

The Times

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A journal of transport timetable history and analysis

What you need to know about PSR

**Inside: Precision Scheduled Railroading?
Paddington Buses follow-up
X24 ... The once-yearly bus**

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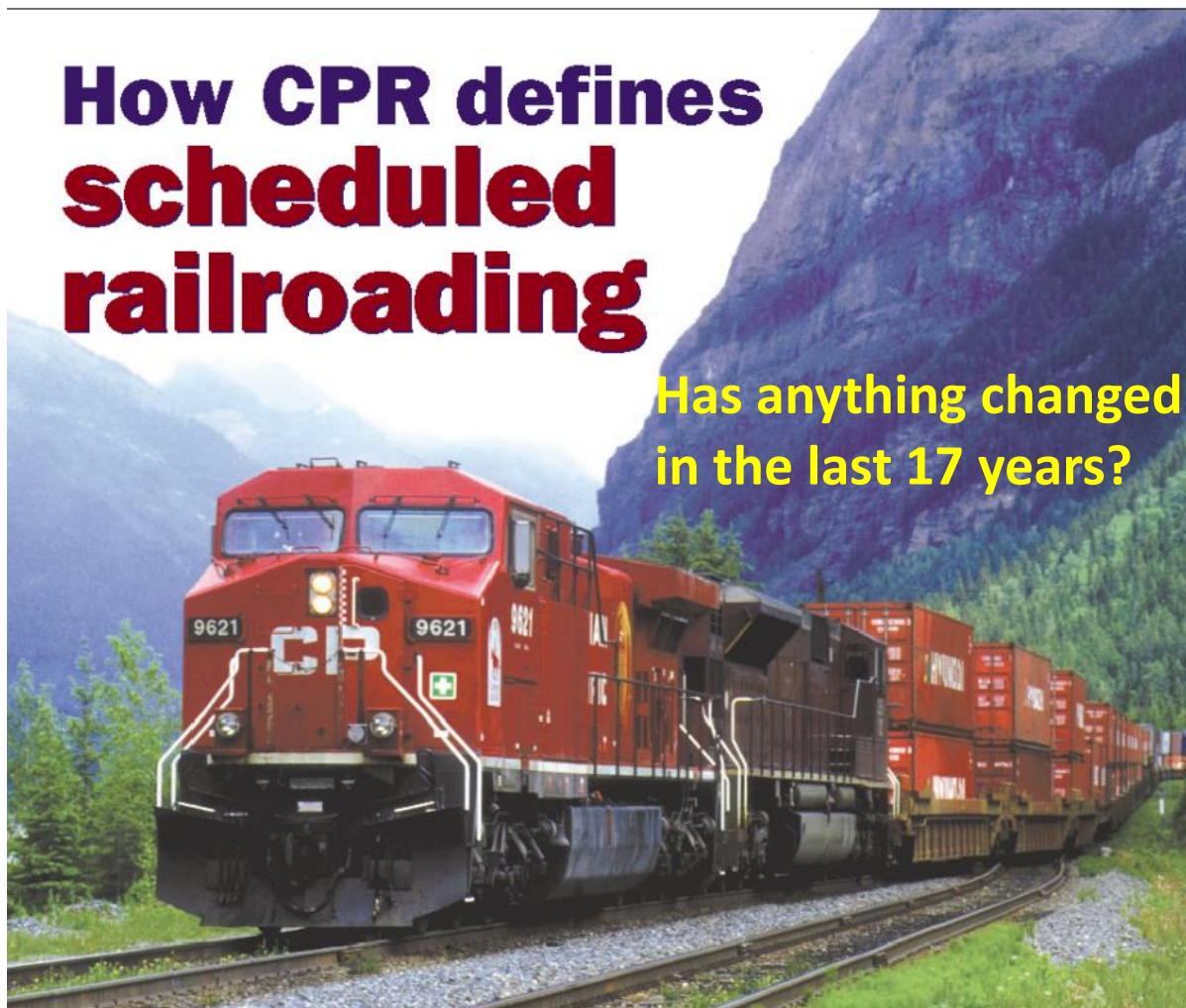
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Precision Scheduled Railroading

Geoff Lambert reviews the confusing literature on this vexed topic

WHAT IS PRECISION SCHEDULED RAILROADING? This is a good question; it is a fair question. It is a question asked by thousands but answered by few ... actually answered by nobody. The man who invented the term, Hunter Harrison, is dead.

There used to be — and indeed there still is — a semantic trick called [Buzz Phrase](#) Generation which tarts up two adjectives and a noun into an eye-glazing piece of Gobbledygook.

- Is it *Precise*? - No it is not
- Is it *Scheduled*? - No it is not
- Is it *Railroading*? - well ... partly.

However, the greater part of the “railroading” occurs on Wall Street, when investors with \$\$\$ signs in their eyes are gulled into investing in a railroad company that is shrinking its business to improve its Operating Ratio and hence its share price—buy low! - sell high!

I first came across the term back in 2005, when I wrote a series of articles in this journal, called “Timetabling Revolution”, which finished on a pessimistic note, with an article on timetable-making in Australia—*“Australian Dog’s Breakfast”*. Some extracts from the March 2005 issue follow ... pretty much as I wrote it at the time.

The Canadian Pacific (CPR), like most North American railroads, used to work on a “tonnage-based approach”. Under the tonnage-based approach, the operating plan may list a train as operating every day, but if the railway cannot fill enough freight cars, it cancels or delays the train. In using this approach, CPR tried to minimize the total number of trains it operated by maximizing their size, which, in theory, minimizes crew costs and maximizes track capacity. However, tonnage-based train planning has serious drawbacks:

- (1) The yards cannot fine-tune their operations and they require more freight cars and greater storage capacity to cope with the traffic variability.
- (2) Demands for crew and locomotive resources may increase along with the costs for repositioning crews and equipment.
- (3) Most importantly, customers suffer from unreliable service because the railroad gives train operation economics priority over customer needs.

A most vexing problem of tonnage-despatching is the crewing problem. Nobody—least of all the train crews who are to work the trains—knows for sure that a train is to be dispatched until it is almost ready to go. This requires crews to “hang around” waiting for their trains, or to be “on call” at all sorts of odd hours. Returning to their home base is not easy, especially when disruptions occur.

The alternative to the tonnage-based approach is the old, more disciplined, schedule-based approach. Scheduled railway strategies are gaining favour in North America as railways use new management science tools, particularly MultiRail, to craft cost-effective and customer-effective operating plans. CPR, Norfolk Southern, and Canadian National have made the boldest moves in this direction.

Overall, CPR has 6,000 customers shipping via 20,000 distinct origin-destination pairs. Every day CPR receives approximately 7,000 new shipments from its customers. It must route and move these shipments safely and efficiently over its 14,000-mile network. It must coordinate the shipments with its operational plans for 1,600 locomotives, 65,000 freight cars, and over 5,000 train crew members and take into account the connections with other railways. These connections account for 40% of CPR’s

business.

CPR’s customers want it to transport carloads, but CPR needs to move entire trainloads. For example, on an average day, of the 650 cars customers release to go to Chicago, only 45 of those cars are to move from the entire province of Alberta to Chicago proper. The railway must aggregate these low volumes of traffic in its operating plan.

