LOCOMOTIVES AND THEIR PERFORMANCE, NO. 26

A TRIBUTE TO NEW ZEALAND'S FAMOUS "Ab" CLASS

By T. A. McGavin

Photograph: N.Z. Railways Publicity

In typical Southland countryside, an "Ab" class Pacific drifts quietly along with a branch-line goods train near Makarewa, a few miles north of Invercargill. August, 1964.

THE resuscitation by New Zealand Railways of two of the famous "Ab" class steam locomotives for the summertime "Kingston Flyer" vintage train, the transfer of "Ab" 832 to the Museum of Transport and Technology at Auckland, and the impending preservation of the class leader, No. 608, at the Ferrymead Museum of Science and Industry, Christchurch, have focussed much attention on this class of locomotive. Descriptive articles are appearing in many places, and it is highly appropriate that we should record our own tribute in these pages. The full story could not possibly be compressed into the space available here, but it is my hope that this material will at least offer a comprehensive if sketchy survey of the life and work of the famous "Ab".

Their fame, I believe, rests largely on their general all-round success as locomotives from both the traffic and mechanical points of view. Relatively simple to maintain, to fire, and to drive, and packing an adequate "punch", they were adopted in the 1920s as the standard locomotive for all main-line duties on New Zealand Railways and became widely dispersed throughout the system. They were ultimately to serve on all main lines, and on many branch lines.

When the design was being worked out about 1914 to the requirements of Mr H. H. Jackson, New Zealand Railways' Chief Mechanical Engineer, by his Chief Draughtsman, Mr S. H. Jenkinson, the latest type of main-line locomotive was the four-cylinder compound "A" class Pacific, the first examples of which were introduced in 1906. Now, with the advent of superheating (whereby the steam produced in the boiler was raised to higher temperatures before being put to work in the cylinders), there was promise of economy in the consumption of coal and water without having to become involved in the complications of compounding, wherein the steam was used twice, first in high-pressure cylinders and then in low-pressure cylinders before being exhausted to the atmosphere.

A long article in *Engineering* (an English periodical) of 22 November 1918, apparently based on information supplied by Mr Jenkinson, recorded that the "A" class compounds could handle the average train of 14 carriages, about 280 tons gross, on a coal and water consumption of 44lb and 35 gallons per mile. For loads above that they were considered to be under-cylindered, so some non-compound engines of the Pacific type of about the same weight as the compounds, but fitted with superheaters, were designed for this service. They were built in the N.Z.R. workshops at Addington, Christchurch, ten being constructed in the first batch turned out in 1915 and 1916. The article continued:

The New Zealand Government Railways are of 3ft 6in. gauge, and the track restrictions in force allow only 10 tons axle load and a maximum speed of only 50 m.p.h., while the loading gauge is only 8ft wide and 11ft 6in. high, so the conditions are severe. Superheated steam of 180lb pressure was decided on, with 54in. coupled wheels and 17in. by 26in. cylinders. Usually an adhesive factor of four is used for express work, but as the line is nearly level this was reduced to 3.6 in order to gain the full benefit from superheating by using large cylinders. A wide firebox was desired, so this entailed a trailing bogie, and a four-wheeled leading bogie was necessary to distribute the weight properly. The three-point system of equalisation is generally used for Pacific engines on the New Zealand Railways, so the driver springs are connected by equalising beams, with each other and with the trailing bogie, each side being a distinct system. . . . .

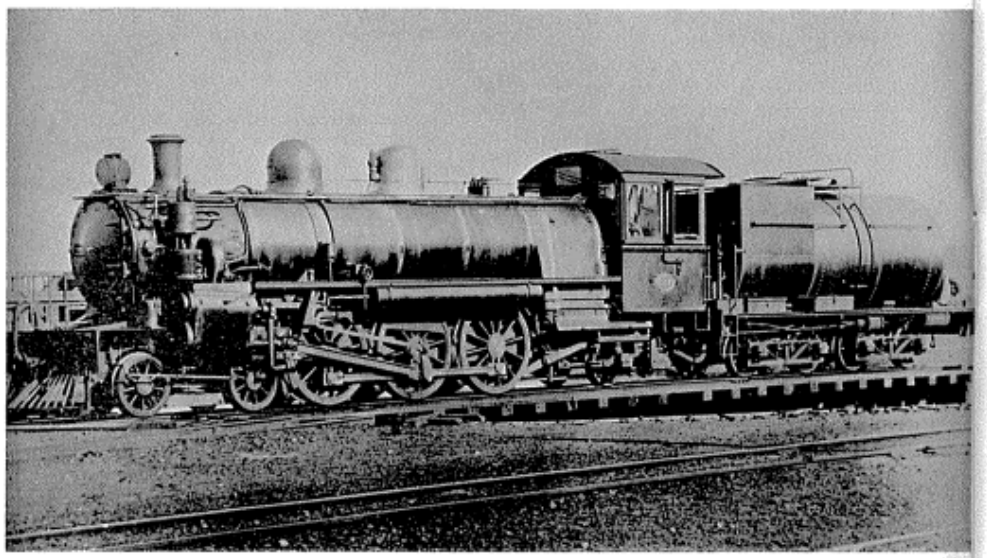
The narrow gauge makes outside cylinders compulsory, and as simple a casting as possible is advisable in Colonial foundries. Outside steam and exhaust pipes are used, and the main cores are everywhere circular in section united by the straight cores for the steam ports at each end. This absence of passages is especially desirable with superheated steam since it minimises expansion and contraction of the castings in service. Special care was taken to ensure metal of uniform thickness and to guard against shrinkage strains generally, while bushes were provided for the steam chest and cylinder wearing surfaces to allow softer and stronger metal to be used for the main castings.

After a detailed description of the boiler, firebox, smokebox, and various mechanical parts, the article continued:

The combination of outside cylinders on a 3ft 6in. gauge so alters the relative value of the moments of the disturbing forces that neither the English compromise (the minimum nosing moment method of D. K. Clark or Professor Dalby) nor American (two-thirds of the reciprocating weight placed opposite the crank), gives best results. In these engines that position of the counterbalance is chosen which gives the least hammer blow, and four-fifths of the reciprocating weight is balanced for fore-and-aft vibration while the nosing moment of all the reciprocating weight is entirely unbalanced. The running of the locomotive has proved entirely satisfactory at all speeds up to 60 m.p.h., and the nosing or boxing is quite negligible, in fact we are informed that it is doubtful if a steadier engine is running in the Dominion.

The reciprocating weights amount to 600lb per side, and 160lb are balanced in each coupled wheel, leaving 120lb unbalanced per side. The "hammer-blow" or load variation amounts to 4800lb per wheel at 54 m.p.h., or 43 percent of the static load. It will be remembered that an approach to this position of the balance weight has been tried by Mr H. H. Vaughan on a Canadian Pacific locomotive, and while the unbalance of the nosing moment has been carried to a greater extent in this case it is satisfactory to record that nothing but good results have followed.

A tender of a modified Vanderbilt type was designed to hold 3500 gallons of water and 4½ tons of coal. This is a decidedly lighter and cheaper tender than the rectangular type, for the



From the W. W. Stewart Collection

"Ab" 617, last of the first batch, as turned out by the Addington Workshops in 1916. Note the position of the Westinghouse air-brake pump beside the smokebox, and the air reservoir beneath the running plate.

tare weight is exactly the same for this 3500-gallon tender as for the 2200-gallon rectangular type used for the compounds. The coal space is much better arranged also, for all coal passes through the self-trimming box on this tender in a few days at most, and no building-up of back and side walls is required while the fireman gets all his coal ready to his scoop and never needs to shovel forward as with the other type.

The first engine built of the type above described was tested on the express run from Christchurch to Timaru against the best compound available. Each engine hauled the train out and home for five consecutive days, doing 200 miles per day, and the result of the 1000-mile test was decidedly in favour of the new engines. The detailed record, Table I, annexed, shows the saving as 20 percent in water and 33 percent in coal, and this includes coal used in making up the fire each morning and during the two hours' stand over at Timaru.

This train is now being run by the new engines exclusively, and the saving in coal and water is being realised steadily. Part of the saving is undoubtedly due to the boiler, which is easily the best steaming boiler seen on a locomotive in New Zealand, but of this saving part again is directly due to superheating. However, without indicator diagrams and tests made on a testing plant under exact conditions it is extremely difficult to apportion the figures with any degree of accuracy. The broad facts remain that this superheated simple engine saves about 30 percent coal over the saturated compounds, which again are quite 25 percent better than the saturated Baldwin simples they superseded on this run in 1907. . . . .

The saving in coal effected by these new engines was not the only advantage. The compounds, while capable of handling 15 cars on the express run under favourable conditions, could be regularly trusted with only 14. The capabilities of the new engine in this respect could not be fully ascertained as traffic restrictions fix the maximum load at 20 cars, which load the new engines handle with ease, and make up a good deal of time when necessary. Probably the finest performance ever recorded on the 3ft 6in. gauge was accomplished on January 29, 1916, when a train of 20 heavily loaded cars was brought from Timaru to Christchurch under difficult conditions. Traffic delays inseparable from holiday traffic were accentuated by a hot box on a car, so that 22 minutes had to be made up. This reduced the actual running time for the 100 miles to 147 minutes, but despite a heavy north-west gale, a train weighing 423 tons behind the tender, carried on 80 axles, and over 950ft in length, was brought to Christchurch on time, although a signal stop at the platform made actual arrival four minutes late.

