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# Counting Rides: How Hard Can it Be?

By Nate Vander Broek

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Counting rides; it can't be that difficult—simply count passengers as they come into the vehicle, right? Well, it's not always that straightforward. Questions can arise about who to count and what to do under certain conditions. For instance, if a passenger is transferring from one bus to another, should she be counted again? If a passenger is dropped off somewhere, and then picked up again, is this considered one or two trips? Are personal care attendants and small children counted? This article will help transit managers understand the correct way to count riders. It will explore new and existing counting technologies and help you decide what method is right for your transit agency.

## Why count rides?

Before discussing how to count rides, it's important to review why it's necessary to count rides.

Keeping an accurate measurement of ridership is necessary to assess performance over time. Examples of performance rates that require the knowledge of ridership include: ridership by route, ridership by trip, average travel time, average passenger trip length, operating costs per passenger trip, productivity, and complaint rate.

These performance measures can be used to show the community and transit staff what has been accomplished. It can show what has worked and can be built upon, and what hasn't worked and needs improvement. And finally, it can show local, state and federal leaders and policy makers that "rural transit is well-deserving of continued financial support" (TCRP Report 136). Categorizing riders, such as by age or disability, also helps the transit agency learn more about their passengers and make better planning decisions. For instance, if an increasing number of its riders are disabled, then the transit agency may want to consider purchasing better-equipped vehicles.

## Unlinked passenger trips

The Section 5311 Formula Program, which provides funding to states for the purpose of supporting public transportation in rural areas, requires all recipients and beneficiaries to report passenger trips to the National Transportation Database (NTD) through their state Department of Transportation (DOT). The NTD requires rides to be counted as unlinked passenger trips, which means a passenger is counted each time he or she boards a vehicle, no matter how many vehicles are used to travel from origin to destination. Round trips, such as when a passenger goes to the doctor and then back home, count as two passenger trips.

## Who to count as a passenger

***Employees.*** Each rider boarding a vehicle is counted as a passenger trip unless the passenger is a transit employee and is "performing work duties that require traveling on the vehicles and [is] being paid while traveling" (TCRP Report 136). For example, an employee who is observing vehicle operations or serving as an on-board aid or assistant for one of the passengers should not be counted as a passenger. However, if the transit employee is traveling for personal reasons or is commuting to and from

work, the employee must be counted as a passenger. The same counting rules applicable to employees also apply to volunteers who provide services for your agency.

***Children and personal care attendants.*** If child or Personal Care Attendant (PCA) accompanies a rider, then they too must be counted as a passenger. This is true whether or not the child or companion pays a fare. However, as mentioned above, when a PCA or companion is working for the transit agency, he or she should not be counted as a passenger when performing job duties.

***Other riders.*** Any trip provided by taxicabs or other transportation services you contract should be counted as a passenger trip. A new change to the 2011 Monthly Reporting Manual states that demand-response service operated through taxicab drivers is now reportable as a separate mode—"demand response-taxi"—and is considered a "purchased transportation" type of service. Trips provided by volunteers should also be included in the total demand-response transit passenger trip count.

## Passenger classifications

In addition to counting the number of riders, it's also necessary to classify the riders.

KDOT's Vehicle Ridership Form requires that passengers be divided into three categories: *elderly, disabled,* and *general public*. KDOT defines elderly passengers as those who are 60 and over. Disabled passengers include those with a temporary or permanent physical impairment that limits mobility for personal transportation. General public includes all the remaining riders who do not fit into the first two categories. The KDOT form also includes a check-box for indicating if a rider is using a wheelchair.

It may be difficult to decide how to classify a passenger when he or she may be part of multiple categories. For instance, if a rider is over 60 and also disabled, which category should you assign to this passenger?

According to Connie Spencer, program consultant at KDOT, it is up to the transit agency to decide how to classify each passenger, as long as each person is assigned to only one category. Barbara Lilyhorn, director of Reno County Area Transportation (RCAT), said that RCAT uses the disabled classification instead of age when a passenger is over 60 years and older and disabled. Another agency may have a different policy to classify users who fall into multiple categories. It's important to assign each passenger to only one category and be consistent with whatever method you decide to use.