In 1997, CPR began exploring the concept of running a scheduled railway, and it was one of the first railways to (re-)adopt a true schedule that allowed it to adjust quickly to changing traffic demands. The schedule-based approach forces trains to run on time, as scheduled, even if they travel with light loads. Until recently, the railway industry shunned scheduled strategies for several reasons:

- (1) They require operating trains with low tonnage when customer demand is below expectations.
- (2) They depend on railways’ systematically forecasting traffic levels by the day of the week, and quickly adjusting the plan.
- (3) They require a granular, actionable understanding of each customer’s requirements in each corridor.
- (4) The needed schedule-based models require sophisticated operations research software to conduct comprehensive and timely analyses of different alternatives.

To address some of these issues, CPR turned to MultiModal Applied Systems and its MultiRail© software. MultiRail was first employed by the St Lawrence and Hudson division of CPR in 1995 and 1996, which encompassed most of the eastern operations of the railway. This division was able to produce dramatic improvements in its costs and service levels through the careful crafting of a new operating plan using MultiRail. A joint team of CPR and MultiModal employees was formed in 1997 to

explore the creation of a new operating strategy for CPR. The team implemented a scheduled railway in late 1999. CPR calls the resulting plan the Integrated Operating Plan (IOP).

The Integrated Operating Plan

A railway operating plan describes how freight cars should move (the car routings and train plan) and often includes the major assets needed to move the freight cars (such as train crews, locomotives, yards, and tracks). The IOP was designed to improve service and to reduce the number of trains. These are often competing goals.

CPR builds the train plan on top of the blocking plan. The railway aggregates these blocks into trains to move as a single unit. The train designer wants to maximize train size, reduce the complexity of the blocking on the train, eliminate work at intermediate yards, calculate running times between yards, determine block connections, and minimize consumption of fuel.

In any month, freight cars can take over 10,000 different potential paths, each unique origin-destination combination including a wide variety of traffic types. By refining the blocking plan, CPR can improve its profitability and operations in the following ways:

- (1) It can cut shipment transit times by reducing switching of freight cars. Handling and holding freight cars in yards often represents over 50 percent of the total transit time.
- (2) It can use the time saved by reducing handlings to slow train speeds to reduce fuel consumption, while still maintaining promised transit times. CPR reduced its fuel consumption by 16 percent to 1.25 US gallons per 1,000 gross ton-miles, making it among the best in the industry despite CPR's moving much of its traffic over the Rocky Mountains.
- (3) It can balance workloads among yards. By making seasonal adjustments to the blocking plan, CPR can increase the capacity of the system by moving processing demand from yards near their freight car processing limit to yards with available capacity.
- (4) It can reduce freight car dwell time

in yards by rerouting cars to build large enough departing volumes to support more than one departing train per day between processing yards. Increased departure frequencies reduce waiting time in yards, further reducing overall transit times and improving reliability. CPR's freight car velocity at 160 miles per day is among the highest in the industry and has improved by 41.6 percent.

CPR and MultiModal "decomposed" the problem into a series of sub-problems that are solved sequentially in five steps:

- (1) Develop a traffic forecast reflecting each market segment's requirements.
- (2) Use these requirements to design the blocking plan.
- (3) Design trains based on the blocking plan.
- (4) Use simulation to analyze yard and train workloads by the day of week and time of day.
- (5) Pass the train schedule on to the planning tools that develop the crew and locomotive cycle plans.

This 5-step process is performed in an iterative fashion, both within each step and between steps. Each iteration adjusts the blocks and trains to improve the overall use of yard and train capacity and to improve the routing of the cars. Then customer-service standards are verified for compliance during the simulation step and changes made in the plan when it doesn't meet these standards.

The blocking plan lays the foundation for the train plan. Each train's schedule lists departure and arrival times, the blocks of cars it picks up or sets out at each location, crew change points, and locomotive requirements, among other details.

To develop a train plan, CPR uses MultiRail's heuristic algorithms to identify large-volume blocks and to create trains around those blocks. The train size might be smaller than capacity, so CPR uses MultiRail to identify other blocks that can be picked up en route until it estimates the train size is close to capacity.

Next, CPR uses MultiRail to re-estimate the train sizes and refine the day-of-week frequency to further

improve capacity utilization.

MultiRail's algorithms can accurately calculate the intermediate arrival and departure times of the trains as they travel across the network, but the planner needs to establish the original departure time for each train. Given the departure times, MultiRail employs several algorithms and reports to show the effects of the train plan on connection times and inventory of cars in the yards. The planner uses these calculations to adjust the train times and sometimes the day-of-week frequency to properly balance yard workloads.

Finally, the planner determines crew and locomotive requirements based on the train plan. These requirements are used in subsequent planning steps to develop specific deployment plans for locomotives and crews.

What are the characteristics of a good train plan? From a high-level view, a train plan must provide frequent service to meet customers' needs but contain a minimum of trains to reduce costs. A train should be fast to maximize track capacity and improve service, but slow to save fuel. A good train plan must not overburden yards by sending too many trains through them at once. Yet, bunching trains may reduce the connection times of cars at the yards. The train planners must resolve these somewhat contradictory design criteria. MultiRail provides rapid, interactive feedback on all of these criteria, allowing the planners to focus on perfecting the plans.

Results and Conclusions

One year after the 1999 implementation, CPR performed an audit of the benefits, which showed that scheduled operations reduced CPR's cost base by \$300 million. Since the audit, CPR has analyzed two of its larger expense categories: crew wages and fuel. This analysis showed that an additional \$210-million savings was attributable to the change in operating practices in 2001 and 2002. Total documented cost savings through the end of 2002 exceeded half a billion dollars.

The new strategies for routing freight cars increase train weights and thus decrease train starts, enabling CPR to

reduce its workforce by 18.8 percent despite an increase in gross-ton-miles of 13.8 percent. These efforts have resulted in an increase in carload train size of over 10 percent. More reliable train schedules facilitate scheduling time for track maintenance and reducing variance in the system and non-productive time. Aggressive yard bypass blocking reduces freight car processing in yards, which effectively increases yard capacity and reduces yard crew wages and yard fuel consumed. Reduced horsepower per ton ratios on trains combined with selective speed reductions enabled by increased car velocity makes the reduction in transit times transparent to customers. CPR has also improved fuel consumption by introducing AC powered locomotives.

So—has all of this resulted in train schedules re-appearing in CPR’s paper timetables? Well, it appears the answer is “no”- but at least, somewhere in the system, schedule trains exist again. Unfortunately, lack of space has prevented us from chasing up this intriguing enigma.

And what of crew scheduling and rostering, has that improved as well?

Writing in *Trains* magazine in January 2005, Editor Mark Hemphill said, “Readers have acquired the impression that the industry’s move toward scheduled railroading means that train crews will be able to go to work and go home at the same time every day. Unfortunately, no. The “schedule” in “scheduled freight railroading” is not the same sort of schedule that passenger trains have.

“Freight schedules have built-in cushions that will allow most of the ordinary things that will go wrong, to go wrong, and still allow a shipment to arrive on the promised day, without incurring huge costs that shippers can’t or won’t pay. For sake of a generalization, consider a “scheduled railroad” to mean that a freight train will arrive and depart each terminal it touches within the same four-hour window every time it runs.

“However, train crews have a 12-hour on-duty limit by federal law, in order to reduce fatigue-caused wrecks and derailments. The moment they report for duty, their clock starts ticking,

whether their train is ready to go or four hours away. Because many crew districts require 9 to 11 hours to cover it one way — or four or five hours and crews double back home on another train — scheduling the train crew and train only works on railroads with a lot of trains, or with very few trains, and only to a point.

