"Doukhobor" Switchers

Canadian Pacific's V1 Class 0-8-0

by Jeff Pinchbeck

Throughout the Canadian Pacific system, switching locomotives worked day in and day out without attracting the sort of attention that some of their main line sisters received. The U3 class of six-coupled locomotives was the most common of the CP switchers and perhaps the first that comes to mind. Almost 200 of these locomotives were built and distributed throughout the CP system: U3a engines, numbered 6101-6130; 3 U3b engines, 6140-6142; 66 U3c engines, 6143-6208, 51 U3d engines, 6209-6259 and 45 U3e engines, 6260-6304; total 195 engines. The later U3d/e classes were modern, efficient, sure-footed locomotives that were capable of working in almost any track conditions. But even as those classes were on a drawing board, the CP was converting other locomotives to help handle the switching needs created by the ever-expanding grain harvest. In 1909, the CP put into operation their first 20 eight-wheel switchers, designated the V class.

The V class totaled 114 locomotives, of which only 18 were built new as switchers, 10 of the V3c and 8 of the V5a subclass. The rest of the class were rebuilt from older 2-8-0 Consolidations.

The V1 class was rebuilt from two orders of locomotives manufactured in 1898 by Baldwin Locomotive Works, Philadelphia, Pennsylvania and American Locomotive Company at its Richmond, Virginia plant. True to design practices of the day, the locomotives were built compounded[1], non-superheated[2] and deckless[3]. The Richmond order comprised of Pittsburg[4] compound locomotives with "D" slide valves and Belpaire fireboxes. This feature was not commonly seen on CP locomotives. The Baldwin order were Vauclain[5] compounds with piston valves, another feature not common on CP. When these locomotives were delivered, they were designated S.E. 2 class.

The S.E. 2 class locomotives were originally assigned in the mountains to serve as pushers on the "Big Hill" and other freight service in the mountains. The 2-8-0 locomotives received the nickname "Doukhobors" because their arrival coincided with that of the Russian immigrant religious sect who immigrated to Western Canada in 1898 to 1899.

(Above photo) Photographed between July 1906 and before September 1910, V1a 2312 shows what the engine would have looked like before renumbering to 6812 in September 1910. The engine has no dome on the whistle-pop valve cluster and appears to have a 3,500 gallon tender.

- Paterson-George Collection

The 6832 was photographed July 1935 in Sutherland, Saskatchewan. The engine has many of the same features and apparatus as the Baldwin built V1As. However there are glaring differences such as the Belpair firebox.

- Paterson-George Collection.

Unlike 6801 and 6803, V1a 6806 has modern sand and steam domes, and a toolbox under the smoke box. Other features are similar to what we expect on more typical CP switching locomotives like the U3 switchers. The whistle and pop valve dome is also different in that the arrangement lacks a whistle shield. This engine pulls along a 3,500 gallon switching tender. No date or location.

- Railway Memories Collection

Waiting with a cut of cars, 6809 was photographed in Lethbridge, Alberta on October 12, 1941. The 6809 has "normal" sand and steam domes but has another style of whistle and pop valve dome. It is difficult to be sure, but the cab looks like it was rebuilt at one time because unlike the tongue-and-groove planking usually used to board up the cab windows the space is smooth.

- Paterson-George Collection.

The 6810 was photographed in Vancouver on April 28, 1939 and demonstrates why this class is so interesting to study. This locomotive has the original Baldwin domes and yet another style of whistle and pop valve dome. The tongue-and-groove window filler on the cab shows clearly in this photograph. The engine has a 3,400 gallon tender from a 70" driver Ten-Wheeler such as an E4.

