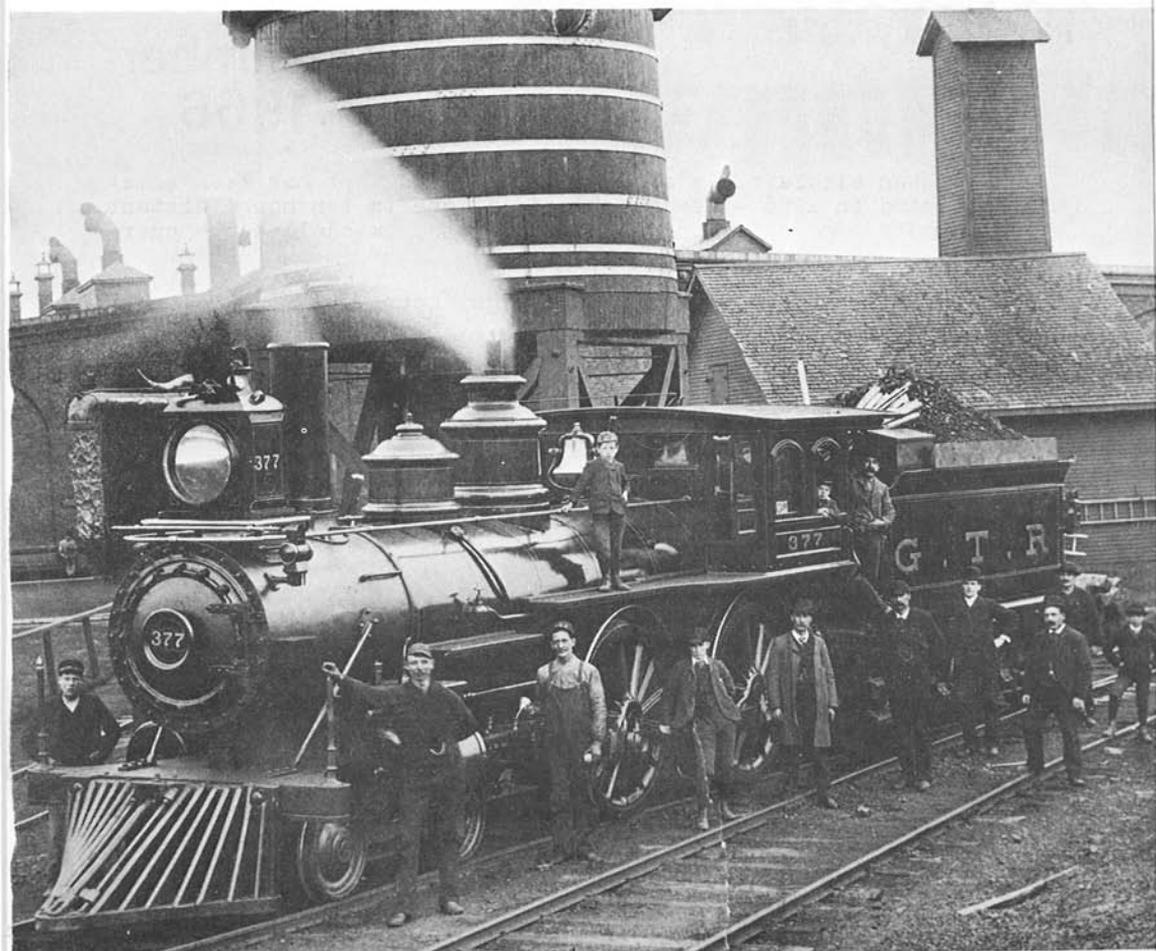


# Canadian Rail

December  
1966  
Number 183





Everyone seems proud to have been photographed beside Grand Trunk Railway's Number 377. Where, when, or why we do not know. Can any reader supply information?

## THE COVER

"The Caribou" ready to leave St. John's, Nfld., for Port aux Basques behind a pair of narrow-gauge Mikados C.N. 317 and 310. (June 20th, 1956). Just a few short weeks after their picture was taken, the steam locomotives were replaced by diesels, and were dismantled during the summer, 1957.

# Getting there was half the fun.

## Some Notes on Travel from Montreal to New York in the Mid-Nineteenth Century

by S. S. Worthen

When aircraft fly and trains run - and that has been somewhat haphazard in 1966 - New York is from one to ten hours distant from Montreal, depending on weather and other miscellaneous operating conditions. Using the "when all else fails" method of transportation, and the ever-expanding network of interstate highways, the element of time may be reduced to eight hours, while the element of hazard rises by about twenty percent. Whether or not this reduction in time spent in travelling is worthwhile, is truly a debatable point. Our grandfathers would never have agreed that it is!

But there were certain disadvantages involved in making a trip of three hundred miles or more, even in the 1820's. Of course, such an expedition was unthinkable in winter! Even the pioneering Champlain and St. Lawrence Railway, in its initial years of operation, closed down operations when the snow got too deep. There were just no ways of coping with the problem of winter in the northern latitudes. For those hardy, eccentric souls who just had to travel in winter, there was available the sleigh, the cutter or simply the reliable horse, fitted out with nothing more complicated than a saddle.

Our grandfathers and great-grandfathers are reputed to have been men of iron, - and well they might have been! No person of uncertain purpose could have set out over the primitive trails through the wilderness of forest of those days. And not even the advent of the turnpike road, with its relatively firm footing for man and beast could eliminate the problems of the spring thaw and the autumn wet. Imagine, then, with what anticipation the weary traveller approached the shore of a navigable stretch of water, whereon he might (nay, surely would) find a barque of some variety, which would float himself and his possessions peacefully and safely to their destination. Barring a couple of storms and a few gales of wind, that is.

The waterway formed by the Richelieu River, Lake Champlain and the Hudson River was from the earliest times, the path of travel between the metropolis on the Atlantic and the settlements in the St. Lawrence Valley. It was, moreover, the most practical all-season route. The Indians first used it, - in peace and in war. The Palefaces (French, British and Americans) "rediscovered" it and used it essentially for the same purposes. International transportation was begun in volume shortly after the War of the Revolution, and in the course of a few years, a large fleet of schooners and sloops appeared on the water portions, propelled variously by sails and oars, and trading between St. Johns in Canada and the various ports on Lake Champlain, in the United States.

While the comparative luxury offered to the traveller by these vessels surely seemed a boon, the magnificence accomplished by their availability can only be estimated by a comparison with the situation in the previous decade. In 1892, a Mr. H. Walworth of Plattsburgh, N.Y., published an extraordinary little book called

"Four Eras in the History of Travelling between Montreal and New York from 1793 to 1892". Herewith, some extracts from a diary of a "Man of Iron" - the traveller of 1792, - in a pleistocene period long before the coming of the steamboat and the railway:

August 18, 1792: Left Montreal at 9 o'clock - arrived at Laprairie at one - left in stage for St. Johns at three - arrived at half past eight - had supper and slept at Cheeseman's tavern.

(Travelling time - 9 hours 30 minutes; distance accomplished - approximately 25 miles.)

August 19, 1792: After much trouble, hired a rowboat and two hands to go as far as Cumberland Head (near Plattsburgh) for seventy shillings. Received our pass from Col. Fitch and delivered in our names.

(Compliance with immigration requirements in the days after the Revolution seem to have been a little different. It appears from the following that an exit visa was required.)

August 20, 1792: Left St. Johns at four o'clock - arrived at Widow Cheshire's and breakfasted on milk punch - delivered in our names at Fort Ile aux Noix - left there about one o'clock - eat dinner in boat - arrived at Staunton's at Mill Point at sunset where are good beds and had a supper of eggs, butter and corn - left Mill Point at ten o'clock at night - crossed over to Ile à la Motte, where we slept at Blanchard's on a straw bed.

(This was quite a day. From 4:00 a.m. to perhaps midnight, our courageous traveller made it from St. Johns to just south of Rouses' Point.)

August 21st : Traversed over to Point à la Roche at Hazen's Farm - had a good dinner of fresh salmon - left at night and rowed up to Cumberland Head, where we slept at a French house.