TABLE 1—Summary of Locomotive Tests

NZR Christchurch-Timaru, 100 Miles, 1915-1916

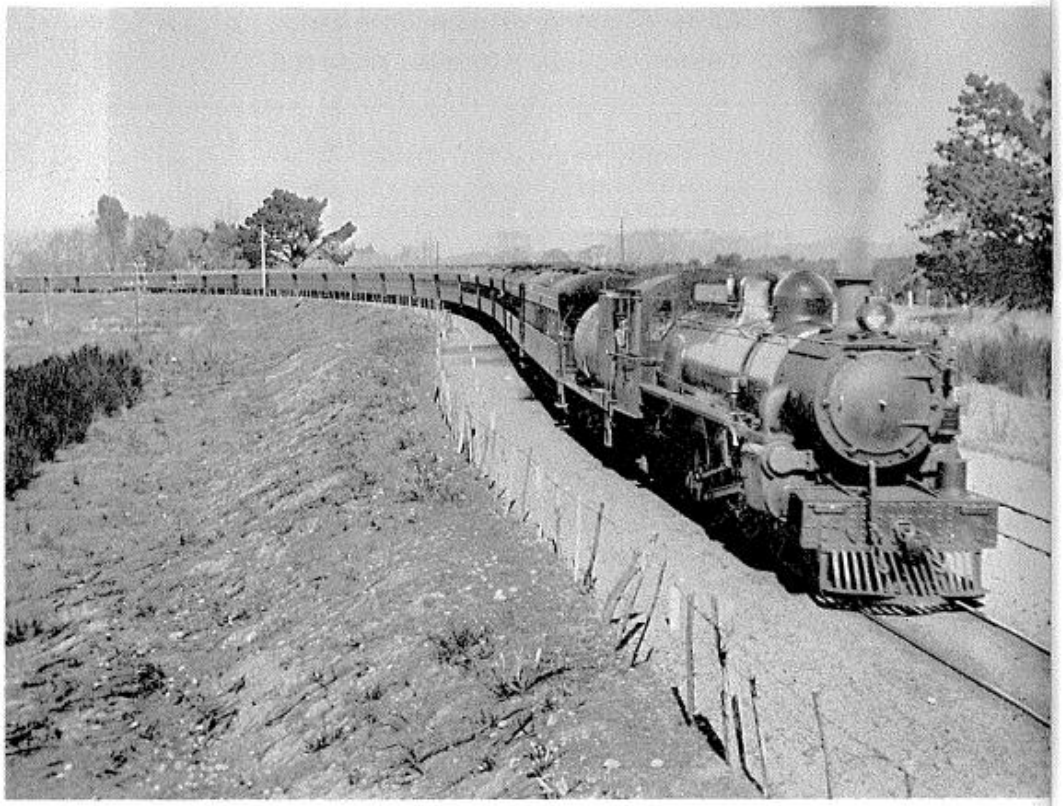
"Ab" 608—Simple Superheated—Weight, 75 tons
(December 13 to 17, 1915)

Trip	Weight of Train	Actual Running Time	Per Round Trip		Per Ton-mile		Weather
			Water	Coal	Water	Coal	
	tons	min.	lb.	lb.	lb.	lb.	
Down	251	179	50,000	5,544	0.833	0.092	Calm
Up	349	165					
Down	268	176	48,000	5,576	0.842	0.098	Light NE
Up	302	167					
Down	275	177	49,500	5,488	0.796	0.088	Light NE
Up	347	162					
Down	334	157	51,000	5,600	0.790	0.087	Strong NW
Up	312	179					
Down	352	171	49,000	5,432	0.717	0.079	Calm
Up	331	165					
Average	312	170	49,500	5,488	0.793	0.088	—

"A" 399—Compound Saturated—Weight, 69 tons
(January 10 to 14, 1916)

Trip	Weight of Train	Actual Running Time	Per Round Trip		Per Ton-mile		Weather
			Water	Coal	Water	Coal	
	tons	min.	lb.	lb.	lb.	lb.	
Down	365	178	68,000	8,176	0.991	0.119	Calm
Up	321	165					
Down	396	174	69,000	8,400	0.936	0.114	Calm
Up	341	166					
Down	327	175	72,000	9,396	1.03	0.135	Strong NW
Up	371	168					
Down	331	155	70,000	9,408	1.07	0.144	Strong NW
Up	321	173					
Down	291	184	62,500	7,840	1.05	0.132	Calm
Up	304	164					
Average*	330	172	66,500	8,133	1.007	0.123	-

* Average taken of first two days and last day only. Third and fourth days, when performance was affected by weather, are omitted from these average figures.



From an old NZR Publicity print

An "Ab" with a 20-total express passenger train in Canterbury, a gross weight of some 400 tons or more behind the tender. Does any reader recognise the locality?

Allowing two minutes for each start and stop the average running speed works out on this occasion at 46 m.p.h., a notable performance for an engine with 54in. drivers and only 30 tons adhesive weight, with a train of 420 tons.

The success of these new locomotives was such that the first batch of ten, Nos. 608 to 617, was quickly followed by construction of a further batch of 1916-17, eight of the latter being completed as the "Ab" class, Nos. 658-665, and two as the "Ws" and "Wab" class tank locomotives, Nos. 686 and 687. No. 614 of the first batch of "Ab"s, and all of the second batch, were allocated to the North Island, where they were put to work on the main trunk expresses between Wellington and Taihape, then 160 miles, and between Auckland and Taumarunui, 174 miles. A series of tests were carried out in September 1916 between "Ab" 658 and "A" 598 on the 160-mile Wellington-Taihape section of the main trunk express service. The average weight of the trains worked out at 333 tons for each of eight runs (four each way) by the "Ab" and 304 tons for each of six runs by the "A". The actual running time per trip averaged 330 minutes for the "Ab" and 332 minutes for the compound, about 10 minutes better than the scheduled running time allowed at that time, when the highest speed permitted

Results of Locomotive Tests

NZR Christchurch-Timaru
December-January, 1915-1916

		"Ab" 608	"A" 399
Coal per engine-mile	lb.	27.44	43.66
Coal per ton-mile	lb.	0.088	0.123
Water per engine-mile	lb.	247.5	332.5
Water per ton-mile	lb.	0.793	1.007
Ton-miles per lb. of coal		11.38	8.114
Ton-miles per lb. of water		12.60	9.925

"Ab" 608 used 33 percent less coal and 20 percent less water than "A" 399.

was 45 m.p.h., and that only between Feilding and Tawa Flat on that section.

Once again, a substantial saving in the consumption of water was recorded, but the saving in coal was only 13.2 percent (0.105lb. per ton-mile compared with 0.121lb). This was attributed to the long sections of downhill running with steam shut off on the undulating alignment of this railway. The new locomotives were described as "great favourites with the crews, and have given such satisfaction in general use that they are now looked upon as standard engines for both passenger and goods services for main-line runs, and will be the only tender engines built till such time as heavier axle loads are allowed."

A third batch of 10 locomotives, Nos. 688-697, was ordered from the Addington Workshops, but deliveries did not begin until the end of 1921 because of difficulty in obtaining supplies of material from overseas. They were completed in 1923, all going into service in the South Island.

Meanwhile, the 18 locomotives in service were running more than 35,000 miles a year each by 1920, and about this time orders were placed with A. and G. Price Ltd, Thames, and the North British Locomotive Co. Ltd, Glasgow, Scotland, for

Attacking the climb from Southdown to Remuera, this "Ab" in original condition is working a Wellington-Auckland express in the early 1920s.

