

Newhaven Pacific
Railway

SIDELIGHTS

... ON ...

THE VICTORIAN RAILWAYS

For any further information, consult The Manager, Publicity and Tourist Services, Administrative Offices, Victorian Railways, Spencer Street, Melbourne, C1.

Issued by The Victorian Railways Commissioners
February 1949

W.P. Durlam

S I D E L I G H T S

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V I C T O R I A N

R A I L W A Y S

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FIRST . . . A PEEP INTO THE FUTURE

IT IS the intention of the Victorian Railways Commissioners not merely to restore pre-war service but to surpass it.

The post-war programme includes the construction of a large number of air-conditioned passenger carriages of "Spirit of Progress" type; modern locomotives for passenger and goods work; modern rail-motor cars; track re-conditioning and strengthening, including a large amount of main-line duplication and extension of suburban lines, with new suburban trains. The total cost will be approximately £15M. spread over a period of about five years.

The aim is to give faster and more comfortable passenger transport; and, for goods traffic on important lines, overnight service will be given to far-distant points.

Although the work has been seriously interfered with by belated deliveries of essential materials, staff shortages, etc., much progress has been made. New country and suburban passenger carriages are under construction as well as new locomotives and a large amount of other rolling-stock.

The construction of modern air-conditioned sleeping cars for the Melbourne - Adelaide service is being undertaken by the South Australian Railways authorities in conjunction with the Victorian Railways Department.

Some of the de luxe rail cars - the engines of which are being obtained in England and the bodies made here - are already in service and proving a boon to country patrons.

No opportunity is being lost to step up the progress of all of the post-war works as materials and manpower become available.

INTRODUCTION

BEHIND the day-to-day job of carrying passengers, goods, live-stock and parcels, there is a wide diversity of solid, often fascinating, work - all finally merging to provide a transportation service so vital to the whole community.

Since the railways are State-owned, it is well that the people of Victoria should try to understand something about the organization and operation of the Department. This publication, therefore, presents some of the factors - ranging from the financial position to details of powerful locomotives - that form part of the railway service today.

"Know Your Railways!" is much more than a slogan : it is a challenge to all Victorians to ensure that their indispensable railway service is maintained and permitted to improve. By practical support, the Victorian Railways will continue to serve the people as they have done for almost 100 years . . .

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FINANCIAL SURVEY

A general view of the financial position of the Victorian Railways (excluding trams and road motors) is presented in the following tables covering operations over the past five years:

Year	Capital expended on lines open \emptyset	Revenue	Total Working Expenses	Interest &c. Charges
	£	£	£	£
'43/44	78,525,655	15,881,888	13,213,417	1,895,527 327,917 x
'44/45	78,576,458	15,258,317	12,832,305	1,896,872 327,824 x
'45/46	79,049,008	14,675,049	12,531,126	1,896,452 312,187 x
'46/47	79,461,181	13,576,885	12,915,783	1,834,269 296,539 x
'47/48	80,178,873	16,321,544	15,224,992	1,856,578 297,806 x

\emptyset Including rolling stock and stores and materials.
x Exchange on interest payments.

Some idea of the demands on rail transportation is given by the following figures:

Year	Passenger Journeys	Goods and Live-stock tonnage
1943/44	194,137,624	8,294,226 x
1944/45	195,697,963	8,063,591 x
1945/46	196,117,567	7,229,025 x
1946/47	170,164,983	7,561,773
1947/48	182,209,652	8,439,760
	x Estimated	

Shortage of coal supplies caused restrictions on train services to be imposed intermittently throughout the year. But for these the business arising from passenger, goods and live-stock traffic, which was at a higher level than in the previous year, would have shown a greater improvement.

The heavily increased expenditure was due chiefly to upward movements in the basic wage and increased marginal awards for salaries and wages, while the continually rising prices for coal and other supplies further aggravated the situation.

A revision of freights and fares, which became operative from October 1, 1947, only partly met this tide of rising expenditure.

Since January 11, 1948, the working week generally has been reduced from 44 hours to 40 hours and made lower in certain grades.

This has had a further adverse effect on the finances, especially in the operating branches where over-time has to be paid in order to maintain the service to the public.

The rapidly mounting expenditure which is outpacing the revenue has caused the return on the Victorian Railways investment to decline to 2.35% on the loan liability as it stood at June 30, 1948.

VICTORIA WELL SERVED BY RAILWAYS

At June 30, 1948, the railways comprised 4,725 route miles of line, of which 4,611 miles were of the 5 ft. 3 in. gauge and the remaining 114 miles, mostly in hilly country, of the 2 ft. 6 in. gauge.

These totals include sections of six track, four track, three track, double track and single track railway. With sidings, etc., the total mileage maintained was 6,096. About 200 miles of 110, 109 and 100 lb. section rails are in use and approximately 2,000 miles of 94 and 80 lb. section, the remainder being principally 60 lb. section.

(Electric tram lines between St.Kilda and Brighton Beach - $5\frac{1}{4}$ miles - and between Sandringham and Black Rock - $2\frac{1}{2}$ miles - are also operated.)

Hardly any appreciable area of arable, pastoral or non-mountainous land is more than eight miles from a railway. Developmental railways were responsible for converting 11,000,000 acres of the Mallee District (in the north-western part of the State) which were regarded as worthless, into a prosperous area covered with thriving settlements and farms.

Long Welded Rails

Welding of rails into longer lengths is the settled policy of the Department. By effecting a reduction in the number of rail joints, longer rails lessen track maintenance costs, increase the life of the rails and reduce wear on rolling stock. In addition, longer rails provide smoother and quieter riding, thus improving travelling conditions for rail patrons.

More than 700 miles of single track in various parts of the country and suburban areas have been welded into lengths varying from 100 to 270 feet.

At a number of locations rails have been welded into exceptional lengths. On the Melbourne-Geelong line, there are two continuous sections of rail - one, 4,748 feet and the other 4,321 feet in length. Rails through two tunnels have been welded into lengths of 1,710 and 1,530 feet.

Detecting Track Defects

Mention should also be made of an ingenious machine by which a higher standard of track maintenance, with greater travelling comfort for train passengers, is achieved. It is the Hallade Track Recorder, a small machine which indicates imperfections in the tracks. The defects are of a kind which, although not ordinarily visible to the naked eye, may cause jolting, oscillating and lurching of railway carriages.

