CHAPTER 3

BLOCKING

Comanche & Big Sky	Comanche & Wyoming	Comanche & San Mateo	Comanche & Carlisle	N. 4th & Griegos	Rio Grande & Montano		Rio Grande & Montano	N. 4th & Griegos	Comanche & Carlisle	Comanche & San Mateo	Comanche & Wyoming	Comanche & Big Sky
6:26	6:35	6:41	6:45	6:55	7:02							
6:56	7:05	7:11	7:15	7:25	7:32		6:10	6:17	6:27	6:31	6:37	6:46
7:26	7:35	7:41	7:45	7:55	8:02	A	6:40	6:47	6:57	7:01	7:07	7:16
7:56	8:05	8:11	8:15	8:25	8:32	M	7:10	7:17	7:27	7:31	7:37	7:46
8:26	8:35	8:41	8:45	8:55	9:02		7:40	7:47	7:57	8:01	8:07	8:16
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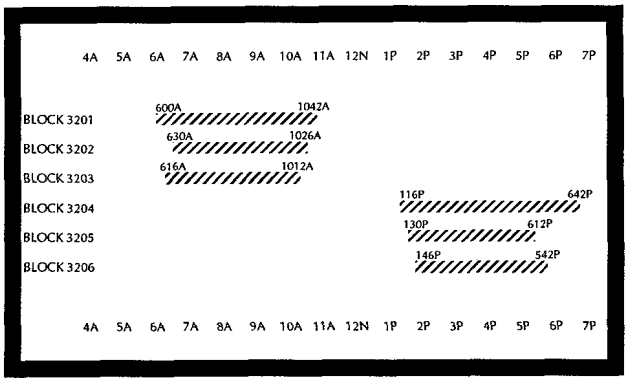
5:56	6:05	6:11	6:15	6:25	6:32							



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Study Objectives

1) Learn that blocking is the process of developing vehicle assignments.
2) Know why blocking is important.
3) Understand that agency work rules and policy regarding layover/recovery time, layover locations and interlining are necessary for proceeding with the blocking process.
4) Remember the definitions of (and difference between) layover and recovery time.
5) Learn that interlining allows one vehicle to operate trips on more than one route.
6) Understand why interlining is done.
7) Be able to block a simple schedule.
8) Be able to complete a blocking sheet for a simple schedule.
9) Be able to recognize a four digit blocking numbering convention.
10) Learn the block/trip number notation for noting block numbers on a master schedule.
11) Learn what "hooking" trips together means.
12) Learn the relationship between cost and the amount of recovery time built into a schedule.
13) Remember the simple formula for computing the number of vehicles needed to maintain a given level of service with a consistent headway.
14) Learn the benefits of maintaining slightly excessive layover/recovery time.
15) Understand why some inconsistencies will occur in headways, particularly during certain times of the day.
16) Be able to recognize and complete a block summary recap sheet.
17) Be able to graph blocks, given the appropriate trip information.

I. Introduction

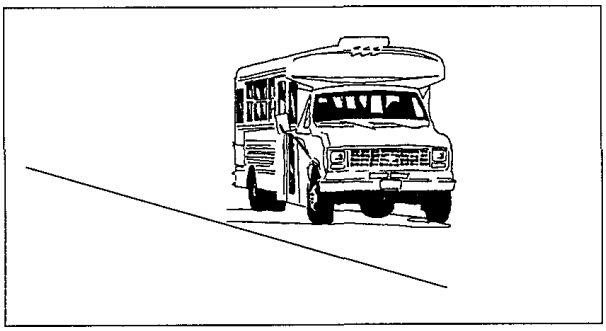
What is "blocking"?

Blocking is the process of developing vehicle assignments.

These assignments, or blocks, describe a series of trips that are "hooked" together and assigned to a single vehicle.

The vehicle trips that are linked together as part of the block may cover more than one route and may also involve more than one operator during the course of the vehicle workday.

However, the block refers to the work assignment for only a single vehicle for a single service workday.



A block is the work assignment for a single vehicle during a service work day.

Why is blocking important?

Blocking is a critical element in the scheduling process because it serves as the basis for both the costs associated with operating the revenue service vehicle as well as influencing the cost associated with work assignments for operators.

Setting up the blocking process

Before blocking can begin, the scheduler must have a completed master schedule for each route to be blocked.

The scheduler must also be thoroughly knowledgeable of all applicable company work rules related to blocking.

Three agency policies that have great impact on the blocking process are

- Layover and recovery time,
- Layover locations, and
- Interlining.

A thorough knowledge of work rules related to the runcutting process (assigning work to operators, see Chapter 4) will also help to optimize the efficiency of the blocking process.

Layover and recovery time

Layover and recovery are "out-of-service" time allowances allocated to a vehicle at a certain location or locations along the route, generally at a terminal location.

("In-service" time is when the vehicle is in revenue service, transporting passengers.)

Layover time is rest or "break" time allocated to the operator somewhere along the line, usually at a terminal location at the end of a trip. The minimum amount of layover time is usually determined by labor agreement or agency policy.

Layover time is often considered time due to the operator, like a break during an office or factory job.

Recovery time can be thought of as "buffer" break time built into the schedule. It may or may not be used by the operator. If the vehicle is behind schedule, it can often catch up to the schedule by not taking any of (or just a portion of) the scheduled recovery time. Recovery time also provides the operator additional time to change headsigns, make trip sheet entries or perform other duties.

Recovery time is distinct from layover time, although they are often taken together at the same location. Unlike layover time, recovery time is typically considered agency time and is allocated at the discretion of the agency.

About layover and recovery policy

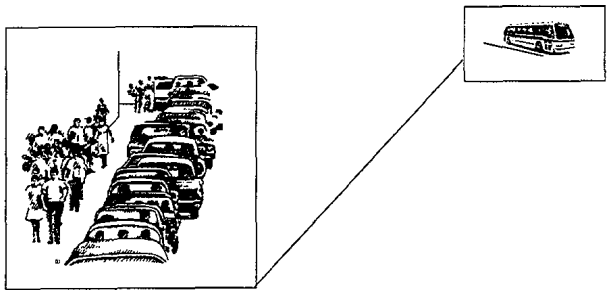
Layover and recovery policy may be determined by labor agreement, practice or agency standards. For optimal blocking, it is important to know whether the layover/recovery policy represents a guideline that can be adjusted to optimize blocks, or is a hard and fast rule which must be followed even if it impacts blocking efficiency.

Often, layover time is required by contract, but recovery time can be adjusted depending on time of day and blocking needs.

One commonly used policy requires a minimum layover and recovery time of 10% of the total round trip running time.

Layover locations

Many agencies have, by practice or work rules, limited the locations where layover and recovery can be taken. For example, on radial routes serving a congested downtown area, layover is often taken at the outer ends of the route only.



Layover is often taken at the outer end(s) of a route serving a congested downtown area.

In some cases, layover is required on both ends of a route depending on the length of the route and the location of the terminals.

Layover and recovery must be taken in a safe location where a vehicle can stand still without impeding traffic. Layover and recovery is generally taken at the end of the line (terminal) where it will inconvenience the fewest passengers. However, it may also be assigned at key transfer points such as rail stations.

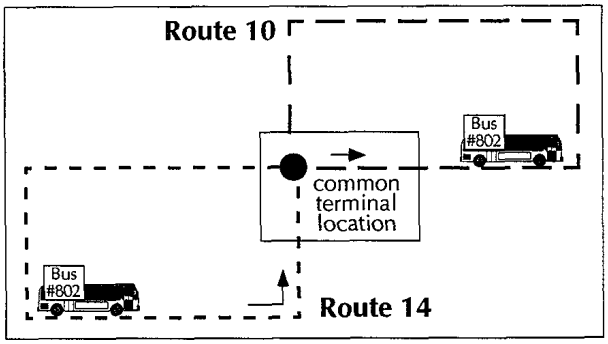
Interlining

What is interlining again?

Interlining assigns a vehicle to operate trips on more than one route.

Interlining is sometimes done to optimize blocking, however, it is also done as a convenience to the passengers.

For example, if many passenger trips that originate on one route are destined for a location or locations on a second route that shares a common terminal location with the first route, interlining will allow those passengers to reach their destination without transferring to another vehicle.



Interlining allows the use of the same vehicle on more than one route or line.

Vehicles may typically travel between one route and another only once or only occasionally during the service day. For example, a vehicle may provide peak service on one route and then begin providing midday service on another route.

More complex interlining may involve a block that alternates between routes throughout the entire service day. These complex interlines generally occur at a common terminal point or points.

Transit agencies often have policies regarding the amount of interlining that can occur and where interlining can be scheduled.

Policy knowledge is a must.

Review key points by answering these questions.

1) Blocking is the process of developing vehicle assignments. True or False

2) A block may refer to more than one vehicle. True or False

3) Blocking is a critical element in the scheduling process because it influences both the costs associated with vehicle assignments and the cost associated with operator assignments. True or False

4) It is not necessary to have a completed master schedule for a route for blocking to begin. True or False

5) A thorough knowledge of work rules related to the runcutting process will also help to optimize the efficiency of the blocking process. True or False

6) _ _ _ _ _ _ _ and _ _ _ _ _ _ _ _ are out-of-service time allowances allocated to a vehicle at a certain location or locations along the route, generally at a terminal point.

7) Recovery time is distinct from layover time, although they are often combined. True or False

8) Often, _____ time is required by contract, but _____ time can be adjusted depending on time of day and blocking needs.

9) Match the following:

Layover time	considered time due the operator
Recovery time	generally allocated at the discretion of the agency
	buffer time
	labor agreement

10) On radial routes serving a congested downtown, layover is often taken...

a) at outer ends c) in western locations

b) at inner ends d) none of the above

11) _ _ _ _ _ _ _ _ _ _ _ assigns a vehicle to operate trips on more than one route.

II. Basic Blocking Exercise

In preparing for blocking, the scheduler typically needs the following information:

1) Master schedule for route
2) Layover/recovery time policy
3) Layover locations
4) Interlining policy
5) Other applicable work rules

This information is provided below for Route 32.

Westbound							Eastbound					
Comanche & Big Sky	Comanche & Wyoming	Comanche & San Mateo	Comanche & Carlisle	N. 4th & Griegos	Rio Grande & Montano		Rio Grande & Montano	N. 4th & Griegos	Comanche & Carlisle	Comanche & San Mateo	Comanche & Wyoming	Comanche & Big Sky
6:26	6:35	6:41	6:45	6:55	7:02							
6:56	7:05	7:11	7:15	7:25	7:32		6:10	6:17	6.27	6:31	6:37	6:46
7:26	7:35	7:41	7:45	7:55	8:02	A	6:40	6:47	6:57	7:01	7:07	7:16
7:56	8:05	8:11	8:15	8:25	8:32	M	7.10	7:17	7:27	7:31	7·37	7:46
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2:26	2:35	2:41	2:45	2:55	3 02		2:10	2:17	2:27	2:31	2:37	2:46
2:56	3:05	3:11	3:15	3:25	3:32		2:40	2:47	2 57	3:01	3:07	3:16
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4.26	4:35	4:41	4:45	4:55	5:02		5:10	5:17	5:27	5:31	5:37	5:46
5:56	6:05	6:11	6:15	6:25	6:32							

Master schedule for Route 32

Layover/recovery time policy:

Minimum Layover/Recovery Time Allowance Table

ROUND TRIP RUNNING TIME (excluding layover/recovery time)	LAYOVER/RECOVERY TIME	MINIMUM % OF RUNNING TIME
Up to 60 minutes	0 - 6 minutes	10%
61 to 120 minutes	6 - 12 minutes	10%
121 to 180 minutes	12 - 18 minutes	10%

Layover/recovery time may be taken at either terminal and may be divided between terminals.

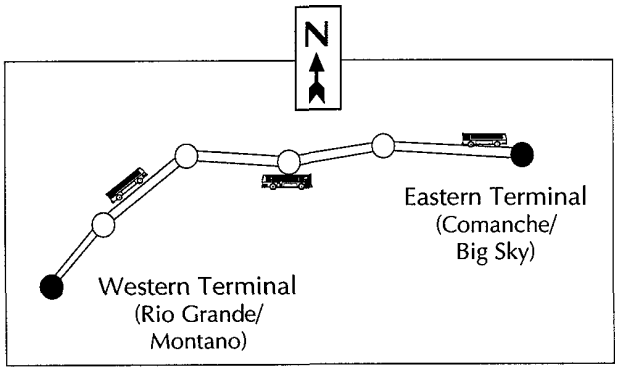
Layover locations: Both the western and eastern terminals.

Interlining policy: Because only one route is being blocked, no interlining will take place.

Work rules: No restrictions apply.

Some notes about the master schedule for Route 32

This schedule is based on a company policy of a 30-minute headway. This means that a vehicle is scheduled to come by any given location on the route every 30 minutes.



With this schedule on Route 32, A.M. WEEKDAY service begins at the western terminal at 6:10 a.m. and ends again at same location at 10:32 a.m. No service is available on this route again until 1:26 p.m. when it begins at the eastern terminal and ends at the western terminal at 6:32 p.m.

A blocking sheet is often used to track blocks as they are created. A sample blocking sheet is shown on the next page.

Pull-out

Pull-out refers to the time that a revenue service vehicle is scheduled to leave the vehicle storage facility and travel to the point on the route where revenue service begins.

For Route 32, the pull-out times are listed on the Pull-out and Pull-in Allowance table shown below.

Pull-in

Conversely, pull-in refers to the time the revenue service vehicle is scheduled to pull-in to the vehicle storage facility after completing revenue service.

For Route 32, pull-in times are also shown below.

Route 32 Pull-out and Pull-in Allowances

Terminal	Pull-out		Pull-in	
Comanche & Big Sky	Weekday	:10	Weekday	:10
	Saturday	No Svc.	Saturday	No Svc.
	Sunday	No Svc.	Sunday	No Svc.
Rio Grande & Montano	Weekday	:10	Weekday	:10
	Saturday	No Svc.	Saturday	No. Svc.
	Sunday	No Svc.	Sunday	No. Svc.