August 22nd : Hired a passage in Hay's cutter - slept at Ransom's tavern.

August 23rd : Left Ransom's Tavern at half past five and arrived on Saturday night (24th.) at 9 o'clock at Skenesborough (now Whitehall, N.Y.) - lost my hat in a gale of wind at Ile Belcour (Valcour Island) - Saturday and Sunday, so fatigued from the voyage and chafed from exposure to the wind that we were glad to remain over at Skenesborough until Sunday afternoon when we left at two o'clock - slept near Kingsbury.

August 26th : Breakfast at Sandy Hill - slept at Gregory's Tavern at the sign of the half moon.

August 27th : Arrived at Albany at 11 o'clock.

August 28th : Embarked on board of a fast sailing clipper for New York - arrived to New York on Tuesday the third of September - meals good on board the clipper - Captain polite - bugs plenty - no accommodation for ladies - little for men. Time, sixteen days.

Shortly after the era in which this dreadful journey was accomplished, changes came about. By 1810, and because of the experiments of Robert Fulton, Captain Morey and others, steamboats were introduced on Lake Champlain, and the Hudson River. The trip north to south was reduced to five days, and in 1830, an ingenious traveller caused a sensation and great excitement by making the trip in the unprecedented time of 41 hours.

Hitherto, the land transport links in the journey had been the most hazardous and most uncomfortable, - and the slowest. Between Montreal and St. Johns, the clay soil and the roads thereon degenerated into a sea of mud of the slightest hint of precipitation. From Whitehall (nee Skenesborough) to Saratoga (not the Springs of today) there was the alternative of keeping to the high ground, with its hills, valleys and impenetrable forests with narrow rocky trails, as opposed to the choice of staying in the comparatively level stretches of the valleys, and foundering around for hours at a time in mudholes, quicksand and bottomless swamps.

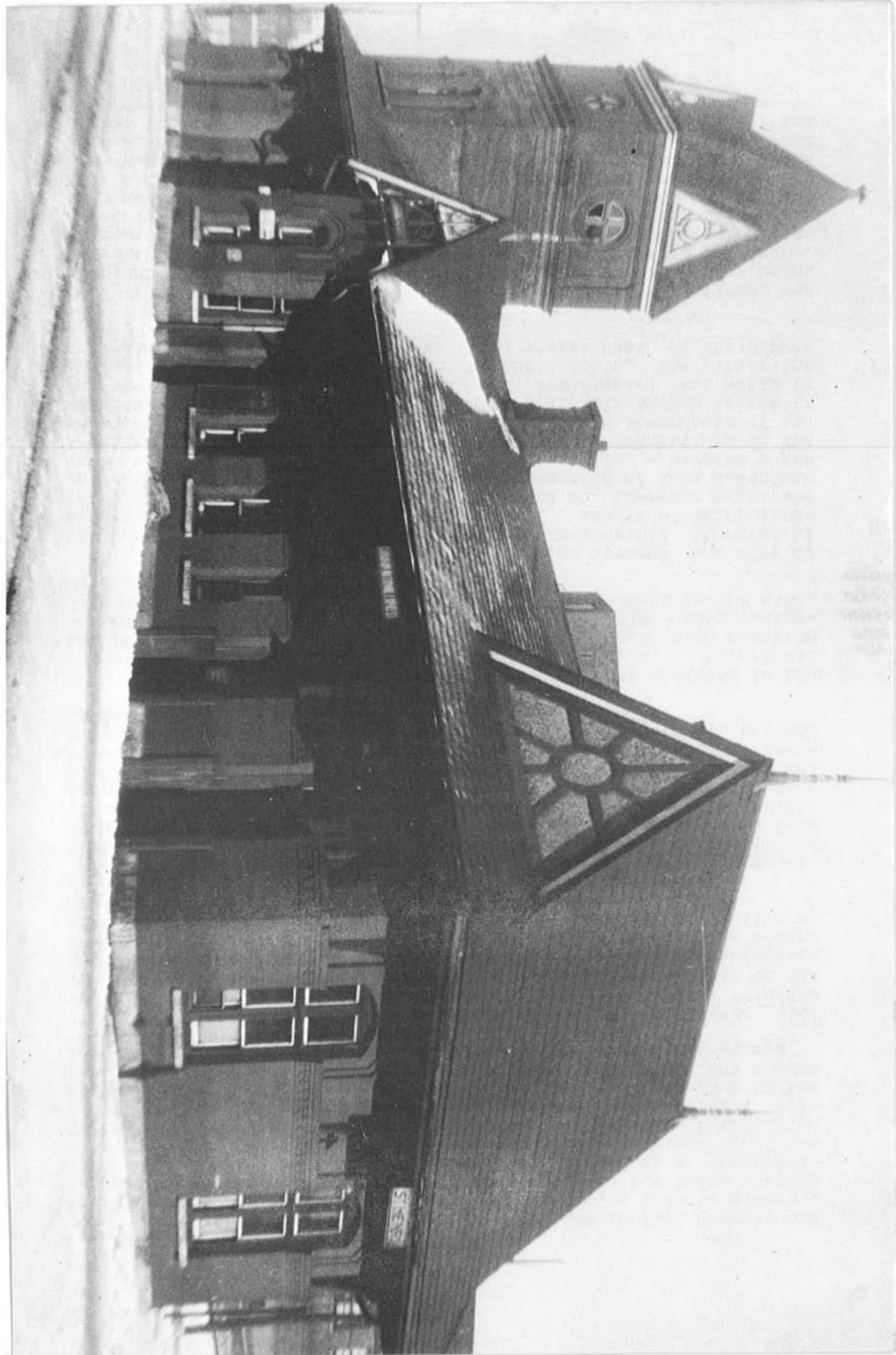
In the early eighteen thirties, innovations were made which at least reduced the total discomfort of the trip from New York to Montreal. A canal was dug from the Hudson River to the head of Lake Champlain. This allowed the traveller to be floated for most of the distance, albeit at a snail's pace. By the summer of 1836, conditions had improved to the point where the mail came down from Montreal to the City by the Sea in three days.

Winter travel had not improved very much over the years, but Yankee ingenuity had prevailed to a degree, and large sleighs were used over the frozen surfaces of the Richelieu River and Lake Champlain. These level stretches made excellent highways. No valorous traveller has recorded the state of affairs on the Hudson River, at about West Point, N.Y. where the water attained that degree of salinity which prevented its freezing. No doubt the scene resembled the now-familiar sight of the St. Lawrence, between Quebec City and Levis, in mid-January.

The epitome of winter transportation was achieved in the winter of 1835-36 when Peter Comstock of Whitehall, N.Y., advertised the Red Bird Line, from Albany to Burlington, Vt., with northern connections to Montreal. The speed was remarkable, - nay, astonishing. The time from Montreal to Albany was reduced to the ultimate minimum of 48 hours, including stops!

The arrangements for transportation between the City of the North and the City by the Sea were considerably improved by events at Laprairie in the summer of 1836. Albeit of short duration, each summer season on the Champlain and St. Lawrence permitted the enthusiastic traveller to reach the steamboats of Lake Champlain more comfortably, and considerably more quickly, - barring a few derailments, engine breakdowns and the like. Connections to the southern end of Lake Champlain were made via the steamboats of the Champlain Transportation Company, which, logically enough (since it was the product of Yankee ingenuity and persistence) was still in operation 100 years later. From Whitehall south, the persistent traveller could select either the canal packet boat or the stage-coach.

Three years previously, a through line of railroad was opened between Saratoga and Schenectady, which at the latter point effected a junction with the Mohawk and Hudson Railroad to Albany. This route, while ministering to needs of the several communities named in the corporate titles, was the long way around to Albany, and therefore it was not to be wondered at that in 1835, the Rensselaer and Saratoga Railroad was opened, from Saratoga to Troy, on the banks of the Hudson. Thus it was that in October, 1835, the Rensselaer and Saratoga Railroad and the operators of the canal packet boats and/or the stagecoaches organized a through service from Troy (Albany) to Whitehall and reduced the journey to one of only nine hours.