When in use, the machine occupies only a small space in the compartment of a passenger train. As the train speeds on, a band of paper (or chart) is running through the machine accurately recording the nature and location of any track defects.

After the test runs, copies of the chart are distributed to the track force who are then able to adjust irregularities in the tracks in the early stages of their development.

Combating Sand-drift

Concentration of sand on railway tracks in the Mallee district of Victoria where the average annual rainfall is about 12 inches has, in the past, caused the Department much expense. Drifts of sand have been blown onto railway tracks, resulting in lengthy train delays pending clearance of the sand.

To minimize this nuisance in localities affected, wind-chute fences have been erected at a number of places, and very satisfactory results have been obtained. About 13 miles of these fences are in position, and more are in process of erection.

The longest continuous section of chutes is 15 chains, and the highest 30 feet above the rail level.

Old sleepers and timber or corrugated iron are used in the construction of the fences. Each section of fencing is spaced eight feet from the track centre, sloping away from the line on the westward side.

The slopes of cuttings on the leeward side have been flattened, thus providing an uninterrupted passage for the sand. A space of from 3 to $3\frac{1}{2}$ feet has been left at the bottom of the fence.

Air currents strike the upper portion of the fence and are deflected downwards. The sand is gathered in the currents of air travelling at an accelerated speed through the opening in the fence and is carried right across the rails clear of the track.

MILLIONS TRAVEL BY ELECTRIC TRAIN

Conversion of the Melbourne suburban railway lines from steam to electric traction was, at the time, one of the largest schemes to be completed. It was commenced in 1913 and, after delay caused by the First World War, was completed in April 1923. The initial cost was approximately £6M., including the cost of Newport Power Station.

In the scheme, 141 miles of high tension 20,000-volt cable had to be laid underground, and 153 miles of overhead high tension line erected while the necessary traction motor and control apparatus had to be fitted to the carriages required for the service.

The electrified lines comprise about 173 route miles, or 438 single track miles, including sidings. They extend from the central station at Flinders Street for varying distances, the longest being to Frankston, $26\frac{1}{2}$ miles.

Growth of Traffic

Immediately before the first line was electrified, the number of suburban passengers per year was 103,000,000. By the end of 1926, the passenger journeys had grown to 160,000,000. With the development of a metropolitan tramway system, the passenger journeys tended to stabilize, but the average annual number of passenger journeys (including country) has increased to 195,000,000.

The greatest number of passenger journeys in one day was 1,092,350 - October 18, 1934, during the visit of the Duke of Gloucester for Victoria's Centenary Celebrations.

The maximum number of six- and seven-car trains in service in one half-hour is 112, some of them running express through the inner suburbs. A seven-car standard electric train seats 628 passengers, but readily handles crush loads exceeding 1,000.

Current for electric trains is generated at the Newport Power Station, about six miles from Melbourne. The plant has an installed capacity of 85,000 kW. at 0.95 lagging power factor. There are six turbo-alternators, three of which have a continuous capacity of 12,500 kW., two have a capacity of 14,000 kW., and one of 30,000 kW., the latter having a one-hour rating of 37,500 kW.

The power is distributed from the Power Station as a three phase, 25 cycle supply. The smaller machines of 12,500 and 14,000 kW. generate at 3,300 volts and this pressure is increased through the step-up transformer to 20,000 volts. The largest and most modern machine generates at the full pressure of 20,000 volts.

Power is distributed by underground cables to the sub-stations of the inner-suburban area. Beyond that boundary, overhead transmission is used, the conductors being suspended, in most cases, from extensions of the structures carrying the direct current contact wire over the railway tracks.

Sub-stations' Part in Scheme

Twenty-one sub-stations feed this power to the electric traction motors. Four of these have mercury arc rectifier plant installed, and the remainder are

equipped with rotary converter plant for supplying the 1,500-volts direct current to the overhead contact wires.

The largest sub-station is at Jolimont, about a mile from Flinders Street Station. It contains four large converters of 4,500 kW. continuous capacity. In 12 of the smaller sub-stations the equipment is entirely automatic.

A depot for the maintenance and repair of overhead equipment is near the Flinders Street Station. It is equipped with fast motor waggons fitted with the necessary gear for the rapid repair of overhead faults anywhere in the suburban electrified system.

Power Control System

To increase the efficiency of the suburban electrified train service, the whole of the widespread units in the power supply system - sub-stations, circuit breakers, cables and overhead wires - are kept continually and effectively supervised from one central point: a modernly-equipped Power Operations Room in the Flinders Street Yard.

Here, the focal point is a large diagram of all the components of the electrified railway system with the various switches, circuit breakers, etc., picked out by small coloured lamps which are automatically illuminated when a fault occurs.

Thus, any abnormal conditions are immediately observed, the location defined, and instant remedial action taken. Also, control can be exercised over the power supply required to meet changes due to traffic fluctuations.

Multiple unit electric trains operating the suburban services are composed of sliding door and swing door cars. The former is the more suitable and has been adopted as standard for all future coach construction.

A normal train at busy periods consists of three motor and four trailer coaches; during the slack periods of the day these trains are cut down to one, two or four coaches, according to traffic needs.

Electric Train Stock

At present, there are 602 sliding-door and 276 swing-door cars, and these are made up into seven-car trains (three first- and four second-class on certain lines; three first- and three second-class and one composite first- and second-class smoker on others).

Each motor coach is fitted with four motors of 140 h.p. continuous capacity, each with single-reduction gearing having a ratio of 3.2 to 1. The motors are of the self-ventilated type. Each motor coach has one pantograph collector of the sliding-pan type, a dynamotor supplying control and lighting current, a motor driven air compressor, and the necessary control gear.

If an electric train driver should attempt to pass a signal at danger, an automatic trip gear will engage with an arm at the side of the track; that contact will cut off the power to the train and apply the brakes.

The control is of the G.E. Type M. all electric, and gives six series steps, and five steps with two pairs of motors in series parallel. The master controller is fitted with a "dead man's handle" which necessitates the driver keeping his hand on the controller handle to prevent the brakes being applied.