“The disconnect between scheduled railroading and scheduled crews grows exponentially each time a train changes crews. Suppose we operate a train 2,200 miles from Chicago to Los Angeles that requires seven crew changes en route. From experience, we know that when everything goes well, a new crew will swing aboard once every nine hours. That’s only an average speed of 30.6 mph, but there are stops for inspections, refueling, meets on single track, and some slow running in the mountains. We write a schedule that calls for the train to leave Chicago at 0001 hours, the second crew to report to work at the second terminal at 0900, the third crew at the third terminal at 1800, the fourth crew at the fourth terminal at 0300 on Day 2, and so forth. The crews know exactly when they’ll work and go home, and the fatigue issue should be solved.

“What if our train loses an hour on every district — bad weather today? The train won’t turn into a pumpkin, but the crews will. By the time it reaches the fourth crew change, it’s 0600 instead of 0300, and the fourth crew has burned up 3 of its 12 hours sitting in the register room. They, and the fifth, sixth, and seventh crews can’t make it across their districts in their 12 hours, and three dog-catch crews are required. Or, we call them on the telephone, tell them to come to work late, and the whole scheduled work thing starts to disintegrate.

“Suppose we pad the schedule to put 12 hours into each crew district: The train waits for the man, rather than the man waiting for the train. The crews can have regular work starts even if our train snags an air hose on a grade-crossing plank and the conductor spends 45 minutes walking the train, or a motorist smashes through a grade-crossing signal arm, requiring every train to stop and flag the crossing until it’s repaired. Now, most trips we will

park \$10 million worth of locomotives and cars on \$3 million worth of siding for 21 hours, waving goodbye forever to the work they could have done. And we’ve delayed delivery of every shipment on that train 24 hours, too. That will actually be better for the company that owns the covered-hopper load of soda ash worth 3 cents per pound, because erratic deliveries are more costly than the \$2 it spends on a day’s interest on the soda ash, but it’s probably not acceptable to the owner of the container-load of MP3 players at \$900 per pound.

Then along came Hunter Harrison

Ewing Hunter Harrison (November 7, 1944 – December 16, 2017) was a railway executive who served as the CEO of Illinois Central Railroad (IC), Canadian National Railway (CN), Canadian Pacific Railway (CPR), and CSX Corporation. He was known for introducing precision scheduled railroading to the companies he ran, which resulted in lower costs and improved efficiency.

Biography: Born in Memphis, Tennessee, Harrison began his railroad career in 1964 when he worked as a carman-oiler for the St. Louis-San Francisco Railway ("Frisco"), while attending Memphis State University. Harrison was later promoted to Ooperator with Frisco and, later, with Burlington Northern Railroad (BN) following that company's acquisition of Frisco in 1980. Harrison was consistently promoted at BN, eventually being appointed vice-president (transportation) as well as vice-president (service design).

Harrison was fired from BN in 1989 and secured a job with the executive team at the Illinois Central Railroad (IC), first as vice-president and chief operating officer, culminating with his appointment as president and chief executive officer from 1993 to 1998. Following the acquisition of IC by CN in 1998, Harrison was appointed vice-president and chief operating officer by CN. Upon the retirement of Paul Tellier, he was appointed president and chief executive officer of CN on January 1, 2003, serving in that position until his retirement on December 31, 2009.

During his time at CN, Harrison was named Railroader of the Year for 2002 by industry trade journal *Railway Age* as well as CEO of the Year for 2007 by *The Globe and Mail's* "Report on Business". On April 29, 2009, CN announced the company's plan for succession in Harrison's position by appointing Claude Mongeau as his successor effective January 1, 2010. Following his service at CN, Harrison retired to his estate in Connecticut where he raised and trained horses for show jumping. Bound by a non-competition clause with CN, Harrison maintained a low profile serving as a director for the Belt Railway of Chicago as well as Dynegy Holdings LLC.

In fall 2011, Harrison was approached by the hedge fund Pershing Square Capital Management led by activist investor Bill Ackman, who was undertaking a proxy battle with the board of directors of CPR. Ackman had offered at that time to appoint Harrison as president and chief executive officer of CPR should his proxy battle in spring 2012 be successful, which would necessarily result in the termination of Fred Green as president and CEO. Ackman was ultimately successful in the proxy battle at the CPR's annual shareholder meeting on May 17, 2012. On June 29, 2012, Harrison was appointed president and CEO of CPR.

CN halted nearly \$40-million in benefits to be paid to Harrison after launching a lawsuit alleging he may have breached, or intended to breach, several confidentiality agreements with the railway dating back to his retirement in 2009. In the suit, CN's board of directors said it had grounds to believe Harrison may have violated his commitments to CN.

On January 18, 2017, Harrison abruptly resigned as CEO of CP Ltd. Instead, he joined Paul Hilal in involving himself in the management of CSX Corp., a US competitor. On March 7, 2017, Harrison was named CEO of CSX.

Harrison died on December 16, 2017.

Bouquets and Brickbats from RR media and blog sites.

"How, exactly, does precision

scheduled railroading improve service? (If at all?)"

Union Pacific's decision to begin precision scheduled railroading marked a turning point for the industry: A majority of Class I railroads in North America now operate under this model.

In a recent report, Moody's concludes the shift "may lead to service improvement." Railroads service levels lagged in 2017, due to high freight demand and weather effects. But those with precision railroading, such as CSX, have seen a marked improvement in train speed and lower dwell times.

However, the model is not a "panacea for service improvements," according to Moody's. BNSF, which does not operate with precision scheduled railroading, has been able to maintain "service levels that to date exceed its average 2013 levels" — a year used as a benchmark for what "good service" metrics look like.

That's a question the railroading industry has been struggling with for over 20 years, since the strategy was first implemented at Illinois Central. The operating model was then implemented at Canadian National and Canadian Pacific by its chief proponent, the late Hunter Harrison — who led each of those three railroads at one time.

There was one problem, though: Results were so closely seen as tied to Harrison's leadership, the model often became a backstory to the railroads' transformation. Even CSX's transformation over the past year was seen as a result of a controversial choice by the board to hire the late CEO.

Now, however, the story is changing — thanks in no small part to Union Pacific's embrace of the model. It's a test of how the changes are made, and whether the same effects can be reached through the model — not just the leadership decisions associated with it, such as lowering overhead costs by laying off employees.

Moody's analysis, published a week before the changes at Union Pacific began, provides an in-depth look at two service metrics associated with the

changes:

- Velocity — Train speed is seen as an indicator of frequent train service and swift shipping times. Historically, Moody's writes, this falls in periods of high freight demand and inclement weather, as service is more frequently disrupted.

- Dwell time — The time during which a train is not moving at a terminal. This is seen as an indicator contributing to on-time arrivals and departures, as well as an overall indicator of the efficiency of a train operation. (If the train is held up, something did not go according to plan.)

In summarizing the model, Moody's explains other associated changes include an increase in train length, converting more trains to "manifest" (or general purpose) services, and boosting handling efficiency at train yards. The basic theory, as Harrison once explained, is that each car — not each train — should have a plan to follow.

This theory, however, also leads to a shift in service routes for shippers.

"Nonetheless, the model's train schedule is established with the primary objective to enhance the efficiency of railroad operations," the report reads. "This narrows the scope to accommodate customer needs and may cause customers having to adapt to the railroad's train schedule."

In fact, this was one of the biggest critiques made at a Surface Transportation Board hearing last year, months after CSX began its own switch. Shippers complained the model raised efficiency at the expense of service.

"If I don't accomplish anything else today, I want to apologize to our valued shippers," Harrison said at the time. "Whatever problems we had, we had internally. We've made some mistakes. This is not a failure of precision scheduled railroading."