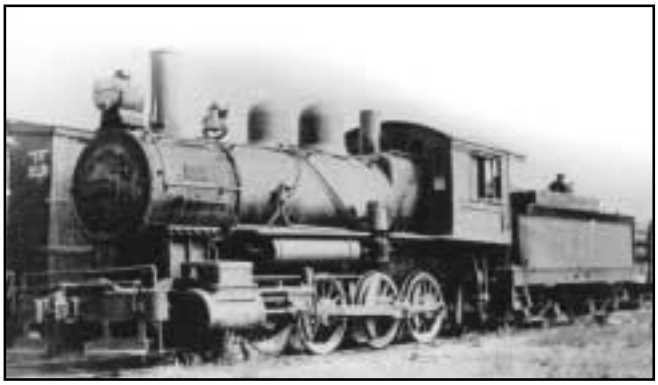
- Paterson-George Collection.

This fireman side view of 6816 appears to be taken during the early part of the Second World War, most likely in Vancouver because the headlight has been removed and the smaller black-out style fitted. This another example of the diversity of the hardware used on the V1a switchers. This locomotive has a combination of a Baldwin steam dome and a normal CP sand dome. Just to be unique, this engine does not have the usual CP bell-boiler feed water valve assembly. Instead, this engine has a simple bell mount between the domes and the boiler feed water at the side just above the air tank, an arrangement that would be similar to when the engine was built. The engine appears to have a 4,000 gallon tender.

- Railway Memories Collection.

Left and right side views of an engine are always informative but what makes it even more fun is when the engine has been modified. In this undated photo from what appears to be the later Second World War years, we have the engineer's side view. The wartime headlight is on the smoke box front and the number board moved down. We also see a smaller 3,500 gallon capacity tender.

- Railway Memories Collection.



This photo of 6820 was taken by Cyril Littlebury in Vancouver, B.C. in 1921. Note the large shielded dome around the pop-whistle cluster.

- Hutchinson-Matthews Collection

This photo of 6821 taken by Cyril Littlebury in 1921 shows some interesting differences from sister 6820.

- Hutchinson-Matthews Collection

In this photograph, around 1934, V1a 6801 is in Winnipeg. This engine shows some typical features such as the original Baldwin sand and steam dome covers, whistle shield on the pop-valve cluster and the tender with several inches added to the bottom of the tank to increase the water capacity from 3,200 to 3,500 gallons.

- Paterson-George Collection

In 1906, CP changed their entire locomotive classification system and the 2-8-0 Doukhobors were reassigned to the L4a and L4c classes. These locomotives continued to work for a few years and were then rebuilt and renumbered as switchers and classed as V1a and V1b in the 2300 number series. The rebuilding involved the installation of simple cylinders, and 'D' slide valves. The rebuilt locomotives had a tractive effort of 28,800 lbs for the V1a and 31,200 lbs for the V1b. The locomotives had an adhesion factor of 5.03 and 4.65, respectively. In other words, they were sure-footed. In 1912, the locomotives were renumbered again to their final number series, 6800-6834.

The V1 switchers were assigned to almost every major point between Vancouver and Fort William, part of present-day Thunder Bay. After 20 years service many V1 switchers were out-classed by larger and more powerful switcher locomotives. Retirements began in the late 1930s with 28 scrapped, 6 in the 1940s and one, 6809, survived to the early 1950s only to be scrapped in February 1951. One notable locomotive assignment was 6801, which served as shop track "goat" at Alyth Yard from 1940 to1946. When 6801 was scrapped in 1946, the 6909 took over until 1951.

V1s were surprisingly diverse looking. Locomotives had either the original tender or new switcher tenders. If a locomotive kept an original tender, the coal bunkers were built up with boards to increase the coal capacity. Many of the Baldwin-built locomotives kept the original steam dome covers, while others received new ones of a design similar to other small CP locomotives. Some locomotives when rebuilt had cabs placed higher to improve visibility for the engineer. For the fireman, this meant climbing down from his seat to the tender floor to shovel coal.