BLOCKING SHEET

Route #: 32

Service: WEEKDAYS

Date: 10/20/XX

Scheduler: BWN

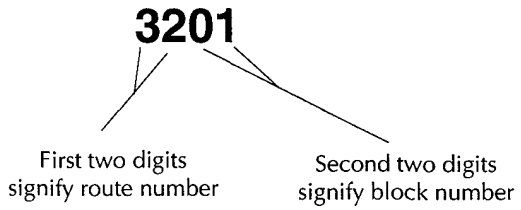
Special Instructions:

18 minutes is available for layover and/or recovery per round trip. OK to split the layover and/or recovery between ends of the line.

Westbound						Eastbound				
Block No.	Pull-out	Trip #	Depart Eastern Terminal	Arrive Western Terminal	Available for next trip (Arrival + Layover)	Trip #	Depart Western Terminal	Arrive Eastern Terminal	Available for next trip (Arrival + Layover)	Pull-in
			Comanche/ Big Sky	Rio Grande/ Montano			Rio Grande/ Montano	Comanche/ Big Sky		

Block numbering conventions

Transit agencies use a variety of numbering conventions for blocks. Many agencies use four digit numbers, where the first two digits are the route number and the second two digits are the block number. Using this convention for Route 32, the first block would be 3201



Layover/recovery allowance table

How much layover/recovery time should I use on this route?

The layover policy allocates layover/recovery time as a minimum percentage of the round trip running time.

Example Layover/Recovery Time Allowance Table

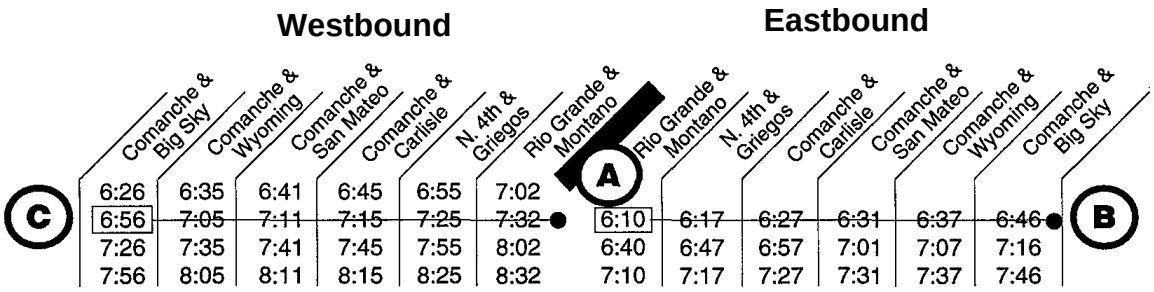
ROUND TRIP RUNNING TIME (excluding layover/recovery time)	LAYOVER/RECOVERY TIME	MINIMUM % OF RUNNING TIME
Up To 60 minutes	0 - 6 minutes	10%
61 to 120 minutes	6 - 12 minutes	10%
121 to 180 minutes	12 - 18 minutes	10%

The layover/recovery allowance table indicates that for a round trip running time of up to 120 minutes, a minimum of 10% of the running time is required for layover/recovery. 72 minutes × 10% = 7.2, rounded up to 8 minutes. However, this agency has determined that operating a consistent and fixed 30-minute headway results in 18 minutes of layover/recovery per round trip (see Chapter 2/ Trip Generation). Eight minutes will be assigned at the western terminal (Rio Grande & Montano) and 10 minutes will be assigned at the eastern terminal (Comanche & Big Sky).

The blocking process

The first block, 3201, pulls-out from the garage and travels without passengers (deadheads) to the western terminal and begins passenger service from there at 6:10. Ⓐ 3201 arrives at the eastern terminal at 6:46. Ⓑ With the required 10 minutes layover/recovery time at the eastern terminal, 3201 would be available for its next trip at 6:56 (6:46 plus 10 minutes).

The next westbound trip on the master schedule leaves Comanche & Big Sky at 6:56. Ⓒ This will be the next trip for block 3201.



It is helpful to note the trip numbers for each block on a copy of the master schedule for the route to help ensure that all trips are blocked. For Route 32 below, the block will be the first number (3201-01) and the trip will be the second number (3201-01). 3201-02 is the second trip for block 3201.

	Westbound							Eastbound						
	Comanche & Big Sky	Comanche & Wyoming	Comanche & San Mateo	Comanche & Carlisle	N. 4th & Griegos	Rio Grande & Montano		Rio Grande & Montano	N. 4th & Griegos	Comanche & Carlisle	Comanche & San Mateo	Comanche & Wyoming	Comanche & Big Sky	
	6:26	6:35	6:41	6:45	6:55	7:02								
3201-02	6:56	7:05	7:11	7:15	7:25	7:32		6:10	6:17	6:27	6:31	6:37	6:46	3201-01
	7:26	7:35	7:41	7:45	7:55	8:02	A	6:40	6:47	6:57	7:01	7:07	7:16	
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	9:56	10:05	10:11	10:15	10:25	10:32		9:10	9:17	9:27	9:31	9:37	9:46	
								9:40	9:47	9:57	10:01	10:07	10:16	
	1:26	1:35	1:41	1:45	1:55	2:02								

The blocking sheet

The blocking sheet is a tool to help the scheduler document the trip start and end times associated with each vehicle.

BLOCKING SHEET

Route #: 32

Service: WEEKDAYS

Date: 10/20/XX

Scheduler: BWN

Special Instructions:

18 minutes is available for layover and/or recovery per round trip. OK to split the layover and/or recovery between ends of the line.

Westbound						Eastbound				
Block No.	Pull-out	Trip #	Depart Eastern Terminal	Arrive Western Terminal	Available for next trip (Arrival + Layover)	Trip #	Depart Western Terminal	Arrive Eastern Terminal	Available for next trip (Arrival + Layover)	Pull-in
			Comanche/ Big Sky	Rio Grande/ Montano			Rio Grande/ Montano	Comanche/ Big Sky		
3201 3201	6:00	02	6:56	7:32	7:40	01	6:10	6:46	6:56	

"Hooking" trips together

The blocking process continues with hooking more trips on to 3201. Diagramming the hooks (colored pencils are a helpful tool) facilitates the process. Note that trip 3201-02 starts from Comanche & Big Sky at 6:56 and ends at Rio Grande & Montano at 7:32. After a layover from 7:32 to 7:40 (8 minutes), block 3201 begins trip 03 at 7:40, and so on until trip 3201-06 is completed at 10:32.

	Westbound							Eastbound						
	Comanche & Big Sky	Comanche & Wyoming	Comanche & San Mateo	Comanche & Carlisle	N. 4th & Griegos	Rio Grande & Montano		Rio Grande & Montano	N. 4th & Griegos	Comanche & Carlisle	Comanche & San Mateo	Comanche & Wyoming	Comanche & Big Sky	
	6:26	6:35	6:41	6:45	6:55	7:02								
3201-02	6:56	7:05	7:11	7:15	7:25	7:32		6:10	6:17	6:27	6:31	6:37	6:46	3201-01
	7:26	7:35	7:41	7:45	7:55	8:02		6:40	6:47	6:57	7:01	7:07	7:16	
	7:56	8:05	8:11	8:15	8:25	8:32		7:10	7:17	7:27	7:31	7:37	7:46	
3201-04	8:26	8:35	8:41	8:45	8:55	9:02		7:40	7:47	7:57	8:01	8:07	8:16	3201-03
	8:56	9:05	9:11	9:15	9:25	9:32		8:10	8:17	8:27	8:31	8:37	8:46	
	9:26	9:35	9:41	9:45	9:55	10:02		8:40	8:47	8:57	9:01	9:07	9:16	
3201-06	9:56	10:05	10:11	10:15	10:25	10:32		9:10	9:17	9:27	9:31	9:37	9:46	3201-05
								9:40	9:47	9:57	10:01	10:07	10:16	
	1:26	1:35	1:41	1:45	1:55	2:02								
	1:56	2:05	2:11	2:15	2:25	2:32		1:40	1:47	1:57	2:01	2:07	2:16	

After 10:32 a.m., there are no additional hooks for 3201. If this block were to stay in service on this route, it would have to wait at the terminal until 1:40 p.m. Since this is not practical and the block will not be interlined onto another route, the vehicle operating this block will return to the garage. The blocking sheet below summarizes the information for the additional trips on block 3201.

BLOCKING SHEET

Route #: 32

Service: WEEKDAYS

Date: 10/20/XX

Scheduler: BWN

Special Instructions:

18 minutes is available for layover and/or recovery per round trip. OK to split the layover and/or recovery between ends of the line.

Westbound						Eastbound				
Block No.	Pull-out	Trip #	Depart Eastern Terminal	Arrive Western Terminal	Available for next trip (Arrival + Layover)	Trip #	Depart Western Terminal	Arrive Eastern Terminal	Available for next trip (Arrival + Layover)	Pull-in
			Comanche/ Big Sky	Rio Grande/ Montano			Rio Grande/ Montano	Comanche/ Big Sky		
3201	6:00					01	6:10	6:46	6:56	
3201		02	6:56	7:32	7:40	03	7:40	8:16	8:26	
3201		04	8:26	9:02	9:10	05	9:10	9:46	9:56	
3201		06	9:56	10:32						10:42

Completing the A.M. blocks

Blocking 3202 continues in the same way, beginning with the 6:40 trip (**3202-01**) from the western terminal at Rio Grande & Montano and ending with the 9:40 trip (**3202-05**) to Comanche & Big Sky, arriving at 10:16.

	Comanche & Big Sky	Comanche & Wyoming	Comanche & San Mateo	Comanche & Carlisle	N. 4th & Griegos	Rio Grande & Montano	Rio Grande & Montano	N. 4th & Griegos	Comanche & Carlisle	Comanche & San Mateo	Comanche & Wyoming	Comanche & Big Sky	
	6:26	6:35	6:41	6:45	6:55	7:02							
3201-02	6:56	7:05	7:11	7:15	7:25	7:32	6:10	6:17	6:27	6:31	6:37	6:46	3201-01
3202-02	7:26	7:35	7:41	7:45	7:55	8:02	6:40	6:47	6:57	7:01	7:07	7:16	**3202-01**
	7:56	8:05	8:11	8:15	8:25	8:32	7:10	7:17	7:27	7:31	7:37	7:46	
3201-04	8:26	8:35	8:41	8:45	8:55	9:02	7:40	7:47	7:57	8:01	8:07	8:16	3201-03
3202-04	8:56	9:05	9:11	9:15	9:25	9:32	8:10	8:17	8:27	8:31	8:37	8:46	**3202-03**
	9:26	9:35	9:41	9:45	9:55	10:02	8:40	8:47	8:57	9:01	9:07	9:16	
3201-06	9:56	10:05	10:11	10:15	10:25	10:32	9:10	9:17	9:27	9:31	9:37	9:46	3201-05
							9:40	9:47	9:57	10:01	10:07	10:16	**3202-05**
	1:26	1:35	1:41	1:45	1:55	2:02							
	1:56	2:05	2:11	2:15	2:25	2:32	1:40	1:47	1:57	2:01	2:07	2:16	

COMPLETE THE ABOVE SCHEDULE FOR BLOCK 3203,
THEN COMPLETE THE BLOCKING SHEET BELOW FOR 3203
(answers are on the next page)

BLOCKING SHEET

Route #: 32

Service: WEEKDAYS

Date: 10/20/XX

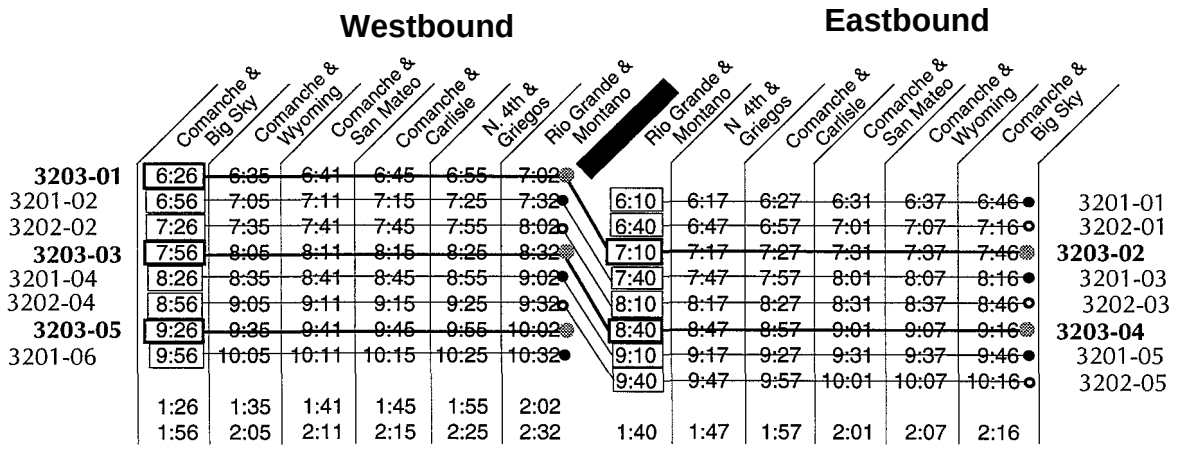
Scheduler: BWN

Special Instructions:

18 minutes is available for layover and/or recovery per round trip. OK to split the layover and/or recovery between ends of the line.