*Trapeze Novus is a great tool for dispatching and scheduling, but it does not have built-in aggregated ridership counts. KDOT is working with a vendor to help with reporting using Novus.*

## Revenue vs. nonrevenue passengers

Everyone who boards the vehicle, including those who do not pay (with the exception of actively working employees or volunteers) must be counted as a passenger. Some agencies or states may require that paying passengers be distinguished from non-paying passengers. The idea is to be able to track passengers in ways that can be matched-up with fare-box receipts. Many agencies calculate their passenger counts after adding up fares at the end of the day, along with the number of passes punched.

Leann Kroeger from ACCESS Transportation in Hays said they get their ridership numbers based on cash or ticket sales. "All the passengers must pay by cash or have a ticket," explained Kroeger. Receipts are totaled at the end of the day to get the number of riders.

## Counting methods

Transit agencies count passengers using a variety of methods, from manual paper-and-pencil counting methods to more advanced Automatic Passenger Counts (APC) technologies. Each method has its own advantages and disadvantages. It is important to know which method makes the most sense for your transit agency before considering a switch to a different method or a newer technology.

***Manual methods.*** Many agencies employ a manual method, such as using vehicle operator trip cards, traffic

## Sources


- TCRP Report 136 - Guidebook for Rural Demand-Response Transportation: Measuring, Assessing, and Improving Performance.
- TCRP Synthesis 29 - Passenger Counting Technologies And Procedures.
- National Transit Database – Unlinked Passenger Trips. http://www.ntdprogram.gov/ntdprogram/pubs/MonthlyRidership/2010/html/ridership.htm#MR20
- Kansas Department of Transportation Public Transportation http://www.ksdot.org/burTransPlan/pubtrans/index.asp

checkers using pencil and paper or hand-held units, and on-board surveys. Hand-held units provide an advantage over pencil and paper by automatically uploading data and eliminating the need for manual data input and decreasing turnaround time.

While a manual method requires minimal or no capital investment and works well for straightforward, familiar and well-established routes, it has several potential problems: accuracy and consistency of the data; labor intensiveness; reliability of the traffic checkers; and cost and consequent limitations on data collection resources (TCRP Synthesis 29).

Jim Dockers, of the Pittsburg Area Community Transportation (PACT), uses a manual method to count riders. "We count people as they come onboard the bus," Dockers explained. He said this method works well for PACT, and he sees no need for changing this method or using new automatic counting technologies. To manage the ridership data, PACT uses Excel.

Leann Kroeger from ACCESS Transportation in Hays said their drivers carry a manifest. They accept cash or tickets and total that up at the end of the day to get their ridership. "The money has to add up," said Kroeger. She said they do not use clickers. She said the current system works well and she doesn't know of any disadvantages using this method. When asked about using new technology to count rides, Kroeger said "investing in [new technology is] not cost effective to count rides."

Anne Smith, director of Flint Hills Area Transportation, said their drivers record all rides and then a staff member later reconciles the ridership data with data from Trapeze Novus. Then they use Excel to keep track of ridership data. Flint Hills Area Transportation has used Trapeze Novus for over a year. She said it is a great tool for dispatching and scheduling, but the current version does not have built-in aggregated ridership counts. Smith said KDOT is working with a third party vendor to help with reporting.

### Tips for Adopting a New Counting Technology

If you agency is considering a move to a newer counting technology, the Transit Cooperative Research Program (TCRP) Synthesis 29 has the following observations and best practices:

1. **Procedures are more important than technology.** Establishing and adhering to data collection procedures that meet the agency's needs is the most critical factor, regardless of the technology selected to count ridership.
2. **Internal changes are necessary to ensure the success of new passenger counting technologies.** A significant investment in time and effort is needed in the early stages to update internal databases and analytical techniques, to ensure that the system receives the priority it needs, and to train staff in its maintenance and use.
3. **Visit and learn from other agencies before deciding on a new passenger counting technology.** Instead of reinventing the wheel, a savvy agency can draw on the experiences of others in planning its own implementation of new technology.
4. **Unnecessary customization should be avoided.** Attempts to redesign what is available on the market to make one's own system unique or better almost always result in failure. Most installations require a fair degree of customization to match agency needs, but taken to extremes, this is a recipe for failure.
5. **A strong commitment from senior management is required.** Support from the general manager raises the priority attached to passenger counting and ensures cooperation among the various departments involved.
6. **Active management of the passenger counting system is critical to success.** Agencies that have successfully adopted new technologies generally have a mid-level person who assumes responsibility for the system and takes the necessary action to ensure its proper functioning.
7. **Advanced passenger counting technologies offer several benefits.** Among benefits cited by the survey and case-study agencies are more frequent data collection, a reduction in turnaround time, the ability to analyze ridership data at finer levels of detail, greater timeliness and responsiveness, and lower cost.
8. **There is no one perfect solution.** Agencies must consider their need for and uses of ridership data before deciding how best to proceed. Each ridership counting technology is appropriate to use for certain purposes, and there are successful examples of each in the case studies. Many agencies using manual techniques are satisfied with established data collection schedules and have been successful in meeting the needs of data users. One hundred percent accuracy does not exist with any technology. New passenger counting technologies have a break-in period of approximately 18 months during which start-up problems are identified and solved.