For suburban goods haulage and for use as shunting locomotives in the yards, there are 12 electric locomotives.

Five electric parcels coaches run to fast schedules on certain suburban lines. They relieve the ordinary passenger trains of parcels traffic, thus contributing to faster passenger services.

TRAIN CONTROL SYSTEM

The system of Train Control is in keeping with the most modern methods of controlling the movements of trains. By means of a special telephone system, Train Controllers at selected locations in Victoria supervise the movements of all trains throughout the State.

In normal times, the main advantage of the system over the previous method of train operation is that it keeps the traffic moving more efficiently and expeditiously.

This is reflected in better timekeeping, a reduction of unproductive mileage, the use of fewer locomotives, and the carrying of greater loads.

Headquarters of the system are in the Head Office at Spencer Street. District control points are located at Geelong, Ballarat, Ararat, Bendigo and Seymour.

Network of Telephones

Special telephone apparatus is installed at every signal box, station office, goods yard and locomotive depot within the controlled area, and is connected to the control office of the particular district.

By this means station staffs and others advise the Train Controllers of the arrival and departure times of all trains and the tonnages attached or detached.

The information is then recorded on graphs and the Train Controller knows at a glance how each train in his section is running and what load it hauls.

The Train Controllers also arrange any special goods trains that may be required over and above the regular services to clear extra loading.

Including the suburban area, the Train Control System now covers 2,400 route miles of railway and includes 712 control points.

OTHER TELEPHONE AND TELEGRAPH SERVICES

A comprehensive telephone system provides telephone inter-communication with all important centres. In addition to the special telephones connected to the Train Control Offices, the majority of the railway stations throughout the State are linked by telephone with the various district administrative centres.

At these centres modern telephone switchboards are installed with provision for switching railway trunk and postal lines to all offices associated with railway activities.

At the Administrative Offices, Spencer Street, Melbourne, a 1,000-line automatic telephone exchange is installed to provide inter-communication between executive officers and staff in the Head Office and all suburban stations, workshops, goods sheds, etc.

Also it provides connexion to railway trunk lines and all subscribers within the postal telephone network.

Carrier Telephone System and Teleprinters

Preparations are being made for the installation of a carrier telephone system and teleprinters under which Melbourne will be linked with Seymour, Benalla, Albury and Sydney.

This high frequency carrier telephone system, which provides a greatly improved standard of telephone transmission, will be super-imposed upon the existing physical circuit.

Six high speed telegraph channels, on which teleprinters will be connected, will be fitted between the upper limit of the normal voice range of the physical circuit and the lower limit of the carrier telephone system.

One physical circuit, three carrier channels and six telegraph circuits will then be operating on one pair of wires.

Recorded Automatically

By transmitting messages and automatically recording them at the receiving end in typewritten form, the teleprinter combines the advantages of the telegraph and the typewriter.

A teleprinter can be used continually at speeds of up to 60 words a minute, which is about twice the maximum speed of a skilled Morse operator.

Operating for 24 hours each day, the Telegraph Office in the Administrative Offices has 25 Morse instruments. Upwards of 5,000 inwards and outwards telegrams, dealing with all manner of railway domestic

affairs, are handled each day, supplemented by about 1,000 telephone calls.

All interstate north- and west-bound railway telegraph business is relayed through the Spencer Street Telegraph Office.

"Telling the Passengers"

Public address equipment is installed on the city stations, also at five suburban and six country stations to "broadcast" train information to the traveling public. Similar equipment has been fitted in main goods and passenger yards in city and country areas to expedite the transmission of instructions to shunters and signalmen regarding the movements of trains and shunting of trucks, etc.

PRINCIPAL PASSENGER & FREIGHT TERMINALS

The busiest passenger station on the Victorian Railways system, and one of the busiest railway stations in the world, is Flinders Street, which includes Princes Bridge. According to the last tally taken in 1941, the daily average number of passengers passing through the barriers was 310,761 compared with 282,426 in 1934. Sixteen platforms are in constant use, with a total face length of $1\frac{3}{4}$ miles.

For handling the daily peak period traffic, 112 trains, mainly of seven-cars each, are used; at other times, 61 trains principally of four-cars each, are in service.

On the day of the record-breaking suburban rail traffic (mentioned on Page 9), over 500,000 passengers passed through Flinders Street Station.

During the day, 2,562 trains arrived at and departed from Flinders Street and Princes Bridge Stations - an increase of 448, or 21 per cent over normal.

Over a two-hour period, trains were being signalled at the rate of 102 per hour, or an average of one every 36 seconds, at the west end of Flinders Street Station.

The Melbourne Yards cover an area of approximately 440 acres and embrace passenger and goods running lines - 89 being gravity sidings - and sidings equal to 137½ miles in length.

The yards, as a whole, fall roughly into three groups: Melbourne Goods Yard, Melbourne (Spencer Street) Passenger Yard, and Flinders Street and Princes Bridge Yard.

The Melbourne Goods Yard consists of three sections: the inner goods yard (comprising approximately 100 roads divided into three sections); North Melbourne gravitation sidings (47 roads); and South Kensington gravitation sidings (20 roads). In the inner portion of the yard are the various goods sheds and sidings.

Big Truck Movements

Under normal conditions the average number of inwards and outwards main line trains dealt with daily is 169, while the average number of trucks received and sent out each day is 5,391.

The greatest number of vehicles handled in and out on any one day was 6,810. These figures are exclusive of truck movements in the yard itself.

At the Spencer Street Passenger Yard, country passenger trains are assembled prior to being drawn to the platforms. In the yard is the plant for heating footwarmers, as well as the dining car depot and laundry.

The Flinders Street and Princes Bridge Yard is used for handling suburban passenger trains, also country passenger trains for eastern and south-eastern lines.

SIGNALLING AND INTERLOCKING

SIGNALLING and safeworking arrangements are up to the best standards. For double line working automatic signalling, track block working and absolute manual block systems are in use, while the permissive system is in force over two miles of line.

The bulk of the single lines are worked under the electric train staff, the train staff and ticket and section order systems.

Electric tablet, absolute permissive block and lever locking and track control systems are in force over some short sections.

