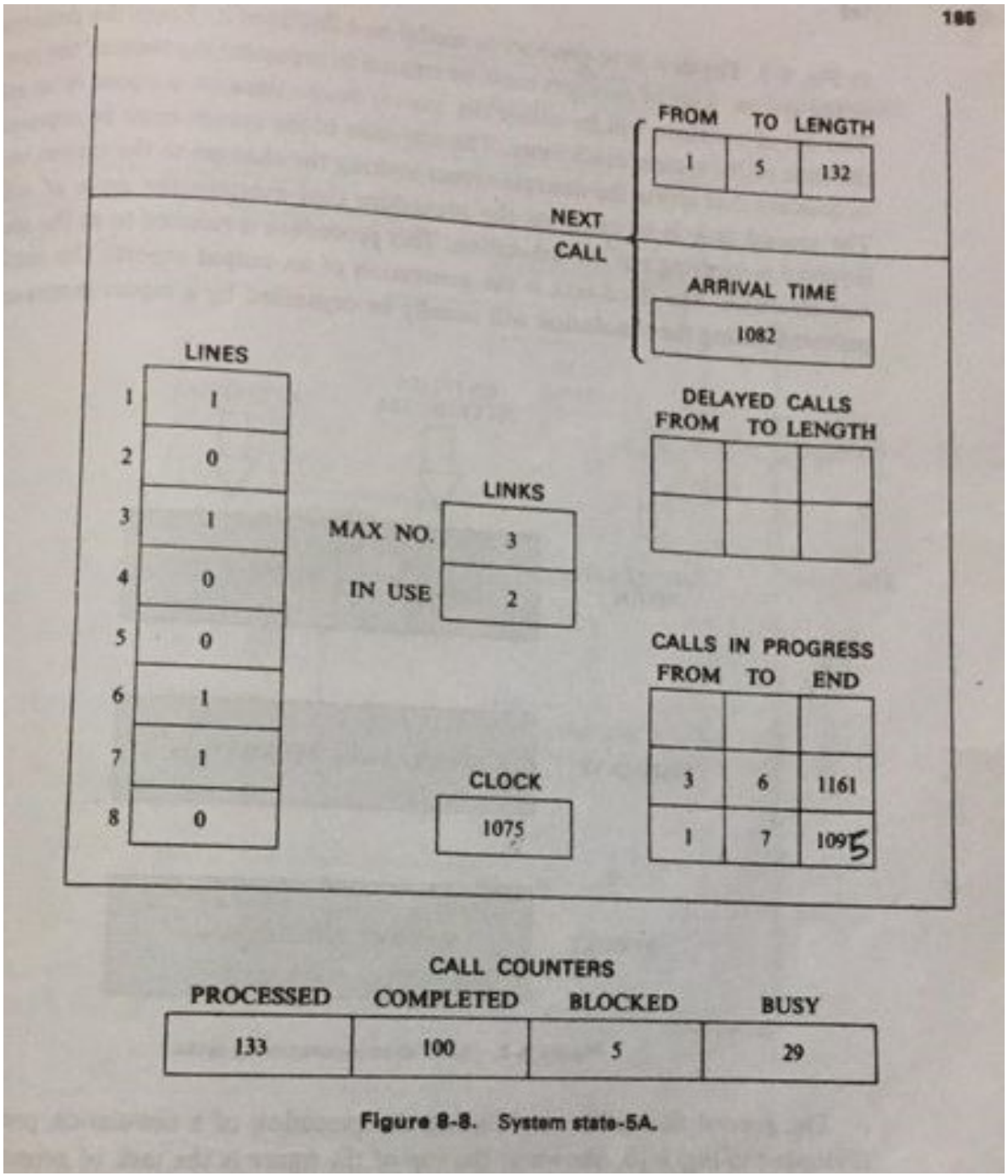

Figure 8-8. System state-5A.