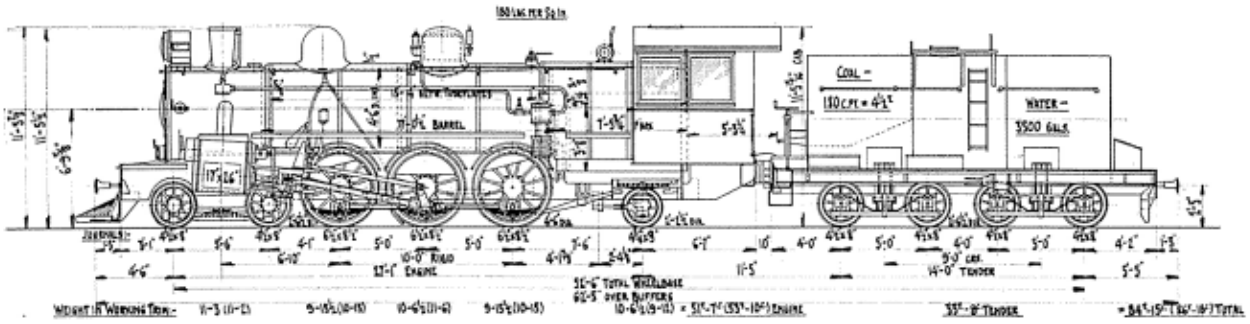
Photograph: W. W. Stewart

TABLE 2—LIST OF NZR "Ab" CLASS LOCOMOTIVES

Road No.	Maker	Maker's No.	Year built	First Location	Allocation 3/1950	Transferred South	Allocation 3/1964	Withdrawn	Road No.
608	NZR/Addn.	163	1915	Sth. Is.	Dunedin	—	Dunedin	10/1967	608
609	NZR/Addn.	164	1915	Sth. Is.	Ch'church	—	Ch'church	4/1964	609
610	NZR/Addn.	165	1915	Sth. Is.	Ch'church	—	G'mouth	8/1968	610
611	NZR/Addn.	166	1916	Sth. Is.	Ch'church	—	—	8/1960	611
612	NZR/Addn.	167	1916	Sth. Is.	Ch'church	—	Ch'church	11/1967	612
613	NZR/Addn.	168	1916	Sth. Is.	Dunedin	—	Dunedin	10/1967	613
614	NZR/Addn.	183	1917	Nth. Is.	Taum.	—	—	2/1964	614
615	NZR/Addn.	170	1916	Sth. Is.	Ch'church	—	Ch'church	4/1966	615
616	NZR/Addn.	171	1916	Sth. Is.	Ch'church	—	Ch'church	9/1967	616
617	NZR/Addn.	172	1916	Sth. Is.	Ch'church	—	Ch'church	3/1969	617
658	NZR/Addn.	169	1916	Nth. Is.	Frankton	8/1959	Dunedin	11/1968	658
659	NZR/Addn.	184	1917	Nth. Is.	Auckland	—	—	2/1964	659
660	NZR/Addn.	185	1917	Nth. Is.	Frankton	5/1958	Dunedin	8/1968	660
661	NZR/Addn.	186	1917	Nth. Is.	Wanganui	—	—	3/1964	661
662	NZR/Addn.	187	1917	Nth. Is.	Frankton	10/1966	Frankton	10/1967	662
663	NZR/Addn.	188	1917	Nth. Is.	Taum.	9/1959	Dunedin	7/1969	663
664	NZR/Addn.	189	1917	Nth. Is.	Frankton	—	—	4/1963	664
665	NZR/Addn.	190	1918	Nth. Is.	Palm. N.	10/1958	—	4/1963	665
688	NZR/Addn.	191	1921	Sth. Is.	Ch'church	—	Ch'church	6/1968	688
689	NZR/Addn.	192	1922	Sth. Is.	Ch'church	—	Ch'church	4/1967	689
690	NZR/Addn.	215	1922	Sth. Is.	Dunedin	—	Dunedin	3/1969	690
691	NZR/Addn.	216	1922	Sth. Is.	Dunedin	—	Dunedin	7/1968	691
692	NZR/Addn.	217	1922	Sth. Is.	Ch'church	—	Ch'church	11/1968	692
693	NZR/Addn.	218	1922	Sth. Is.	Dunedin	—	Dunedin	3/1969	693
694	NZR/Addn.	219	1922	Sth. Is.	Dunedin	—	Dunedin	3/1969	694
695	NZR/Addn.	220	1923	Sth. Is.	Ch'church	—	Ch'church	4/1966	695
696	NZR/Addn.	221	1923	Sth. Is.	Ch'church	—	Ch'church	6/1964	696
697	NZR/Addn.	222	1923	Sth. Is.	Ch'church	—	Ch'church	6/1964	697
698	Price	93	1922	Nth. Is.	Frankton	—	—	10/1959	698
699	Price	94	1922	Nth. Is.	Palm. N.	8/1958	Ch'church	3/1968	699
700	Price	95	1922	Nth. Is.	Frankton	—	Frankton	1/1966	700
701	Price	96	1922	Nth. Is.	Frankton	12/1963	Dunedin	7/1968	701
702	Price	97	1923	Nth. Is.	Wang.	—	Napier	3/1965	702
703	Price	98	1923	Nth. Is.	Auckland	—	Frankton	10/1966	703
704	Price	99	1923	Nth. Is.	Frankton	9/1957	Ch'church	6/1969	704
705	Price	100	1923	Nth. Is.	Wang.	7/1966	Wanganui	3/1969	705
706	Price	101	1923	Nth. Is.	Frankton	9/1959	Dunedin	7/1969	706
707	Price	102	1924	Nth. Is.	Wang.	2/1967	Wanganui	3/1969	707
708	Price	103	1924	Nth. Is.	Wang.	—	Wanganui	12/1966	708
709	Price	104	1924	Nth. Is.	Wang.	—	Wanganui	12/1966	709
710	Price	105	1924	Nth. Is.	Napier	—	—	11/1963	710
711	Price	106	1924	Nth. Is.	Wang.	—	Wanganui	12/1966	711
712	Price	107	1925	Nth. Is.	Taum.	—	Frankton	7/1965	712
713	Price	108	1925	Nth. Is.	Wang.	11/1964	Wanganui	7/1968	713
714	Price	109	1925	Nth. Is.	Frankton	—	Palm. N.	9/1966	714
715	Price	110	1925	Nth. Is.	Frankton	7/1964	Frankton	6/1968	715
716	Price	111	1925	Nth. Is.	Wang.	—	—	3/1964	716
717	Price	112	1925	Nth. Is.	Frankton	12/1963	Dunedin	10/1967	717
718	N. British	22848	1921	Sth. Is.	Ch'church	—	Ch'church	3/1969	718
719	N. British	22849	1921	Sth. Is.	In'gill	—	In'gill	7/1968	719
720	N. British	22853	1921	Sth. Is.	Ch'church	—	Ch'church	8/1968	720
721	N. British	22856	1921	Sth. Is.	In'gill	—	In'gill	3/1969	721
722	N. British	22857	1921	Sth. Is.	Ch'church	—	G'mouth	12/1966	722
723	N. British	22860	1921	Sth. Is.	Ch'church	—	G'mouth	11/1968	723
724	N. British	22869	1921	Sth. Is.	Ch'church	—	Ch'church	3/1969	724
725	N. British	22873	1921	Sth. Is.	In'gill	—	In'gill	3/1969	725
726	N. British	22875	1921	Sth. Is.	In'gill	—	In'gill	11/1968	726
727	N. British	22876	1921	Sth. Is.	Dunedin	—	Dunedin	7/1968	727
728	N. British	22877	1921	Sth. Is.	Dunedin	—	Dunedin	8/1968	728
729	N. British	22881	1922	Sth. Is.	In'gill	—	In'gill	11/1968	729
730	N. British	22883	1922	Sth. Is.	In'gill	—	In'gill	3/1969	730
731	N. British	22884	1922	Sth. Is.	In'gill	—	In'gill	3/1969	731
732	N. British	23043	1923	Sth. Is.	In'gill	—	In'gill	3/1969	732
733	N. British	22838	1921	Nth. Is.	Frankton	—	Frankton	5/1966	733
734	N. British	22834	1921	Nth. Is.	Palm N.	—	Wanganui	2/1965	734
735	N. British	22844	1921	Nth. Is.	Palm. N.	12/1963	Dunedin	3/1968	735
736	N. British	22841	1921	Nth. Is.	Napier	—	Napier	3/1966	736
737	N. British	22847	1921	Nth. Is.	Palm N.	10/1966	Palm. N.	3/1969	737
738	N. British	22852	1921	Nth. Is.	Napier	—	Frankton	1/1965	738
739	N. British	22855	1921	Nth. Is.	Frankton	—	Frankton	7/1965	739
740	N. British	22859	1921	Nth. Is.	Napier	7/1958	Ch'church	11/1967	740
741	N. British	22868	1921	Nth. Is.	Palm. N.	—	Palm. N.	2/1965	741
742	N. British	22872	1921	Nth. Is.	Palm. N.	—	Wanganui	2/1965	742
743	N. British	22871	1921	Nth. Is.	Wang.	9/1966	Wanganui	6/1969	743
744	N. British	22874	1921	Nth. Is.	Wang.	—	—	3/1964	744
745	N. British	22880	1922	Nth. Is.	Wang.	—	—	1/1957	745
746	N. British	22885	1922	Nth. Is.	Frankton	-/1957	Dunedin	3/1969	746
747	N. British	22836	1921	Nth. Is.	Palm. N.	—	—	10/1963	747
748	N. British	22837	1921	Nth. Is.	Palm. N.	—	Wanganui	9/1966	748
749	N. British	22839	1921	Nth. Is.	Palm. N.	—	—	10/1959	749
750	N. British	22840	1921	Nth. Is.	Auckland	4/1959	G'mouth	6/1964	750
751	N. British	22842	1921	Nth. Is.	Palm. N.	4/1966	Palm. N.	11/1967	751
752	N. British	22843	1921	Nth. Is.	Auckland	—	—	2/1964	752
753	N. British	22846	1921	Nth. Is.	Frankton	5/1964	Frankton	11/1968	753
754	N. British	22850	1921	Nth. Is.	Taum.	10/1966	Frankton	3/1969	754
755	N. British	22851	1921	Nth. Is.	Palm. N.	2/1959	Dunedin	3/1968	755
756	N. British	22854	1921	Nth. Is.	Auckland	—	—	6/1962	756
757	N. British	22858	1921	Nth. Is.	Wang.	—	—	3/1964	757
758	N. British	22866	1921	Nth. Is.	Palm. N.	—	Palm. N.	9/1966	758
759	N. British	22867	1921	Nth. Is.	Auckland	—	Auckland	1/1965	759
760	N. British	22870	1921	Nth. Is.	Wang.	—	—	3/1964	760
761	N. British	22882	1922	Nth. Is.	Palm. N.	—	Palm. N.	6/1965	761
762	N. British	23039	1923	Nth. Is.	Auckland	6/1959	Ch'church	11/1967	762
773	N. British	23040	1923	Nth. Is.	Auckland	2/1967	Auckland	11/1968	773
774	N. British	23041	1923	Nth. Is.	Frankton	—	—	10/1959	774
775	N. British	23042	1923	Nth. Is.	Palm. N.	—	—	10/1958	775
776	NZR/Addn.	233	1925	Sth. Is.	Ch'church	—	Ch'church	4/1966	776
777	NZR/Addn.	234	1925	Sth. Is.	Dunedin	—	Dunedin	3/1969	777
778	NZR/Addn.	235	1925	Sth. Is.	Dunedin	—	In'gill	7/1969	778
779	NZR/Addn.	236	1925	Sth. Is.	Dunedin	—	Dunedin	7/1968	779
780	NZR/Addn.	237	1926	Sth. Is.	Ch'church	—	Ch'church	3/1969	780
781	NZR/Addn.	238	1926	Sth. Is.	Dunedin	—	Dunedin	8/1968	781
782	NZR/Addn.	239	1926	Sth. Is.	Dunedin	—	Dunedin	7/1969	782
783	NZR/Addn.	240	1926	Sth. Is.	Ch'church	—	Ch'church	12/1966	783
784	NZR/Addn.	241	1926	Sth. Is.	In'gill	—	In'gill	3/1969	784
785	NZR/Addn.	242	1926	Sth. Is.	Ch'church	—	—	2/1963	785
804	N. British	23173	1925	Sth. Is.	Ch'church	—	Ch'church	4/1966	804
805	N. British	23174	1925	Sth. Is.	In'gill	—	In'gill	7/1968	805
806	N. British	23175	1925	Sth. Is.	Ch'church	—	Ch'church	3/1969	806
807	N. British	23176	1925	Sth. Is.	Ch'church	—	Ch'church	3/1969	807
808	N. British	23183	1925	Sth. Is.	Ch'church	—	G'mouth	9/1967	808
809	N. British	23184	1925	Sth. Is.	Ch'church	—	Ch'church	4/1966	809
810	N. British	23185	1925	Sth. Is.	In'gill	—	In'gill	10/1967	810
811	N. British	23186	1925	Sth. Is.	Ch'church	—	Ch'church	7/1969	811
812	N. British	23182	1925	Sth. Is.	Dunedin	—	Dunedin	10/1967	812
813	N. British	23187	1925	Sth. Is.	Ch'church	—	Ch'church	3/1969	813
814	N. British	23177	1925	Nth. Is.	Wang.	—	—	3/1964	814
815	N. British	23178	1925	Nth. Is.	Auckland	—	—	12/1963	815
816	N. British	23179	1925	Nth. Is.	Palm. N.	4/1965	Palm. N.	6/1969	816
817	N. British	23180	1925	Nth. Is.	Wang.	—	Wanganui	12/1966	817
818	N. British	23191	1925	Nth. Is.	Auckland	—	—	10/1963	818
819	N. British	23192	1925	Nth. Is.	Palm. N.	—	Palm. N.	12/1966	819
820	N. British	23193	1925	Nth. Is.	Auckland	4/1959	Ch'church	3/1969	820
821	N. British	23194	1925	Nth. Is.	Auckland	7/1959	Dunedin	3/1969	821
822	N. British	23195	1925	Nth. Is.	Frankton	-/1957	Dunedin	3/1969	822
823	N. British	23196	1925	Nth. Is.	Auckland	9/1959	G'mouth	7/1969	823
824	N. British	23197	1925	Nth. Is.	Auckland	—	Auckland	1/1966	824
825	N. British	23198	1925	Nth. Is.	Auckland	8/1966	Auckland	11/1967	825
826	N. British	23203	1925	Nth. Is.	Palm. N.	5/1964	Wanganui	11/1967	826
827	N. British	23204	1925	Nth. Is.	Palm. N.	—	Palm. N.	5/1964	827
828	N. British	23207	1925	Nth. Is.	Wang.	—	Napier	8/1966	828
829	N. British	23181	1925	Nth. Is	W'gton	12/1964	Napier	6/1968	829
830	N. British	23188	1925	Nth. Is.	Auckland	—	—	10/1959	830
831	N. British	23189	1925	Nth. Is.	W'gton	8/1966	Napier	3/1969	831
832	N. British	23190	1925	Nth. Is.	W'gton	—	Napier	12/1967	832
833	N. British	23199	1925	Nth. Is.	Auckland	5/1959	Ch'church	4/1966	833
834	N. British	23200	1925	Nth. Is.	Palm. N.	—	Auckland	10/1966	834
835	N. British	23201	1925	Nth. Is.	Taum.	—	—	2/1964	835
836	N. British	23202	1925	Nth. Is.	Wang.	—	—	9/1963	836
837	N. British	23205	1925	Nth. Is.	Palm. N.	—	Napier	8/1965	837
838	N. British	23206	1925	Nth. Is.	Palm. N.	—	Frankton	9/1966	838