Westbound						Eastbound				
Block No.	**Pull-out**	**Trip #**	**Depart Eastern Terminal**	**Arrive Western Terminal**	**Available for next trip (Arrival + Layover)**	**Trip #**	**Depart Western Terminal**	**Arrive Eastern Terminal**	**Available for next trip (Arrival + Layover)**	**Pull-in**
			Comanche/ Big Sky	Rio Grande/ Montano			Rio Grande/ Montano	Comanche/ Big Sky		
3201	6:00					01	6:10	6:46	6:56	
3201		02	6:56	7:32	7:40	03	7:40	8:16	8:26	
3201		04	8:26	9:02	9:10	05	9:10	9:46	9:56	
		06	9:56	10:32						10:42
3202	6:30					01	6:40	7:16	7:26	
3202		02	7:26	8:02	8:10	03	8:10	8:46	8:56	
3202		04	8:56	9:32	9:40	05	9:40	10:16		10:26
3203										

Completing the A.M. blocks (answers to the previous page exercise)



BLOCKING SHEET

Route #: 32

Service: WEEKDAYS

Date: 10/20/XX

Scheduler: BWN

Special Instructions:

18 minutes is available for layover and/or recovery per round trip. OK to split the layover and/or recovery between ends of the line.

Westbound						Eastbound				
Block No.	Pull-out	Trip #	Depart Eastern Terminal	Arrive Western Terminal	Available for next trip (Arrival + Layover)	Trip #	Depart Western Terminal	Arrive Eastern Terminal	Available for next trip (Arrival + Layover)	Pull-in
			Comanche/ Big Sky	Rio Grande/ Montano			Rio Grande/ Montano	Comanche/ Big Sky		
3201	6:00					01	6:10	6:46	6:56	
3201		02	6:56	7:32	7:40	03	7:40	8:16	8:26	
3201		04	8:26	9:02	9:10	05	9:10	9:46	9:56	
		06	9:56	10:32						10:42
3202	6:30					01	6:40	7:16	7:26	
3202		02	7:26	8:02	8:10	03	8:10	8:46	8:56	
3202		04	8:56	9:32	9:40	05	9:40	10:16		10:26
3203	**6:16**	**01**	**6:26**	**7:02**	**7:10**	**02**	**7:10**	**7:46**	**7:56**	
3203		**03**	**7:56**	**8:32**	**8:40**	**04**	**8:40**	**9:16**	**9:26**	
3203		**05**	**9:26**	**10:02**						**10:12**

Some notes about the blocking process

Layover/recovery time allowance

Recovery time should not be viewed as a way to guarantee that all trips are on time all the time. This level of guarantee would require higher operator labor costs and more vehicles to operate the same level of service.

How is recovery time related to costs?

Excessive recovery time increases the number of vehicles and operators required to operate a given service. Again, to calculate the number of vehicles required to operate a given service, the following formula can be used:

$$\text{\# Vehicles} = \frac{\text{Cycle time}}{\text{Headway}}$$

Cycle time = running time + layover/ recovery time

Headway = time between vehicles travelling in the same direction at a given location

Formula for computing the number of vehicles needed to operate a given service.

For example, if a route has a running time of **54** minutes plus *6* minutes for layover/ recovery and a headway of **10** minutes, then the formula shows a need for 6 vehicles.

$$6 = \frac{(54 + 6) = 60}{10}$$

However, if the layover/recovery time is increased to *16* minutes, then the number of needed vehicles increases.

$$7 = \frac{(54 + 16) = 70}{10}$$

Obviously, a layover/recovery of 6 minutes versus 16 is more economical in terms of fewer vehicles and, most likely, fewer operators.

Is there any benefit to having slightly excessive layover/recovery time?

As noted in Chapter 2/ Trip Generation, extra layover time may be assigned when clock headways are developed as a convenience to customers. For example, customers know that vehicles come along every 5 , 10 or 30 minutes past the hour. Route 32 provides that type of service by maintaining a 30-minute headway.

Also, timed transfers sometime result in the need for extra layover/recovery time so that trips arrive and leave at precisely the same time. Master schedule development and blocking are often a balance between cost-effectiveness and responding to customer service needs.

In cases where excessive layover/recovery time does exist after a trip, it may be possible to hook on another trip. These are opportunities that schedulers continually evaluate.

In the example of Route 32, two A.M. blocks begin at the western terminal and one begins at the eastern terminal. Why?

While initiating the blocking process by beginning with the first inbound trip to downtown tends to be a convention, vehicles are often sent out to both ends of a route to begin the service day. When peak service is provided from an outer terminal into a downtown area, it is more common to send vehicles primarily to the outer terminal at the start of A.M. service and to the inner terminal at the start of P.M. service.

Do many schedules maintain a consistent headway throughout the day?

Even with schedules that are very consistent with fixed headways, the last trip or two of the day is often inconsistent with the headway pattern for a variety of reasons. One important reason is the desire to include a slight delay in the start times of the last trips on a route in order to allow the maximum number of passengers the opportunity to catch the final trip(s).

COMPLETE THE SCHEDULE NOTATIONS AND BLOCKING SHEET BELOW
FOR THE P.M. BLOCKS OF ROUTE 32
(answers are on the next page)

	Westbound							Eastbound						
	Comanche & Big Sky	Comanche & Wyoming	Comanche & San Mateo	Comanche & Carlisle	N 4th & Griegos	Rio Grande & Montano		Rio Grande & Montano	N 4th & Griegos	Comanche & Carlisle	Comanche & San Mateo	Comanche & Wyoming	Comanche & Big Sky	
	6:26	6:35	6:41	6:45	6:55	7:02								
	6:56	7:05	7:11	7.15	7:25	7:32		6:10	6:17	6:27	6:31	6:37	6:46	
	7:26	7:35	7:41	7:45	7:55	8:02	A	6:40	6:47	6:57	7:01	7:07	7:16	
	7:56	8:05	8:11	8:15	8:25	8:32	M	7:10	7:17	7:27	7:31	7:37	7:46	
	8:26	8:35	8:41	8:45	8:55	9:02		7:40	7:47	7:57	8:01	8:07	8:16	
	8:56	9:05	9:11	9:15	9:25	9:32		8:10	8:17	8:27	8:31	8:37	8:46	
	9:26	9:35	9:41	9:45	9:55	10:02		8:40	8:47	8:57	9:01	9:07	9:16	
	9:56	10:05	10:11	10:15	10:25	10:32		9:10	9:17	9:27	9:31	9:37	9:46	
								9:40	9:47	9:57	10:01	10:07	10:16	
3204-01	1:26	1:35	1:41	1:45	1:55	2:02								
	1:56	2:05	2:11	2:15	2:25	2:32		1:40	1:47	1:57	2.01	2:07	2:16	
	2:26	2:35	2:41	2:45	2:55	3:02		2:10	2:17	2:27	2:31	2:37	2:46	3204-02
3204-03	2:56	3:05	3:11	3:15	3:25	3:32		2:40	2:47	2:57	3:01	3:07	3:16	
	3:26	3:35	3:41	3:45	3:55	4:02		3:10	3:17	3·27	3:31	3:37	3:46	
	3.56	4:05	4:11	4:15	4:25	4:32	P	3:40	3:47	3:57	4:01	4:07	4:16	3204-04
	4:26	4:35	4:41	4:45	4:55	5:02	M	4:10	4:17	4:27	4:31	4:37	4:46	
	4:56	5:05	5:11	5:15	5:25	5:32		4:40	4:47	4:57	5:01	5:07	5:16	
	5:26	5:35	5:41	5:45	5:55	6:02		5:10	5:17	5:27	5:31	5:37	5.46	
	5:56	6:05	6:11	6:15	6:25	6:32								

BLOCKING SHEET

Route #: 32

Service: WEEKDAYS

Date: 10/20/XX

Scheduler: BWN

Special Instructions:

18 minutes is available for layover and/or recovery per round trip. OK to split the layover and/or recovery between ends of the line.

Westbound						Eastbound				
Block No.	Pull-out	Trip #	Depart Eastern Terminal	Arrive Western Terminal	Available for next trip (Arrival + Layover)	Trip #	Depart Western Terminal	Arrive Eastern Terminal	Available for next trip (Arrival + Layover)	Pull-in
			Comanche/ Big Sky	Rio Grande/ Montano			Rio Grande/ Montano	Comanche/ Big Sky		
3204	1:16	01	1:26	2:02	2:10	02	2:10	2:46	2:56	
3204		03	2:56	3:32	3:40	04	3:40	4:16	4:26	
3204		05				06				
3204		07								___
3205										
3205										
3205										
3205										___
3206										
3206										
3206										___

Completing the P.M. blocks (answers from previous page exercise)

	Westbound							Eastbound						
	Comanche & Big Sky	Comanche & Wyoming	Comanche & San Mateo	Comanche & Carlisle	N. 4th & Griegos	Rio Grande & Montano		Rio Grande & Montano	N. 4th & Griegos	Comanche & Carlisle	Comanche & San Mateo	Comanche & Wyoming	Comanche & Big Sky	
	6:26	6:35	6:41	6:45	6:55	7:02								
	6:56	7:05	7:11	7:15	7:25	7:32		6:10	6:17	6:27	6:31	6:37	6:46	
	7:26	7:35	7:41	7:45	7:55	8:02	A	6:40	6:47	6:57	7:01	7:07	7:16	
	7:56	8:05	8:11	8:15	8:25	8:32	M	7:10	7:17	7:27	7:31	7:37	7:46	
	8:26	8:35	8:41	8:45	8:55	9:02		7:40	7:47	7:57	8:01	8:07	8:16	
	8:56	9:05	9:11	9:15	9:25	9:32		8:10	8:17	8:27	8:31	8:37	8:46	
	9:26	9:35	9:41	9:45	9:55	10:02		8:40	8:47	8:57	9:01	9:07	9:16	
	9:56	10:05	10:11	10.15	10:25	10:32		9:10	9:17	9:27	9:31	9:37	9:46	
								9:40	9:47	9:57	10:01	10:07	10:16	
3204-01	1:26	1:35	1:41	1:45	1:55	2:02●								
3206-01	1:56	2:05	2:11	2:15	2:25	2:32◎		1:40	1:47	1:57	2:01	2:07	2:16○	3205-01
3205-02	2:26	2:35	2:41	2:45	2:55	3:02○		2:10	2:17	2:27	2:31	2:37	2:46●	3204-02
3204-03	2:56	3:05	3:11	3:15	3:25	3:32●		2:40	2:47	2:57	3:01	3:07	3:16◎	3206-02
3206-03	3:26	3:35	3:41	3:45	3:55	4:02◎		3:10	3:17	3:27	3:31	3:37	3:46○	3205-03
3205-04	3:56	4:05	4:11	4:15	4:25	4:32○	P	3:40	3:47	3:57	4:01	4:07	4:16●	3204-04
3204-05	4:26	4:35	4:41	4:45	4:55	5:02●	M	4:10	4:17	4:27	4:31	4:37	4:46◎	3206-04
3206-05	4:56	5:05	5:11	5:15	5:25	5:32◎		4:40	4:47	4:57	5:01	5:07	5:16○	3205-05
3205-06	5:26	5:35	5:41	5:45	5:55	6:02○		5:10	5:17	5:27	5:31	5:37	5:46●	3204-06
3204-07	5:56	6:05	6:11	6:15	6:25	6:32●								

BLOCKING SHEET

Route #: 32

Service: WEEKDAYS

Date: 10/20/XX

Scheduler: BWN

Special Instructions:

18 minutes is available for layover and/or recovery per round trip. OK to split the layover and/or recovery between ends of the line.

Westbound						Eastbound				
Block No.	Pull-out	Trip #	Depart Eastern Terminal	Arrive Western Terminal	Available for next trip (Arrival + Layover)	Trip #	Depart Western Terminal	Arrive Eastern Terminal	Available for next trip (Arrival + Layover)	Pull-in
			Comanche/ Big Sky	Rio Grande/ Montano			Rio Grande/ Montano	Comanche/ Big Sky		
3204	1:16	01	1:26	2:02	2:10	02	2:10	2:46	2:56	
3204		03	2:56	3:32	3:40	04	3:40	4:16	4:26	
3204		05	4:26	5:02	5:10	06	5:10	5:46	5:56	
3204		07	5:56	6:32						6:42
3205	1:30					01	1:40	2:16	2:26	
3205		02	2:26	3:02	3:10	03	3:10	3:46	3:56	
3205		04	3:56	4:32	4:40	05	4:40	5:16	5:26	
3205		06	5:26	6:02						6:12
3206	1:46	01	1:56	2:32	2:40	02	2:40	3:16	3:26	
3206		03	3:26	4:02	4:10	04	4:10	4:46	4:56	
3206		05	4:56	5:32						5:42

Block summary recap

The blocks created for Route 32 can now be further summarized on a block summary recap form as shown below. This form shows only the first trip and the last trip of each block for the one route.

Platform hours denote the amount of time an operator is scheduled to be behind the wheel of the vehicle, including Pull-In and Pull-Out times. Pull-In and Pull-Out times are not generally included in Revenue Service time unless the vehicle is actually available for passenger service during those times.

BLOCK SUMMARY RECAP

Route #: 32 - Griegos-Comanche

Service: WEEKDAYS

Date: 10/27/XX

Scheduler: BWN

Special Instructions:

18 minutes is available for layover and/or recovery per round trip. OK to split the layover and/or recovery between ends of the line.