Modelling Notes:

HO scale modellers have an excellent starting point to create the V1a locomotive. The Roundhouse 2-8-0 Old Timer is based on the standard Baldwin 2-8-0 of the 1890s and is an excellent starting point for modelling a V1a switcher. The boiler, wheel spacing and all major dimensions, including wheel diameter, are very close. The model tender would also be correct for the V1a locomotives that retained their original tenders.

Your V1a would receive standard switcher painting and lettering. The locomotive would be a black, window sashes painted Tuscan Red and all lettering would be imitation (dulux) gold. In the post-1928 era, twelve-inch high numbers on the cab sides are centered neatly with the total width of the numbers no wider than 5 feet. The tender receives 10" high, 14' 5" wide, "CANADIAN PACIFIC" lettering centered on the tender sides. The end of the tender displays the locomotive number in 5 inch lettering with the lettering a maximum of 2' 5" high from the tender frame centered on the end. Two inches below, two inch lettering would display the tender water capacity in gallons. Refer to photographs to confirm the correct placement of lettering.

The main rods of V1a 6803 are removed and placed on the running boards with the cross head blocked. This would indicate the locomotive was moved for maintenance or, dare we believe, scrapping. This engine has the original Baldwin domes and sports a 3,500 gallon switching tender. No date or location.

- Paterson-George Collection.

This undated War-years photograph shows an uncommon view of 6822. We notice a couple of features looking from the rear of the engine. The first is the 3,400 gallon tender from an E-class engine. The rear of the tender tank displays the standard warning for employees not to travel on the footboard. From this vantage point we can also see the door on the rear of the engine cab, required on deckless engines, where the engineer would enter.

- Railway Memories Collection.

~ LOCOMOTIVE ASSIGNMENTS ~

Number	1916	1930	Number	1916	1930
6800	Alyth	Calgary	6818	Grand Forks	Ogden Shops
6801	Lethbridge	Medicine Hat	6819	Hardisty	Wilkie
6802	Brandon	Winnipeg	6820	Kamloops	Vancouver
6803	Alyth	Red Deer	6821	Fort William	MacLeod
6804	Winnipeg	Brandon	6822	Moosejaw	Vancouver
6805	Fort William	Fort William	6823	Medicine Hat	Strathcona
6806	Weyburn	Alyth	6824	Cranbrook	Ogden Shops
6807	Broadview	Brandon	6825	Souris	Kenora
6808	Alyth	Ogden Shops	6826	Fort William	Lethbridge
6809	Alyth	Alyth	6827	Regina	Regina
6810	Field	Vancouver	6828	Calgary	Red Deer
6811	Medicine Hat	Strathcona	6829	Kenora	Kenora
6812	Minnedosa	Assinaboia	6830	MacLeod	Medicine Hat
6813	Minnedosa	Brandon	6831	Alyth	Ogden Shops
6814	Transcona Yard	Bredenbury	6832	Lethbridge	Sutherland
6815	Vancouver	Vancouver	6833	Transcona Yard	Minnedosa
6816	Grand Forks	Vancouver	6834	Broadview	Winnipeg
6817	Vancouver	Vancouver			

Location Notes: Alyth (Calgary); Ogden Shops(Calgary); Strathcona (Edmonton); Sutherland(Saskatoon); Transcona Yard(Winnipeg)
Source: Canadian Pacific Steam Locomotives, Omer Lavallee

Footnotes:

1 Compounding is a cylinder configuration to try to improve fuel efficiency of steam locomotives by recycling exhaust steam from a high pressure cylinder to a low pressure cylinder. Compounding grew out of favour when superheating came into wide spread use because superheating provided greater steam economy.