Road No.	Maker	Maker's No.	Year built §	First Location	Converted from Wab*	Allocation 3/1950	Allocation 3/1964	Withdrawn	Road No.
786	NZR/Hillside	243	1925	Sth. Is.	10/1947	Ch'church	Ch'church	11/1968	786
787	NZR/Hillside	244	1925	Sth. Is.	11/1947	Ch'church	Ch'church	4/1966	787
788	NZR/Hillside	245	1925	Sth. Is.	1/1948	Dunedin	Dunedin	3/1969	788
789	NZR/Hillside	246	1925	Sth. Is.	8/1947	Dunedin	Dunedin	3/1969	789
790	NZR/Hillside	247	1925	Sth. Is.	9/1957	W'gton.	Ch'church	2/1966	790
791	NZR/Hillside	248	1926	Sth. Is.	11/1947	Dunedin	Dunedin	10/1967	791
792	NZR/Hillside	249	1926	Sth. Is.	6/1947	Dunedin	Dunedin	7/1969	792
793	NZR/Hillside	250	1926	Sth. Is.	2/1948	Dunedin	Dunedin	3/1969	793
795	NZR/Hillside	252	1927	Sth. Is.	12/1947	Dunedin	Dunedin	7/1969	795
798	Price	115	1926	Nth. Is.	11/1957	W'gton.	Ch'church	3/1969	798
803	Price	120	1927	Nth. Is.	12/1957	Auckland	In'gill	7/1968	803

§ Year built as "Wab" 4-6-4T locomotives.
* All conversions were made at Hillside workshops, Dunedin.



From a Cedric Green locomotive diagram.

NZR "Ab" CLASS 4-6-2 LOCOMOTIVE

(As running in North Island 1935)

Principal Dimensions

BOILER:	
Barrel diameter inside	4ft. 6in.
Length between tube plates	15ft. 4in.
Tubes, number	110
Tubes, diameter	1¾in.
Flues, number	12
Flues, diameter	5½ in.
GRATE:	
Length	6ft. 7⅛in.
Width	5ft. 0in.
Area	33sq. ft.
HEATING SURFACE §:	sq. ft
Firebox	124
Tubes and flues	1024
Total evaporative	1148
Superheater	204
Total	1352

§ Applicable to locomotives with M.L.S. superheaters.

CYLINDERS:	
Number	2
Diameter	17in.
Stroke	26in.
MOTION:	
Type	Walschaerts
Piston valve diameter	8in.
Maximum valve travel	4⅜in.
Steam lap	1in.
Lead	⅛in.
Port	1¼in.
TRACTIVE EFFORT:	
At 85 percent working pressure	21,280lb.
ADHESIVE WEIGHT:	29.88 tons †
FACTOR OF ADHESION:	
Ratio of tractive effort to adhesive weight	3.1 †

† These figures apply to North Island locomotives without ballast block over leading bogie. Figures in brackets on the diagram show the weights of South Island locomotives with ballast block.

20 and 45 "Ab" class locomotives respectively. The North British locomotives, Nos. 718-732 for the South Island and 733-762 for the North Island, mostly entered service during 1921 and 1922, but Nos. 732 and 762 did not appear until 1923, evidently to replace two that were lost in the wreck of the *Wiltshire* off the Northland coast. The 20 Price "Ab"s were Nos. 698-717, deliveries being spread over the four years from 1922 to 1925, all for service in the North Island.

The North British order was increased by three locomotives, and these, Nos. 773-775, were placed in North Island service in 1923 with the two replacement engines Nos. 732 and 762. A fourth and final order with the Addington workshops was placed about 1922 for ten more "Ab"s, Nos. 776-785. These were completed during 1925 and 1926, by which time a second contract had been placed with the North British Locomotive Company for 35 locomotives required to cope with the increased traffic following completion of the Midland line in the South Island and the link to Whangarei in the North. The line to Tauranga and the east was also approaching completion.

Ten of the final North British "Ab"s, Nos. 804-813, were allocated to the South Island when they arrived in 1925, and the remainder, Nos. 814-838, were distributed throughout the North Island. Their arrival also made possible the withdrawal of many obsolete locomotives that were 40 or 50 years old. By the end of 1926 the full fleet of "Ab"s was in service, 87 in the North Island and 54 in the South Island.

It is interesting to note the extent of the monetary inflation that occurred during the 10 years when the "Ab"s were being built. According to figures published in the annual reports, the first batch of ten "Ab"s cost £42,417, or an average of £4242 each, but the second batch (of eight), built only two years later, cost £6,168 each. The final batch, built at Addington in 1925-26, cost £7796 per locomotive, while the second batch of North British locomotives, the 35 supplied in 1925, cost £6367 each.

My own experience of the work of these fine locomotives dates back to 1939. Shortly after acquiring a new Omega pocket watch, I began a series of journeys to Palmerston North and back on Saturdays to observe

TABLE 3 — NZR WELLINGTON-PALMERSTON N.

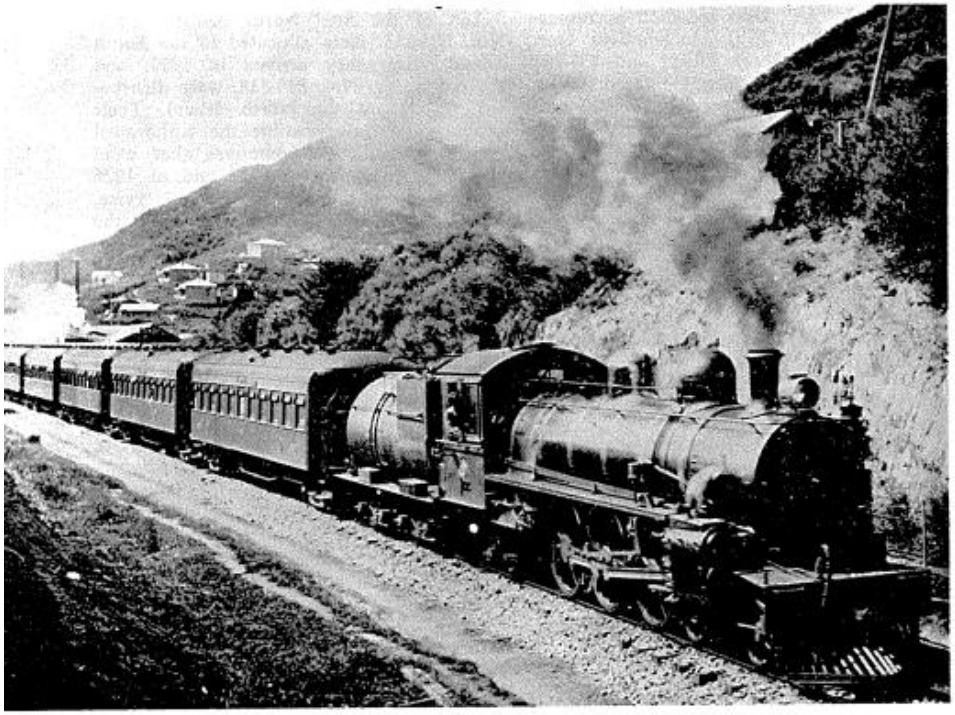
9.40 a.m. Wellington-Napier Express (Train No. 612)

4 February 1939

Locomotive: Class "Ab" 4-6-2 No. 837.

Load: 11 total, 260 tons tare, 280 tons gross.

Distance		Stations	Sched.	Actual Times	Average Speeds	
miles	km.		min.	m.s.	m.p.h.	km/hr
0.00	0.0	WELLINGTON	0	0.00	—	—
8.54	13.7	Tawa Flat	17	23.15	22.0	35.4
11.00	17.7	Porirua	—	27.30	34.7	56.5
13.80	22.2	Paremata	—	32.30	33.6	54.0
15.49	24.9	Plimmerton	30	36.30	—	—
19.12	30.8	Pukerua Bay	—	40.45	23.8	38.1
24.34	39.2	Paekakariki	51	51.55	19.5	31.7
				61.30	32.7	52.6
5.89	9.5	Paraparaumu	—	10.45	32.9	53.0
10.37	16.7	Waikanae	—	17.18	41.0	66.0
16.21	26.1	Te Horo	24	25.18	43.8	70.5
19.74	31.8	Otaki		30.20	42.1	68.0
25.25	40.6	Manakau	40	39.35	35.7	57.1
28.89	46.5	Ohau		44.30	44.4	72.0
32.09	51.6	Levin	51	49.15	40.4	64.4
5.64	9.1	Kaputuraa	—	8.30	39.8	64.2
10.07	16.2	Shannon	—	13.45	50.6	81.1
13.42	21.6	Makerua	—	17.45	50.2	81.0
17.47	28.1	Tokomaru	—	22.32	50.9	81.6
21.02	33.8	Linton	—	27.02	47.3	76.0
24.72	39.8	Longburn	39	32.15	42.5	69.0
28.56	46.0	PALMERSTON N.	45	37.45	41.9	67.6



From the W. W. Stewart Collection

A Wellington-Auckland express train passing Mangapehi in the early 1920s. Note the polished brass steam-dome cover and boiler bands.