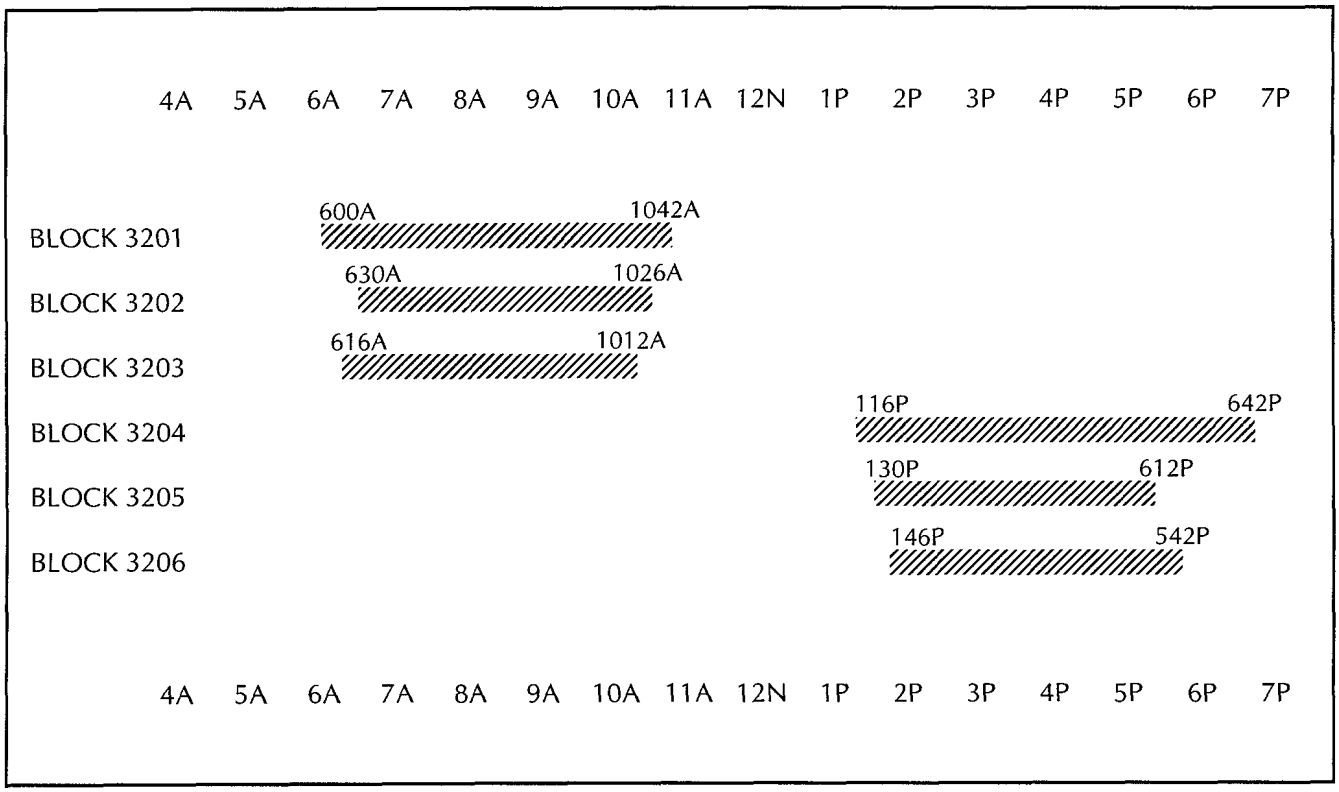
BLOCK #	PULL-OUT TIME (Time out)	PULL-ON LOCATION	FIRST REVENUE TIME	LAST REVENUE TIME	PULL-OFF LOCATION	PULL-IN TIME (Time in)
3201	6:00A	Rio Grande/ Montano	6:10A	10:32A	Rio Grande/ Montano	10:42A
Platform Hours			**4:42**			
3202	6:30A	Rio Grande/ Montano	6:40A	10:16A	Comanche/ Big Sky	10:26A
Platform Hours			**3:56**			
3203	6:16A	Comanche/ Big Sky	6:26A	10:02A	Rio Grande/ Montero	10:12A
Platform Hours			**3:56**			
3204	1:16P	Comanche/ Big Sky	1:26P	6:32P	Rio Grande/ Montano	6:42P
Platform Hours			**5:26**			
3205	1:30P	Rio Grande/ Montano	1:40P	6:02P	Rio Grande/ Montano	6:12P
Platform Hours			**4:42**			
3206	1:46P	Comanche/ Big Sky	1:56P	5:32P	Rio Grande/ Montano	5:42P
Platform Hours			**3:56**			
TOTAL PLATFORM HOURS			**26:38**			

Graphing the Blocks

Blocks are often displayed graphically to illustrate the time spans that the blocks are in service. Time spans (in this case, platform time) can be obtained from the block summary recap.

This type of graphic display is especially valuable as a tool for runcutting.

An example of a graphic display of Route 32 is shown below.



Review key points by answering these questions.

1) Match the following:

Pull-In	The time a vehicle is scheduled to leave the storage facility
Pull-Out	The time a vehicle is scheduled to arrive at the storage facility

2) A Blocking Sheet is often used to track blocks as they are created. True or False

3) If the 4-digit number below was a numbering convention for blocking, the two numbers on the right would typically refer to the trip number. True or False

   1204

4) It is helpful to note the trip numbers for each block on a copy of the master sheet for the route to help ensure that

   a) all trips are blocked
   b) pull-out time is correct
   c) enough recovery time is allowed
   d) blocks are graphically displayed

5) Recovery time should not be viewed as a way to guarantee that all trips are on time all the time. True or False

6) Excessive recovery time <u>increases</u> / <u>decreases</u> the number of vehicles (and sometimes operators) required to operate a given level of service. (choose one)

7) Extra recovery time is often given by agencies to produce even (or clock) headways as a convenience to customers. True or False

8) In cases where excessive layover time may result after a particular trip, it may be possible to hook on another trip. True or False

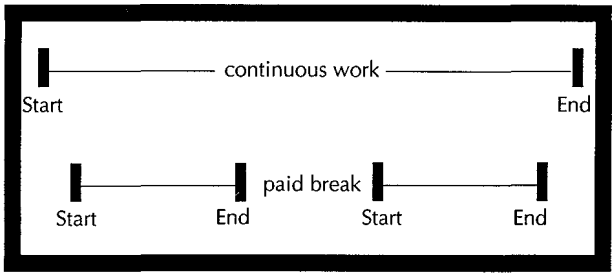
9) Beginning blocking with the first inbound trip to downtown is considered a convention. True or False

10) What is one reason that one or more trips may be planned with an inconsistent headway while most trips on the route maintain a fixed headway?

11) Graphic block displays generally depict revenue service vehicle platform hours. True or False

CHAPTER 4

RUNCUTTING



SPLIT RUN

Report Allowance	:10
Pull-Out Allowance	:23
Revenue Time	5:00
Pull-In Allowance	:21
Turn-In Allowance	:05
Report Allowance	:10
Pull-Out Allowance	:15
Revenue Time	1:28
Pull-In Allowance	:13
Turn-In Allowance	:05
Total Platform & Collaterals	8:10
Make-Up Time	:00
Pay Hours	8:10
OT Pay	:05
Total Pay Hours	8:15

A.M BLOCKS		P.M. BLOCKS	
3201 6:00am	4:42 10:42am	3206 1:46pm	3:56 5:42pm
3203 6:16am	3:56 10:12am	3205 1:30pm	4:42 6:12pm
3202 6:30am	3:56 10:26am	3204 1:16pm	5:26 6:42pm
Total A.M Platform	12:34	Total P M Platform	14:04

RUN GUIDE - Route 32

RUN GUIDE

Service Days: WEEKDAYS Effective: 10/27/XX

Run No	1st Piece Block	Route	Time On	Pull Out	Pull In	Time Off	2nd Piece Block	Route	Time On	Pull Out	Pull In	Time Off	Plat-form	Total Spread	Allowance Report	Turn In	Relief	Make Up	Work Hours	Over Time	Spread Penalty	Pay Hours
1	3201	32	550a	600a	1042p	1047a	3206	32	136p	146p	542p	547p	8:38	11:57	:20	:10			9:08	:34	:14	9:56
2	3203	32	606a	616a	1012a	1017a	3205	32	120p	130p	612p	617p	8:38	12:11	:20	:10			9:08	:34	:21	10:03
3	3202	32	620a	630a	1026a	1031a	3204	32	106p	116p	642p	647p	9:22	12:27	:20	:10			9:52	:56	:29	11:17
TOTALS													26:38 Plat-form		1:00 Allowance Report	:50 Turn In	0 Relief	0 Make Up	28:08 Work Hours	2:04 Over Time	1:04 Spread Penalty	31:16 Pay Hours

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Study Objectives

1) Learn that runcutting is the process of developing operator (driver) assignments.
2) Be able to recognize the difference between straight runs and split runs.
3) Remember that swing time is an unpaid break in a split run.
4) Understand that runcutting is critical because it defines the number of operators ultimately needed to operate the service reflected in the Master Schedule(s).
5) Recognize that before cutting runs, a scheduler must have a completed master schedule, blocking sheet and block summary recap for each route.
6) Learn the concept, definition and applicability of minimum and maximum platform time.
7) Learn the concept, definition and applicability of report and turn-in allowances.
8) Learn the concept, definition and applicability of spread time and spread penalty.
9) Learn the concept, definition and applicability of run type percentages.
10) Learn the concept, definition and applicability of make-up time.
11) Be able to identify the components of a run visualization diagram.
12) Remember the equation for estimating the number of runs that can be cut from a pool of blocks.
13) Understand the design and listing order of the chronological block listing.
14) Be able to give reasons for optimization.
15) Remember that the Run Guide can be a valuable resource for operator bids as well as provide useful information for some payroll accounting systems.
16) Be able to define the purpose of each column in a representative Run Guide.
17) Given applicable information, be able to cut runs.

I. Introduction

What is "runcutting"?

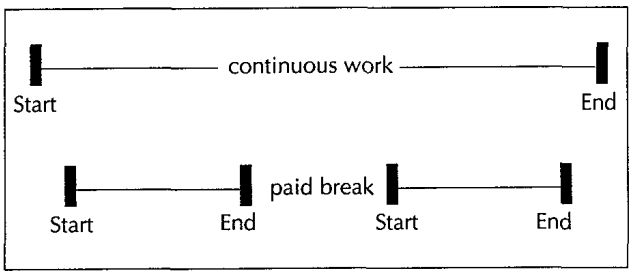
Runcutting is the process of developing operator (driver) assignments.

These assignments, called "runs" are assembled or "cut" from the vehicle assignments (blocks). (See Chapter 3.) Runs consist of one or more complete or partial blocks.

These blocks are cut and assembled in such a way as to create either straight runs or split (multi-piece) runs.

Straight runs

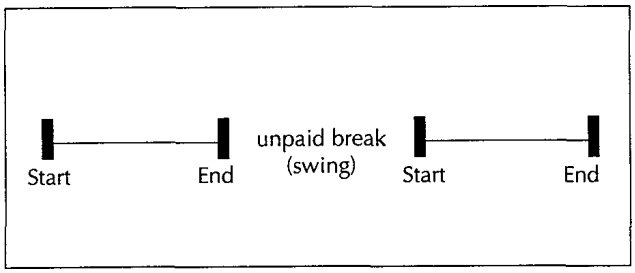
Straight runs imply continuous work of longer duration. A straight run generally consists of a single block piece of work close to eight hours long or more. A straight run can also consist of two block pieces with a paid break (usually under 60 minutes) in between.



Examples of straight runs

Split runs

A split run generally consists of two (sometimes three) block pieces with an unpaid break (often called swing time) in between. The operator is off-duty during the swing.



Example of a split run

Why is runcutting important?

Whereas efficient blocking is important in terms of vehicle utilization, runcutting is critical because it defines the number of operators ultimately needed to operate the service reflected in the Master Schedule(s).

Schedulers will often have to bring to bear all their skill and creativity in assigning all of the block pieces to the fewest number of operator runs possible.

Runs that adhere to all relevant work rules and policy guidelines are often called "legal" runs.

II. Setting up the Runcutting Process

Before beginning the runcutting process, the scheduler typically gathers a completed master schedule (Chapter 2), blocking sheet and block summary recap (Chapter 3) for each route.

Again, the scheduler must also be thoroughly knowledgeable of all applicable work rules and agency policies that affect or influence the runcutting process.

Although a diversity of work rules relating to scheduling can be found in the transit industry, five (5) will be exemplified and made applicable to the runcutting exercise for this chapter. Again, Route 32 will serve as the foundation for this section.

The five work rules applicable to the runcutting exercise for Route 32 are

- Minimum and Maximum Platform Time,
- Report and Turn-in Allowances,
- Spread Time and Spread Penalty,
- Run Type Percentages, and
- Make-up Time.

Each of these areas is covered on the following pages.

Minimum and maximum platform time

This work rule defines the minimum and maximum allowable length of each run as measured by platform time. Again, platform time is the total time during which an operator is scheduled to be behind the wheel of a vehicle in both revenue and non-revenue service. Another variation of minimum/maximum rules applies to pay hours. This variation considers the minimum or maximum amount of time an operator may be paid.

Platform time also includes any "pull-out" and "pull-in" allowance. These allowances, commonly referred to as "deadhead" times, are non-revenue time assigned for the movement of a revenue vehicle to the first scheduled stop (pull-out) and from the last scheduled stop back to the garage (pull-in).

At many agencies, block pieces that cannot be assembled into runs of minimum platform are generally arranged into pieces of work for part-time operators or assigned to the Extra Board (a contingency of operators who stand by or fill in for other operators).

Work Rule	For Route 32, the minimum platform time for a legal run is 6 hours. The maximum platform time for a legal run is 9.5 hours.

Report and turn-in allowances

The report allowance is an amount of time paid to an operator, starting when the operator reports for duty and ending when the pull-out time begins. During this paid time, the operator obtains instructions and supplies pertinent to the run, locates the assigned vehicle, performs a pre-trip inspection of the vehicle and tends to any other required duties before taking the vehicle onto the street.

The turn-in allowance is paid time for the operator to report to the dispatcher at the conclusion of the run (when pull-in time ends) for turning in transfers, receipts, supplies, reports and to tend to any other required duties after leaving the vehicle.

Work Rule	For Route 32, a 10-minute report allowance and a 5-minute turn-in allowance will apply for each piece of work.

Spread time and penalty

Spread time is generally defined as the total elapsed time between the first report time and the final turn-in time of a run. Spread time typically applies to split runs and, depending on the agency, varies between 10 and 14 hours in duration.