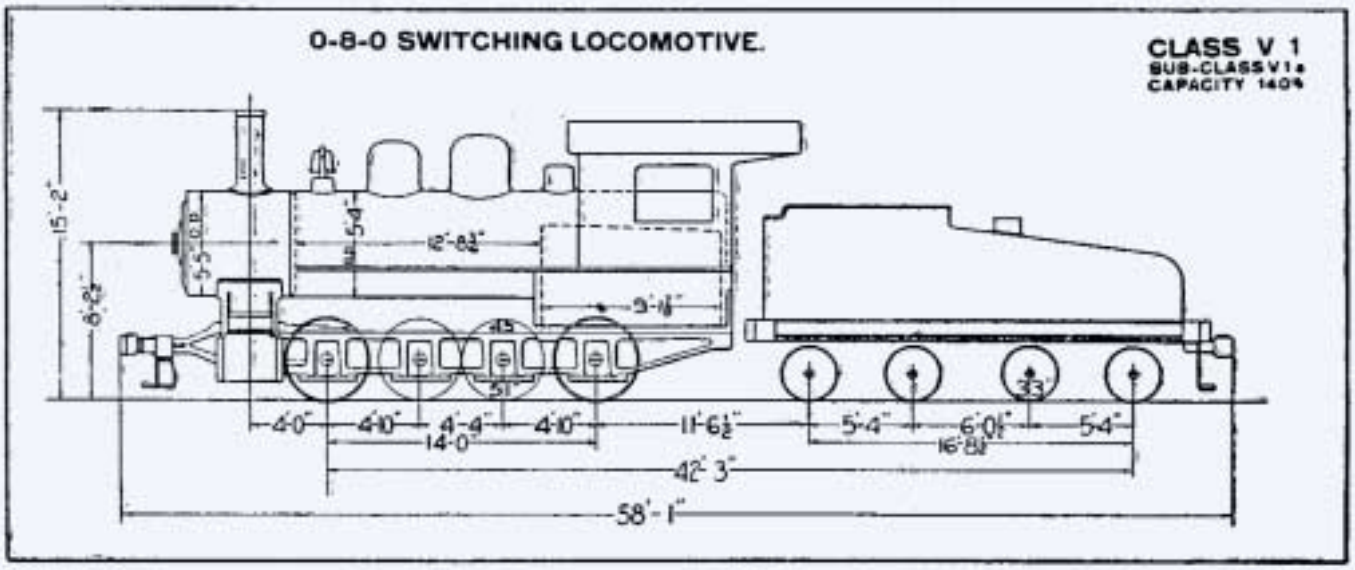
2 Superheating is a process of using an appliance to raise the temperature of steam. The process removes the suspended water from the boiler steam to make a pure gas. The improved efficiencies result from suspended water being converted to "dry" steam. The higher steam temperature allows the steam to be used twice before it condenses back to water.