Automatic staff exchanging apparatus has been fitted on all single line sections over which interstate express trains operate, and on certain main country lines.

First Interlocking Frame

The first interlocking frame on the Victorian Railways was installed in 1876, the block telegraph in 1880, the needle block instrument in 1883, the electric tablet instruments in 1892, lock and block instruments in 1896, track circuit control of signals in 1897, electric staff instruments in 1897, and three position signalling in 1915.

In later developments, electric locking was superimposed on the mechanical machine which provides a ready means of securing control of levers from adjacent signal boxes and also of holding a route once a signal has been placed at proceed.

Subsequently, the electro-mechanical machine, as at South Yarra, was introduced. Here the points are worked mechanically by rodding, but the signals are electrically controlled by miniature levers above the larger point levers.

Later, the all-electric interlocking machines, as used at Viaduct Junction and Franklin Street, West Melbourne, were installed.

Ultimate in Safety

These machines have every possible safeguard against error, failure or misplacement of apparatus and, with the aid of illuminated track diagrams (which show the position of all trains in the area controlled by the signalman), represent the most up-to-date methods.

This system is more flexible than the electric staff as, with intermediate signals, the section can be divided for two or more following trains. That facility can be secured under the electric staff system only by expensive methods.

LOCOMOTIVES AND ROLLING STOCK

ON June 30, 1948, the locomotive stock of the Victorian Railways comprised 569 units: 555 for 5 ft. 3 in. gauge lines; the balance for 2 ft. 6 in. gauge lines, (including two "Garratt" type engines, each of 27,650 lb. tractive effort).

For express passenger service and fast goods work, there is the 4-6-0 type ("A2" Class) locomotive, with a tractive effort of 27,480 lb. For heavy goods work, the 2-8-0 consolidation type ("C" Class) locomotive with a tractive effort of 38,400 lb. is used.

A lighter engine of the 2-8-0 ("K" Class), with a tractive effort of 28,650 lb., operates goods traffic on light lines. "N" class locomotives, which also operate on light lines, are of the 2-8-2 "Mikado" type, with the same tractive effort as the "K" class.

Orders have been placed for the building of 70 "N" Class locomotives -- 50 to be imported from England, the balance to be made by a private engineering company in New South Wales which will also construct 20 "R" Class locomotives. The "R" is a new, improved type of passenger locomotive, designed by V.R. engineers, and capable of speeds up to 70 m.p.h.

For the first time in Victorian Railways' history, diesel-electric shunting locomotives, imported from England, are to be used on this system. Orders have been placed for 10, mainly for use in the Melbourne Goods Yard.

To make this State less dependent upon black coal from New South Wales, two steam locomotives are to be converted, on trial, to pulverized brown coal firing. The equipments have been obtained from Germany where, over a period of approximately 10 years immediately prior to the Second World War, the State Railways operated a limited number of converted locomotives under service conditions with pulverized brown coal as a fuel.

Famous "S" Class Locomotives

A striking tribute to the Victorian Railwaymen who designed and built them, the four "S" Class ("Pacific") locomotives have given outstanding service since they were introduced between 1928-1930.

They resulted in the authorized load for a single locomotive being increased and for longer non-stop runs between Melbourne and Albury.

"Spirit of Progress" - the streamlined, air-conditioned train which runs 190 miles non-stop between Melbourne and Albury on the Melbourne-Sydney inter-capital service - is hauled by one of these "S" Class locomotives.

The average overall speed with a load of 11 cars, 547 long tons, is 53.2 miles per hour; in the reverse direction it is 49.7 miles per hour. The maximum authorized speed is 70 miles per hour.

Historic Names

When streamlined and painted royal blue with two gold bands in 1937 to harmonize with "Spirit of Progress", these four locomotives were given distinctive names that perpetuate the names of men prominent in the early history of the State: S.300 - "Matthew Flinders"; S.301 - "Sir Thomas Mitchell"; S.302 - "Edward Henty"; and S.303 - "C.J. Latrobe".

From the time when they were first put into commission up to December 11, 1948, the four "S" Class locomotives had covered a total of 4,560,659 miles.

Valuable Work by "H" Class Locomotive

Reference should also be made to the giant "H" Class locomotive (No.220). This locomotive was also designed and built by departmental engineers and craftsmen and is intended eventually to operate "The Overland" express passenger train service between Melbourne and Ararat on the Melbourne - Adelaide inter-capital service without the need for double-heading.

Pending the strengthening of that track, it is performing invaluable service on fast goods operation between Melbourne and Albury. Since it began running in 1941, it has run 503,437 miles.

In 1929, a heavy type of goods locomotive, the "X" Class, was introduced to handle more efficiently the larger trains being operated.

This type of engine has a roadworthy weight of 185 tons 6 cwt. and a tractive effort of 39,360 lb. or 48,360 lb. with booster operating. All but one of the 25 engines of this type are fitted with boosters.

Main dimensions and particulars of the five principal types of locomotives in use are given in the Appendix - Pages 32 to 34.

The best modern practice has been followed in the construction of these locomotives, with modifications to suit local conditions.

The boilers of the "X", "N" and "S" types are of liberal dimensions, especially in the firebox and grate area, for the burning of the low-grade black coals from the State Coal Mine which have a calorific value of 11,500 B.T.U. and an ash content of 12 per cent.

The Walschaert valve gear has been adopted as standard practice, and speed recorders are installed.

Due to recurring coal shortages, the Victorian Railways Department has been reluctantly obliged to use firewood and oil as substitute fuels for locomotives. So far, about 275,000 tons of firewood have been used on goods and shunting locomotives.

As the calorific value of one ton measurement of dry firewood is about one-third of that of one long ton (2240 lb.) of coal, the wood consumed represented an approximate saving of 90,000 tons of coal - a distinct help in the most difficult fuel situation in the Department's history.

Firewood's Limitations

In the warm summer months, the use of firewood in locomotives is discontinued owing to fire hazards to grasslands and other property paralleling railway lines.

To this limitation, must be added difficulties of distribution to many extra fuelling points, as well as delays to trains because of stoppages for re-fuelling.

On a relatively short run of 100 miles a goods train burning coal would not re-fuel until reaching its destination. However, with a wood-burning locomotive over the same route, stops have to be made to re-fuel at three points en route.