Spread penalty is an amount of pay granted to an operator for all minutes worked over a specified spread time.

Work Rule	For Route 32, the maximum allowed spread time is 13 hours. The spread penalty will be one half of all minutes over 11:30 spread time paid at straight time. Overtime will not be paid on spread minutes.

Run type and percentages

Many agencies are required to develop a certain percentage of straight runs and/or restrict the number of split runs. Usually, the restriction on split runs defines a certain percentage of splits that can exceed given levels of spread times.

For example, an agency may restrict run type and percentages as follows:

- 50% of all runs must be straight.
- Of the remaining 50%, 1/3 must be completed within 12:00 spread, 1/3 must be completed within 12:30 spread, and no more than 1/3 must be completed within 13:00 spread.

Work Rule	For Route 32, 60% of all blocks in revenue service at 11:00 a.m. must be cut to include a minimum of one straight run.
Work Rule	1/3 of all split runs must be completed within 12:00 spread time and 1/3 within 12:30. The remaining 1/3 must be completed within the maximum allowed spread of 13:00 hours.

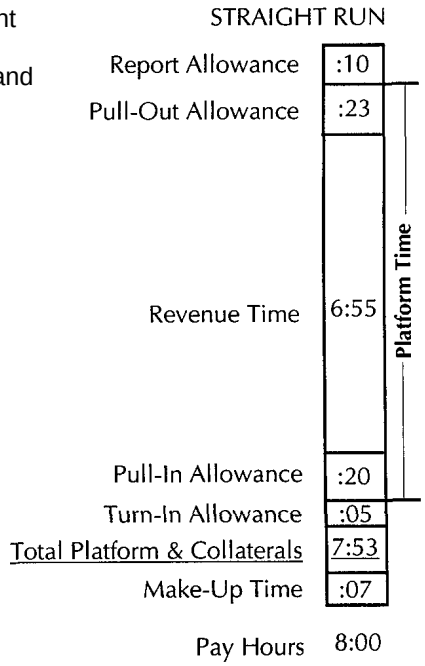
Make-up time

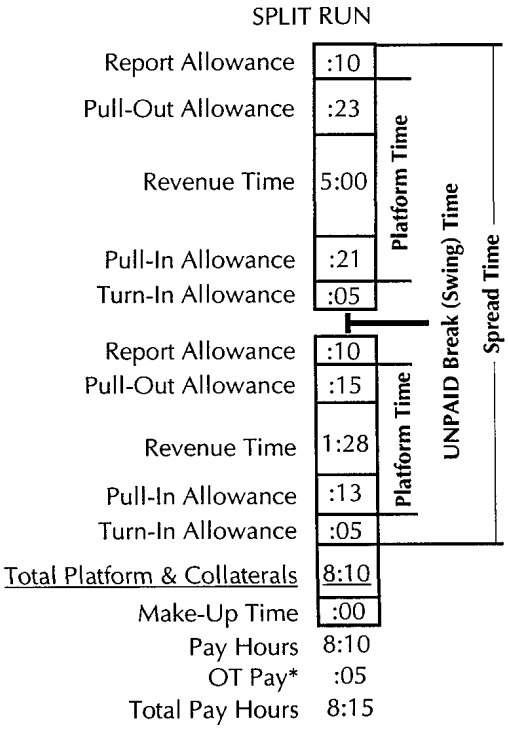
Make-up time is payment for time not actually worked by an operator in order that the total paid time for a run is equal to a minimum daily or weekly guarantee. For example, a run that totals 7:50 including all platform and report and turn-in allowances will be granted ten minutes of make-up time so that the total pay equals eight hours for the day.

Work Rule	For Route 32, a minimum of 8 hours daily pay is guaranteed.

Visualization of run components

The diagrams on the right illustrate the typical components of straight and split runs.





* Overtime pay at this agency is half time of all minutes in excess of 8 hours daily.

Review key points by answering these questions.

1) Match the following:

Runs	Vehicle Assignments
Blocks	Operator (driver) Assignments

2) Which of the following implies continuous work of longer duration... straight runs / split runs.

3) The break between split runs is paid / unpaid. This break is often called a s_ _ _ _ .

4) Runcutting defines the number of operators ultimately needed to operate the service reflected in the Master Schedule for a route. True or False

5) _ _ _ _ _ _ _ _ time is the total time during which an operator is scheduled to be behind the wheel of a revenue vehicle. As a work rule, this is defined in minimum/maximum terms for runs.

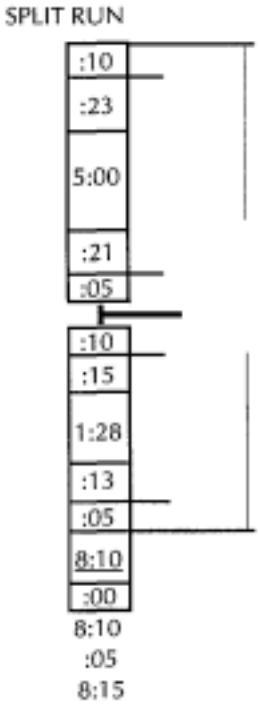
6) Match the following:

Report Allowance	Time paid an operator for duties prior to pull-out
Turn-In Allowance	Time paid an operator after pull-in

7) _ _ _ _ _ _ time is defined as the total elapsed time between the first report time and the final turn-in time of a run.

8) What is make-up time?

9) Identify each segment of the run visualization diagram on the right..



Summary of Route 32 Work Rules

Work Rule	Stipulation
Minimum Platform Time	Six (6) hours
Maximum Platform Time	Nine and one-half (9.5) hours
Report Allowance	Ten (10) minutes per pull-out
Turn-In Allowance	Five (5) minutes per turn-in
Spread Time	Thirteen (13) hours
Spread Penalty	1/2 of the minutes over 11:30 @ straight time
Run Type Percentages	Straights Minimum of one (1) from all base vehicles in revenue service at 11:00 a.m.
	Splits 1/3 within 12:00 spread, 1/3 within 12:30 spread, and no more than 1/3 within 13:00 spread
Make-Up Time	Up to eight (8) daily pay hours
Overtime	1/2 of the minutes over 8:00 hours daily

Estimating the number of runs

Step 1 in the runcutting process is the estimation of the number of runs to be cut from the blocks.

An estimate of the number of runs to be cut will enable the scheduler to assess, at various points in the process, if the progression is on target.

Too few or too many runs may indicate a missing block or a block that has been assigned twice. As the number of blocks in the pool increases, the importance of the estimate and periodic checks against it becomes more important.

A common estimation technique consists of dividing the total platform time contained in the blocks by a target number of platform hours to be included in each run.

For Route 32, the expectation is to cut runs from the block pool that contains approximately nine (9) platform hours each.

$$\frac{\text{Total Platform Hours}}{\text{Target Platform Hours Per Run}} = \text{Estimated Number of Runs}$$

Estimation equation for number of runs to be cut from a block pool.

Applying the above estimation equation to Route 32 yields the following results:

$$\frac{\textbf{26:38}\ \text{(from Block Summary Recap in Chapter 3)}}{\textbf{9}} = 2.95 \text{ or } \textbf{3}$$

The estimated number of runs for Route 32 is **3**.

Chronological block listing

Step 2 in the runcut process is often the listing of all of the blocks in such a way that the scheduler can more easily see that runs are being cut in a manner that conforms to existing work rules. One method involves listing

all A.M. blocks that pull-out prior to 11:59 a.m. in ascending (earliest to latest) pull-**OUT** order, and

all P.M. blocks that pull-out after 12:00 noon in ascending pull-**IN** order.

Listing the blocks in this order also helps facilitate the development of split runs that will conform to spread time limitations.

In large block pools, a second sort order can be made according to ascending or descending platform time of blocks with the same pull-out or pull-in time. This secondary sort will facilitate the development of runs according to the platform requirement.

The chronological block listing format shown below is considered a typical listing "convention."

CHRONOLOGICAL BLOCK LISTING (FORMAT)

A.M. BLOCKS		P.M. BLOCKS	
Block Number	Platform Time	Block Number	Platform Time
Pull-Out Time	Pull-In Time	Pull-Out Time	Pull-In Time
Earliest to Latest			Earliest to Latest

Completing the chronological block listing for Route 32 yields the following table:

CHRONOLOGICAL BLOCK LISTING - ROUTE 32

A.M. BLOCKS			P.M. BLOCKS	
	3201 6:00 a.m.	4:42 10:42 a.m.	3206 1:46 p.m.	3:56 5:42 p.m.
	3203 6:16 a.m.	3:56 10:12 a.m.	3205 1:30 p.m.	4:42 6:12 p.m.
	3202 6:30 a.m.	3:56 10:26 a.m.	3204 1:16 p.m.	5:26 6:42 p.m.
	Total A.M. Platform	12:34	Total P.M. Platform	14:04

Observations

With all of the blocks now listed in the chronological block listing, a number of observations can be made.

- There are no base (all day) blocks on Route 32.
- The lack of base blocks and the duration of the swing period (the time between the end of A.M. service and the beginning of P.M. service — 10:42 a.m. to 1:16 p.m.) indicates that there will be no straight runs on Route 32.
- There is an equal number of A.M. and P.M. blocks - called piece balance. Piece balance is critical in assembling all block pieces into runs with no block pieces left over.
- Assuming that all of the block pieces can be coupled into legal runs, three split runs can be developed and there will be no pieces left over.

The possibilities for combining run pieces for Route 32 are limited. It is important to keep in mind that when multiple routes are involved, it is preferable to mix and match the pieces from the various routes in the most cost-effective runs possible.

Some agencies or labor agreements stipulate that each route has to be cut individually and the mixing of routes in the runs is disallowed.

This restrictive stipulation generally results in a more costly solution than could be obtained if all of the routes were pooled for the runcut (system runcut).

Optimization and the Run Guide

Optimization

In this stage of the runcutting process, the blocks that have been listed on the Chronological Block Listing are arranged into runs on a form referred to as the Run Guide. The Run Guide records the work and pay components of the various runs. The run information is recorded in such a way as to facilitate the scheduler's review of individual runs and the runs collectively.

This review helps the scheduler to determine if the most efficient matching of blocks is occurring. Reviewing and adjusting is known as "optimization." During optimization, the scheduler strives to

- achieve the fewest number of runs necessary to provide the desired level of service,
- equalize platform time and pay hours among the runs,
- ensure that runs conform to labor agreements and agency policies, and
- facilitate the calculation of accurate pay hours.

The greater the number of block pieces that exist, the greater the number of possibilities for creating and optimizing the runs.

The Run Guide

A representative Run Guide is shown below.

RUN GUIDE (example format)

RUN GUIDE

Service Days Effective:

Run No.	1st Piece Block	Route	Time On	Pull Out	Pull In	Time Off	2nd Piece Block	Route	Time On	Pull Out	Pull In	Time Off	Plat-form	Total Spread	Allowance Report	Turn In	Relief	Make Up	Work Hours	Over Time	Spread Penalty	Pay Hours
TOTALS													Plat-form		Allowance Report	Turn In	Relief	Make Up	Work Hours	Over Time	Spread Penalty	Pay Hours

In addition to the information on individual runs, the Run Guide also contains spaces to total all of the various run work and pay hour components. The information contained in the Run Guide can also help operators when they are given regular opportunities to pick (or bid) the runs that they choose to work. The order of the bid for available runs by operators is usually based on seniority.

The Run Guide can also provide valuable information for agency payroll/accounting systems.

Review key points by answering these questions.

1) An estimation of the number of runs to be cut will enable the scheduler to assess, at various points in the process, if the progression is on target. True or False

2) Complete the equation below.

$$\frac{\text{Total Platform Hours}}{\text{Target Platform Hours Per Run}} = \text{Number of } ____$$

3) In the Chronological Block Listing, A.M. blocks that pull-out prior to 11:59 a.m. are listed in ascending pull ___ order. All P.M. blocks that pull-out after 12:00 noon are listed in ascending pull ___ order.

4) Fill in the blank spaces in the chronological block listing format below.

A.M. BLOCKS		P.M. BLOCKS	
Block Number	Platform Time	Block Number	Platform Time
Pull-Out Time			
Earliest to Latest			Earliest to Latest

5) Piece _ _ _ _ _ _ _ means that there are an equal number of A.M. and P.M. blocks.

6) A system runcut means that all routes are pooled for the runcut. True or False

7) During _ _ _ _ _ _ _ _ _ _ _ _ the scheduler strives to achieve the fewest number of runs necessary to provide the desired level of service and equalize platform time and pay hours among the runs.

8) The greater the number of block pieces that exist, the greater the number of possibilities for creating and optimizing the runs. True or False

9) The Run Guide can provide valuable information for agency payroll/accounting systems. True or False

III. Cutting the Runs

The following eight steps are taken in the process of cutting the runs and completing the Run Guide.

1) The required heading information is filled in, consisting of the days of operation and the effective date of the runs.

2) After referring to the Chronological Block Listing, the earliest (first) A.M. piece is selected and recorded as the first piece of Run No. 1. Run Guides are generally developed on the basis of ascending report times within each run type. The Run Guide entry consists of the appropriate run number, block number, route number, pull-out and pull-in times.

   Note: As determined earlier, there are no straight runs possible on Route 32. Many agencies list A.M. straight runs first on the Run Guide followed by midday and P.M. straights and finally the split runs.