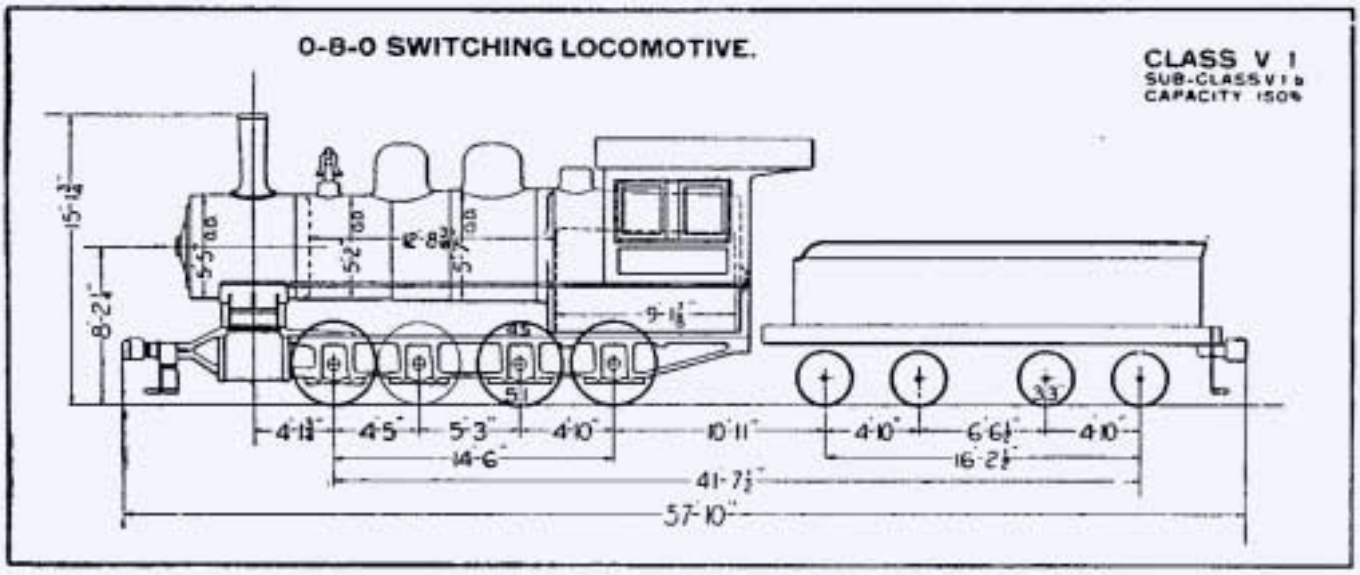
3 Deckless locomotives are a locomotive configuration where the boiler backhead was flush with or protruding through the rear cab wall (no cab deck). The fireman stood on the tender and shoveled coal into the firebox. The engineer, fireman and on freight trains, the head-end brakeman had to climb into and out of the cab through doors on each side of the rear wall of the cab.

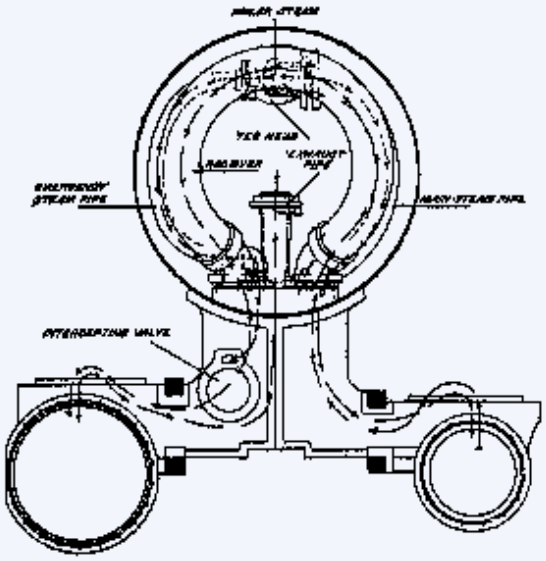
4 The Pittsburg compound design was the most common design on the CP. The configuration consisted of a high pressure cylinder on one side and low pressure on the other. The engineer would start the locomotive with the low pressure cylinder receiving high pressure steam and would switch to compounding once the train was started for greater steam efficiency. The configuration is also known as cross compounding.

5 The Vauclain compound design was a Baldwin patented design where each side of the locomotive had a high and low pressure cylinder conjoined. This configuration wasn't very popular because it was more complex to maintain. The Vauclain configuration is also known as balanced compounding.

6 Factor of adhesion is the ratio of the locomotive weight on the drivers and the starting tractive effort. The static coefficient of friction between a steel tire and rail is 0.25. The ideal factor of adhesion is the reciprocal of the coefficient of friction, which is 4. Locomotives with lower values were slippery, while higher considered sluggish in that they tend to get bogged down instead of slipping. As tires and rails became polished or wet with rain or snow, the coefficient decreased, increasing the tendency to slip. Fall leaves, which are greasy, have the same effect.







(Left)
Line drawing to illustrate how a Pittsburg cross compound locomotive works. The illustration comes from *Cyclopedia of Engineering, Steam and Machine-shop Practice*, 1902, published by American Technical Society, Boston.

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