RIGHT: The up "Rotorua Limited" passing Otahuhu about 1931, after the observation car had been found uneconomic and the van had reverted to the rear of the train. This "Ab" has an electric headlight and new-style smokebox door, and the brake pump has been moved back nearer the cab.

Photograph: W. W. Stewart

the performance of express trains, and my first run on train 612, the 9.40 a.m. Wellington-Napier express, produced the interesting results summarised in Table 3. "Ab" 837 lost time badly on the 1 in 122 climb out of Wellington through the long tunnels with its 280-ton train, resulting in an unscheduled stop at Paremata to cross a down train normally held for the express at Plimmerton. The crew evidently managed to correct the situation, for better work was done north of Paekakariki, and indeed more than seven minutes were gained on schedule from Levin to Palmerston North. The 28.56 miles (46.0 km) were covered from start to stop at an average speed of 45.4 m.p.h. (73.1 km/hr), the 15.38 miles of nearly level track from Koputaroa to Linton having been covered in 18 min. 32 sec. at an average speed of 49.8 m.p.h., or almost exactly 80 km/hr.

Six years earlier, the Australian enthusiast M.A. Park had made some extensive observations of locomotive running in New Zealand. This was at a time just before the general introduction of the first "K" class 4-8-4s when the "Ab" Pacifics were still the pride of the road. Tables 4 and 5 selected from his collection of logs illustrate their competence with normal loads on the schedules of the period. In Table 4 "Ab" 825, one of the last batch of North British locomotives, was at the head of a 9-total 235-ton Auckland-Wellington express, the running from Auckland to Frankton being tabulated. This shows that

TABLE 4 — NZR AUCKLAND-FRANKTON JN.

5.00 p.m. Auckland-Wellington Express (Train No. 227)
19 January 1933
Locomotive: Class "Ab" 4-6-2 No. 825.
Load: 9 total, 212 tons tare, 235 tons gross.

Distance		Stations	Sched.	Actual Times	Average Speeds	
miles	km.		min.	m.s.	m.p.h.	km/hr
0.00	0.0	AUCKLAND	0	0.00	—	—
2.06	3.3	Crakel	—	5.07	24.1	38.7
5.03	8.1	Glen Innes	—	10.32	33.1	53.1
8.50	13.7	Sylvia Park	—	15.17	43.6	70.7
9.51	15.3	Westfield	15	16.45	41.2	65.3
10.32	16.6	Otahuhu	17	18.02	38.0	60.9
12.65	20.4	Papatoetoe	—	21.33	39.7	64.8
14.40	23.2	Wiri	—	24.17	38.5	61.5
16.59	26.7	Manurewa	—	27.20	43.1	68.9
20.99	33.8	Papakura	34	34.51	35.1	56.7
24.17	38.9	Drury	—	38.53	47.3	75.9
29.52	47.5	Paerata	—	47.11	38.7	62.2
32.29	52.0	Pukekohe	56	51.37	37.5	60.9
4.73	8.1	Tuakau	8	7.54	35.9	61.5
6.87	11.1	Whangarata	—	11.46	33.2	46.5
9.56	15.4	Pokeno	—	15.24	44.5	71.1
12.20	19.6	Mercer	19	19.33	38.2	60.7
2.80	4.5	Amokura	5	6.06	27.5	44.3
10.92	17.6	Te Kauwhata	—	19.26	36.6	59.0
16.82	27.1	Ohinewai	—	28.06	40.8	65.7
21.96	35.3	Huntly	35	35.32	41.5	66.2
4.54	7.3	Taupiri	9	7.18	37.3	60.0
9.15	14.7	Ngaruawahia	17	14.53	36.5	58.6
12.57	20.2	Horotiu	22	19.33	43.9	70.7
16.12	26.0	Te Rapa	—	24.12	45.8	74.8
19.49	31.4	FRANKTON	34	29.39	37.1	59.5

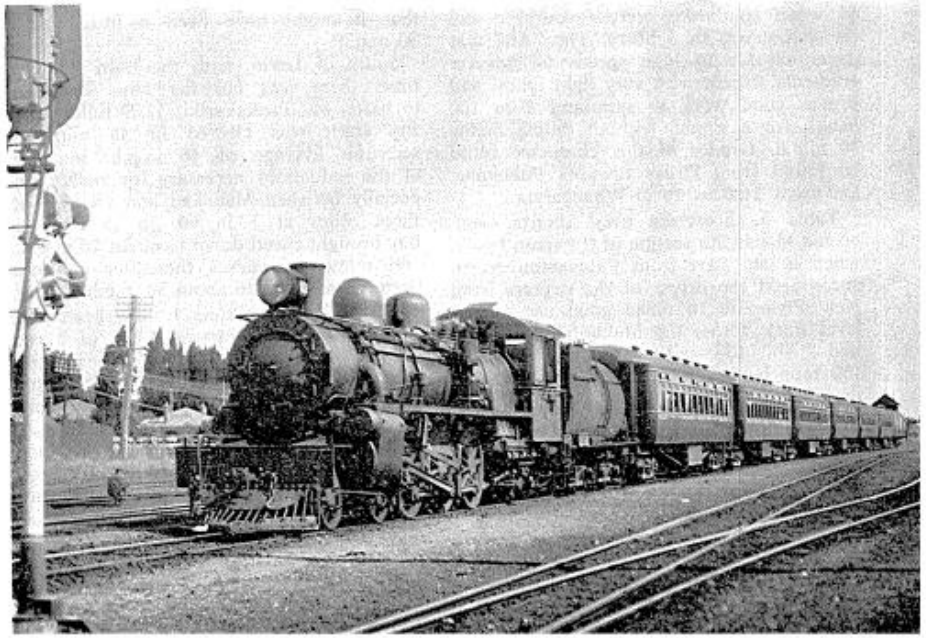


TABLE 5 — NZR PALMERSTON N.-WELLINGTON

New Plymouth-Wellington Express (Train No. 507)
3 February 1933
Locomotive: Class "Ab" 4-6-2 No. 834.
Load: 7 total, 138 tons tare, 150 tons gross.

Distance		Stations	Sched.	Actual Times	Average Speeds	
miles	km.		min.	m.s.	m.p.h.	km/hr
0.00	0.0	PALMERSTON N.	0	0.00	—	—
3.84	6.2	Longburn	6	7.05	32.5	52.5
7.54	12.1	Linton	—	13.45	33.3	53.1
11.09	17.8	Tokomaru	—	18.05	49.2	79.0
15.14	24.4	Makerua	—	22.50	51.2	83.4
18.49	29.8	Shannon	29	26.53	49.6	80.0
22.92	36.9	Koputaroa	—	32.26	47.9	76.8
28.56	46.0	Levin	47	42.22	34.1	55.0
3.20	5.1	Ohau	—	5.53	32.6	52.1
6.84	11.0	Manakau	—	10.50	44.1	71.5
12.35	19.9	Otaki	21	19.44	37.2	60.0
15.87	25.5	Te Horo	—	25.07	39.2	62.5
21.71	34.9	Waikanae	—	33.16	43.0	69.2
26.20	42.2	Paraparaumu	41	40.01	39.9	64.9
32.09	51.6	Paekakariki	49	48.04	43.9	70.1
37.30	60.0	Pukerua Bay	—	59.33	27.2	43.9
40.94	65.9	Plimmerton	—	66.17	32.4	52.6
42.62	68.6	Paremata	72	69.39	29.9	48.1
45.42	73.1	Porirua	—	74.26	35.2	56.5
48.15	77.5	Tawa Flat	—	79.20	33.4	53.9
52.39	84.3	Johnsonville	98	96.29	14.8	23.8
54.00	86.9	Khandallah	102	101.03	21.2	34.1
55.54	89.4	Ngaio	106	104.59	23.5	38.2
			111	107.40		
58.45	94.1	WELLINGTON	119	115.35	22.0	35.6

speeds of 40-45 m.p.h. were adequate for timekeeping, with occasional bursts above 45 when conditions were favourable and the driver was in a hurry. The "Ab" was never capable of high speeds on adverse gradients, except with very light loads, and it was good work to surmount 1 in 100 banks, for example, without falling below 30 m.p.h. Grades of this character could be found from Drury towards Pukekohe, and from Tuakau up to Whangarata.

Table 5 shows an even smarter run, on the Manawatu section of the main trunk, when a late start from Palmerston North encouraged the driver of the express from New Plymouth to make good use of the level track across the Makerua Plains. He had "Ab" 834 with a modest load of 150 tons behind the tender and, after the then speed-restricted area between Palmerston North and Linton, covered the 15.4 miles (24.8 km) thence to Koputaroa in 18 min. 41 sec. The 28.56 miles (46.0 km) from Palmerston North to Levin were thus completed in 42 min. 22 sec., a gain of 4½ minutes on schedule, with a maximum speed of about 55 m.p.h. The minimum speed up the 2½ miles of 1 in 100 south of Koputaroa was not shown in the log, but the station-to-station averages suggest that it might have been a little below 30 m.p.h.

South of Levin, with the train now on time, there was not the same incentive to haste, but Paekakariki, 32.09 miles from the start, was cleared in 48 min. 04 sec., an average of 40 m.p.h. in spite of the reductions necessary for curves, especially between Manakau and Otaki. The three miles at 1 in 66 up to Pukerua Bay brought speed down to about 20 m.p.h., and numerous curves thereafter enforced frequent restraint to about 30 m.p.h.

This is the first time I have been able to include in these pages a log of a run over the old main line via Johnsonville, and the average of 14.8 m.p.h. (23.8 km/hr) up the four miles mainly at 1 in 56 (compensated for curves) from Tawa Flat is interesting. It was just adequate for timekeeping. The stop at Ngaio was to cross an up train, and included reversal into the north backshunt before the train could leave from the loop.