CHRONOLOGICAL BLOCK LISTING - ROUTE 32

A.M. BLOCKS			P.M. BLOCKS	
	3201 6:00 a m	4:42 10:42 a.m.	3206 1:46 p.m	3:56 5:42 p.m
	3203 6:16 a m	3:56 10:12 a.m.	3205 1:30 p.m.	4:42 6:12 p m.
	3202 6:30 a m.	3:56 10:26 a.m	3204 1:16 p.m	5:26 6:42 p.m
	Total A.M Platform	12:34	Total P M Platform	14:04

RUN GUIDE - Route 32

RUN GUIDE

Service Days: WEEKDAYS Effective 10/27/XX

Run No.	1st Piece Block	Route	Time On	Pull-out	Pull-in	Time Off	2nd Piece Block	Route	Time On	Pull-out	Pull-in	Time Off	Platform	Total Spread	Allowance Report	Turn-in	Relief	Make-up	Work Hours	Over-time	Spread Penalty	Pay Hours
1	3201	32		600a	1042a																	

TOTALS	Platform	Allowance Report	Turn-in	Relief	Make-up	Work Hours	Over-time	Spread Penalty	Pay Hours

Note: It is good practice to develop a system of checks each time a block piece is transferred to the Run Guide. The Chronological Block Listing contains columns for checking off the block pieces each time one is transferred. An "X" is placed next to A.M. block 3201 to indicate that it has been used.

3) Referring to the Chronological Block Listing, a P.M. piece is selected that fits best with A.M. block 3201. It is important to keep in mind any spread time stipulations and maximum platform constraints. Generally, it is good policy to initially select the first P.M. piece that best meets the spread time stipulations. Since the P.M. pieces have been listed in pull-in order, block 3206 is the earliest pull-in and is selected as the second piece for Run No. 1. A quick check is made to be sure that the platform rule has not been violated.

The same information is recorded for block 3206 as was done for 3201. Additionally, the combined platform time of both pieces is recorded in the Platform column. Block 3206 is now shown as having been assigned a run.

CHRONOLOGICAL BLOCK LISTING - ROUTE 32

A.M. BLOCKS			P.M. BLOCKS		
X	3201 6:00 a m	4:42 10:42 a m.	X	3206 1:46 p m	3:56 5:42 p m.
	3203 6:16 a.m	3:56 10:12 a m		3205 1:30 p m	4:42 6:12 p m
	3202 6:30 a m	3:56 10:26 a m.		3204 1:16 p m.	5:26 6:42 p m.
	Total A M. Platform	12:34		Total P.M. Platform	14:04

RUN GUIDE - Route 32

RUN GUIDE

Service Days: WEEKDAYS **Effective:** 10/27/XX

Run No.	1st Piece Block	Route	Time On	Pull-out	Pull-in	Time Off	2nd Piece Block	Route	Time On	Pull-out	Pull-in	Time Off	Plat-form	Total Spread	Allowance Report	Turn-in	Relief	Make-up	Work Hours	Over-time	Spread Penalty	Pay Hours
1	3201	32		600a	1042a		3206	32		146p	542p		8:38									

TOTALS	Plat-form	Allowance Report	Turn-in	Relief	Make-up	Work Hours	Over-time	Spread Penalty	Pay Hours

Cutting the runs (con't)

4) The same process is then followed for the remaining Route 32 blocks.

COMPLETE THE RUNCUT INFORMATION FOR THE REMAINING 2 BLOCKS OF ROUTE 32
(answers are on the next page)

CHRONOLOGICAL BLOCK LISTING - ROUTE 32

A.M. BLOCKS			P.M. BLOCKS		
X	3201 6:00 a m	4:42 10:42 a m.	X	3206 1:46 p.m	3:56 5:42 p m
	3203 6:16 a.m	3:56 10:12 a.m.		3205 1:30 p m	4:42 6:12 p m
	3202 6:30 a.m	3:56 10:26 a m		3204 1:16 p m.	5:26 6:42 p m.
	Total A M. Platform	12:34		Total P M Platform	14:04

RUN GUIDE - Route 32

RUN GUIDE

Service Days: WEEKDAYS Effective: 10/27/XX

Run No.	1st Piece Block	Route	Time On	Pull-out	Pull-in	Time Off	2nd Piece Block	Route	Time On	Pull-out	Pull-in	Time Off	Plat-form	Total Spread	Allowance Report	Turn-in	Relief	Make-up	Work Hours	Over-time	Spread Penalty	Pay Hours
1	3201	32		600a	1042a		3206	32		146p	542p		8:38									
2																						
3																						
TOTALS													Plat-form		Allowance Report	Turn-in	Relief	Make-up	Work Hours	Over-time	Spread Penalty	Pay Hours

Completing the runcuts (answers to the exercise on the previous page)

CHRONOLOGICAL BLOCK LISTING - ROUTE 32

A.M. BLOCKS			P.M. BLOCKS		
X	3201 6:00 a.m	4:42 10:42 a m.	X	3206 1:46 p m.	3:56 5:42 p m
X	3203 6:16 a m	3:56 10:12 a m	X	3205 1:30 p.m	4:42 6:12 p.m.
X	3202 6:30 a m.	3:56 10:26 a.m.	X	3204 1:16 p.m.	5:26 6:42 p m
	Total A.M. Platform	12:34		Total P M Platform	14:04

RUN GUIDE - Route 32

RUN GUIDE

Service Days: WEEKDAYS Effective: 10/27/XX

Run No.	1st Piece Block	Route	Time On	Pull-out	Pull-in	Time Off	2nd Piece Block	Route	Time On	Pull-out	Pull-in	Time Off	Plat-form	Total Spread	Allowance Report	Turn-in	Relief	Make-up	Work Hours	Over-time	Spread Penalty	Pay Hours
1	3201	32		600a	1042a		3206	32		146p	542p		8:38									
2	3203	32		616a	1012a		3205	32		130p	612p		8:38									
3	3202	32		630a	1026a		3204	32		116p	642p		9:22									

TOTALS	Plat-form	Allowance Report	Turn-in	Relief	Make-up	Work Hours	Over-time	Spread Penalty	Pay Hours

A review of the runs at this stage reveals that all of the runs are legal in terms of total platform time. Each run falls between the six (6) hour minimum and the nine and one-half (9 1/2) hour maximum.

5) The next step is to ascertain that the spread time is not going to exceed the maximum allowed and that the percentages allowed at each spread time interval is not exceeded.

Spread time and percentage recalled from the Work Rule Table:
Spread time limit: 13 hours
Spread percentages: 1/3 of all split runs must be within 12 hour spread, 1/3 must be within 12.5 hour spread and no more than 1/3 must fall within 13 hours spread.

Since Route 32 has produced 3 runs, no more than 1 can fall into the 12.5 spread level and no more than 1 can fall in the 13 hour spread level.

Reminder: Spread time is the total elapsed time between the first report time (time on) and the last turn-in time (time off).

Time on and time off allowances

Spread time does include time on and time off allowances. The report allowance (paid time prior to pull-out) has been established for Route 32 as 10 minutes. The time off allowance (from pull-in to the end of operator duties) for Route 32 has been established as 5 minutes.

These times are transferred to the Run Guide. The spread times are then determined.

RUN GUIDE - Route 32

RUN GUIDE

Service Days: WEEKDAYS Effective: 10/27/XX

Run No.	1st Piece Block	Route	Time On	Pull-out	Pull-in	Time Off	2nd Piece Block	Route	Time On	Pull-out	Pull-in	Time Off	Plat-form	Total Spread	Allowance Report	Turn-in	Relief	Make-up	Work Hours	Over-time	Spread Penalty	Pay Hours
1	3201	32	550a	~~600a~~	~~1042p~~	~~1047a~~	~~3206~~	~~32~~	~~136p~~	~~146p~~	~~542p~~	547p	~~8:38~~	11:57								
2	3203	32	606a	616a	1012a	1017a	3205	32	120p	130p	612p	617p	8:38	12:11								
3	3202	32	620a	630a	1026a	1031a	3204	32	106p	116p	642p	647p	9:22	12:27								

TOTALS	Plat-form	Allowance Report	Turn-in	Relief	Make-up	Work Hours	Over-time	Spread Penalty	Pay Hours

All three runs are within the allowable spread time limit of 13 hours. In fact, none of the runs have fallen into the longest interval between 12:31 and 13:00 hours. One of the goals of the scheduler is to strive for the least amount of spread time, primarily for two reasons.

1) When a spread penalty exists (for exceeding spread limits), the least amount of spread translates into lower labor costs.

2) Operators tend to appreciate runs with the lowest possible spread time.

All three runs are legal in terms of both platform and spread times.

6) The next step is to complete the costing of the runs as follows:

   a) Total all of the report and turn-in allowances and record them under their respective columns. Note that split runs have two (10 min. each) report and two (5 min. each) turn-in allowances.

   b) Leave the relief column blank because there are no relief allowances for Route 32.

   c) Since all runs are in excess of eight (8) hours platform time, no make-up time is necessary.

   d) The Platform and Allowances columns are totalled and the sum is recorded in the Work Hours column.

RUN GUIDE - Route 32

RUN GUIDE

Service Days: WEEKDAYS Effective: 10/27/XX

Run No.	1st Piece Block	Route	Time On	Pull-out	Pull-in	Time Off	2nd Piece Block	Route	Time On	Pull-out	Pull-in	Time Off	Plat-form	Total Spread	Allowance Report	Turn-in	Relief	Make-up	Work Hours	Over-time	Spread Penalty	Pay Hours
1	3201	32	550a	600a	1042p	1047a	3206	32	136p	146p	542p	547p	8:38	11:57	:20	:10			9:08			
2	3203	32	606a	616a	1012a	1017a	3205	32	120p	130p	612p	617p	8:38	12:11	:20	:10			9:08			
3	3202	32	620a	630a	1026a	1031a	3204	32	106p	116p	642p	647p	9:22	12:27	:20	:10			9:52			

TOTALS	Plat-form	Allowance Report	Turn-in	Relief	Make-up	Work Hours	Over-time	Spread Penalty	Pay Hours

7) The next columns are the overtime and spread penalty columns. For overtime, "time and a half" is paid for all daily work hours over 8:00. For spread penalty, one-half of all minutes in excess of 11:30 is paid as straight time. Since only one-half of the excess minutes are recorded in these columns, the total pay hours calculated is total straight time.

   Overtime is any time over 8 hours per day.
   Overtime minutes column = (Work hours: 8:00) / 2

   Spread penalty is paid for any spread time over 11:30.
   Spread penalty minutes column = (Total Spread: 11:30) / 2

   Again, dividing these additional minutes in half and recording the resulting time in the Run Guide columns for overtime and spread penalty allows simple addition of the work hours with these times to compute the total Pay Hours, which is then paid at the straight rate.

Applying the equations for overtime to Run Nos. 1, 2 and 3 yields the following results:

Run	Work Hours	Limit	Excess	Excess (mins)	1/2 of min.=O/T Minutes
1	9:08	8:00	1:08	68	:34
2	9:08	8:00	1:08	68	:34
3	9:52	8:00	1:52	112	:56

Applying the equations for spread penalty works much the same way.

Run	Total Spread	Limit	Excess	Excess(mins)	1/2 of min.=Spread Penalty
1	11:57	11:30	:27	27	:14
2	12:11	11:30	:41	41	:21
3	12:27	11:30	:57	57	:29

The Run Guide is now updated to include these amounts.

RUN GUIDE - Route 32

RUN GUIDE

Service Days: WEEKDAYS Effective: 10/27/XX

Run No.	1st Piece Block	Route	Time On	Pull-out	Pull-in	Time Off	2nd Piece Block	Route	Time On	Pull-out	Pull-in	Time Off	Plat-form	Total Spread	Allowance Report	Turn-in	Relief	Make-up	Work Hours	Over-time	Spread Penalty	Pay Hours
1	3201	32	550a	600a	1042p	1047a	3206	32	136p	146p	542p	547p	8:38	11:57	:20	:10			9:08	:34	:14	
2	3203	32	606a	616a	1012a	1017a	3205	32	120p	130p	612p	617p	8:38	12:11	:20	:10			9:08	:34	:21	
3	3202	32	620a	630a	1026a	1031a	3204	32	106p	116p	642p	647p	9:22	12:27	:20	:10			9:52	:56	:29	

TOTALS	Plat-form	Allowance Report	Turn-in	Relief	Make-up	Work Hours	Over-time	Spread Penalty	Pay Hours

8) The final step in completing the runcutting process for Route 32 is to total the various columns on the Run Guide and cross check the totals to verify the accuracy of the computations.

RUN GUIDE - Route 32

RUN GUIDE

Service Days: **WEEKDAYS** **Effective:** **10/27/XX**

Run No.	1st Piece Block	Route	Time On	Pull-out	Pull-in	Time Off	2nd Piece Block	Route	Time On	Pull-out	Pull-in	Time Off	Plat-form	Total Spread	Allowance Report	Turn-in	Relief	Make-up	Work Hours	Over-time	Spread Penalty	Pay Hours
1	3201	32	550a	600a	1042p	1047a	3206	32	136p	146p	542p	547p	8:38	11:57	:20	:10			9:08	:34	:14	9:56
2	3203	32	606a	616a	1012a	1017a	3205	32	120p	130p	612p	617p	8:38	12:11	:20	:10			9:08	:34	:21	10:03
3	3202	32	620a	630a	1026a	1031a	3204	32	106p	116p	642p	647p	9:22	12:27	:20	:10			9:52	:56	:29	11:17
TOTALS													26:38 Plat-form		1:00 Allowance Report	:30 Turn-in	0 Relief	0 Make-up	28:08 Work Hours	2:04 Over-time	1:04 Spread Penalty	31:16 Pay Hours

Verification:

Total Pay Hours for Route 32 runs are 31:16. This total was determined and verified by adding both the Pay Hour Column vertically and the total Platform, Report Allowance, and Turn-in Allowance (Work Hours) with the Overtime and Spread Penalty to get the total Pay Hours horizontally.

Review key points by answering these questions.

Given the following information, complete the Run Guide below.