Below are some entries from a blog, headed "*What is precision railroading exactly ?*"

- I know that E Hunter Harrison invented it and I know that CN and CP

practice it, but, at the risk of asking a stupid question, I do not know what it is or how it differs from regular railroading. I am interested in what the customers think of it also. Does it help or hurt reliability?

- Every railroad practices a form of Precision Scheduled Railroading. The heart of it is having an operating plan that allows you to schedule shipments. That is, you know exactly how a car is supposed to move - which trains - which yards - what connections - and when it will arrive at the customer or interchange. You can use the plan to figure out your asset needs - crews, locomotives, mainlines, yards, etc. The goal is to have the most efficient plan you can and then tighten the assets to just fit the plan. EHH was a master at doing this.

- The only real problem with doing this is figuring out how much "safety stock" you need to cover unexpected events. NS was cruising along in 2013 with excellent network velocity and shipment performance when the CBR traffic hit in 2014 along with a general rise in traffic. They didn't have enough crew hiring in the pipeline to cover it well. The RR went in the ditch and got congested. A congested RR consumes more assets than a free flowing one, so NS had to hire a huge amount of folk and get every locomotive they could get their hands on to get out of the ditch. It took until 2015 to make this happen. Now, the RR is flowing freely again and the number of assets has been trimmed way back (this on top of what's been going on with coal.)

- "Precision Railroading" is a concept or dream that the real world converts into little more than a marketing buzzword. Others have indicated how freight flows vary and cause it to become imprecise. Probably the best example of "Precision Railroading" in operation is Amtrak, with more or less fixed consists running on the same schedule every day. And we know how that works out in practice. Not all trains arrive on time, empty seats some days, while turning away customers at peak travel times.

- From what I have read, CP usually finishes at the bottom of customer satisfaction polls. Personally I wouldn't put EHH and trains running

on schedule in the same paragraph. However, in a visit to the Canadian Prairies a year ago CP WAS doing a better job of keeping their trains on time than CN. But there was a simple reason for that: fewer trains on CP.

The number of scheduled freights on CP's main line had dropped from 7 or 8 each way a decade or so ago to four each way. And now that number east of Winnipeg has dropped to three. As mentioned above, railroads seem to do well when traffic drops but have issues keeping their trains on time when traffic grows. Just ask UP.

- So, as I understood the CN 'Precision RR', It's the scheduled departure of a given train, very much like passenger DEPARTURES, not arrivals. On time is they pull out of Toronto at 8 pm and if your shipment didn't make it to the yard you got the next day's train. On time arrival was give or take a few hours. But, I may have misunderstood what I was told.

- it's not a new concept, by any means. I have a 1963 New York Central ETT. On the back cover is a drawing entitled "Operation Sunset," "Protected connections pay off - Let's roll as advertised." The schematic shows desired arrival and departure times all along the line. Elkhart was the busy place - everything went through there headed if headed east or west in that region. Chicago area connections are shown as Cicero (CB&Q), Englewood (CRI&P), Bensenville (MILW), Proviso (CNW), Norpaul, Streator (ATSF), and Reddick (Wabash).

Here's another view

Hunter's triumph from the grave

Every big railroad is either following his game plan or under pressure to do so. Will that really change railroading?

In the year since Hunter Harrison's death, Precision Scheduled Railroading, or PSR, has progressed from crackpot railroading (in the eyes of some railroaders and shippers) to the gold standard. And it happened so fast we are still trying to wrap our arms around what it means for the future of this industry.

The facts are these: Canadian National, Canadian Pacific, and CSX

Transportation have been put through Harrison's PSR wringer, emerging in every case much leaner in terms of productive assets—cars, locomotives, trackage, and employees. That meant tons of savings to hand to investors. Interesting to me is what happened after that. CN, which Harrison ran as president or CEO from 1998 through 2009, went on a growth spurt in that period that continues to this day. Revenue ton miles at CN—the most basic measure of what a railroad does—rose 48 percent between Harrison's retirement in 2009 and 2017. So it's clear that downsizing the railroad's assets didn't inhibit Canadian National's growth, because no other railroad even approaches what it accomplished during this period. Revenue ton miles rose slightly during Harrison's tenure at Canadian Pacific and are now rising faster. His successor there, Keith Creel, says CP is game to grow. That's the same story coming from Jim Foote, who succeeded Harrison late in 2017 at CSX.

Harrison's impact on the other railroads of North America is palpable. The man was scarcely buried before financial analysts forgot the chaos he unleashed in his hurry to implement PSR at CSX and began asking other railroads why they weren't more like CN, CP and CSX. Union Pacific, the oldest surviving nameplate in American railroading, capitulated and began implementing PSR practices within months on the eastern part of the railroad, with a goal of expanding the transformation to the entire system within several years. Chief Executive Lance Fritz insists this isn't a case of PSR Lite.

Norfolk Southern, in rewriting its entire operating plan, beginning with improving terminals. Chief Executive Jim Squires, being purposefully vague, says, "We will implement PSR principles where they lead to a better result for customers and shareholders." Translation: "We're not going down the PSR route yet, but I realize there's a gun to my head." Kansas City Southern CEO Pat Ottensmeyer said in late October that his railroad was looking into "elements of Precision Scheduled Railroading that make sense" and also indicated it may

follow UP's lead in this direction. That translates: "Talk to me later."

This leaves only BNSF Railway, which is wholly owned by conglomerate Berkshire Hathaway and supposedly immune from the financial community's obsession with PSR and how-low-can-you-go operating ratios. But things are changing there, too. Chairman Warren Buffett is age 88 and early in 2018 named two new vice chairmen who will probably compete to be his successor. One of the appointees, Greg Abel, oversees all of Berkshire's non-insurance subsidiaries. Now, instead of writing Buffett a quarterly letter, BNSF Executive Chairman Matt Rose answers directly to Abel, and my sources say Abel is fascinated by the profits enabled by Precision Scheduled Railroading. Abel perhaps forgets that Rose took BNSF from No. 2 in carloads, revenues, and profits versus Union Pacific to number one in each category, as of 2017. One is forced to conclude that pressure from Abel contributed to Rose's decision to retire early in 2019. BNSF's chief executive, Carl Ice, may have had little choice but to join the PSR bandwagon, thereby making Hunter Harrison's triumph all but complete [Ice has since retired... Katie Farmer is now the CEO].

I'm continually asked two questions. First, can a railroad like Union Pacific (or BNSF or KCS) successfully implement Precision Scheduled Railroading and reap its financial rewards without it being done by Harrison or one of his disciples, such as Creel? Second, if you have an entire railroad industry marching to the PSR beat, what does this portend for the future?

The answer to the first question is, not easy — to change the railroad, you must change the culture. Harrison did it in every instance by *force majeure*—if you didn't embrace his plan, goodbye. Who will change the culture at Union Pacific? I am at a loss to know. My sources say the impetus for PSR came not from within the railroad, but from the board of directors, which puts Lance Fritz in a thankless position. He must lead the effort, but this isn't his idea, and morale in management ranks is low to

begin with. His chief operations officer is new to the job, and nothing in the man's background shouts to me that he is up to this.

Yet there are a lot of smart people at Union Pacific, and no company of its stature launches something of this magnitude with a will to fail. I am heartened that UP began by pruning its management ranks—in 2017 it counted 3,678 executives, officials and staff assistants, versus BNSF's 1,511. (In fairness, BNSF outsources its information technology, whereas UP does not, accounting for some of the difference.) UP revealed in late 2018 it would eliminate 500 non-union jobs by year's end, plus 200 contract workers.