Oil-burning Locomotives

The conversion of 81 locomotives from coal to oil-burning was commenced in June 1946. Although satisfactory running results have been obtained, this action is only a temporary expedient.

It is the Department's intention to re-convert the locomotives for coal-burning when adequate supplies of coal can be relied upon as the cost of oil fuel is very high.

When the conversion scheme is completed, there will be a saving of approximately 2,500 tons of coal a week. The oil capacity of the improvised tank of each locomotive is 1,500 imperial gallons, sufficient for a return passenger trip of about 260 miles without refuelling.

There are 754 country steam passenger cars in service, including country carriage stock comprising 193 first-class, 390 second-class, and 171 composite vehicles. It is generally of the four- and six-wheel bogie types with corridor throughout and vestibule, lavatory and wash basin at each end. There are 39 other vehicles, including sleeping, dining, buffet and parlour cars.

Construction of 20 modern, all-steel, air-conditioned carriages (of "Spirit of Progress" type) for main line passenger trains is proceeding.

Australia's Finest Train

"Spirit of Progress", which runs daily in each direction (Sundays included) on the Melbourne-Albury portion of the Melbourne-Sydney service, compares favourably with any train of its type in the world.

Consisting of streamlined, air-conditioned sitting, dining and parlour cars, the train is of all-steel construction, with the interiors fitted out with polished veneered panels featuring Australian timbers.

"The Overland", which runs daily (Sundays included) between Melbourne and Adelaide, provides for both sitting and sleeping car passengers. Sleeping compartments, which are of the two-berth type, are provided with wardrobes, berth lights, fans and wash basins. New sleeping cars containing a number of single berths, of "roomette" type, for use on "The Overland" are being constructed, by arrangement, in the Railway Workshops at Islington, South Australia.

Light petrol-driven rail motors have served sparsely settled districts with an economic service where steam passenger trains would not be justified.

Now, these vehicles are being replaced, orders having been completed for 30 diesel rail-cars, ranging in capacity from 102 h.p. and seating accommodation for 40 - 45 passengers for use on branch lines of light traffic, to units of 280 h.p. capable of seating about 100 passengers for service on main and important branch lines. Several diesel rail-cars are already in service and are proving highly popular with passengers.

Petrol-electric rail motors are the most powerful of the rail motor fleet. Their power equipment consists of a 200 h.p. six-cylinder Winton petrol engine directly coupled to a generator and exciter, which supplies power to two main traction motors of 140 h.p. each, and to a lighting and starting battery.

The car is designed for a speed of 60 m.p.h. on level track with trailer attached. Of these there are 10 operating at present, each with seating accommodation for 54 passengers. There are now 42 rail motors and 30 trailers in service.

Trucks For All Purposes

The bulk of the freight stock is of the four- and six-wheeled type, but there is a fair percentage of bogie stock. All-steel construction is standard. The open type of waggon with tarpaulins for use according to weather conditions is the general utility truck, the relatively mild climate not demanding the use of box waggons.

Covered waggons of the refrigerated and louvre types are, however, utilized for frozen meat and perishable products. There are also sheep, cattle, hopper, water and flat trucks, and special vehicles for the transport of racehorses, etc.

There are 20,043 freight and 886 service vehicles in use.

In the latest designs of freight rolling-stock, provision is made for the use of electric welding in their construction.

Automatic couplers are fitted to this stock, also a transition chain to enable them to be coupled to vehicles with either automatic couplers or draw hooks.

RAILWAY WORKSHOPS AND LOCO DEPOTS

ONE of the largest establishments of its kind in the Southern Hemisphere, the Newport Railway Workshops undertakes the construction of almost everything connected with the Rolling Stock Branch: from nuts and bolts to the huge "H" class locomotive, and from hammer heads to the streamlined, air-conditioned carriages of "Spirit of Progress".

Besides the constructional work mentioned, a big and continuing amount of repair, maintenance and conversion work on locomotives, carriages and trucks is carried out.

Because of these varying types of work, it is impossible to give output figures which would adequately convey the valuable operations performed at these Workshops since their inception 60 years ago.

However, some outstanding production performances at the Newport Workshops may be of interest:

	<u>Maximum number built</u> <u>in one year</u>
Locomotives	52
Passenger cars, vans and sundry stock	212
Freight waggons	937
Locomotive boilers	74

Approximately 3,300 men are employed in a great variety of callings. The workshops and ancillary tracks extend over 130 acres.

Two sets of a remarkable, modern railway equipment - the supersonic flaw detector - arrived from England during 1948 for use initially at the Newport Workshops.

Based on the principle of radar, the detectors are used to detect hidden flaws in axles, without the costly necessity for stripping wheels.

The modern Testing and Research Laboratory is responsible for inspecting and testing materials, and analysing coal, water, etc. A well-equipped Ambulance Room and a spacious dining room service for employees are important adjuncts to the Workshops.

Fully equipped workshops are also located at Ballarat and Bendigo, distant respectively 74 and 100 miles from Melbourne. These undertake the repair work of the steam stock in the districts in which they are situated.

Workshops at Jolimont

For the equipping and maintenance of electric rolling-stock, workshops have been established at Jolimont, near the metropolitan terminal. They comprise fitting, turning and general repair shops, inspection shop and body repair and paint shop, as well as offices and stores.

All electric trains come into the inspection shop after 3,500 miles running (approximately once every three weeks), for re-wheeling every 50,000 miles (approximately once a year), and for minor overhaul every 150,000 miles (approximately every 2½ years).

Also there are workshops, under the control of the Way and Works and Electrical Engineering Branches, in which equipment for construction purposes and renewals is manufactured and repaired.

Largest and most important locomotive depot on the Victorian Railways system is at North Melbourne. From this point, crews are supplied for about 190 locomotives which are serviced at the Depot. These locomotives are used on passenger and goods trains radiating from Melbourne.

Approximately 950 men, including 250 Drivers and 150 Firemen, are employed at the Depot; the remainder consists of many grades of tradesmen principally engaged on the maintenance of locomotives.

Any locomotives requiring minor repairs, etc., are dealt with at the North Melbourne Locomotive Depot; otherwise, they are sent to the Newport Workshops for attention.