A good many of the big spenders of the era, besides the Colossal Commodore Van der Bilt, seem to have got their start as steamboat operators on various parts of the mighty Hudson River. This fact alone provides an estimate of traffic to and fro thereon. Daniel Drew (the reprehensible but crafty 'Uncle Dan'l' of a later decade) and Nelson Robinson, steamboat operators of the Hudson, purchased the Champlain Transportation Company in the summer of '49. Their connections, both physical and financial, with other steamboat and railway lines, permitted a more progressive policy to be adopted in the affairs of the Champlain Transportation Company. When the Saratoga and Washington Railroad was completed after a formidable number of trials and tribulations, a through line was established between Montreal and New York. Much tedious loading and unloading was necessitated during the trip, which was organized along the following plan:

Montreal - Laprairie:	steamboat
Laprairie - St. Johns:	railway
St. Johns - Whitehall:	steamboat
Whitehall - Troy/Albany:	railway
Troy/Albany - New York:	steamboat

This caper became known as the "North and South Through line" (subtitled perhaps 'Per Ardua ad Astra') and those lucky, lucky passengers were thereby enabled to buy tickets and check their baggage (after Customs' inspection, you can be sure) directly between Montreal and New York for the first time.

Some authorities contend that the Champlain and St. Lawrence Railroad - Canada's first experiment in railroading (to be followed by a long line of experimental railroads) was the weak link in the chain for about 10 years. Nevertheless, the chain, weak links and all, seemed to be quite adequate for the comparatively small amount of international traffic of the time. But by 1846, competition was rearing its ugly head. The Vermont Central was coming up strong from Boston, and the St. Lawrence and Atlantic was hastening to an end-on junction with the Atlantic and St. Lawrence in the wilds of wooded Vermont. If the monopoly of the Champlain Valley was to be maintained, something had to be done.

Of course, the obvious thing was done. The Champlain and St. Lawrence extended its line to the outlet of Lake Champlain at Rouses' Point in 1851. Several advantages were thereby incurred. First of all, the Vermont and Canada Railroad to St. Albans and Burlington (Essex Junction) was effectively stifled from further extension northward, - by this route, at least. Secondly, the United States government, having been moved to grant bonding privileges to Canada, in 1845, no longer collected duty on Canadian trade passing through American ports. Finally, it was no longer necessary for the steamboats to make their way down the Richelieu River from the outlet of Lake Champlain to St. Johns.

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For 115 years, the journey between Montreal and New York could be very pleasantly accomplished via the "Great North & South Through Route". Trains that passed by CN's St. Henri Station -- near Montreal -- now no longer run.

-- E. A. Toohey collection

With the connection with the Vermont and Canada/Vermont Central Railroads at Rouses' Point, the Champlain and St. Lawrence intended to run through cars to Boston and New York. In 1852, an amending Act from the Canadian government authorized the C. & St.L. to enter into such an agreement, for the interchange of cars, engines, and other rolling stock, permitting these engines and vehicles to enter Canada without the payment of duty, providing that they were actually in use for foreign trade and were entering with the avowed intention of immediately leaving the Country again. A similar ruling was made by the United States government, and it is likely that this was the first international agreement of the kind. So far as Canada and the United States are concerned, this rule is still in force.

Although the connection of the C. & St.L. with the Vermont system did permit through travel from Montreal to New York, it was obviously the "long way round" when compared to the original rail/ship route straight south, via Lake Champlain and the Hudson River. Although the railway sections north and south of Lake Champlain were completed by 1851, the granite cliffs on west side of the Lake resisted the engineers' surveys and contractors' drills well into the last quarter of the nineteenth century. By that time, travel in winter and in summer between the two cities had become something of a commonplace, with only occasional monkey-puzzle interludes, such as Essex Junction, Vt., Springfield, Mass., and New Haven, Conn., to convulse what was otherwise a tedious and boring journey.

Only in the summer of 1966 did this original railway link for travellers between the City on the River and the City by the Sea disappear. Its demise was not one which befitted such an historic enterprise, and the wake, if there was one, was not, by any manner of means conducted in the best Irish tradition. Indeed, the manner of the passing of this noble and notable enterprise was scarcely perceived. Its last days were reported in the regional press quite briefly. Reports of its death throes suffocated amid a welter of other and less important trivia; the flame of its existence was dimmed, and reduced to a glowing cinder which disappeared shortly thereafter in a pale, tenuous ribbon of smoke.

For one hundred years, the journey between Montreal and New York was primitive, prolonged and a challenge to the frontiersman. Subsequently, and for a period of 115 years, it was somewhat more pleasant. Now we have come full circle and the traveller is once again without benefit of rail service for his itinerations on the "Great North and South Through Route".

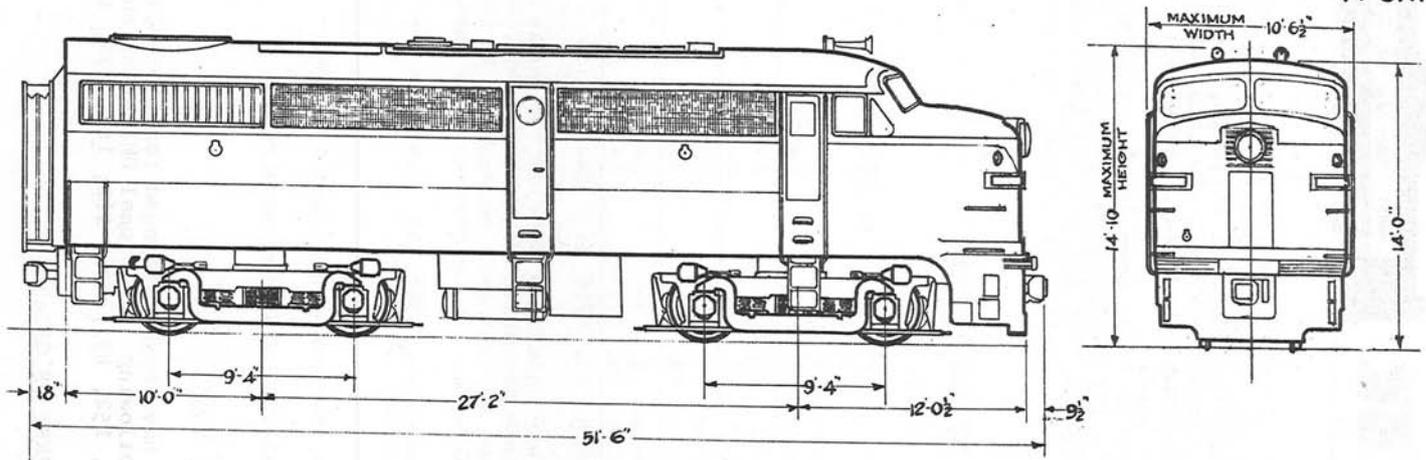
## DIAGRAM

The diagram this issue is of Canadian National's road freight units numbers 9400 to 9407 -- class MFA-15a. They were built in 1950 by the Montreal Locomotive Works and were originally designated as class W-1-A, until the general reclassification of all diesel-electric units in September 1954. They were the second group of streamlined freight diesels acquired by the Canadian National and are believed to be the first such locomotives constructed in Canada. Other essential specifications are shown on the diagram.

During the past year a few of these units have been retired and "traded-in" to the Montreal Locomotive Works on new models; however others are still in operation on the CN.

<b>SUB CLASS</b>	<b>DATE BUILT</b>	<b>BUILDER</b>	<b>BUILDER'S ORDER N<sup>o</sup>.</b>	<b>ROAD NUMBERS</b>	<b>CANADIAN NATIONAL RAILWAYS</b> MECHANICAL DEPARTMENT MONTREAL <b>TYPE DIESEL ELEC CLASS W-1-A</b>
W-1-A-a	1950	M.L.WKS	DM 568	9400 TO 9407	

A-UNIT.