But let's face it: As done by Harrison, you begin the PSR process by stripping a railroad to its underwear. At CSX it meant cutting every conceivable cost, denuding the railroad of field supervisors and just about everything else, until it began to be dysfunctional. That's when he knew he had cut enough and could add back assets to make the railroad workable. This method is like becoming pregnant; there is no half way. Union Pacific began Precision Scheduled Railroading with a go-slow approach, not wanting to punish shippers and arouse regulators. Hmm. The way it looks to me now, UP may achieve some good financial results but not the sort that Hunter Harrison could or that its directors might expect. It would be a lot easier for UP to simply buy Canadian Pacific and let Keith Creel, a Harrison acolyte who knows PSR inside and out, come in as an outsider and do the dirty work. And if the process will be hard for Union Pacific, imagine the barriers to PSR in front of BNSF, KCS, and NS, all under pressure to walk the walk but so far unwilling to do so.

That brings me to the other question, whether a Precision Scheduled Railroading world would be a better one. It depends on how you define better. I'm an old-fashioned Rob Krebs-type guy. Like Matt Rose, his successor at BNSF, Krebs (CEO 1995-2001) sought to bake a bigger and more profitable pie by striving to be 99 percent dependable in delivering intermodal business, which is BNSF's

linchpin. Do that, he said, and customers will come to you. In other words, please the customer, and you will succeed.

By its very definition, PSR requires that you get rid of assets until you size the railroad to its current volume; otherwise, you are throwing away money. That implies that a PSR-designed railroad could not grow. Yet Canadian National proved you can add back locomotives and cars and people in a PSR environment.

That's part of the deal, but I come back to pleasing the customer. To quote one well connected railroad consultant who I cannot name: "I don't know in my heart that any railroad cares about customer service. They've all improved their operational costs and grown their businesses at the same time that service parameters are bad across the board. If you want to be more than a profitable land-barge system, which combines high efficiency with low on-time results, you've got to grow with the economy, and that is not happening."

I guess I'm saying that good customer service that will entice more business is possible with, or without, Precision Scheduled Railroading. In other words, PSR is irrelevant in that regard. So to repeat what I've said before: If you want to attract satisfied customers, then align the compensation of your people to that end. We will all follow the money. Make right-day delivery of whatever piece of the business is important a part of everyone's bonus and stock grant, and you will see miracles occur here on earth. Who is doing that in a serious manner? Maybe nobody. So Hunter wins, and it doesn't matter.

As mentioned above, of the "transcon" railroads, BNSF has been the most-resistant to PSR. It still has ETTs but these no longer show schedules ... not even Amtrak schedules.

Comment on this article – [Letter to the Editor](#)

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WESTWARD ↓	Length of Siding (Feet)	Station Nos.	Mile Post	Siding Switch	HI Line Subdivision		Rule 4.3	Type of Oper.	Line Seg.	Miles to Next Stn.	EASTWARD ↑
					MAIN LINE STATIONS						
End Hi Line Sub MT, MP 964.8 / Begin Milk River Sub MT, MP 964.8 Information for Pacific Jct is located in the Milk River sub timetable.											
	8,431	01356	971.0	959.7 971.5		BURNHAM					9.0
	8,493	01365	980.0	979.0 980.7		KREMLIN					8.9
		01375	988.9			GILDFORD					5.3
			994.2			HINGHAM CENTER	X				5.5
			999.7			HINGHAM WEST	X(2)				2.3
	8,520	01387	1002.0	1001.3 1003.1		RUDYARD (MT2)					4.7
			1006.7			INVERNESS	X(2)				5.2
			1011.9			JOPLIN					4.1
	9,580	01400	1016.0	1014.8 1016.7		BUELOW					6.2
			1022.2			CP 1022					1.8
	8,460	01407	1024.0	1023.1 1024.8		CHESTER					12.0
	8,585	01420	1036.0	1034.7 1036.5		LOTHAIR					11.0
	8,480	01432	1047.0	1046.3 1048.1		DEVON					10.0
	8,960	01441	1057.0	1056.1 1058.0		DUNKIRK					8.5
			1065.5			SHELBY EAST					0.3
		01451	1065.8			SHELBY Adj. Sub: Great Falls, MP 1065.6	BJTX				1.2
			1067.0			SHELBY CENTER					1.2
			1068.2			TETON Adj. Sub: Sweet Grass, MP 1068.2	X(2)				19.9
			1088.1			CUT BANK EAST	X(2)				1.9
		01475	1090.0			CUT BANK	B				0.6
			1090.6			CUT BANK CENTER					0.4
			1091.0			CUT BANK WEST					15.5
		01491	1106.5			PIEGAN	X(2)				9.9
		01501	1116.4			BLACKFOOT	T				6.6
	11,075	01508	1123.0	1121.9 1124.1		BROWNING					9.0
			1132.0			SPOTTED ROBE					4.1
			1136.1			GRIZZLY					1.9
	4,513	01522	1138.0	1137.3 1138.4		GLACIER PARK	T				6.0
	9,591	01525	1144.0	1142.7 1145.0		BISON					5.8
		01534	1149.8			SUMMIT					1.9
			1151.7			MARIAS	T				6.0
		01540	1157.7			BLACKTAIL					7.5
		01548	1165.2			JAVA EAST					1.0
			1166.2			JAVA WEST					4.1
		01552	1170.3			ESSEX	TX(2)				2.9
		01558	1173.2			PINNACLE					4.3
			1177.5			PAOLA					7.7
		01568	1185.2			RED EAGLE	TX				2.7
			1187.9			NYACK					8.1
	10,257	01578	1196.0	1195.0 1197.1		BELTON					7.0
	10,237	01586	1203.0	1202.3 1204.3		CORAM					5.7
		01590	1208.7			CONKELLEY					3.0
		01593	1211.7			COLUMBIA FALLS Adj. Sub: Kalispell, MP 1211.7	JT X(2)				1.5
			1213.2			CP 1213.1	X(2)				4.3
		01601	1217.5			WHITEFISH	BT X(2)				250.5
End Hi Line Sub MT, MP 1217.5 / Begin Kootenai River Sub MT, MP 1217.5 Information for Whitefish is located in the Kootenai River sub timetable.											

Mountain Continental Time in effect on Hi Line Subdivision

Radio Call-In		
Radio Channel 076 in service Pacific Jct to Cut Bank		
Havre - 27(X)	Rudyard - 28(X)	Lothair - 29(X)
Shelby - 30(X)	Cut Bank - 31(X)	
Great Falls YM - 306	Great Falls YM - 316	
Radio Channel 076 in service Cut Bank to W Whitefish		
Piegan - 42(X)	Browning - 32(X)	Glacier Park - 34(X)
Summit - 35(X)	Blacktail - 36(X)	Java - 46(X)
Essex - 37(X)	Pinnacle - 47(X)	Red Eagle - 38(X)
Tunnel 3.7 - 48(X)	Belton - 39(X)	Coram - 49(X)
Conkelley - 50(X)		
Radio Channel 070 in service Columbia Falls / Whitefish		
Columbia Falls - 41(X)		
Radio Channel 087 in service at Whitefish Yard		
Glacier DISPR - 51(X)	Boyer E DISPR - 41(X)	
Emergency - Call 911		
Dispatcher X=0, Mechanical Desk X=2, Customer Support X=3, Railroad Police X=4, Detector Desk X=5, PTC Desk X=9		

Dispatcher Information

Pacific Jct to Cut Bank—817-867-7035, Fax 817-352-7014
Cut Bank to Whitefish—817-867-7069, Fax 817-352-7015

1. Speed Regulations

See Item 1 of the System Special Instructions for additional speed restrictions.