Summary of Route 32 Work Rules

Work Rule	Stipulation	
Minimum Platform Time	Five (5) hours	
Maximum Platform Time	Ten (10) hours	
Report Allowance	Ten (10) minutes per pull-out	
Turn-in Allowance	Five (5) minutes per turn-in	
Spread Time	Thirteen (13) hours	
Spread Penalty	1/2 of the minutes over 12:00 @ straight time	
Run Type Percentages	Straights	Minimum of one (1) from all base vehicles in revenue service at 8:00 a.m.
	Splits	1/2 within 11:00 spread, 1/2 within 12:00
Make-up Time	Up to eight (8) daily pay hours	
Overtime	1/2 of the minutes over 8:00 hours daily	

CHRONOLOGICAL BLOCK LISTING - ROUTE 32

A.M. BLOCKS			P.M. BLOCKS	
3201 6:00 a m	4:42 10:42 a m	3206 1:46 p m	3:56 5:42 p m	
3203 6:16 a m	3:56 10:12 a m	3205 1:30 p m	4:42 6:12 p m	
3202 6:30 a m	3:56 10:26 a m	3204 1:16 p m	5:26 6:42 p m	
Total A M Platform	12:34	Total P M Platform	14:04	

RUN GUIDE - Route 32

RUN GUIDE

Service Days: **Effective:**

Run No.	1st Piece Block	Route	Time On	Pull-out	Pull-in	Time Off	2nd Piece Block	Route	Time On	Pull-out	Pull-in	Time Off	Plat-form	Total Spread	Allowance Report	Turn-in	Relief	Make-up	Work Hours	Over-time	Spread Penalty	Pay Hours
TOTALS													Plat-form		Allowance Report	Turn-in	Relief	Make-up	Work Hours	Over-time	Spread Penalty	Pay Hours

Notes:

CHAPTER 5

ROSTERING

Operators Required and Days Off for 8 Hour Runs:

Day	Number of Daily Runs	X	Weekly Total
Weekdays (M - F)	120	5	600
Saturdays	54	1	54
Sundays	26	1	26
Weekly Total			680
Total Operators (Weekly total divided by 5 days of work per operator)			136

Master Lists

Weekday Runs Run	Platform time	Sat Runs Run	Platform time	Sun Runs Run	Platform time
01	8:00	51	8:15	61	9:10
02	8:00	52	8:21	62	9:05
03	8:12	53	8:00		
04	8:51				

Available Days Off

Su	Mo	Tu	We	Th	Fr	Sa
3	1	1	1	1	1	2

Weekday Master RUN GUIDE - Route 32

RUN GUIDE

Service Days WEEKDAYS Effective 10/27/XX

Run No.	1st Piece Block	Route	Time On	Pull Out	Pull In	Time Off	2nd Piece Block	Route	Time On	Pull Out	Pull In	Time Off	Plat-form	Total Spread	Allowance Report	Turn In	Relief	Make Up	Work Hours	Over Time	Spread Penalty	Pay Hours
1	3201	32	550a	600a	1042p	1047a	3206	32	136p	145p	542p	547p	8:38	11:57	:20	:10			9:08	:34	:14	9:56
2	3203	32	606a	616a	1012a	1017a	3205	32	120p	130p	612p	617p	8:38	12:11	:20	:10			9:08	:34	:21	10:03
3	3202	32	620a	630a	1026a	1031a	3204	32	106p	116p	642p	647p	9:22	12:27	:20	:10			9:52	:56	:29	11:17

No Saturday Runs

No Sunday Runs

Master Day Off List

Sun	Mon	Tues	Wed	Thur	Fri	Sat
3	0	0	0	0	0	3

Day	Roster With daily guarantee: Work	Guarantee	Pay	Roster Without daily guarantee: Work	Guarantee	Pay
Sunday	OFF			OFF		
Monday	OFF			OFF		
Tuesday	7:50	:00	8:00	7:50	:00	7:50
Wednesday	7:50	:00	8:00	7:50	:00	7:50
Thursday	7:50	:00	8:00	7:50	:00	7:50
Friday	7:50	:00	8:00	7:50	:00	7:50
Saturday	8:40	:00	8:40	8:40	:00	8:40
TOTAL	40:00	:00	40:40*	40:00	:00	40:00

* 40 minutes of overtime paid for the workweek

Weekly Roster No.	Sun	Mon	Tue	Wed	Thur	Fri	Sat	Weekly Pay Hours
101	OFF	OFF	1 / 9:56	1 / 9:56	1 / 9:56	1 / 9:56	OFF	
102	OFF	2 / 10:03	OFF	2 / 10:03	2 / 10:03	2 / 10:03	OFF	
103	OFF	3 / 11:17	3 / 11:17	3 / 11:17	3 / 11:17	OFF	OFF	
104	OFF	1 / 9:56	2 / 10:03	OFF	OFF	3 / 11:17	OFF	

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Study Objectives

1) Learn that rostering is the process of grouping daily operator runs into weekly run packages.

2) Remember that weekly rosters combine runs and days off into weekly operator assignments.

3) Understand the basic difference between operator developed (cafeteria style) rostering and agency developed rostering.

4) Be able to recognize and understand typical constraints for rostering under the cafeteria approach.

5) Be able to cite cost saving potential in each type of rostering approach.

6) Name an advantage of using the cafeteria style rostering approach.

7) Be prepared to explain the process for preparing variations for a particular agency developed roster.

8) Name an advantage of using the agency developed rostering approach.

9) Remember what type of charts are frequently used to present quantifiable information to aid in the evaluation of the rostering variations.

10) Learn the definition of equivalent straight time hours.

I. Introduction

What is "rostering"?

Rostering is the process of "grouping" daily operator runs into weekly run packages.

Operators are generally given the opportunity, based on order of seniority, to "pick" (choose) the run packages they will work for the next interval of time (often called bid period or mark-up period). At most agencies, mark-ups generally occur 3 or 4 times a year.

These weekly rosters may include mixtures of runs, such as

- weekday runs only,
- weekday runs and a Saturday run,
- weekday runs and a Sunday run,
- weekday runs and a Saturday run and a Sunday run.

Weekly run packages or rosters usually consist of five daily 8-hour runs. However, at agencies where 10-hour daily runs exist, the weekly rosters may consist of four daily runs. Where part-time operators are utilized, the weekly rosters may consist of two, three or four daily runs.

Some agencies even develop rosters with five 10-hour daily runs as a method of reducing the number of required operators. However, as expected, this rostering practice results in a high level of weekly overtime.

Rosters will generally remain in effect until the next mark-up.

Weekly Roster No.	Su	Mo	Tu	We	Th	Fr	Sa	Weekly Pay Hours
101	Off	1/8:00	1/8:00	1/8:00	1/8:00	1/8:00	Off	40:00
102	Off	2/8:00	2/8:00	2/8:00	2/8:00	Off	51/8:00	40:00
103	62/10:00	3/10:00	3/10:00	3/10:00	Off	Off	Off	40:00
104	Off	Off	4/10:00	4/10:00	4/10:00	4/10:00	Off	40:00
105	61/8:00	4/8:00	4/8:00	4/8:00	4/8:00	Off	Off	40:00

Example of a weekly roster

II. Types of Rostering

Rostering, depending on work rules and agency policy, is performed in one of two ways

- Operator developed (cafeteria style) or
- Agency developed.

Operator developed (cafeteria style) rostering

Under the operator developed or cafeteria style of rostering, an operator can choose both specific daily runs **and** days off from a master list or lists, just as a customer in a cafeteria line can choose individual food items that make up a complete food tray.

When it is time to mark-up, the Schedule and/or Operations department(s) posts master lists containing all weekday, Saturday and Sunday runs, and available days off. The master lists may be the actual Run Guides for each day or some variation of the Run Guide.

In the example master list(s) shown below, the two digit numbers that begin with "0" indicate that the runs are weekday (M - F) runs. The two digit numbers that begin with "5" indicate that these runs are Saturday runs. Those runs that begin with "6" are Sunday runs.

The available days off list displays the total number of days off that may be chosen for each day of the week.

Master Lists

Weekday Runs			Sat Runs			Sun Runs		
Run		Platform time	Run		Platform time	Run		Platform time
01	-	8:00	51	-	8:15	61	-	9:10
02	-	8:00	52	-	8:21	62	-	9:05
03	-	8:12	53	-	8:00			
04	-	8:51						

Available Days Off

Su	Mo	Tu	We	Th	Fr	Sa
3	1	1	1	1	1	2

Operator developed rostering allows operators to combine runs and days off according to work rules.

In addition, a master list of available extra board (relief, standby, etc.) is posted along with a master list of eligible operators. The operator list generally displays operators in seniority order with the day and time of their turns to pick listed next to their names. Picking runs and days off can be as simple as initialling the runs and days off on the master lists.

Schedule and/or Operations department personnel and if applicable, union personnel, generally "officiate" during the mark-up to ensure that operators pick work according to the seniority list and that all rules governing the cafeteria roster and mark-up process are adhered to.

Variants of the cafeteria approach

There are a number of variants under the cafeteria approach, ranging from no restrictions to many restrictions. Typical constraints for rostering under the cafeteria approach include

- Days off must be consecutive as long as the opportunity to select them exists.
- Routes cannot be mixed during the work week until such time as the same route is not available for all work days of the week.
- Run types (straight/split) cannot be mixed until necessary to form full weekly rosters.
- A certain number of off duty hours (usually 8) must exist between each daily run.

Cafeteria rostering is generally addressed very specifically in a labor agreement.

Agency developed rostering

Under the agency developed rostering approach, the weekly runs and days off are chosen by the agency and combined into the weekly rosters (see 101 - 105 below). Operators then pick from the list of weekly rosters.

The major difference from the operator developed (cafeteria) approach is that with the agency developed approach, the transit system combines the daily runs and days off before posting. Using the comparison to the cafeteria line, this means that operators choose from a selection of prepackaged complete food trays rather than picking the individual food items that make up the food tray.

Each operator, generally based on seniority, picks a weekly roster from the agency developed roster package. These are the runs the operator will work until the next mark-up period.

Weekly Roster No.	Su	Mo	Tu	We	Th	Fr	Sa	Weekly Pay Hours
101	Off	1/8:00	1/8:00	1/8:00	1/8:00	1/8:00	Off	40:00
102	Off	2/8:00	2/8:00	2/8:00	2/8:00	Off	51/8:00	40:00
103	62/10:00	3/10:00	3/10:00	3/10:00	Off	Off	Off	40:00
104	Off	Off	4/10:00	4/10:00	4/10:00	4/10:00	Off	40:00
105	61/8:00	4/8:00	4/8:00	4/8:00	4/8:00	Off	Off	40:00

Agency developed rosters contain a combination of both runs and days off. Operators choose from weekly roster numbers.

Potential cost savings associated with each approach

Operator developed (cafeteria) rostering - cost awareness

In support of the operator developed (cafeteria) approach, many transit systems believe that operators are more conscientious about the quality of their work when they have additional control over their work hours and assignments.

In theory, that increased operator conscientiousness could translate into potential costs savings associated with improved attendance, fewer accidents, reduced worker compensation claims, and fewer customer complaints.

Agency developed rostering - cost awareness

Many transit systems prefer the agency developed approach because in many cases the pre-assembled rosters can be developed in a more cost-effective manner.

This is especially true for agencies where a daily guarantee does not have to be paid. In those cases, the agency can combine large daily runs (over 8 hours) with small daily runs (under 8 hours) into weekly rosters of 40 pay hours or fewer. Overtime pay (when paid for time worked over 40 hours in a week) is thus minimized or avoided altogether. (See example below.)

As with runcutting, the more daily runs there are to work with, the greater the opportunity for enhanced cost-effectiveness in developing the weekly rosters.

The example below demonstrates the potential cost savings for a transit system using the agency developed rostering approach when daily guarantees are not paid. In this case, one large run (over 8 hours) can be combined with 4 other daily runs to equal 40 weekly pay hours. No overtime pay is necessary because the operator does not work over 40 hours per week.

Day	Roster with daily guarantee			Roster without daily guarantee		
	Work	**Guarantee**	**Pay**	**Work**	**Guarantee**	**Pay**
Sunday	OFF			OFF		
Monday	OFF			OFF		
Tuesday	7:50	:10	8:00	7:50	:00	7:50
Wednesday	7:50	:10	8:00	7:50	:00	7:50
Thursday	7:50	:10	8:00	7:50	:00	7:50
Friday	7:50	:10	8:00	7:50	:00	7:50
Saturday	8:40		8:40	8:40	:00	8:40
TOTAL	40:00	**:40**	**40:40***	40:00	:00	40:00

* 40 minutes of overtime paid for the work week.

Agency developed rosters provide an opportunity to combine daily runs of over 8 hours with daily runs of under 8 hours so as not to exceed 40 pay hours per week. This applies only where daily guarantees are not paid.

Of note:

It is important to note that, in the absence of daily guarantees and overtime, savings are also possible under the cafeteria approach. However, those savings are typically random and generally do not reach the potential savings associated with the agency developed rostering approach.

Often, under the cafeteria approach, more senior operators develop their weekly roster to include daily runs with over 8 hours in order to qualify for weekly overtime pay. Since senior operators usually pick first during the mark-ups, more junior operators are often left with runs that pay 8 hours or fewer per work day. As a result, some operators are paid high levels of weekly overtime while less senior operators are left with rosters that pay 40 hours or fewer.

Review key points by answering these questions.

1) Rostering is the process of grouping _ _ _ _ _ operator runs into _ _ _ _ _ _ run packages.

2) Weekly run packages or rosters usually consist of five daily 8 hour runs. True or False

3) Rosters will generally remain in effect until the next _ _ _ _ - _ _.

4) Rostering, depending on work rules and agency policy, is performed in one of two ways...

   1. (list type)
   2. (list type)

5) Under the _ _ _ _ _ _ _ _ developed (cafeteria) style of rostering, an operator can choose both days off and specific daily runs from a master list or lists.

6) During mark-up, operators generally pick work based on their order of seniority. True or False

7) Which of the following is (are) typical of the constraints applicable to cafeteria rostering?