DEPARTMENTAL FOOD SERVICES

UNDER normal peacetime conditions, travellers on the Victorian Railways desiring meals or light refreshments are catered for at 35 stations.

They provide either a dining room or a counter service. Also there are 16 stalls at railway stations at which large quantities of fruit, fruit-juice drinks and confectionery are sold.

The Department possesses four buffet cars which provide grills, soups and light refreshments in transit. Also there is one dining car upon which dinners, breakfasts and light refreshments are served to passengers travelling on "Spirit of Progress", which runs daily in each direction between Melbourne and Albury.

In addition, there are nine canteens for members of the railway service at workshops, depots, etc. Of these, five serve hot meals; the balance, light refreshments.

Dining Car Depot's Varied Activities

Foundation of these activities is the Dining Car Depot, which is situated conveniently close to the Melbourne terminal. In the well-equipped kitchen, a vast amount of food is prepared and cooked each day for distribution to dining rooms, the dining car and buffet cars.

Also there is a bakery and a butchery. Table cloths, towels, sheets, pillow-slips and staff uniforms form part of the 120,000 articles which pass through the departmental laundry at the Dining Car Depot each month.

Portion of the egg requirements of the departmental food services is supplied from the departmental Poultry Farm where, during 1947-48, over 30,000 dozen eggs were produced.

All the abovementioned activities are under the control of the Superintendent of Refreshment Services who is also responsible for the management and operation of two guest-houses situated at Mt. Buffalo National Park and Mt. Hotham respectively in the Australian alpine region of North-eastern Victoria.

SPECIAL ACTIVITIES

THE Publicity and Tourist Services handle all publicity matters such as the stimulation of all classes of rail traffic, tourist publicity and the preparation and distribution of tourist booklets, pamphlets, etc.

Preparation and screening of documentary and tourist films, and the organization of the "Reso" and "Holiday Train" tours are other functions of this section.

The Victorian Government Tourist Bureau, with local and interstate branches, is also controlled by the Publicity and Tourist Services with which the Betterment and Suggestions Board is also associated. The Board investigates suggestions for improvements in railway operation submitted by members of the service and the public.

Up to the present, over 49,000 ideas have been received: of those, about one in six have been adopted. The Engineering Member of the Board is Chairman of the Railways Safety Council which controls Safety First activities in the Department.

The Department has helped the primary producer by the preparation and distribution of propaganda to increase the local consumption of various kinds of vegetables and fruit. Soft and citrus fruit growers are further assisted by the sales of fruit and fruit juice drinks at stations; their special featuring on dining car and refreshment room menus; and their liberal use in many recipes prepared by departmental chefs. The dried fruit industry is similarly assisted.

The Advertising Division of the Refreshment Services Branch controls the sale of advertising space on departmental premises, i.e., station hoardings, show cases on station platforms, railway carriages, etc. For the twelve months ended June 30, 1948, the activities of the Advertising Division resulted in a gross revenue of £45,752.

Road Motor Services

Road motor passenger transport conducted by the Department consists of four services - three within the metropolitan area, and one in the country, as follows:-

- (a) Road service has been substituted for the rail service on the East Camberwell - Deepdene - East Kew branch line where it was found that the traffic offering did not justify the cost of electrifying the line, or in continuing to provide either a steam or a rail motor service.
- (b) Between Hawthorn - Kew, an "off peak" road service is provided; this is more economical than a train service.
- (c) Between Sandringham - Black Rock - Beaumaris via Beach Road,
- (d) Between Porepunkah and The Chalet, Mt. Buffalo National Park, for the transport of guests from and to the railhead.

In addition to these passenger services, the Department operates at Melbourne and Geelong road collection and delivery services for goods carried by rail. By this means, some check has been placed on road competition, and substantial traffic conserved to the railways.

A goods transfer system is in operation within the suburban area, and many small consignments which formerly had to wait for a scheduled train are now being economically and expeditiously carried between the metropolitan terminal and certain suburban stations by daily departmental road service.

In addition, motor trucks and trailers, fitted with specially insulated containers, are in use for the transport of export butter from cool stores to the ship's side at the Port of Melbourne.

Departmental road service is also extensively used for domestic work between various depots and stations in the suburban area.

Opportunities for Apprentices

It is widely recognized that the system of training adopted for Apprentices in the Victorian Railways has no superior in Australia.

From the date of their appointment, Apprentices are under the direct control of the Supervisor of Apprentices, who takes an active, personal interest in their lives, both on and off the job.

For the first three years, they are given part-time instruction in technical subjects at the Department's own Technical College at Newport.

For outstanding apprentices there are a number of scholarships to the University or Senior Technical Schools.

This becomes the main avenue leading to appointment as professional engineers. Scholarship winners are paid a regular living wage in addition to fees whilst undergoing the five years' full-day course.

Educational Course for New Employees

Schools of instruction in elementary principles, conducted by selected officers, are established. Probationary Porters are required to pass through these classes.

Short lectures are given on "Safety First" principles, "Personal Appearance", "Conduct towards the Public", "Economy", and any other matters affecting transportation employees.

Instruction is imparted in various branches of passenger, parcels and luggage work and the conducting of parcels and luggage business, both at the forwarding and destination stations. General instruction is given on suburban and country tickets, also in station work generally.

Payment at full time rates is made to all staff, and lads attending ordinary classes of instruction who are eligible, are paid a "living away from home" allowance.

A similar procedure exists for preliminary training of Engine Cleaners - the starting point for Locomotive Firemen and Drivers.

Modern Printing Works

Modern plant and equipment are features of the Railways Printing Works at North Melbourne. Huge quantities of books, forms, waybills, special time-tables, etc., are produced each year.

Also there is a very large output of publicity material dealing with the stimulation of rail travel. In a pre-war year, about 2,000,000 separate pieces of publicity, including booklets, folders, handbills and leaflets, were printed.

Ambulance Organization

The safety of the public is of paramount importance. All passenger trains and all stations are supplied with ambulance equipment whilst in the Melbourne metropolitan area and at larger country centres, corps of trained ambulance men are available in emergencies.

First-aid qualifications are necessary for appointment as Guards or Conductors of all trains.

