

Western Australian Railways

In the southwest of the State there is an extensive 3 ft 6 in gauge system which extends as far as Meekatharra in the north and Kalgoorlie and Esperance in the east. A new 4 ft 8½ in gauge line between Perth and Kalgoorlie is being constructed.

Commonwealth Railways

This system comprises four separate railways. The Trans-Australian Railway, extending from Port Pirie to Kalgoorlie is of 4 ft 8½ in gauge as is that part of the Central Australia Railway from Port Augusta (Stirling North) to Maree. A further extension of this railway from Maree to Alice Springs is of 3 ft 6 in gauge, as is the North Australia Railway from Darwin to Birdum. The Australian Capital Territory Railway from Queanbeyan to Canberra is of 4 ft 8½ in gauge. In this chapter particulars of these four separate Commonwealth railways are grouped; however, separate particulars for each railway are shown in the annual bulletin *Transport and Communication*.

A graph showing the route-mileage and traffic of all Government railways from 1870 to 1966 appears on plate 32, opposite.

In addition to these Government railways there are a number of short but significant private railways in Australia. The majority were constructed for the haulage of coal, iron ore and other minerals to processing plants, ports or government railheads, but some handle general traffic and passengers also. The more important of the private railways operate from Whyalla to Iron Knob and Iron Baron (South Australia), from Maitland to Cessnock (New South Wales), from Broken Hill (New South Wales) to the South Australian border, and from Burnie to Zeehan (Tasmania). In the north-west of Western Australia private railways were brought into service during 1966 to haul iron ore from Mt Tom Price to King Bay, a distance of 180 miles and from Mt Goldsworthy to Finicane Island (Port Hedland), a distance of 70 miles.

Standardisation of railway gauges*

Government railways in Australia use a variety of track gauges ranging from 2 ft to 5 ft 3 in, but only in the case of the 3 ft 6 in, the 4 ft 8½ in and the 5 ft 3 in gauges are the route mileages extensive. The importance of the present measures to bring about railway standardisation largely derives from the many economic and political difficulties occasioned by these differences in track gauges.

Programmes for the standardisation of railways in Australia have been arranged on the basis of mutual agreement and collaboration between the Commonwealth and State Governments with the ratification of the Parliaments concerned. There is no national co-ordinating railway authority in Australia, but the Railway Commissioners discuss mutual problems and make inter-system working arrangements through the Australian and New Zealand Railways Conference.

Under various Commonwealth-State Standardisation Agreements approximately 420 route miles of standard (4 ft 8½ in) gauge track have been completed since 1956, and a further 680 route miles are expected to be completed by the end of 1968. Melbourne is now linked to Sydney and Brisbane by a standard gauge railway, and by 1968 it is expected that a direct standard gauge link will be available between Sydney and Perth. Bogie exchange facilities have been installed at Melbourne and Port Pirie (South Australia) to eliminate the physical transfer of goods between the rolling-stock of the standard gauge and that of the broad gauge systems serving Victoria and a large part of South Australia.

Early history of standardisation in Australia

The history of standardisation of railway track gauges in Australia goes back to before the construction of the first steam railway. During the 1840's the diversity of gauges in Great Britain was causing concern to railway administrators, and in 1846 the British Secretary for State for Colonies recommended a uniform gauge of 4 ft 8½ in for railway construction in the Colonies. At that time there were no steam powered railways in any Australian Colony.