SAND STORAGE	BOILER WATER	COOLING WATER	LUBRICATING OIL	FUEL OIL	WHEELS	JOURNALS	WEIGHTS		TRACTION EFFORT	GEAR RATIO	MAX. SPEED	HAULAGE RATING
							LOADED	LIGHT				
22 CU. FT.	NONE	210 IMP. G <sup>AL</sup>	167 IMP. G <sup>AL</sup>	1000 IMP. G <sup>AL</sup>	40" DIA.	6 1/2" DIA. ROLLING BEARINGS	247,000	231,900	42000 LB <sup>S</sup> CONTINUOUS	18-74	65 M.P.H.	42%
1500 HP. DIESEL ENGINE		GENERATOR		AUX. GENERATOR		EXCITERS		AIR COMPRESSOR		STORAGE BATTERY		
ALCO. VEE TYPE - 4 CYCLE.		GEN. ELECT. GT-564		GEN. ELECT. GY-27		GEN. ELECT. AM-80B		WESTINGHOUSE 3.C.B.D.		EXIDE MVTD. 25		
12 CYL. - 9" BORE, 10 1/2" STROKE		DIRECT CURRENT		DIRECT CURRENT				DRIVE FROM ENGINE		385 AMP. HRS.		
1000 R.P.M. FULL SPEED								306 CU. FT. DISPLACEMENT AT FULL SPEED		32 CELLS. 25 PLATES		
350 " IDLING "								107 " " IDLING "				
TURBOCHARGER G.E.												
CAB HEATER		HORNS		BELL		HEADLIGHT		MIN. CURVE		AIR BRAKES		TRACTION MOTOR
KYSOR		WEST <sup>ING</sup> E2		ALCO 12" WITH PNEUMATIC RINGER		PYLE NATIONAL 250W.32V		274 FT		WEST <sup>ING</sup> SCHEDULE-24 RL		GEN. ELECT. GE 752
HOT WATER TYPE												N <sup>o</sup> OF MOTORS 4

# POWER

..with Murray W. DEAN

In this, our last issue of 1966, I would like to extend my thanks to those persons who supplied information so patiently for "Power" during the year - Canadian National Railways, Canadian Pacific Railway, and Montreal Locomotive Works. To those who corrected and sent information throughout the year, especially Mr. Ray Corley, I am also deeply indebted.

Next year, "Power" plans to delve more deeply into both past and present motive power with the publication of rosters, summaries and technical articles, such as the one Mr. William Blevins supplied this month. Current news shall, of course, continue to be published.

## CANADIAN PACIFIC RAILWAY

Purchases: up to January 11, 1967.

ROAD NUMBER	DATE DELIVERED	BUILDER'S NUMBER
5524	November 30, 1966	A-2157
5525	November 30, 1966	A-2158
5526	December 17, 1966	A-2159
5527	December 17, 1966	A-2160
5528	December 22, 1966	A-2161
5529	December 22, 1966	A-2162
5530	December 29, 1966	A-2163
5531	December 29, 1966	A-2164
5532	December 29, 1966	A-2177

Officially, the railway class is DRF-30a for units 5500 to 5531 inclusive at which time the sub-class becomes "b". However, when units 5530 and 5531 were in Montreal on January 3, 1967, they both sported plates of DRF-30b. It is assumed that these may be changed in due course!

Number 182 stated December --, 1966 as the date for 5524 and 5525. Please note the revision.

Rentals: up to date unknown, between 9/9/66 and 15/12/66.

PGE units 605, 621, and 627 have been acquired.

Rentals: up to December 15, 1966.

PGE units 605 and 627 have been exchanged for locomotives 622 and 623. As well, the following additional DMI units have been leased: 138, 142; 143, 147, 152, 153, 156, 162, 165, 170, 173.

## GOVERNMENT OF ONTARIO

Deliveries: up to January 11, 1967.

The last GO unit, #600, was outshopped December 31, 1966. It is to be used to train crews and is complete with its electric generator.

CANADIAN NATIONAL RAILWAYS

Retirements: up to January 11, 1967.

ROAD NUMBER	OUT OF SERVICE	RETIRED	BUILDER'S NUMBER	DATE BUILT	NOTES
1611	25/4/66	10/1/67	2664	23/1/52	
1612	5/12/66	10/1/67	2665	23/1/52	
1618	9/5/66	10/1/67	2692	30/8/52	
1638	5/12/66	10/1/67	2888	17/10/55	
3006	28/12/66	10/1/67	79181	30/11/53	£
9410	30/12/66	10/1/67	77324	23/2/51	£
9433	28/12/66	10/1/67	77724	15/2/52	£

£ - units so marked were traded-in to MLW as credit on their present order.

Rebuilds: up to January 12, 1967.

It has been noticed that although units used to make boosters have been noted by "Canadian Rail", only B-14 had its delivery date published. The following is a summary of B-1 to B-15, the total number of boosters planned so far. All were built at CN's Point Saint Charles' Shop. The delay in reaching the operating department for units B-1 to B-10 was due either to lack of traction motor blowers, or, as in the case of B-2 and B-4, to the lead unit not being ready. These boosters do not have serial numbers.

ROAD NUMBER	OUT OF SHOP	TO OPERATING DEPARTMENT	CONVERTED FROM	BUILDER'S NUMBER	DATE BUILT
B-1	12/12/63	3/1/64	8477	79137	10/9/53
B-2	1/4/64	30/6/64	8452	77759	7/1/52
B-3	27/6/64	2/12/64	8462	77283	29/1/53
B-4	9/5/64	22/7/64	8465	77286	27/2/53
B-5	15/8/64	9/1/65	8487	76436	29/4/54
B-6	15/9/64	14/1/65	8491	76440	1/6/54
B-7	24/10/64	29/1/65	8488	76437	7/5/54
B-8	14/11/64	2/12/64	8489	76438	13/5/54
B-9	12/12/64	15/12/64	8479	79139	15/9/53
B-10	26/12/65	26/1/65	8495	80982	9/7/54
B-11	19/2/65	19/2/65	8466	77287	28/2/53
B-12	18/3/65	18/3/65	8494	80981	29/6/54
B-13	3/5/66	3/5/66	8464	77285	31/1/53
B-14	23/9/66	23/9/66	8450	77757	5/11/51
B-15	12/12/66	12/12/66	8451	77758	8/12/51

CONFEDERATION TRAIN

On January 1, 1967, the Canadian Confederation Train was dedicated at Ottawa Union Station by Madame Vanier in ceremonies starting at 15:00 hours. At 15:26 the "O Canada" whistle blew and one minute later the Train drove off from Track 1 into a snowstorm, supposedly to Vancouver. Actually, it circled round the station via Ellwood Diamond, Walkley Diamond, M&O Junction, and thence into the station on Track 3 behind CP Train 1 at 16:25 hours. At 17:00

Continued on Page 267

The extremely great tractive effort required to pull heavy trains through the Rocky Mountains led Canadian Pacific to order 3 dozen Selkirk-type locomotives. They were the largest and heaviest steam locomotives in the British Commonwealth.



THE DETERMINATION OF

## TRACTIVE EFFORT

by William G. Blevins.

The tractive effort of a locomotive is quite simply the amount of force exerted at the rails by the locomotive driving wheels.

It is probable that most of you have seen a rated tractive effort value given for steam locomotives. The figure usually quoted is starting tractive effort and is a maximum. As the speed of a locomotive increases, the tractive force decreases. The following is a derivation of a tractive effort vs. speed diagram.

There have been several methods of deriving analytically the tractive effort of a locomotive. The method outlined herein is a development of the Baldwin Locomotive Works, described in their "Handbook" - Locomotive Data, 12th Edition, 1944, Baldwin-Lima-Hamilton Corporation, Philadelphia, Pennsylvania.