In addition, the Department has a casualty ambulance road vehicle completely fitted so that, in case of emergency, the best skilled attention can be given at the site of any accident.

Classes of instruction in ambulance work are held at all important centres; consequently many employees throughout the service are qualified to render first aid, if required.

Medical Division

Members of the railway service are required to be of a high standard of physical fitness.

To achieve that aim, three members of the medical profession, including the Chief Medical Officer are engaged full time in the Medical Division examining sick and injured employees; also on physical and vision and hearing examinations at intervals of all employees on safeworking duties.

Appointees to the service are examined in the Medical Division before being engaged. For the year ended June 30, 1948, there were 14,304 physical examinations and 14,976 vision and hearing.

Photography Division

Possessing the most modern camera and printing equipment, the Departmental Photography Division is responsible for a great variety of work. This includes scenic photographs in railway carriages, also in travel booklets and window displays at the Victorian Government Tourist Bureau and branches.

There are many thousands of photographs of all aspects of railway operation and equipment. Copies are available for sale in varying sizes.

Of equal importance is the huge number of blue and white prints produced for the Department's engineering and architectural sections.

Victorian Railways Institute

Catering for the educational, social and sporting activities of members of the railway service and their families, the Victorian Railways Institute has 18 country centres and sub-centres.

It is controlled by a Council: some are elected by members; others are appointed by the Railways Commissioners.

A nominal annual fee of 17/4d. for adult males and less for others covers full membership, and the roll totals over 16,000.

Classes are available in an extensive range of railway and non-railway subjects. There are many social and sporting activities ranging from radio to football. A circulating library contains about 61,000 volumes.

During the Second World War, the Institute was mainly responsible for the administration and organization of the Victorian Railways Patriotic Fund. When the Fund closed, more than £70,000 in cash and kind had been raised and disbursed for the purchase of comforts, mobile canteens, ambulances and hospital equipment.

SOME SIGNIFICANT DATES IN

VICTORIAN RAILWAYS' HISTORY

- 1852 Private railway companies formed in Victoria.
- 1854 First steam railway in Australia, Flinders Street to Sandridge (now Port Melbourne), opened for traffic: September 13.
- 1856 Victorian Railways Department established: March 19.
- 1857 First Victorian country railway (Geelong to Melbourne) opened by a private company: June 25.
- 1858 Spencer Street Station built (since extended).
- 1859 First Government railways opened from Melbourne to Williamstown: January 17; and to Sunbury: February 2.
- 1862 Lines opened from Melbourne to Ballarat: April 11; and to Bendigo: October 21.
- 1871 First locomotive built (at Williamstown Workshops) by the Victorian Railways.
- 1873 Line from Melbourne to Wodonga completed: November 21.
- 1879 Line from Melbourne to Sale completed: April 2. Melbourne and Hobson's Bay United Railway Company's suburban railway service purchased by Government: July 1.
- 1883 Melbourne - Sydney service opened: August 21.
- 1884 Victorian Railways Department placed under management of three Commissioners: February 1.
- 1887 Victorian and South Australian Railways connected at Serviceton: January 19. This development provided the first Sydney-Melbourne-Adelaide railway link.
- 1888 Newport Workshops opened (major extensions in 1927).

- 1891 Viaduct between Flinders Street and Spencer Street Stations constructed. Duplication (as today) completed in 1917.
- 1892 Victorian Railways Administrative Offices, Spencer Street, built.
- 1893 First locomotive built at Newport Workshops.
- 1906 St. Kilda to Brighton electric tramway opened: May 7.
- 1910 Flinders Street Station built. Victorian Railways Institute opened. "Tait" (sliding door) carriages introduced on suburban lines.
- 1913 Electrification of Melbourne suburban railways commenced in December. (Progress delayed owing to First World War.)
- 1917 Workshops at Ballarat North and Bendigo North opened.
- 1919 First electric train service, Essendon to Sandringham: May 28.
- 1923 Electrification of Melbourne suburban railways virtually completed.
- 1926 Train Control System commenced operating.
- 1928 First of "S" Class (Pacific) locomotives built at Newport Workshops.
- 1935 First air-conditioned passenger carriage (36'AE') in British Empire placed in running on Melbourne-Albury line: December 23.
- 1937 Air-conditioned, streamlined "Spirit of Progress" (built at Newport Workshops) commenced on Melbourne-Albury section of Melbourne-Sydney express passenger train service: November 23.
- 1941 "H" (220) Class locomotive built at Newport Workshops.

A P P E N D I X

Main dimensions and details of five principal types of locomotives.

"S" CLASS (SUPERHEATER) LOCOMOTIVE : TYPE 4-6-2:

Cylinders (3), diameter	20 $\frac{1}{2}$ in.
Cylinders, piston stroke	28 in.
Wheels, coupled, diameter	6 ft. 1 in.
Wheelbase, rigid	13 ft. 4 in.
Wheelbase, (engine and tender) - total	76 ft.
Length overall	85 ft. 6 in.
Weight in working order:	
Engine	114 tons 10 cwt.
Tender	<u>107 tons 11 cwt.</u>
	TOTAL
	222 tons 1 cwt.
Adhesive weight	70 tons 10 cwt.
Boiler heating surface:	
Tubes	2,871 sq. ft.
Firebox	250 sq. ft.
Superheater	<u>631 sq. ft.</u>
	TOTAL
	3,752 sq. ft.
Boiler pressure	200 lb. per sq. in.
Grate area	50 sq. ft.
Tractive effort at 85% boiler pressure	41,100 lb.
Tender:	
Tank capacity	13,000 gal.
Coal capacity	8 $\frac{1}{2}$ tons.

"H" CLASS (SUPERHEATER) LOCOMOTIVE : TYPE 4-8-4:

Cylinders (3), diameter	21 $\frac{1}{2}$ in.
Cylinders, piston stroke	28 in.
Wheels, coupled, diameter	5 ft. 6 in.
Wheelbase, rigid	17 ft. 6 in.
Wheelbase, (engine and tender) - total	82 ft. 1 in.
Length overall	92 ft. 5 $\frac{3}{4}$ in.
Weight in working order:	
Engine	146 tons 10 cwt.
Tender	<u>113 tons 11 cwt.</u>
	TOTAL
	260 tons 1 cwt.
Adhesive weight	92 tons 12 cwt.
Boiler heating surface:	
Tubes	3,613 sq. ft.
Firebox	367 sq. ft.
Superheater	<u>800 sq. ft.</u>
	TOTAL
	4,780 sq. ft.
Boiler pressure	220 lb. per sq. in.