Malcolm Park's log just described makes an interesting comparison with one of my own (Table 6) when "Ab" 744 was provided for the Palmerston North-Wellington leg of the trial "Daylight Limited" run on 24 October 1949. The load, at 215 tons gross, was somewhat heavier, the coaches being of a later roller-bearing design. As far as Shannon there was close correspondence between the times of the two runs, but here 744 was opened out to accelerate rapidly down the short 1 in 100 south of the station to better than 55 m.p.h. (about 90 km/hr). The Koputaroa bank was attacked with vigour and surmounted triumphantly without falling below 35 m.p.h., with the result that Levin was passed in the excellent time of 39 min. 10 sec. from the start.

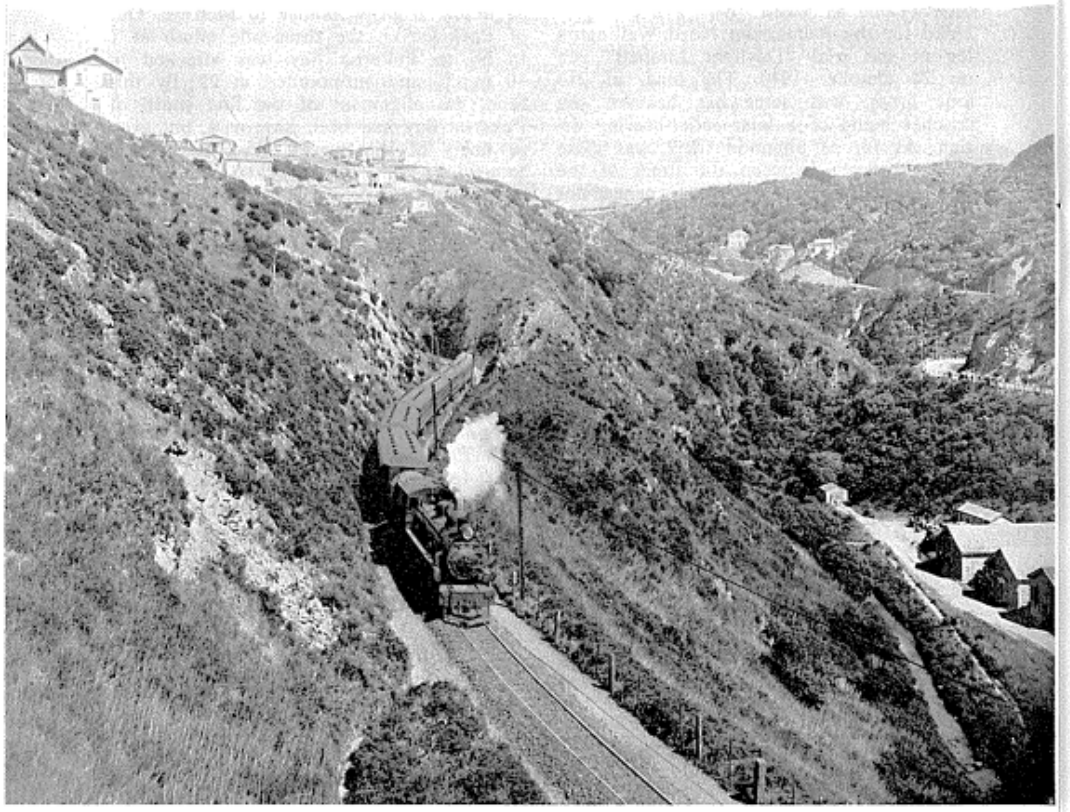
Speed restrictions and stops to cross opposing trains made timekeeping on this fast schedule impossible, but the intermediate work was of undiminished vigour, as displayed by the average of better than 52 m.p.h. from Waikanae to McKays. Out of Paekakariki, the three-mile climb at 1 in 66 to Pukerua Bay was attacked at 40 m.p.h. and surmounted at 22. By this time, the alignment of the line south of Pukerua Bay had been improved, but even so many of the curves were taken at a somewhat higher speed than usual. The climb up to No. 2 Tunnel on the new line beyond Tawa Flat brought speed down to about 30 m.p.h., but the final scamper downhill through the tunnels was spoiled by a final signal check costing about 1½ minutes. The net time for the run was an improvement of about 10 minutes on the schedule.

For sustained high-speed exploits, however, the line between Christchurch and Timaru in the South Island is unique in New Zealand. Here I have tabulated two runs from Timaru to Christchurch with the Invercargill-Christchurch express, Table

TABLE 6 — NZR PALMERSTON N.-WELLINGTON

8.10 a.m. Auckland-Wellington "Daylight Limited"
(Train J-9, 24 October 1949)
Locomotive: Class "Ab" 4-6-2 No. 744.
Load: 7 total, 198 tons tare, 215 tons gross.

Distance		Stations	Sched.	Actual Times	Average Speeds	
miles	km.		min.	m.s.	m.p.h.	km/hr
0.00	0.0	PALMERSTON N.	0	0.00	—	—
3.84	6.2	Longburn	7	7.00	32.9	53.1
7.54	12.1	Linton	13	13.03	36.7	58.5
11.09	17.8	Tokomaru	—	17.28	48.2	77.4
15.14	24.4	Makerua	—	22.27	48.8	79.5
18.49	29.8	Shannon	27	26.42	47.3	76.2
22.92	36.9	Koputaroa	33	31.35	54.5	87.3
28.56	46.0	Levin	42	39.10	44.6	72.0
				S/R		
31.76	51.1	Ohau	—	44.53	33.6	53.5
				52.18		
35.40	57.0	Manakau	52	58.48	33.6	54.5
40.91	65.9	Otaki	62	68.44	33.3	53.8
			66	75.35		
				S/R		
44.43	71.5	Te Horo	72	83.23	27.1	43.1
				S/R		
50.27	80.9	Waikanae	—	92.12	39.7	63.9
54.76	88.2	Paraparaumu	86	97.21	52.3	85.1
58.72	94.5	McKays	91	101.52	52.6	83.6
60.65	97.6	Paekakariki	94	104.44	40.3	64.8
				104.53		
62.80	101.1	North Junction	98	109.11	30.0	48.8
64.76	104.2	South Junction	103	113.17	28.7	45.4
65.86	106.0	Pukerua Bay	—	116.07	23.3	38.2
69.51	111.9	Plimmerton	112	121.00	44.9	72.6
71.20	114.6	Paremata	—	123.15	45.1	72.0
74.01	119.3	Porirua	—	127.23	40.8	68.3
76.46	123.1	Tawa Flat	125	131.03	40.0	62.1
78.93	127.0	(Summit)	—	135.32	33.1	52.2
				Sigs		
84.99	136.8	WELLINGTON	140	147.04	31.5	51.0



Photograph: N.Z. Railways Publicity

Drifting down the 1 in 40 grade through the Ngaio Gorge, the down "Night Limited" from Auckland is near the end of its overnight run to Wellington about 1933.

7, the first being the "gem" of the late Malcolm Park's 1933 collection, and the second being my first experience in this direction in August 1941.

On the 1933 occasion, "Ab" 809 had a 13-total 330-ton train, and made rather heavy weather of it up the long drag to Ealing, complicated by two severe speed restrictions, losing more than 11 minutes in the process. But the gentle descent from Ealing to Hinds and the level track beyond gave the needed impetus enabling five minutes to be recovered before Ashburton was reached. The 17.36 miles (27.9 km) from Ealing to Tinwald had been covered in less than 20 minutes.

From Ashburton "Ab" 809 accelerated gradually up the gentle climb through Dromore, and reached Rakaia just inside schedule. The long 15 m.p.h. crawl across the Rakaia River bridge, longest in New Zealand, then followed before the engine could be opened out for the final downhill dash to Christchurch. In those days there was no Burnham stop, so it was possible to maintain full speed for almost 30 miles. The 27.5 miles from Bankside to Middleton had been covered in 29 min. 30 sec., with speed just touching the mile-a-minute rate at Templeton.

My own run in 1941 makes an interesting comparison. Although "Ab" 785 had a

TABLE 7 — NZR TIMARU-CHRISTCHURCH

Invercargill-Christchurch Express (Train No. 174)

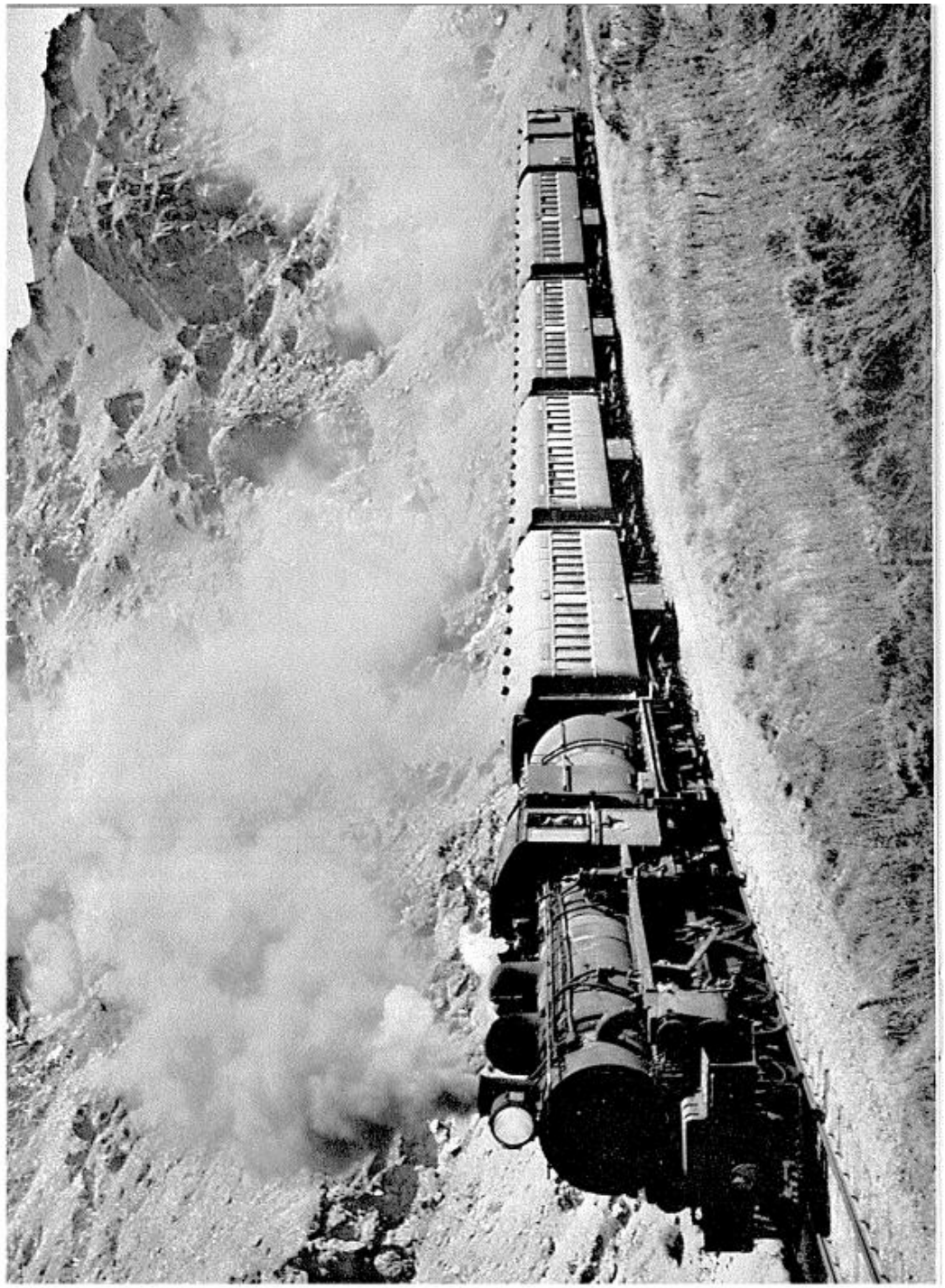
Date	25 Feb. 1933	28 Aug. 1941
Locomotive Number	809	785
Load (cars/tare/gross tons)	13/293/330	14/340/385