1(A). Speed—Maximum

Main Track	Psg	Frnt	Snow Plow	
			Under 100 TOB	100 TOB & Over
MP 964.8 to MP 1217.5	79	60	55	

Exception to System Special Instructions, Item 1, Speed Restrictions: Trains consisting entirely of loaded double stack equipment may operate at 60 MPH if under 105 TOB.

* Work trains engaged in snow service may observe the Snow Plow speed when instructed by the MW EIC. These trains may observe, and PTC will enforce the Passenger Speed on Form A Track Bulletins but not to exceed 45 mph.

	Snow Plow	
MP 964.8 to MP 1217.5	45	

1(B). Speed—Permanent Restrictions

	Psg	Frnt	Snow Plow
MP 964.8 to MP 967.2	55	50	45
MP 992.6 to MP 993.3	70	60	45
MP 1023.0 to MP 1022.4, EWD, HER	70	60	45
MP 1040.3 to MP 1046.1	70	60	45
MP 1062.6 to MP 1065.1	70	60	45
MP 1065.1 to MP 1066.1	45	45	45
MP 1066.1 to MP 1068.7	65	45	45
MP 1068.7 to MP 1075.1	55	50	45
MP 1080.1 to MP 1082.4	70	60	45
MP 1082.4 to MP 1083.1	55	50	45
MP 1083.1 to MP 1090.0	70	60	45
MP 1090.0 to MP 1090.6	30	30	40
MP 1090.6 to MP 1095.0	50	45	45
MP 1111.4 to MP 1112.7	55	50	45
MP 1117.2 to MP 1122.4	70	60	45
MP 1122.4 to MP 1126.9	55	50	45
MP 1126.9 to MP 1135.1	65	50	45
MP 1135.1 to MP 1138.4	45	40	45
MP 1138.4 to MP 1140.7	35	30	45

Extract of a recent BNSF ETT, showing one of the pages devoted to the High Line sub—showing [Buelow](#), the place where the accident displayed on our cover, occurred

Paddington buses follow-up

DUNCAN MACAUSLAN *comments on Richard Peck's recent article*

I HAVE BEEN THINKING ABOUT writing a response to Richard's Loop Services article from the March 2022 issue where he didn't really explain the difference between the 'Loop' services now being implemented and circular or loop services where the outbound and inbound trips are quite different. The present Loops basically mean the bus does not have a layover at one end such as in the city; for example — the 442 stops to set down and pick up at QVB at the same stop with only 2 minutes allowed.

I'd suggest that Paddington was a village from around 1841 when Victoria Barracks were built – see <https://dictionaryofsydney.org/entry/paddington>

The first horse buses ran there in the early 1850s – see SMH 26 April 1852 p1, there were still horse buses to Paddington in 1882 as listed in the 1882 Gibbs Shallard guide, and 1893 as listed in an article by 'Monad' in the SMH 3 Jan 1893 p6. There were stables for the ST&OC in Barcom Avenue, and in Jersey Road for the Waverley and Woollahra buses. The last dedicated Paddington Horse buses ran in 1903.

The steam trams traversed Oxford Street from 1879 and into Paddington along Queen Street.

The authority for bus route history is Robert Henderson's sydneybusroutes.com and it confirms most of the early bus details noted by Richard.

The bus pictures come from various collections; credits should have been provided. It takes hours to search the collections. I assume the colour pictures on page 3 of the article are Richard's

DEPARTMENT OF ROAD TRANSPORT—MOTOR OMNIBUS SERVICE

ROUTE No. 4

Elizabeth Bay-King's Cross-Taylor Sq.

COMMENCING ON SUNDAY, the 15th DECEMBER, 1935 the Departmental Omnibus Service (Route No. 4) will operate between Elizabeth Bay and Taylor Square only.

A NEW ROUTE No. 229 will in future operate between Darling Point and Lawson Street, Paddington via Beach Road, Kings Cross, Taylor Square and Five Ways Paddington

Particulars of Time-table, Route and Fares are shown hereunder:

Mondays to Saturdays						Sundays and Holidays					
Elizabeth Bay for Taylor Sq., D'hurst			Taylor Sq., D'hurst for Elizabeth Bay			Elizabeth Bay for Taylor Sq., D'hurst			Taylor Sq., D'hurst for Elizabeth Bay		
Elizabeth Bay	Kings Cross	Taylor Square	Taylor Square	Kings Cross	Elizabeth Bay	Elizabeth Bay	Kings Cross	Taylor Square	Taylor Square	Kings Cross	Elizabeth Bay
Dep. a.m. 7.7	Dep. a.m. 7.11	Arr. a.m. 7.15	Dep. a.m. —	Dep. a.m. 7.1	Arr. a.m. 7.5	Dep. a.m. 10.7	Dep. a.m. 10.11	Arr. a.m. 10.15	Dep. a.m. 10.17	Dep. a.m. 10.21	Arr. a.m. 10.25
7.27	7.31	7.35	7.17	7.21	7.25	10.27	10.31	10.35	10.17	10.21	10.25
7.47	7.51	7.55	7.37	7.41	7.45	10.47	10.51	10.55	10.37	10.41	10.45
every 20 minutes to p.m. 8.7	p.m. 8.11	p.m. 8.15	7.57	8.1	8.5	every 20 minutes to p.m. 12.27	p.m. 12.31	p.m. 12.35	10.57	11.1	11.5
8.47	8.51	8.55	8.17	8.21	8.25	1.7	1.11	1.15	every 20 minutes to p.m. 12.37	p.m. 12.41	p.m. 12.45
9.7	9.11	9.15	8.57	9.1	9.5	1.27	1.31	1.35	1.17	1.21	1.25
every 20 minutes to 11.47	11.51	11.55	9.17	9.21	9.25	1.47	1.51	1.55	1.37	1.41	1.45
			every 20 minutes to 11.37	11.41	11.45	every 20 minutes to 6.7	6.11	6.15	1.57	2.1	2.5
			11.57	12.1	—	6.47	6.51	6.55	every 20 minutes to 6.17	6.21	6.25
						7.7	7.11	7.15	6.57	7.1	7.5
						every 20 minutes to 11.47	11.51	11.55	7.17	7.21	7.25
									every 20 minutes to 11.37	11.41	11.45
									11.57	12.1	—

ROUTE—Elizabeth Bay and Darlinghurst Road, Burton and Forbes Street. For further Particulars—Phone Woolloomooloo Omnibus Depot, F2806.

James & James, General Printer, 198 Liverpool Road, Ashfield

I'd presume that Times readers would prefer to see timetables. For example, the attached, from SBM's scanned collection, the 1941 326 timetable, the 326 route map, 4 timetable, 229 timetable, August 1981 the 09:20 single trip (Note A Commences from Lawson Street, Paddington). The unsubstantiated reason for this trip is that someone important must live

there!

The change from 389 to 388 occurred on 17 November 2017.

Comment on this article – [Letter to the Editor](#)

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ROUTE No. 326.

LAWSON ST., PADDINGTON—CENTRAL RAILWAY, via Five Ways, Paddington.

Commencing on Sunday, 9th February, 1941, the following Time-table will be operated:—

ROUTE.—Glenmore Road, Oxford, Liverpool, and Elizabeth Streets, Eddy Avenue.

SUNDAYS AND HOLIDAYS.