The method uses curves computed from cylinder sizes and the mean effective pressure, the limiting factors at low speeds, and the steam producing capability of the boiler which is the limiting factor at high speeds. The joining of these two curves gives a smooth curve relationship. The method assumes average cut-offs and a fixed rate of steam evaporation and consumption, however, the theoretical results are very close to road test results determined with a dynamometer car. The calculations presented here will account only for gross tractive effort and not for losses due to the resistance of the locomotive and tender. For more information on this see Hay, W. W., "Railroad Engineering", 1953, John Wiley & Sons, Inc., New York

## Part 1 CYLINDER TRACTIVE EFFORT

$$W_1 = \text{m.e.p.} \times \frac{\pi D^2}{4} \times S \times 4 \quad \text{---(1)}$$

where  $W_1$  = the work done by both cylinders in one revolution  
 m. e. p. = mean effective cylinder pressure, which is a function of speed times boiler pressure =  $f(V) \times P_B$   
 $V$  = speed of locomotive in miles per hour  
 $D$  = cylinder diameter in inches  
 $S$  = cylinder stroke in inches

$$\text{Now, } W_2 = T_C \pi (W.D.) \quad \text{---(2)}$$

where  $W_2$  = the work done at the rim of the driving wheels  
 $T_C$  = tractive force of the cylinders in pounds  
 $W.D.$  = driving wheel diameter in inches

If frictional losses are neglected then

$$W_2 = W_1$$

$$\text{i.e. } T_C \pi (W.D.) = f(V) \times P_B \times \pi D^2 \times S$$

$$\text{or } T_C = f(V) \times P_B \times D^2 \times S / (W.D.) \quad \text{---(3)}$$

now  $\text{m.e.p.} = f(V) \times P_B$  must be determined.

$$P.S. = 2 \text{ R.P.M.} \times \frac{S}{12} \text{ ————— (4)}$$

where P.S. = piston speed in feet per minute  
 S = stroke in inches  
 R.P.M. = revolutions per minute  
 =  $\frac{\text{locomotive speed} \times \text{revolutions per mile}}{60}$

$$= \frac{V \times 5280 \times 12}{60 \pi \times (W.D.)} = \frac{336 V}{(W.D.)}$$

$$\therefore P.S. = \frac{336 V}{(W.D.)} \times \frac{25}{12} = \frac{56 V S}{(W.D.)} \text{ ————— (5)}$$

thus piston speed is a function of locomotive speed.

Now Graph I shows the variation of mean effective pressure with piston speed and thus for any locomotive speed the piston speed can be computed and the mean effective pressure =  $(f(V) \times P_B)$  can be determined. When these values are fed into equation (3) the cylinder tractive effort can be calculated and a plot of cylinder tractive force vs. speed can be made.

## Part II BOILER TRACTIVE EFFORT

At high speeds, the evaporative capacity of the locomotive boiler limits the tractive effort because the cylinders demand more steam than the boiler can produce.

$$H.P. = \frac{T_B \times v}{33,000} \text{ ————— (6)}$$

where H.P. = boiler horsepower  
 $T_B$  = boiler tractive effort  
 $v$  = speed in feet per minute  
 and 33,000 ft - lbs/min = one horsepower

$$H.P. = \frac{T_B \times V \times 5280}{33,000 \times 60} = \frac{T_B \times V}{375} \text{ ————— (7)}$$

where V = speed in miles per hour

$$\therefore T_B = \frac{H.P. \times 375}{V} \text{ ————— (8)}$$

The boiler horsepower must now be determined. This is defined as the total amount of water evaporated per hour divided by the rate of steam consumption per horsepower-hour.

$$H.P. = \frac{(A_D \times E + A_I \times t)(F.W.)}{F_S} \text{ ————— (9)}$$

where  $A_D$  = sum of direct fire heating surface areas. (e. g. arch tubes, syphons, combustion chamber, firebox) in square feet  
 $E$  = evaporation per square foot per hour (assumed to be 80 pounds per hour for modern (post 1920) locomotives and 55 pounds per hour for pre-1920 locomotives).  
 $A_I$  = sum of indirect heating surface (e. g. boiler flues and tubes) in square feet.  
 $t$  = tube factor, i. e. the evaporation per square foot per hour (TABLE 3).  
 $F.W.$  = feedwater heater factor of 1.08 if a feedwater heater is used and 1.00 if no feedwater heater is used.  
 $F_S$  = the pounds of steam evaporated per indicated horsepower-hour (TABLE 1). The superheat values may be determined from TABLE 2

TABLE I<sup>1</sup>

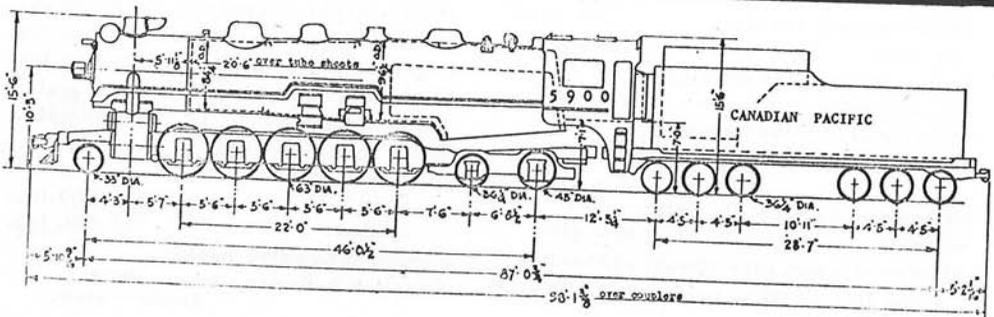
Steam Rates						
Steam Press. lbs/in <sup>2</sup>	Steam Temp. °F	Pounds of Steam per Indicated Horsepower Hour				
		Saturated	Superheat			
			150° F	200° F	250° F	300° F
175	377	28.75	21.65	20.40	19.30	-
200	388	28.00	21.00	19.70	18.70	-
225	397	27.40	20.55	19.25	18.25	-
250	406	26.90	20.20	18.85	17.95	17.10
275	414	26.60	20.00	18.70	17.75	16.80
300	422	26.30	19.70	18.60	17.675	16.75

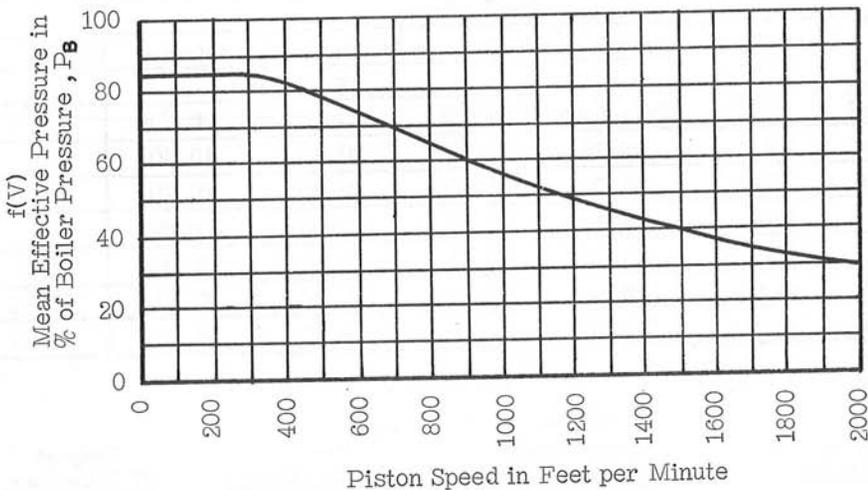
TABLE 2<sup>1</sup>

Type of Superheater	Degree of Superheat		Ratio Small : Large	Degree of Superheat
	Tube Sizes Large - Small			
A	5 3/8 - 2		≥ 7	150° F
A	5 1/2 - 2 1/4		≥ 6	200° F
A	5 1/2 - 2 1/4		4 to 6	250° F
E	5 3/8 - 2		< 5	250° F
	5 1/2 - 2 1/4		< 4	250° F
	3 3/4 - 2 1/4		-	

TABLE 3<sup>1</sup>

Tube Factors					
Tube Length ft.	Evaporation lbs./ft. <sup>2</sup>	Tube Length ft.	Evaporation lbs./ft. <sup>2</sup>	Tube Length ft.	Evaporation lbs./ft. <sup>2</sup>
10.0	13.00	17.0	10.25	21.0	8.95
11.0	12.55	17.5	10.00	21.5	8.80
12.0	12.00	18.0	9.85	22.0	8.65
13.0	11.65	18.5	9.70	22.5	8.55
14.0	11.25	19.0	9.50	23.0	8.40
15.0	10.90	19.5	9.35	23.5	8.30
16.0	10.70	20.0	9.20	24.0	8.20
16.5	10.50	20.5	9.05	24.5	8.10



GRAPH I<sup>1</sup>

Once the horsepower has been determined, then the boiler tractive effort can be calculated for any speed. The cylinder tractive effort and boiler tractive effort curves cross and when the lower points of the two curves are joined by a straight line a very close approximation to the true tractive effort curve is obtained. With the true plot of tractive force vs. velocity, equation (7) can be used to determine the true variation of locomotive horsepower with velocity. Following is an illustrative example in which all the curves are shown.