Contd.

"H" CLASS (SUPERHEATER) LOCOMOTIVE : TYPE 4-8-4(contd.)

Grate area	68 sq. ft.
Tractive effort at 85% boiler pressure	55,000 lb.
Tender:	
Tank capacity	14,000 gal.
Coal capacity	9 tons.

"C" CLASS (SUPERHEATER) LOCOMOTIVE : TYPE 2-8-0

Cylinders (2), diameter	22 in.
Cylinders, piston stroke	28 in.
Wheels, coupled, diameter	5 ft. 1-5/8 in.
Wheelbase, rigid	17 ft. 0 in.
Wheelbase (engine and tender) - total	58 ft. 2 1/2 in.
Length overall	64 ft. 4 1/2 in.
Weight in working order:	
Engine	81 tons 10 cwt.
Tender	<u>46 tons 14 cwt.</u>
TOTAL	128 tons 4 cwt.
Adhesive weight	73 tons.
Boiler heating surface:	
Tubes	1,921 sq. ft.
Firebox	175 sq. ft.
Superheater	<u>353 sq. ft.</u>
TOTAL	2,449 sq. ft.
Boiler pressure	200 lb. per sq. in.
Grate area	32 sq. ft.
Tractive effort at 85% boiler pressure	38,400 lb.
Tender:	
Tank capacity	4,700 gal.
Coal capacity	6 tons.

"X" CLASS (SUPERHEATER) LOCOMOTIVE : TYPE 2-8-2

Cylinders (2), diameter	22 in.
Cylinders, piston stroke	28 in.
Wheels, coupled diameter	5 ft. 1-5/8 in.
Wheelbase, rigid	17 ft. 0 in.
Wheelbase, (engine and tender) - total	67 ft. 0 3/4 in.
Length overall	77 ft. 4 1/4 in.
Weight in working order:	
Engine	102 tons 18 cwt.
Tender	<u>82 tons 8 cwt.</u>
TOTAL	185 tons 6 cwt.
Adhesive weight	74 tons 5 cwt.
	Contd.

"X" CLASS (SUPERHEATER) LOCOMOTIVE : TYPE 2-8-2(contd.)

Boiler heating surface:

Tubes	2,364 sq. ft.	
Firebox	251 sq. ft.	
Superheater	<u>540 sq. ft.</u>	
TOTAL		3,155 sq. ft.

Boiler pressure	205 lb. sq. in.
Grate area	42 sq. ft.
Tractive effort at 85% boiler pressure	39,360 lb.
Tractive effort of "booster"	<u>9,000 lb.</u>
TOTAL	48,360 lb.

Tender:

Tank capacity	8,600 gal.
Coal capacity	9 tons.

"A2" CLASS (SUPERHEATER) LOCOMOTIVE : TYPE 4-6-0

Cylinders (2), diameter	22 in.
Cylinders, piston stroke	26 in.
Wheels, coupled, diameter	6 ft. 1 in.
Wheel base, rigid	13 ft. 4 in.
Wheelbase, total engine & tender	53 ft. 6-1/8 in.
Length overall	62 ft. 6-7/8 in.
Weight in working order:	
Engine	72 tons 7 cwt.
Tender	<u>45 tons 15 cwt.</u>
TOTAL	118 tons 2 cwt.

Adhesive weight	52 tons 2 cwt.
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Boiler heating surface

Tubes	1,568 sq. ft.	
Firebox	145 sq. ft.	
Superheater	<u>341 sq. ft.</u>	
TOTAL		2,054 sq. ft.

Boiler pressure	185 lb. per sq. in.
Grate area	29 sq. ft.
Tractive effort at 85% boiler pressure	27,480 lb.

Tender:

Tank capacity	4,700 gal.
Coal capacity	6 tons.

Choose a Railway Career . . and Security

JUNIOR CLERKS—with Intermediate Certificate. Commencing salary according to age (16 or under, £182 per annum), with automatic advancement to £516 at age 28. Junior Clerks at stations are paid the adult basic salary at 19 years of age; others at 20 years of age.

ADULT CLERKS—with Intermediate Certificate. Ex-service-men under 30 years of age; others under 25 years. Commencing salary £331 to £374 according to age and experience, with automatic advancement to £516. Higher rates on promotion.

TRAINEE ENGINEMEN—commence as Engine Cleaner and advance to Fireman, Locomotive Driver or Electric Train Driver receiving up to 35/10 per day. Age limits: 18 and under 30 years. Trainee Enginemmen receive adult basic wage at 19 years of age. Good prospects of promotion.

JUNIOR AND ADULT PORTERS—may graduate to Signaller, Shunter, Guard, Yard Foreman, Stationmaster (up to £783 per annum) and higher positions. Free uniforms. Age limits: 15 and under 40 years. Junior Porters are paid the adult basic wage at 19 years of age.

LADS FOR WORKSHOPS—may rise to Engineman, Train Examiner, Running Gear Repairer, etc.

LABOURERS for Melbourne Goods Depot—may graduate to Stower, Goods Checker and Goods Foreman.

LABOURERS for Metropolitan Railway Workshops and for Track Maintenance Gangs with good prospects of promotion.

Tradesmen are also required.

ATTRACTIVE GENERAL CONDITIONS

- Periodical ticket at half-fare.
- Liberal annual leave with all lines pass.
- Cumulative sick leave.
- Long-service leave.
- Superannuation benefits after two years.
- Shift allowance between 8 p.m. and 6 a.m.
- Living-away-from-home allowance for Juniors.
- Penalty rates for Saturday and Sunday work.

Rates subject to Arbitration Court Awards.

Write to The Secretary— . . .

VICTORIAN RAILWAYS

Room 225, Fourth Floor, Railway Offices, Spencer Street, Melbourne, Cf.

Victorian Railways Print.

TELEPHONE—MV 218

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