OMNIBUSES DEPART			OMNIBUSES DEPART		
Lawson Street, Paddington.	Taylor Square.	Central Railway.	Central Railway.	Taylor Square.	Lawson Street, Paddington.
dep. a.m.	dep. a.m.	arr. a.m.	dep. a.m.	dep. a.m.	arr. a.m.
8* 0	8* 6	8* 12	8* 15	7* 51	7* 57
8* 30	8* 36	8* 42	8* 45	8* 51	8* 57
9* 0	9* 6	9* 12	9* 15	9 19	9* 25
9 30	9 36	9 42	9* 45	9 51	9 57
every 30 minutes to—			every 30 minutes to—		
p.m.	p.m.	p.m.	p.m.	p.m.	p.m.
8 30	8 36	8 42	8 45	8 51	8 57
9 0	9 6	...			

* Holidays only.

SECTIONS AND FARES.

Section No.	Between the undermentioned points and—	Section No. 1.				Section No. 2.	
		Taylor Square, Darlinghurst.				Lawson Street, Paddington.	
		Peak Hours.		Slack Hours.			
1	Central Railway Station	Ad. 3d.	Ch. 1d.	Ad. 3d.	Ch. 1d.	Ad. 3d.	Ch. 1d.
2	Taylor Square, Darlinghurst	—	—	—	—	—	—

Ad.—Indicates Adult fares. Ch.—Indicates fares for Children under 14 years of age and Children holding Day School Concession Fare Certificates.

FARES CHARGED ON OMNIBUS SERVICES OPERATING ALONG TRAMWAY LINES DURING PEAK AND SLACK HOURS.

Mondays to Thursdays: Up to 9.30 a.m. omnibus fares are charged in either direction. From 9.30 a.m. to 4.0 p.m. tram fares are charged in either direction. From 4.0 p.m. to 6.30 p.m. omnibus fares are charged out of the City and tram fares into the City. From 6.30 p.m. to midnight tram fares are charged in either direction.


Fridays: Up to 9.30 a.m. omnibus fares are charged in either direction. From 9.30 a.m. to 4.0 p.m. tram fares are charged in either direction. From 4.0 p.m. to 9.0 p.m. omnibus fares are charged out of the City and tram fares into the City. From 9.0 p.m. to midnight tram fares are charged in either direction.

Saturdays: Up to 9.30 a.m. omnibus fares are charged in either direction. Tram fares are charged in either direction from 9.30 a.m. to midnight.

Sundays and Holidays: Tram fares are in operation throughout the day to midnight. After midnight to finish of running omnibus fares are charged on all services.

Note:—Omnibus fares denotes fares charged during peak hours. Tram fares denotes fares charged during slack hours.

For further particulars phone Randwick Omnibus Depot, FX 6509.



ROUTE 326

RAILWAY SQUARE-PADDINGTON

TIMETABLE

COMMENCING : SEPTEMBER 1984 E125

Serving: PADDINGTON



URBAN TRANSIT AUTHORITY OF NEW SOUTH WALES

TRIPS from CIRCULAR QUAY

Showing Route No.	389					389		389					389	
	am	am	am	am	am	am	am	am	am	am	am	am	pm	
Circular Quay	5.10	5.40	6.10	6.30	6.45	7.25	7.38	8.58	9.03	9.13	9.13	1.53		
St Vincent's Hospital	5.22	5.52	6.22	6.42	6.57	7.37	7.51	9.11	9.18	9.28	9.28	2.06		
Bondi Junction Station	5.33	6.03	6.33	6.53	7.08	Then	7.48	9.23	9.31	9.41	Then	2.21		
Train departs Central	5.17	5.47	6.17	6.37	6.53	every	7.33	9.08	9.13	9.27	every	2.07		
Train arrives Bondi Junction	5.28	5.58	6.28	6.50	7.05	10 minutes	7.45	9.20	9.25	9.38	10 minutes	2.18		
Bondi Junction Station	5.35	6.05	6.35	6.55	7.10	until	7.50	9.25	9.33	9.43	until	2.23		
Seven Ways	5.43	6.13	6.43	7.03	7.18		7.58	9.34	9.42	9.52		2.32		
Curlew St & Simpson St														
North Bondi	5.49	6.19	6.49	7.09	7.24		8.04	9.42	9.50	10.00		2.40		

Showing Route No.	389		389		389		389		389		389		389		389	
	pm	pm	pm	pm	pm	pm	pm	pm	pm	pm	pm	pm	pm	pm	pm	
Circular Quay	2.04	2.54	3.04	3.14	3.24	3.34	3.34	3.44	3.44	3.44	3.44	3.44	3.44	3.44	3.44	
St Vincent's Hospital	2.19	3.09	3.19	3.29	3.39	3.49	3.49	3.59	3.59	3.59	3.59	3.59	3.59	3.59	3.59	
Bondi Junction Station	2.32	Then	3.22	3.32	3.42	3.52	4.02	4.12	4.12	4.12	4.12	4.12	4.12	4.12	4.12	
Train departs Central	2.18	every	3.08	3.13	3.18	3.28	3.33	3.38	3.43	3.48	3.53	3.58	4.03	4.03	4.08	
Train arrives Bondi Junction	2.3	10 minutes	3.20	3.25	3.30	3.40	3.45	3.50	3.55	4.00	4.05	4.10	4.15	4.15	4.20	
Bondi Junction Station	2.34	until	3.24	3.29	3.34	3.44	3.49	3.54	3.59	4.04	4.09	4.14	4.19	4.19	4.24	
Seven Ways	2.43		3.33	3.38	3.43	3.53	3.58	4.03	4.08	4.13	4.18	4.23	4.28	4.33	4.38	
Curlew St & Simpson St													4.28	4.38		
North Bondi	2.51		3.41	3.51	4.01	4.06	4.11	4.16	4.21	4.26	4.31	4.31	4.36	4.41	4.41	

Showing Route No.	389		X84		389		389		X84		389		389		X84		389		X89	
	pm	pm	pm	pm	pm	pm	pm	pm	pm	pm	pm	pm	pm	pm	pm	pm	pm	pm	pm	
Circular Quay	4.04	4.14	4.24	4.24	4.24	4.24	4.24	4.24	4.24	4.24	4.24	4.24	4.24	4.24	4.24	4.24	4.24	4.24	4.24	
St Vincent's Hospital	4.19	4.29	4.39	4.39	4.39	4.39	4.39	4.39	4.39	4.39	4.39	4.39	4.39	4.39	4.39	4.39	4.39	4.39	4.39	
Bondi Junction Station	4.32	4.42	4.52	4.52	4.52	4.52	4.52	4.52	4.52	4.52	4.52	4.52	4.52	4.52	4.52	4.52	4.52	4.52	4.52	
Train departs Central	4.16	4.23	4.23	4.28	4.33	4.33	4.38	4.43	4.43	4.48	4.48	4.53	4.53	4.58	4.58	4.58	4.58	4.58	4.58	
Train arrives Bondi Junction	4.30	4.35	4.35	4.40	4.45	4.45	4.50	4.50	4.55	4.55	4.55	4.55	4.55	4.55	4.55	4.55	4.55	4.55	4.55	
Bondi Junction Station	4.34	4.39	4.39	4.44	4.49	4.49	4.54	4.54	4.59	4.59	4.59	4.59	4.59	4.59	4.59	4.59	4.59	4.59	4.59	
Seven Ways	4.43	4.48	4.53	4.58	5.03	5.00	5.08	5.03	5.00	5.08	5.10	5.13	5.18	5.23	5.18	5.23	5.28	5.25	5.25	
Curlew St & Simpson St	4.46	4.56	4.56	4.56	4.56	4.56	4.56	4.56	4.56	4.56	4.56	4.56	4.56	4.56	4.56	4.56	4.56	4.56	4.56	
North Bondi	4.51	4.51	4.56	5.01	5.01	5.06	5.11	5.08	5.11	5.16	5.18	5.21	5.21	5.26	5.31	5.31	5.36	5.33	5.33	

WEEKLY TRAVELPASS

Allows you the freedom of unlimited trips for nearly half the price. TravelPass is available for periods of a week, a quarter or a year.