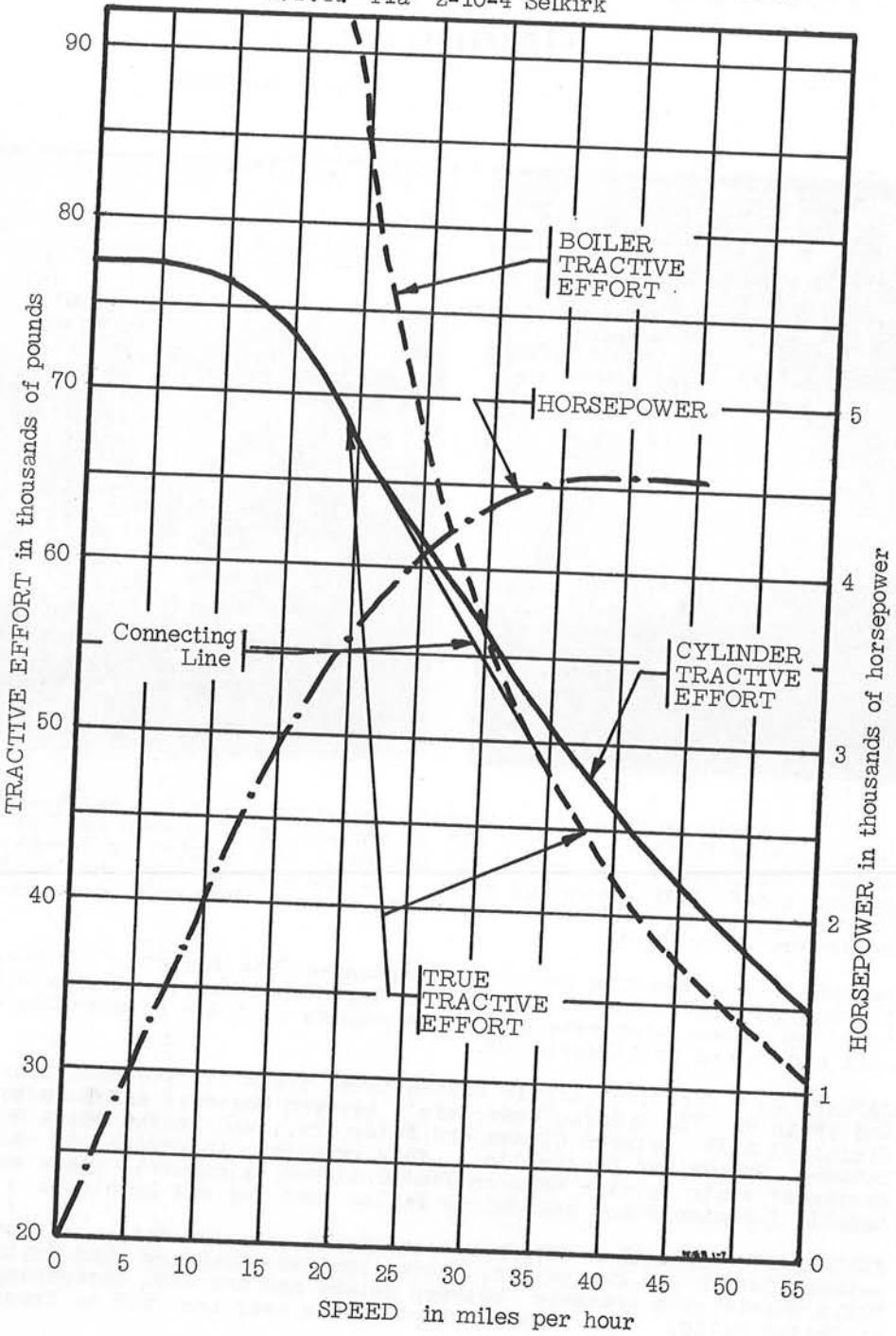
1. Baldwin-Lima-Hamilton Corp., HANDBOOK, 1944, "Locomotive Data"

### CANADIAN PACIFIC RAILWAY COMPANY - 2-10-4 SELKIRK TYPE

#### Specifications:

Sub Class:	T-1-a	Firebox heating surface:	377 sq-ft.
Boiler Pressure:	275 lbs./sq.in.	Arch tube heating surface:	45 sq-ft.
Cylinders:	25½x32"	Fire Heating surface:	4,931 sq-ft.
Driving Wheels:	63"	Superheating surface:	2,112 sq-ft.
Tractive Effort:	77,200 lbs.	Combined heating surf.:	7,043 sq-ft.
Tractive Effort of Booster:	12,000 lbs.	Weight on drivers:	312,800 lbs.
Firebox width, inside:	96"	Loaded weight of engine:	452,500 lbs.
Firebox length, inside:	140 3/16"	Light weight of engine:	412,500 lbs.
Grate area:	93.5 sq. ft.	Loaded weight of tender:	297,500 lbs.
Number and outside diameter of arch tubes:	4 - 3½"	Light weight of tender:	137,000 lbs.
Number and outside diameter of tubes:	59 - 2¼"	Fuel capacity, oil:	4,100 Imp.gals.
	7 - 3½"	Water capacity:	12,000 Imp.gals.
Number and outside diameter of flues:	196 - 3½"	Total weight of engine and tender -	
Distance between tube sheets:	20' 4-7/8"	light:	549,500 lbs.
Tube and flue heating surface:	4,509 sq.ft.	loaded:	750,000 lbs.
		Elesco feedwater heater.	
		Vaughan & Horsey type "E" superheater.	

TRACTION EFFORT & HORSEPOWER vs. SPEED  
 C. P. R. T1a 2-10-4 Selkirk



# The 1966 passenger timetable Revue.

by F. A. Kemp



1966 has been an extremely eventful year for passenger train service in Canada. Not all of the action has been confined to the time-changes in April and October, but started in January and continued throughout the year. It would seem that the most logical way to explain these changes is to list them in chronological order, as follows:

**JANUARY 9-12** - Canadian Pacific discontinued "The Dominion" -- Nos. 3 & 4 Montreal-Vancouver and 13 & 14 Toronto-Sudbury. Trains 235 & 232 continued to operate on the schedules of 3 & 4 between Montreal and Ottawa until April 30.

**JANUARY 23** - Canadian Pacific discontinued Train 21 "The Royal York" and Train 22 "Le Château Champlain" between Montreal and Toronto, Trains 33 & 34 between Ottawa and Peterboro, and trains 261 & 262 between Ottawa and Brockville. This resulted in removal of all passenger train service between Vaudreuil and Agincourt; Ottawa and Bedell; Carleton Place and Smiths Falls; Glen Tay and Havelock.

**JANUARY 24** - Canadian National established a twice-daily service between Ottawa and Brockville, using its own Beachburg and Smiths Falls Subdivision trackage between Ottawa and the CPR interchange at Smiths Falls, thence by trackage rights over the CPR to Brock-

ville. Trains operated as passenger extras until the April 30 change of time, but bore interim numbers 34, 35, 37 and 38. Trains at first carried two coaches, with a parlour car on the afternoon train switched to trains 15 and 6 at Brockville. A lunch bar was provided on the early trains, and a dining car soon appeared on the afternoon run, on which traffic often warranted a separate through train.