Distance		Stations	Sched.	Actual Times	Average Speeds		Sched.	Actual Times	Average Speeds	
miles	km		min.	m.s.	m.p.h.	km/hr	min.	m.s.	m.p.h.	km/hr
0.00	0.0	TIMARU	0	0.00	—	—	0	0.00	—	—
				S/R						
3.18	5.1	Washdyke	7	11.27	16.7	26.7	7	7.28	25.5	41.0
8.83	14.2	Arowhenua	—	19.36	41.6	67.0	—	15.49	40.6	65.4
11.18	18.0	Temuka	19	23.20	37.8	61.1	19	19.35	37.4	60.5
3.66	5.9	Winchester	—	9.53	22.2	35.8	—	8.36	25.5	41.2
7.47	12.0	Otari	16	17.52	28.6	45.9	14	16.45	28.0	44.9
6.33	10.2	Rangitata	—	14.42	25.8	41.6	10	13.37	27.9	44.9
				S/R						
9.05	14.6	Ealing	16	21.15	24.9	40.3	—	17.28	42.4	68.6
17.01	27.4	Hinds	27	30.08	53.8	86.5	24	27.26	47.9	77.0
22.55	36.3	Winslow	—	36.33	51.8	83.2	32	34.07	49.8	80.0
26.41	42.5	Tinwald	40	41.09	50.4	80.9	37	38.55	48.3	77.5
28.60	46.0	Ashburton	44	44.11	43.4	69.3	41	42.10	41.7	66.7
3.54	5.7	Fairfield	—	7.16	29.2	47.1	—	7.14	29.4	47.3
6.01	9.7	Dromore	—	10.57	40.3	65.2	—	11.03	38.8	62.8
11.48	18.4	Chertsey	—	18.05	46.0	73.4	—	18.18	45.3	72.0
16.69	26.9	Rakaia	26	25.26	42.5	69.4	26	24.35	49.8	81.2
				S/R						
4.96	8.0	Bankside	—	12.40	23.5	37.9	—	8.03	37.0	59.6
11.00	17.7	Dunsandel	17	19.25	63.7	86.2	15	14.40	54.7	87.9
13.81	22.2	Norwood	—	22.33	53.9	86.3	19	17.38	56.8	90.9
17.72	28.5	Burnham	—	26.34	58.4	94.0	b	22.10	51.8	83.4
								24.00		
21.80	35.1	Rolleston	31	30.54	56.5	91.4	32	30.53	35.6	57.6
26.84	43.2	Templeton	—	36.06	58.2	93.5	—	36.20	55.5	89.2
28.66	46.1	Islington	—	38.00	57.5	91.6	—	38.12	58.4	93.1
30.02	48.3	Hornby	43	39.27	56.3	91.9	43	39.34	59.6	96.4
31.22	50.2	Sockburn	—	40.46	54.6	86.4	—	40.43	62.6	99.2
32.50	52.3	Middleton	—	42.10	54.9	90.0	—	42.03	57.7	94.7
34.17	55.0	Addington	49	45.00	35.4	57.2	49	44.15	45.5	73.6
35.51	57.1	CHRISTCHURCH	54	48.10	25.4	39.8	54	47.20	26.1	40.9

heavier 14-total train of 385 tons all told, better work was done uphill, although on the slightly faster schedule now in force some time was dropped from Timaru to Ashburton. The descent of the Ealing bank did not produce quite as much pace as might have been expected, but the run from Ashburton to Rakaia finished with a flourish.

Then, from Rakaia, with the advantage of a new bridge and unrestricted speed over the river, the 17.72 miles (28.5 km) to Burnham were covered in just 22 min. 10 sec. from start to stop with a maximum speed of 57 m.p.h. With heavy trains such as this, the total weight including engine and tender being more than 15 times the weight available for adhesion, great care in starting was needed to avoid excessive slipping of the driving wheels. But the driver had speed up to 48 m.p.h. at Rolleston on the gentle downgrade (dropping at no more than four feet to the mile), and acceleration continued.

From Rolleston to Christchurch the line falls at an average gradient of about 1 in 440, with the steepest pinches at 1 in 220 through Templeton and 1 in 222 beyond Hornby. Speed reached 57 m.p.h. at Templeton, 61 at Hornby, and a rousing 64 at Sockburn, where steam was shut off for the approach to the city. Considering the modest size of the locomotive in relation to the weight of the train, and even allowing for the assistance of gravity, this was an impressive performance. Writing in these pages in 1945, I observed that, at the estimated maximum speed of 64 m.p.h., the driving wheels were spinning at a rate equivalent to those of an LMSR Class



ABOVE: This brace of "Ab"s, with a Blossom Festival excursion returning from Alexandra to Dunedin in September, 1964, is near the top of Tiger Hill.

Photograph: G. W. Emerson

LEFT: Returning from Cromwell to Dunedin on Tuesday 28 March 1967, this was the last special Easter passenger working on the Otago Central line. It is seen passing through the Cromwell Gorge.

Photograph: D. L. A. Turner

5 4-6-0 with 6ft wheels travelling at 85 m.p.h., and that such a speed with this class of engine, while no doubt not unknown, could hardly be regarded as common, and certainly not down a flatter grade than 1 in 200.

These few examples will have to suffice here to illustrate the work of the "Ab"s in any detail, but brief mention might be made of some other examples. One in particular was an occasion in January 1933 when the "Daylight Limited" from Wellington was made up at Frankton to a 13-total train of 280 tons tare and 315 tons gross weight headed by a pair of "Ab"s, Nos. 820 and 828. The six cars added at Frankton were from Rotorua, and we are fortunate that Malcolm Park was on hand to record how 16 minutes of lost time were recovered.

The 19.5 miles (31.4 km) from Frankton to a special stop at Huntly were completed in 31 min. 32 sec., a normal time for the period, but then the real effort began. On level track, speed was worked rapidly into the "fifties" and Rangiriri, 9.0 miles from the start, was cleared in 12 min. 32 sec. Track curvature required moderation of speed onward to Mercer, 22.0 miles (35.3 km) in 29 min. 33 sec., and the subsequent 3½ miles of 1 in 100 were surmounted at about 33 m.p.h. The 34.2 miles (54.9 km) from Huntly to Pukekohe were thus covered in 49 min. 11 sec. from start to stop, excellent work considering the limitations imposed by track alignment.

Out of Pukekohe, speed appears to have reached 50 m.p.h. or so in the vicinity of Drury, but after speed had been reduced through the turnout from the single to double track near Papakura, the 10.7 miles (17.2 km) thence to Otahuhu were covered in the truly remarkable time of 11 min. 45 sec. The record indeed shows that the 2.3 miles from Papatoetoe to Otahuhu occupied only 2 min. 8 sec. After the required easing through Otahuhu, the climb to Remuera was attacked with vigour, the final mile (at 1 in 42) being breasted at 25 m.p.h. Newmarket, 28.3 miles from

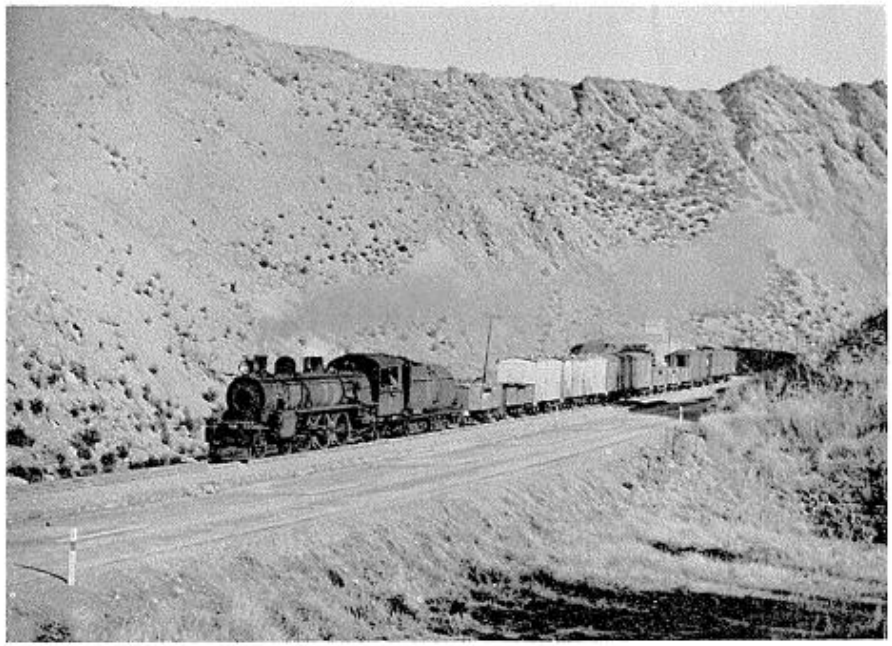
Pukekohe, was reached in 38 min. 32 sec. Against the timetable allowance of 32 minutes from Papakura to Newmarket, this "flyer" had taken only 22 min. 17 sec! Writing a few days later, Mr Park remarked: "After such a fine run the N.Z.R. may well rest on their laurels, for it is not often that such a run is made on the standard and broad gauge lines in Australia."