"Trapeze Novus is not providing the information that KDOT needs—it has no way to track duplicated individuals" said Smith, and she noted that the information that is available is difficult to get out of the system. "If I want to get information on where riders are going, I have to go through 50 or 60 pages," she said. However, Smith said that the Trapeze Novus is very helpful in batching, creating and printing the driver's manifest. She said it's amazing to watch Trapeze work and has become a necessity at their organization.

Smith is hoping that Flint Hills Transportation will be one of the first agencies in Kansas to use mobile data terminals (MDTs) because of its high number of paratransit riders (about 300 per day). MDTs are computerized devices that reside in the transit vehicle and allows for communication with a central dispatch office. They can also be used to display mapping and other relevant information. Smith has heard the MDT units have a touch screen to allow drivers to keep track of riders and automate the counting system. She is excited about the use of new technology. "Anytime we can introduce new technology, that's fantastic," she said.

Debbie Atkinson, Transportation Coordinator at OCCK Inc. in Salina, said their drivers currently carry a manifest and use tab counters to keep track of each passenger. But Atkinson said they're also interested in using mobile data terminals as long as the test pilot in Hutchinson works out. Atkinson said she too has heard the MDT comes with a touch screen that drivers can use to help keep track of passengers and it would provide automatic record-keeping functions and send the data to the necessary office. Atkinson said that OCCK Inc. also uses Trapeze NOVUS scheduling and dispatching software provided by KDOT.

Barbara Lilyhorn at Reno County Area Transportation (RCAT) said the MDT test pilot in Hutchinson was launched in November but ran into some problems so it is not fully operational yet. Until it is, RCAT will continue to use paper and pencil to classify riders as they come onto the vehicle. Lilyhorn said all passengers must pay or use punch cards. That information is reconciled with data from the dispatch center at the end of the day in order to get ridership totals. Just like the other transit agencies, Lilyhorn hopes that the new MDTs will have a touch screen that will allow drivers to record ridership data and provide easy reporting tools.

***Automated methods.*** While most rural agencies in Kansas use a manual method for counting and classifying riders, there are some high-tech devices available to help. The TCRP Synthesis 29 report provides examples of automated technologies including electronic fare boxes (ERF) and automatic passenger counts (APC).

Electronic fare boxes are most commonly used when transit agencies are interested in automating the revenue process, but passenger counts are possible through this technology. Some issues with EFRs include: mechanical problems, such as currency jams and difficulty reading swipe-cards; lack of operator with proper procedures for entering information using the keypad—leading to useless or inaccurate data; and software problems such as difficulties with generating reports at the route level. The Report said this technology takes an average if 18 months for employees to become familiar with the new equipment and for start-up problems to be addressed.

Automatic Passenger Count devices can tally passengers when they board and dismount the vehicle, as well as record times at each stop. This technology counts passengers in two ways: the first method uses infrared beams that cross the stairwells and keeps track of passengers entering and leaving the bus; the other method uses treadle mats which are mounted to the vehicle steps and contain switches that open and close when people step on the mats. APCs require the knowledge of stop location. This is done through the use or combination of signposts that calibrate the location along a route, and a global positioning system (GPS) that locates the bus via satellite.

As with the electronic fare boxes, the Report said APCs require a long time for debugging and adjustment to a new technology—about 17 months on average. Software and hardware issues are reported most often.

**In summary**

It is important to keep a consistent and accurate method of counting passengers. This information is useful in assessing performance over time—showing the community and your staff what has been accomplished, learning what works well and what hasn't, and convincing local, state and federal leaders that rural transit needs continued financial support. While a simple manual method of counting passengers is often all that is necessary, it doesn't hurt to review new technologies to see how they may benefit your transit agency.

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