FEBRUARY 14 - The third phase of the Ottawa-Toronto change-over went into effect with the restoration of overnight service, which had been discontinued on the previous October 29th. This was accomplished by adding a coach and two sleepers to the Canadian National's "Express Freight" trains 105 and 106, which operate via Napanee over a line on which regular passenger train service ended in 1933, and mixed train service in 1955. Freight cars formerly handled on 105 and 106 were moved in re-established trains 445-446 (the one-time mixed trains). The service operates nightly except Saturday, and stops at the former CN station in Smiths Falls, while the day trains stop at the C.P. station.

MARCH 3 - The Canadian Pacific Railway re-scheduled its "Dayliner" trains 427 and 428, between Sudbury and Sault Ste. Marie, Ont. to connect with "The Canadian", trains 1 & 2, 11 and 12 at Sudbury. This resulted in an after-midnight departure from Sudbury and an early-midnight arrival in Sault Ste. Marie. The return service is much more convenient, providing a morning departure from the "Soo" and evening arrivals in Toronto and Montreal.

#### APRIL 25th: NEW NUMBER SYSTEM ON CANADIAN NATIONAL

The new number system eliminated duplicate numbers for trains in different parts of the country (the same numbers were often in use by four trains at once). Blocks of numbers were assigned to trains in each region, with through trains numbered 1-99, local and branch-line passenger trains (and week-end variations of through schedules) 100-199, "express freight" trains 200-229 mixed trains 230-299, "Railiners" 600-699 and suburban trains 900-999. On the Montreal-Toronto line, ordinary through trains were given numbers 50-59, while "Rapido" services were numbered 60-69. Numbers of principal trains follow with new names thus ★

<u>New No.</u>	<u>Old No.</u>	<u>Train Name</u>	<u>Terminal Stations</u>
1-2	1-2	Super Continental	Montreal-Vancouver
3-4	51-52	" "	Toronto-Capreol (x)
5-6	9-10	Panorama	Montreal-Vancouver
7-8	109-110	" "	Toronto-Capreol
9-10	5-6		Jasper-Prince Rupert
11-12	59-60	Scotian	Montreal-Halifax
14-15	1-2	Ocean	Montreal-Halifax
16-17	61-62	Chaleur	Montreal-Campbellton
18-19	3-4	(Maritime)	Montreal-Campbellton
18-19	103-104		Campbellton-Moncton
20-21	20-21	Washington-Montrealer	Montreal-White River Jct.
26-27	76-75	Ambassador	Montreal-White River Jct.
22-23-123	24-23-123	Champlain	Montreal-Quebec
30-31	48-47	Gatineau	Montreal-Ottawa
33-38	45-50		" "
34-35	44-49	Bytowner	" "
36-39	46-51	Laurier	" "
41-42	75-76	Erie-Tecumseh ★	Toronto-Windsor
44-45	-- --		Ottawa-Brockville

<u>New No.</u>	<u>Old No.</u>	<u>Train Name</u>	<u>Terminal Stations</u>
46-47	106-37	St. Clair ★	Toronto-Windsor
48-49	16-29	Tecumseh-Erie ★	Toronto-Windsor
50-51	81-82	Huron ★	Toronto-Sarnia
50-51	14-5	Lakeshore	Toronto-Montreal
53-54	5-6	Mohawk ★	Toronto-PortHuron-Chicago
54-55	6-15	Bonaventure	Toronto-Montreal
55-56	15-14	International	Toronto-Chicago
58-59	16-17	Cavalier	Toronto-Montreal
58-59	20-17	Maple Leaf	Chicago-Toronto
60-61	7-8	Premier	Montreal-Toronto
64-65	30-29	Rapido	Toronto-Montreal
70-71-72-	116-121		
73	115-122		Montreal-Chicoutimi
74-75	12-11		Quebec-Cochrane
76-77-78-	113-114-		
79	117-118		Montreal-Hervey
83-84	53-54	O.N.R.	Engleheart-Noranda
87-88	49-50	Northland(CN-O.N.R.)	Toronto-Hearst
90-91	76-75		Winnipeg-Thompson
92-93	64-63		Winnipeg-Churchill
101-102	1-2	Caribou	Port aux Basques-St.John's

Service changes at this time included reduction of the St. John-Moncton, N.B. to two trains from three, daily. Mixed train operations between Noranda-Rouyn and Taschereau were reduced to tri-weekly from six days a week. Passenger service was eliminated from express-freight trains 18-19 and 31-32 (old nos.) Montreal-Toronto and from 201 (old 103) Montreal to Winnipeg. On the credit side, Lyster-Richmond trains 627-630 were extended to Charny, apparently for operating reasons, and Capreol-Foley mixed trains 252-266-267 ran daily during the summer.

Charter bus service was provided between Rivière du Loup, Que., and Edmundston, N.B., connecting with the "Chaleur" and the "Scotian". On the Canadian Pacific, Sudbury-White River, Ont. trains 417-418 were operated on a daily basis during the summer. This resulted from a ruling of the Board of Transport Commissioners which allowed withdrawal of former trains 3 and 4. Mixed train service was reinstated between Mattawa and Temiscaming, Que.

MAY 20 - Canadian Pacific's famous international mixed train 517-518 "the Scoot" was withdrawn from its twice-weekly service between Brownville Junction Me. and Megantic, Que.

JUNE (exact date unknown) Another CPR mixed train ended service, this one being 570-573 between Fredericton and Pennlyn, N.B., thus ending all branch-line passenger service on the CPR in New Brunswick.

JULY 31 The new Ottawa Station was opened, exactly 2.4 miles east of the former one. Canadian Pacific trains 131, 132, 133, 134, 137 and 138 were principally affected. By-passing Hull Station, they now stop at Hull West and Ottawa West, tracing a semi-circle around the city to reach the new station. Ironically, both of these points had direct bus service to down-town, which the new station did not, during its first three months of operation! The trains are allowed ten extra minutes for this operation, while "M&O Sub." trains take five minutes less for their Montreal-Ottawa runs.

AUGUST 26 - SEPTEMBER 3 On the former date, a nation-wide railway strike began and service ended on most railways in Canada. On the latter date, through passenger service on the CN-CV-B&M-NH route



Sudbury - Copper Cliff #38 was headed for "Gatchell" as this photo was taken on the main street of the Northern Ontario community. The other two trams are not identified.

#### 1966 TIMETABLE REVUE -- continued

between Montreal and New York was to have ended with the last run of train No. 20 "the Washingtonian". However, the last train was apparently No. 20 of August 25. The trains continued to run to and from St. Albans, Vt. until September 2 (trains 21, 26 and 27) and September 3 (train 20) as previously announced. The discontinuance was occasioned by the application of the Boston & Maine Railroad to withdraw from passenger service between Springfield, Mass. and White River Jct. Vt. Approval was given by the Inter-State Commerce Commission, and was to take effect July 17, but a postponement was made under an injunction obtained in a Federal court by the State of Vermont. This ended all passenger service on the Central Vermont Railway, and all regular passenger train service in the State of Vermont except a tourist operation on the Green Mountain Railroad (part of the former Rutland). This is only the second State to have this dubious distinction; the first was Hawaii, where passenger trains disappeared long before Statehood.

OCTOBER 30 The Fall time change was exactly that on Canadian National, for it marked the introduction of the 24-hour time system for all railway operations. The system differs from that used in operating time-tables in Western Canada for many years in always using four digits, i.e. 0123 for 1:23 A.M. and in the first hour of the day, the time is figured from 0001 to 0059 instead of from 24.01k to 24.59k as was done under the "Western" system. Canadian Pacific continues to use the two former systems, but is expected to change at the end of April, 1967.

1966 TIMETABLE REVUE -- continued  
OCTOBER 30 SERVICE CHANGES

The chief feature of the time-tables was the addition of two more "Rapido" services to Canadian National's line-up. These were Nos. 60-61 between Montreal and Toronto (formerly the "Premier" run at peak seasons only) which runs in the same 4-hour, 59-minute time, but with a morning departure and lunch-time arrival in both cities, with a stop at Dorval. The other "Rapido" is a Montreal-Quebec service, numbered 24-124-25. It leaves Montreal in the morning, returns in the evening, with a stop at St. Foy. Time is still 3 hours, 10-15 minutes, but the opposite runs, now called "Rapido-Champlain" now go in 2 hours 59 minutes.