   - days off must be consecutive as long as the opportunity to select them exists
   - run types (straight/split) cannot be mixed until necessary to form full weekly rosters
   - a certain number of hours (usually 8) must exist between each daily run
   - all of the above
   - none of the above

8) The diagram on the right is an example of an agency developed roster. True or False

Weekly Roster No	Su	Mo	Tu	We	Th	Fr	Sa	Weekly Pay Hours
101	Off	1/8:00	1/8:00	1/8:00	1/8:00	1/8:00	Off	40:00
102	Off	2/8:00	2/8:00	2/8:00	2/8:00	Off	51/8:00	40:00
103	62/10:00	3/10:00	3/10:00	3/10:00	Off	Off	Off	40:00
104	Off	Off	4/10:00	4/10:00	4/10:00	4/10:00	Off	40:00
105	61/8:00	4/8:00	4/8:00	4/8:00	4/8:00	Off	Off	40:00

9) The diagram on the right is an example of part of the process of developing a cafeteria roster. True or False

Master Lists

Weekday Runs Run	Pickup time	Sat Runs Run	Pickup time	Sun Runs Run	Pickup time
01	8:00	51	8:15	61	9:10
02	8:00	52	8:21	62	9:05
03	8:12	53	8:00		
04	8:51				

Available Days Off

Su	Mo	Tu	We	Th	Fr	Sa
3	1	1	1	1	1	2

10) Name one potential advantage (cost or otherwise) of the cafeteria rostering approach.

11) Name one potential advantage (cost or otherwise) of the agency developed rostering approach.

12) Under which approach are more senior operators more likely to include more daily runs which pay over 8 hours in order to qualify for weekly overtime pay?

Example: CAFETERIA Rostering Approach

Under the cafeteria rostering approach, operators pick their weekly roster work from the master days off and daily run lists. These master lists are either the actual Run Guide(s) or derived directly from the Run Guide(s).

For Route 32, the master day off and daily run lists originate with the Run Guide developed in Chapter 4.

The master days off and daily runs for this simple example are shown below

Weekday Master RUN GUIDE - Route 32

RUN GUIDE

Service Days: WEEKDAYS Effective: 10/27/XX

Run No.	1st Piece Block	Route	Time On	Pull-out	Pull-in	Time Off	2nd Piece Block	Route	Time On	Pull-out	Pull-in	Time Off	Plat-form	Total Spread	Allowance Report	Turn-in	Relief	Make-up	Work Hours	Over-time	Spread Penalty	Pay Hours
1	3201	32	550a	600a	1042p	1047a	3206	32	136p	146p	542p	547p	8:38	11:57	:20	:10			9:08	:34	:14	9:56
2	3203	32	606a	616a	1012a	1017a	3205	32	120p	130p	612p	617p	8:38	12:11	:20	:10			9:08	:34	:21	10:03
3	3202	32	620a	630a	1026a	1031a	3204	32	106p	116p	642p	647p	9:22	12:27	:20	:10			9:52	:56	:29	11:17

No Saturday Runs

No Sunday Runs

Master Day Off List

Sun	Mon	Tues	Wed	Thur	Fri	Sat
3	0	0	0	0	0	3

Because Route 32 operates only on weekdays, available off days are on Saturdays and Sundays only.

The number of available days off is equal to the number of weekday runs that may be picked by operators. A formula for computing the number of available days off is demonstrated on the following pages.

Formula for computing days off and required operators

Operators Required and Days Off for 8-Hour Runs:

Day	Number of Daily Runs	X	Weekly Total
Weekdays [M - F]	120	5	600
Saturdays	54	1	54
Sundays	26	1	26
Weekly Total			680
Total Operators [Weekly total divided by 5 days of work per operator]			136

Day Off Distribution:

	Total Number of Operators	Minus Daily Runs	Operators off Each Day
Weekdays [M - F]	136	120	[M,T,W,T,F] 16
Saturdays	136	54	82
Sundays	136	26	110
Total [Weekday x 5 plus Saturday plus Sunday]			272

Check:

Total Off Days Required - [Total Operators x 2 days]	272
Total Off Days Assigned - [Sum of Operators Off Each Day]	272
Leftover Days	0

Operators Required and Days Off for 10-Hour Runs:

Day	Number of Daily Runs	X	Weekly Total
Weekdays [M - F]	100	5	500
Saturdays	40	1	40
Sundays	40	1	40
Weekly Total			580
Total Operators [Weekly total divided by 4 days of work per operator]			145

Day Off Distribution:

	Total Number of Operators	Minus Daily Runs	Operators off Each Day
Weekdays [M - F]	145	100	[M,T,W,T,F] 45
Saturdays	145	40	105
Sundays	145	40	105
Total [Weekday x 5 plus Saturday plus Sunday]			435

Check:

Total Off Days Required - [Total Operators x 3 days]	435
Total Off Days Assigned - [Sum of Operators Off Each Day]	435
Leftover Days	0

Using Route 32 data, complete the following Summary of Operators Required and Days Off Formula. (Note: Answers are show below.)

Operators Required and Days Off for 10-Hour Runs:

Day	Number of Daily Runs	X	Weekly Total
Weekdays [M - F]			
Saturdays			
Sundays			
Weekly Total			
Total Operators [Weekly total divided by 5 days of work per operator]			

Day Off Distribution:

	Total Operators	Minus Daily Runs	Operators off Each Day
Weekdays [M - F]			[M,T,W,T,F]
Saturdays			
Sundays			
Total [Weekday x 5 plus Saturday plus Sunday]			

Check:

Total Off Days Required - [Total Operators x 2 days]	
Total Off Days Assigned - [Sum of Operators Off Each Day]	
Leftover Days	

ANSWERS TO ABOVE

Operators Required and Days Off for 10-Hour Runs:

Day	Number of Daily Runs	X	Weekly Total
Weekdays [M - F]	3	5	15
Saturdays	0	1	0
Sundays	0	1	0
Weekly Total			15
Total Operators [Weekly total divided by 5 days of work per operator]			3

Day Off Distribution:

	Total Operators	Minus Daily Runs	Operators off Each Day
Weekdays [M - F]	3	3	[M,T,W,T,F] 0
Saturdays	3	0	3
Sundays	3	0	3
Total [Weekday x 5 plus Saturday plus Sunday]			6

Check:

Total Off Days Required - [Total Operators x 2 days]	6
Total Off Days Assigned - [Sum of Operators Off Each Day]	6
Leftover Days	0

Example: AGENCY DEVELOPED Rostering Approach

As explained earlier, under the agency developed rostering approach, operators pick their weekly roster work from a master list of weekly rosters. When developing those weekly rosters, it is very common for the agency to consider several variations before deciding on the final version to post.

As shown before, a common convention for the form used for posting weekly rosters is as follows:

Weekly Roster No.	Sun	Mon	Tue	Wed	Thur	Fri	Sat	Weekly Pay Hours
101	OFF	# / X:XX	# / X:XX	# / X:XX	# / X:XX	# / X:XX	OFF	XX:XX

In the example form convention above, a 100 series number is assigned as the weekly roster number to help avoid confusion with the numbers used to represent the daily runs. "#" represents the daily run number under the days of the week columns and "X:XX" represents the pay hours associated with the run, both in the daily and in the weekly pay hours column.

For variation 1 below, the scheduler quickly assesses that all operators will be off on Saturdays and Sundays. Daily runs from Route 32 are simply transferred to the Roster below.

ROSTER - Route 32 (variation 1)

Weekly Roster No.	Sun	Mon	Tue	Wed	Thur	Fri	Sat	Weekly Pay Hours
101	OFF	1 / 9:56	1 / 9:56	1 / 9:56	1 / 9:56	1 / 9:56	OFF	49:40
102	OFF	2 / 10:03	2 / 10:03	2 / 10:03	2 / 10:03	2 / 10:03	OFF	50:15
103	OFF	3 / 11:17	3 / 11:17	3 / 11:17	3 / 11:17	3 / 11:17	OFF	56:25

These are long and consistent runs. Generally, an agency is reluctant to develop weekly rosters that contain such high levels of overtime (time over 40 hours weekly) unless there is a compelling reason to keep the overall number of operators at a minimum.

One argument for longer runs and fewer operators is to reduce the cost of medical premiums, pension obligations, worker compensation exposure and other costs. However, these savings could potentially be offset by the increased costs of accidents and absenteeism that may be associated with working longer hours.

In the example of Route 32, because there are no other runs to work with, few choices exist for mitigating the high levels of weekly overtime. Variation 2 (presented on the next page) offers one alternative.

Example: AGENCY DEVELOPED Rostering Approach (con't)

Under variation 2, the option of creating 4 weekly run packages is explored. Obviously four operators, not three, would be needed to provide this service. The additional operator will add both direct and indirect costs that may or may not be offset by savings in overtime. Further evaluation is beneficial.

ROSTER - Route 32 (variation 2)

Weekly Roster No.	Sun	Mon	Tue	Wed	Thur	Fri	Sat	Weekly Pay Hours
101	OFF	OFF	1 / 9:56	1 / 9:56	1 / 9:56	1 / 9:56	OFF	39:44
102	OFF	2 / 10:03	OFF	2 / 10:03	2 / 10:03	2 / 10:03	OFF	40:12
103	OFF	3 / 11:17	3 / 11:17	3 / 11:17	3 / 11:17	OFF	OFF	45:08
104	OFF	1 / 9:56	2 / 10:03	OFF	OFF	3 / 11:17	OFF	31:16

In variation 2 above, weekly roster no. 104 is made up of daily runs from weekly roster numbers 101, 102 and 103 (as they were developed in variation 1). Also, in variation 2, each roster 101 - 103 works 4 days per week instead of 5. The fifth daily run of each variation 1 weekly roster was assigned to 104 above.

However, many agencies believe that it is important for an operator not to switch daily runs too frequently during the week. These agencies believe that the operator's familiarity with the route configuration and regular passengers on that run is desirable. With this consideration, some additional cost may therefore be justified.

Where mixing and matching runs is not a critical consideration, a third variation for Route 32 could result in more evenly distributed work hours. Variation 3 (below) is an example of that approach.

ROSTER - Route 32 (variation 3)

Weekly Roster No.	Sun	Mon	Tue	Wed	Thur	Fri	Sat	Weekly Pay Hours
101	OFF	OFF	1 / 9:56	1 / 9:56	2/ 10:03	2/ 10:03	OFF	
102	OFF	2 / 10:03	OFF	2 / 10:03	1/ 9:56	1/ 9:56	OFF	
103	OFF	1/ 9:56	2/ 10:03	3 / 11:17	3 / 11:17	OFF	OFF	
104	OFF	3 / 11:17	3 / 11:17	OFF	OFF	3 / 11:17	OFF	

Exercise: Compute the weekly pay hours for the weekly rosters in variation 3 above.

III. Evaluating the Agency Developed Roster Variations

Choosing between variations is often somewhat arbitrary. However, cost considerations are extremely important. Some leniency is often officially or unofficially factored in to accommodate the considerations mentioned earlier, such as operator run familiarity, consistency of runs worked and others.

Comparison charts are frequently used to present quantifiable information to aid in the evaluation of the variations. An example comparison chart for the three variations of agency developed rosters for Route 32 is shown below.

	Variation 1	Variation 2	Variation 3
Total pay hours for all weekly rosters	156:20	156:20	156:20
@ Straight time	120:00	151:00	153:47
@ Overtime	36:20	5:20	2:33
Equivalent straight time hours*	174:30	159:00	157:37
Number of operators required	3	4	4

Comparison charts are frequently used to help evaluate quantifiable information.

* Equivalent straight time hours is the sum total of overtime hours multiplied by 1.5 (because overtime is paid at time and a half) plus regular straight time hours.

Observations about the variations

Variation 1

Variation 1 results in the greatest overall cost in terms of equivalent straight hour pay. However it does require the fewest number of operators. Fewer operators could result in savings in training costs, medical premiums, pension contributions, worker compensation exposure and premiums, uniforms and other related personnel costs. Safety and absenteeism issues may exist since Variation 1 rosters are 5-day packages consisting of large daily runs.

Variation 2

Variation 2 is less costly than Variation 1 in terms of overall equivalent straight hours. However Variation 2 requires all the related hiring, training and maintenance costs (and fringe costs) associated with employing an additional operator.

Variation 3

Variation 3 is the least costly in terms of equivalent straight time hours. However Variation 3 still requires an additional operator that Variation 1 does not. Agency policy on direct cost, customer service and contingent costs plays an important role in the decisionmaking process.

Review key points by answering these questions.

1) Under the cafeteria rostering approach, operators pick their weekly roster work from the master days off and daily run lists. True or False

2) The following form convention is commonly used for posting weekly agency developed rosters. True or False

Weekly Roster No.	Sun	Mon	Tue	Wed	Thur	Fri	Sat	Weekly Pay Hours
101	OFF	# / X:XX	# / X:XX	# / X:XX	# / X:XX	# / X:XX	OFF	XX:XX

3) Compute the weekly pay hours in the example below, then complete the column for variation X in the comparison chart shown below.

ROSTER - Route 32 (variation X)

Weekly Roster No.	Sun	Mon	Tue	Wed	Thur	Fri	Sat	Weekly Pay Hours
101	OFF	OFF	1 / 9:56	1 / 9:56	1 / 9:56	1 / 9:56	OFF	...
102	OFF	2 / 10:03	OFF	2 / 10:03	2 / 10:03	2 / 10:03	OFF	...
103	OFF	3 / 11:17	3 / 11:17	3 / 11:17	3 / 11:17	OFF	OFF	...
104	OFF	1 / 9:56	2 / 10:03	OFF	OFF	3 / 11:17	OFF	...

	Variation X
Total pay hours for all weekly rosters	
@ Straight time	
@ Overtime	
Equivalent straight time hours	
Number of operators required	