Paddington X24- the once annual route

RICHARD C PECK

ROUTE 324 HAS RUN FROM Circular Quay to Watsons Bay since 1960, when it replaced the tram service. However, to accommodate crowds on Boxing Day going to view the start of the Sydney-Hobart yacht race, the service has been supplemented in recent years by buses running express (to and from). When 324 commenced from Walsh Bay in 2015, the express runs on Boxing Day

were given the number X24— photo which also shows the use of older buses with blinds as X24 did not appear on electronic destination signs at that time!). In 2021 two remaining journeys of L24 inwards were renumbered 324X thus blocking the use of that number for Boxing Day 2016. So the old number (X24) was still used. For the first time, a printed timetable was available on the

Transport for NSW website. This showed regular trips from 9.00am-12.30pm and return 1.24pm-4.31pm ... though the events section only showed running between 9.00-10.35am and 1.25-3.45pm!

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Proof-readers' additions and suggestions to this article and to the article on page 14

Sydney's route number 324 was used in January 1950 for a peak hour express between Circular Quay and Watsons Bay during the five months the trams were curtailed at Rose Bay. From 1960, route 324 replaced the complete tram service. However to accommodate Boxing Day crowds viewing the start of the Sydney-Hobart yacht race, the 324 has been supplemented in recent years by buses running express to and from Watsons Bay

With George Street's closure in 2015 for light rail construction, 324 was diverted to Walsh Bay. The Boxing Day express runs were given the separate number X24 (second photo which shows the use of older buses with blinds as X24 was not programmed on electronic destination signs).

L24 was used from 25 August 1997 for two limited stops weekday morning inward trips on the 324, which were renumbered 324X in 2021. To avoid confusion X24 was still used for the 2016 Boxing Day specials. For the first time, a printable timetable was available on the Transport for NSW website. This showed regular outward trips from 09:00 until 12:00, and return trips between 13:24 and 16:31, though TfNSW's events section only showed a service between 09:00 and 10:35am return from 13:25 until 15:45.

Editors Note. Replacement buses: The following timetables exist in private collections: L1, 2L1, 3L1 and 4L1 and, hopefully, will appear in a future DL List

TANYA'S QUIZ #11

1. In terms of the fares from the capital city as listed in the late 1930s' PTTs, what do the following trio of stations have in common?
* Cressy, Crystal Brook and Hillston
2. Which V/Line coach route's terminus is in Victoria but north of New South Wales?
3. What station was located on Victoria's South East line, New South Wales' Blayney to Demondrille line and on both gauges of Commonwealth Railways' Central Australia Railway?
4. For many years, a railway reservation existed north of Deniliquin. What was the northern terminus of this reservation?
5. a/ Where was the only ferry for electric trams in Australia?
b/ This ferry was later used in the construction of a major engineering feature during World War II. What was this?
6. Which departmental passenger station near Chullora Junction in Sydney had 3 passenger platforms?

ANSWERS TO TANYA'S QUIZ #10

1. * longer distance: *Midlander* – Rockhampton to Winton in Queensland (east - west) and Perth to Geraldton via the former Midland Railway in Western Australia (north - south)
* shorter distance: *Westcoaster*: Rosebery to Guildford on the Emu Bay Railway in Tasmania (north - south) and Spencer Street to Warrnambool in Victoria (east - west)
2. Injune
3. * opened with the line as **Loftus** 9th March 1886
* renamed **National Park** 1st May 1889
* renamed **Loftus** January 1890
* renamed **National Park** 1st December 1895
* renamed **The National Park** April 1934
* renamed **The Royal National Park** 16th July 1955
* very short temporary platform at new site opened 17th February 1978
* new permanent platform at a second new site opened 28th April 1979
* renamed **Royal National Park** about 1979 – did this coincide with new platform? (certainly by 1982)
* service suspended 12th June 1991 a/c derailment (taxis operated for a couple of weeks)
* line closed 9th September 1991
* line reopened as heritage/tourist tramway 1st May 1993
4. Copper – one Linda was on the private branch from Walterhall (*yes, it is one word*) into the mine at Mt. Morgan and was operated by QR which provided a workers' passenger service from Rockhampton and the other Linda was on the private North Mount Lyell Railway near Queenstown in Tasmania [Silver and lead were also produced.]
5. The Murraylands line north north east towards Karoonda (*i.e.* the Barmera line)
6. The steam locomotive facilities at the southern extremity of the North Australia Railway were at Birdum, about 5 mi beyond Larrimah. As there was no revenue traffic beyond Larrimah, it was not necessary to run trains beyond Larrimah after dieselisation of the NAR in 1958.



L1 replacement buses

(comments more or less by row numbers in the montage)

- (1) 6am 23.10.21-7.11.21, Central-The Star, Central-Dulwich Hill (unnumbered), buses sources *ad hoc*.
- (2) 8.11.21-29.11.21, Central-The Star, Central-Dulwich Hill (routes 498 499 only shown on www not on destination signs, buses sources STA(Y))
- (3) 29.11.21- 2L1 Central-The Star & return. Stops: Central, Paddy's Markets, Convention, The Star. Timing points Central, LR crossing Darling Drive Haymarket, The Star, LR crossing, Central 25 mins (approx.)
- 3L1 Lilyfield-Central via Glebe, St. Stops: Lilyfield, Rozelle Bay, Jubilee park, Glebe, Wentworth Park, Fish Markets, John St Square, The Star, Convention, Paddy's Markets, Central. Timing points Central, LR crossing, The Star, Miller St Pyrmont, Bridge Rd Glebe, Lilyfield LR 40 mins (approx.)
- 4L1 Dulwich Hill-The Star via Anzac Bridge & return. Stops: Dulwich Hill, Dulwich Grove, Arlington Waratah Mills, Lewisham West, Taverner's Hill, Marion, Hawthorne, Leichhardt North, Lilyfield, The Star. Timing points Dulwich Hill Station, Old Canterbury Rd Lewisham, Foster St Leichhardt, Leichhardt Nth LR, Lilyfield LR, The Star, Leichhardt Nth LR, Old Canterbury Rd Lewisham, Dulwich Hill Station 72 mins (approx.) NB. Omits Lilyfield LR outbound.

50% Opal discount from 8.11.21 (backdated). All STA (Y with W and R seen on 2L1). Timetables published on website. Route numbers shown on Y buses but not necessarily those from other depots (eg R simply had "Light Rail Replacement").

A 4L1 at a Pyrmont stop. Note the 1L1 pointer as well. Website does not show 1L1 so this may be a future route or one lost in planning. 1L1 + 4L1 pointers seen from The Star to Lilyfield (have not checked beyond). I suspect 1L1 will be the public holiday all stops version to Central-Dulwich Hill via The Star and Lilyfield. Timetables FOR 2L1-4L1 do NOT show Public Holidays.



F10 Barangaroo -Blackwattle Bay (card only).
NB. Commenced 30.9.19 on 6 months trial. Transdev. ME-MEL