An example of excellent "against-the-collar" work was reported by Mr N. Mather after a run from Christchurch to Arthur's Pass by "Ab" 720 with a 10-total, 275-ton train, 25 tons in excess of the passenger train limit laid down for the 1 in 50 grades beyond Springfield. On this occasion, recorded in these pages in June 1946, the 15.9 miles from Rolleston up to Darfield were run from start to stop in 26¼ min., excellent considering the vertical rise of 468 feet in that distance. Speed averaged 38 m.p.h. (about 61 km/hr) on the steepest part of the climb, about 1 in 160, and rose to 46 on the easing of the grade approaching Darfield. Thereafter the train stopped at most stations, involving frequent acceleration from rest against the grade. On the 1 in 78 approaching Springfield, speed fell to 25 m.p.h., and on the long 1 in 50 banks approaching Avoca and Springfield, the minimum rate was 10 m.p.h.

This latter is the kind of work that would have been expected of the "Ab" in heavy goods train service. Passenger train loads were usually adjusted to permit a speed of 15 to 20 m.p.h. to be maintained up the steepest gradients. In the 1919 working timetable, for example, load ratings up the long 1 in 50 grades approaching Waimarino (now National Park) from the north, and uncompensated for curvature, were 230 tons of goods trains and 210 tons for passenger trains. On the 1 in 60 from Ohakune up to Pokaka, they were 300 and 250 tons respectively; and up the 1 in 70 banks from Te Kuiti to Porootarao, 330 and 280 tons. On level track,

At 6 o'clock in the morning, "Ab" 831 slogs through pouring rain in the Buller Gorge with the overnight goods train from Greymouth to Westport. This was in December 1967 in the last years of its service.

Photograph: R. J. McGavin



Photograph: B. Hutton

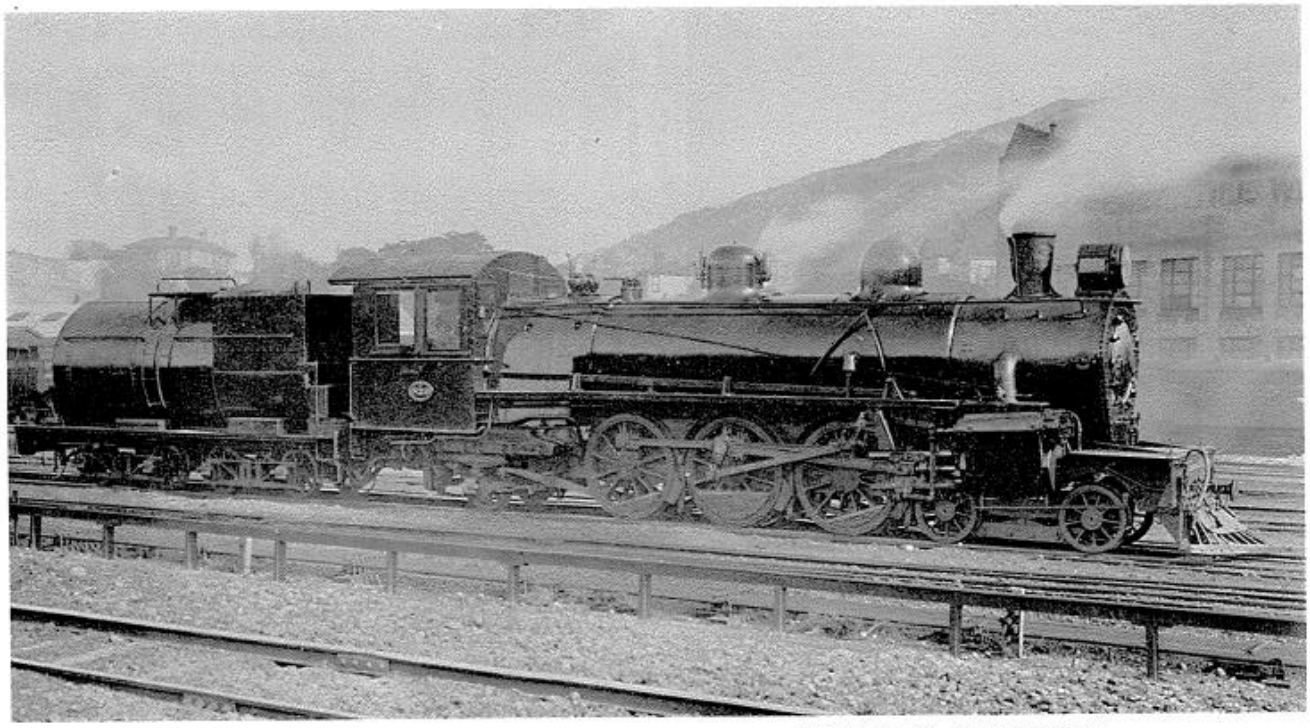
In April 1967, "Ab" 728 leaves Cromwell with the morning goods train to Dunedin, a long 154-mile journey over rugged country.

much heavier loads could be moved at the usual goods train running speeds of 25-30 m.p.h., and the highest ratings in 1919 were 650 tons, as for example between Mercer and Frankton. From Mercer northwards to Otahuhu, where the ruling grade was 1 in 100, the limits were set at 520 tons for goods trains and 380 tons for passenger.

I have mentioned that, by about 1919 or 1920, the "Ab"s were running about 35,000 miles each per annum. During the 1920s, efforts were made to improve the utilisation of equipment, under the pressure of economic circumstances, and averages approaching 50,000 miles a year were ultimately attained. The statistics published in the annual reports until 1960 are useful for assessing the use and general performance of locomotives, and I have selected the ten years from April 1935 to March 1945 for a sample of the extent to which the "Ab"s were used. During these ten years, the 141 "Ab"s ran a total of 58,929,050 miles. This was an average of 417,940 miles per locomotive, or 41,794 miles a year for each engine. The average number of days each year that each locomotive was in use was 274, so that the average mileage run per day in use was 152.

The records show that, during these 10 years alone, 1,653,497 tons of coal were shovelled, *by hand*, into the hungry fireboxes of the 141 "Ab" class locomotives. This figure can be broken down to show that, on average, each "Ab" consumed 1,173 tons of coal a year, which meant about 4.3 tons for each day the locomotive was in use. When one recalls that all this coal was shovelled by hand on a rocking, pitching, tossing, noisy footplate, in all weathers, through a relatively small firebox door, one can gain a small impression of the conditions of life for the enginemen of the day, and of their skill and dedication to the life they had chosen of service to the "iron horse".

In spite of all the hard work, there was for many of these men a strong sense



Photograph: N.Z. Railways Publicity

No. 829, seen here at Thorndon after an overhaul at Hutt Workshops about 1936, was a typical North Island "Ab" of the period. It has been fitted with a Waikato spark arrester in the smokebox, and with a front-discharge smokebox-ash hopper. This is the driver's side.

BELOW: Two "Ab"s pass Tawhai with a Greymouth-Reefton goods train in September 1968

Photograph: D. L. A. Turner

Photograph: B. Prebble

On their way from Invercargill to Lumsden for the official inauguration of the "Kingston Flyer" service on Saturday 18 December 1971, the two restored "Ab"s, Nos. 795 and 778, approach Makarewa.

of pride and achievement as they undertook their daily tasks of moving their heavy trains of human and other freight to the demanding timetables that had been laid down. Often, when they had to nurse a sick engine, their sense of achievement would be heightened by their triumph over adversity.

During the ten years I have mentioned (1935-1945), the busiest time for the "Ab" class Pacifics was from April 1937 to March 1939, while traffic was recovering from the depression, and before the advent of the "J" and "Ka" class eight-coupled locomotives in 1939 and 1940. It was then that the "Ab"s attained an average annual mileage of almost 47,000 per engine, or 167 miles per day in use. Most of their work then was the haulage of trains of all kinds, goods, mixed, suburban passenger, and express, on branch lines and secondary lines as well as main lines, but as they were displaced by more modern power they were used to an increasing extent for shunting and for assisting engine purposes as well as more of the secondary work.

Nevertheless their usefulness was such that, in 1947-48, the eight "Wab" class 4-6-4 tank locomotives remaining in the South Island were converted to "Ab" class 4-6-2s. Then in 1957 three of the "Wab"s in the North Island were sent to Hillside workshops to be similarly converted, making a final total of 152 representatives of the "Ab" class. Meanwhile, however, in 1956, one of the North Island locomotives, No. 745, had been caught in a track subsidence near Hawera and was

(Concluded on page 170)

Tribute to the "Ab" Class

(*Concluded from page 144*)

written off where it lay. The total number of "Ab"s ever in service at one time was thus 151.

Withdrawal of "Ab" locomotives that it was considered uneconomic to overhaul after the process of dieselisation had started began in a small way in the North Island in 1958 and in the South Island in 1960, and accelerated from 1963 onwards. Some 34 "Ab"s were also transferred from the North to the South Island during this period. The last North Island "Ab", No. 832, dropped its last fire at Christmas time, 1967, at Frankton, and was then set aside for preservation by the Museum of Transport and Technology at Western Springs, Auckland. In the same year it was announced that the class leader, No. 608, would be made available to the N.Z. Railway and Locomotive Society for preservation at Ferrymead Historic Park, Christchurch.

The last batch of South Island "Ab"s was written off the books in July 1969, but as is now common knowledge No. 699 had meanwhile been made available for preservation by the Pleasant Point Railway and Historical Society (being moved to its final resting place in November 1970), and Nos. 778 and 795 were subsequently brought out of retirement and restored for the "Kingston Flyer" service between Lumsden and Kingston. The saga of New Zealand's famous "Ab" is accordingly not yet finished.