The other principal addition to the time-table is Railiner 674-675, which restores thrice-daily service to the Toronto-North Bay line after several years' absence. Trains 9 and 10 are continuing six-days-weekly service through the winter on the 720-mile route between Jasper and Prince Rupert, after several years of tri-weekly service west of Prince George. This is apparently intended to facilitate connections with the State of Alaska coastwise ferry service to Haines, Alaska and with the B.C. Government ferry to Kelsey Bay (with direct bus connections to Vancouver and Victoria).

Other entries on the change-list are written on the debit side. More small towns and villages along CN main lines will hear only the air-horn's blare and the clatter of wheels as the fast express hurries past, never deigning to stop. Trains 201 and 202 no longer carry passengers between Winnipeg and Saskatoon, or between Ottawa and Montreal. Trains 209 and 210 have been withdrawn between Montreal and Belleville and run only five days a week between Toronto and Belleville. Trains 18 and 19 have had a considerable number of stops cut from their schedules, and even some of the remote hamlets on the Truro-Sydney line are now without passenger service. Mixed trains 274-275 between Foleyet and Hornepayne are withdrawn for the winter, while Capreol-Foleyet mixed trains 266-267 have reverted to tri-weekly operation, as have Sudbury-White River "Dayliner" trains 417-418 on the Canadian Pacific. (This is about the only change other than the cover and the "information" page, both changed for the better, in the CP time-table) The twice-weekly Lévis-Edmundston Passenger service is obviously finished; the chartered buses and the tri-weekly, non-connecting mixed trains continue as before.

Some of the "little railways" have had passenger changes, too. The Northern Alberta now runs RDCs, and has cut down the time by 2 hours and 10-25 minutes on the Dawson Creek line and 1 hour and 20-20 minutes on the Waterways route. To provide a twice-weekly service with the same cars, on both lines, it has rescheduled the Dawson Creek trains to run overnight, as they did several years ago, but, of course, they no longer have sleeping cars! This railway's passenger service suffers from the "remote-station syndrome" which has recently beset Ottawa at Dunvegan Yards, nearly five miles from CN's smart new building at 100th Street in down-town Edmonton. The Pacific Great Eastern is somewhat of a mystery - a column was left for it in the CN time-table, but no train service is shown. The line was shut down by a strike during September, and this may account for its absence. Many retrenchments have been made since its peak year in 1960.

Both Canadian National and Canadian Pacific are advertising trains for next year, with CN promoting Montreal-Toronto Turbo-trains (three a day and CP having an item about the Expo Limited-L'Expo Limité which will provide an additional transcontinental service during the period of Expo 67.

Service, Equipment and Fares - Itemized lists of car lines have appeared again in the CN folder for some of the heavy sleeper trains, and it is noteworthy that the "Panorama" will carry the Sceneramic cars all the way between Winnipeg and Vancouver, while the three leased B&O dome sleepers, which ran on 9 and 10 to Prince Rupert during the summer, are now in Edmonton-Vancouver service on the "Super Continental". Most railway enthusiasts know that a "drawing room" in a sleeping car is an enclosed space containing an upper and lower berth and a wall bed or a sofa, with a separate washroom and toilet. The CN is now calling some of these "family rooms", but the latter term is somewhat flexible, as the double bedrooms in the "White" buffet-sleepers are known as "Dor-mette family rooms".

Now that morning and afternoon "Rapidos" are running between Montreal and Toronto, the slowness of the overnight "Cavalier" is becoming more apparent. Certainly an earlier arrival time would be desirable, and would ensure a connection to Quebec (eastbound) which is now missed by ten minutes! A seven-hour schedule should be possible, and would lead to fewer remarks about "cavalier" treatment. Another schedule oddity is Toronto-Chicago train 55, which saves 10 minutes by not going into Hamilton, but then loses 25 minutes between London and Chicago, arriving 15 minutes later than before! Train 219 is now the only one westbound out of Hamilton, which involves backing three miles to Bayview. Buses take passengers to Dundas or Burlington at train times.

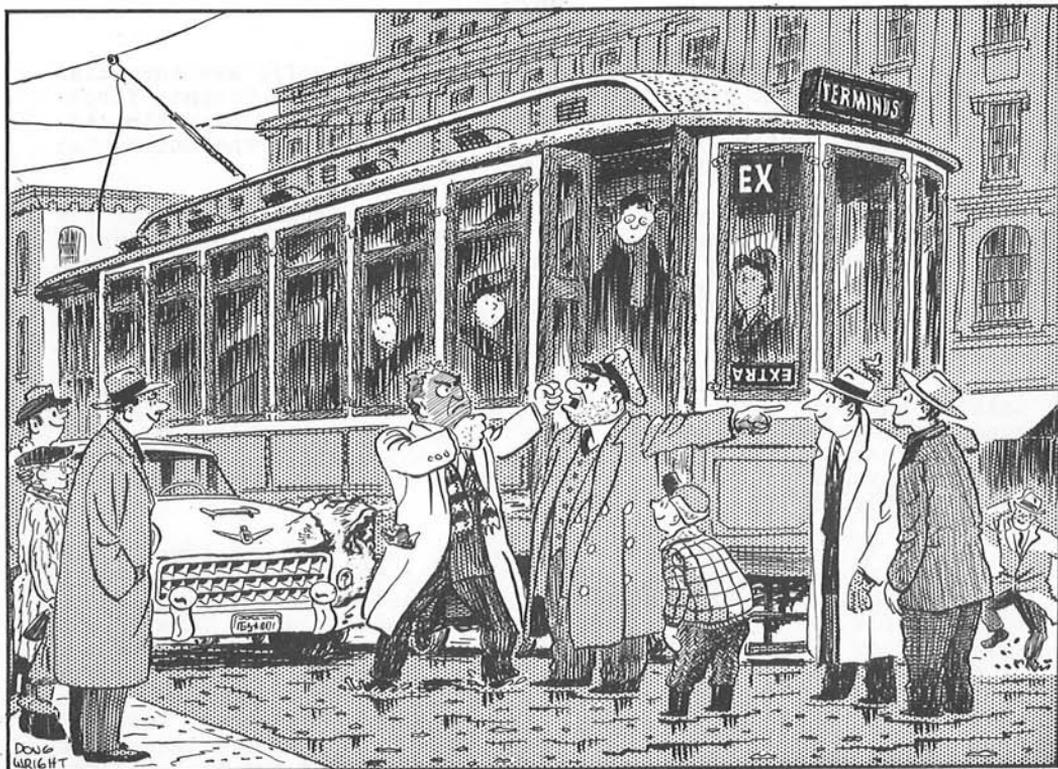
With the removal of Central Vermont passenger service and the extension of Red, White and Blue fares to Chicago on November 1st, all CN passengers, except commuters, use these fares. Some slight adjustments have been made all across Canada, but increases have been kept to a minimum, varying from 5 cents (red) Montreal-Ottawa to \$5.00 St. John's-Prince Rupert (blue), the latter being the longest possible CN rail trip at 4646.8 miles of track and 100 miles of water, for which the fare would be \$84.00 Red \$93.00 White and \$102.00 Blue.

Mixed train riders on the Souris line in Prince Edward Island are going to have a bit of walking to do this winter! The tri-weekly mixed from Souris via Elmira to Charlottetown is shown terminating at Royalty Jct., 5.3 miles from the "big city" of the Island, which isn't quite big enough to have bus service!

POWER: Cont'd. from Page 255

hours the Train was moved to Track 4 where it was left for the night. The Train left Ottawa for Vancouver at approximately 10:00 on January 2, 1967 with Engineer George Burns and Fireman-Helper George Dufresne. They also handled the Train during the dedication ceremonies. Locomotive data is below.

CONFEDERATION NUMBER	FORMER NUMBER	BUILT	BUILDER'S NUMBER	HORN
1867	CP 1411	4/54	A-595	Standard;Special
1967	CN 6509	31/12/54	A-639	Standard Only



"I am NOT chicken . . . it's just that, if I turn my back, half this crowd will hop into the tram and claim they was injured in the accident."

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