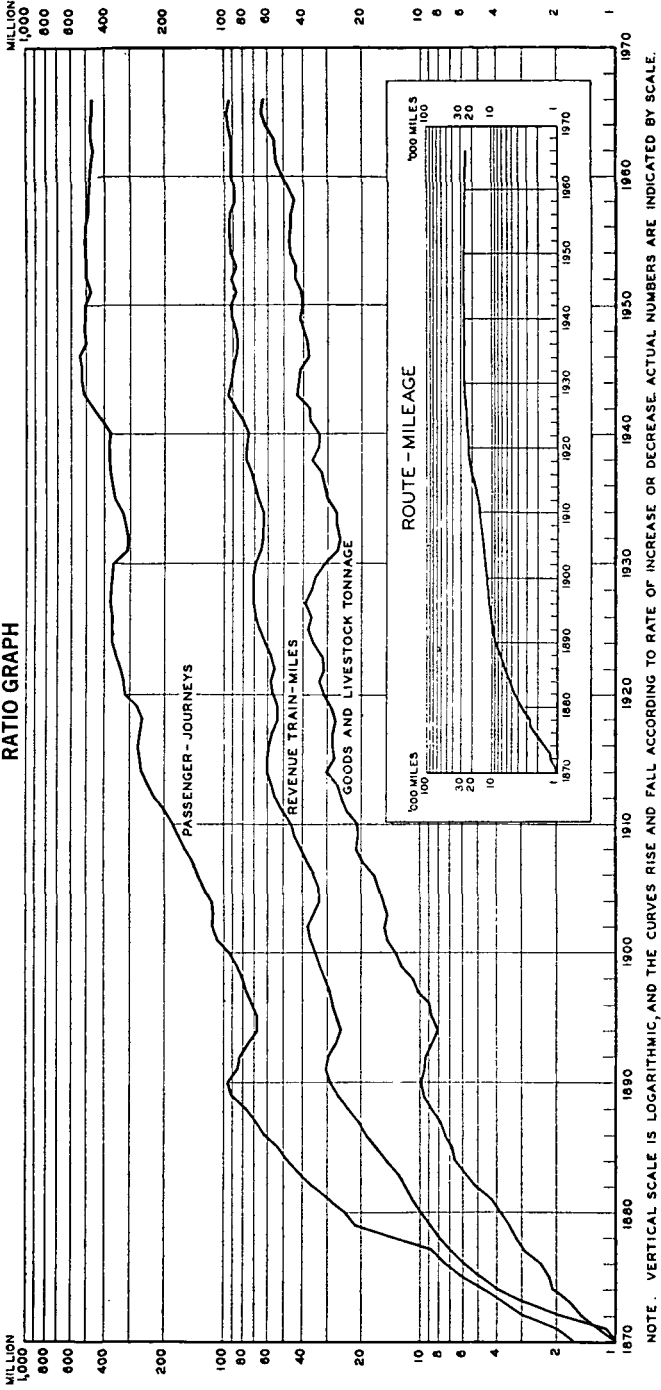
In 1850, however, a private company submitted a proposal to construct the Sydney-Parra-matta railway using a track gauge of 5 ft 3 in. This proposal was approved by the Governor-General and the Colonial Secretary, and in 1853 an Act was passed making it compulsory for all railways in New South Wales to be of 5 ft 3 in track gauge. The Governors of Victoria and South Australia accepted this as the standard gauge for Australia.

The following year the Company revised the proposed gauge and succeeded in having the 1852 Act repealed and a new Act passed setting the gauge for New South Wales at 4 ft 8½ in. This step was taken without reference to either South Australia or Victoria, where private companies had

* The following article on standardisation of railway gauges was specially prepared for this issue of the Year Book by the Commonwealth Department of Shipping and Transport.

GOVERNMENT RAILWAYS: AUSTRALIA, 1870 TO 1966

ROUTE MILEAGE AND TRAFFIC RATIO GRAPH



NOTE. VERTICAL SCALE IS LOGARITHMIC, AND THE CURVES RISE AND FALL ACCORDING TO RATE OF INCREASE OR DECREASE. ACTUAL NUMBERS ARE INDICATED BY SCALE.

PLATE 32

placed large orders for 5 ft 3 in gauge rolling stock. Both these Colonies decided to adhere to the 5 ft 3 in gauge. On appeal to England it was decided that this was a local dispute and 'as the forests were so dense it was improbable that the lines would meet in any case'. This was the end of early attempts at standardisation.

The adoption of a 3 ft 6 in track gauge by Queensland, Western Australia and Tasmania, and the subsequent use of this gauge for certain lines in South Australia, appears to have been based on geographical, financial and economic factors. However, it is also likely that the possibility of links between States was still considered remote. The first interstate railway link was established in 1883 when the New South Wales and Victorian systems met at Albury. This was followed by a link between New South Wales and Queensland in 1888 and the Victorian-South Australian broad gauge link in 1889. (It was 1917 before Western Australia was linked with the railway systems of the other mainland States.)

Following the establishment of these early links the disadvantages of a break of gauge at State borders soon became evident, and in 1897 the Premiers of New South Wales, Victoria and South Australia agreed that a standard gauge was desirable. The Railway Commissioners met and recommended conversion of South Australia and Victoria to 4 ft 8½ in gauge, but no further action was taken.

The question was debated at a number of conferences between 1900 and 1920. The urgent necessity of the work was confirmed many times, but nothing was done. In 1920 the Premiers Conference considered a report and resolved that an expert committee be set up to consider the unification of gauges. This took the form of a Royal Commission. In 1921 the Royal Commission reported strongly in favour of a standard track gauge of 4 ft 8½ in and set out plans, costs and the order of conversion of two proposals; first the conversion of the main trunk lines between capital cities and secondly the conversion of all lines. Included in the plans were new standard gauge lines between Brisbane and Kyogle (New South Wales) and between Port Augusta and Lochiel (South Australia). Both lines reduced the distance between capitals and provided a lower maximum elevation on the route, which, in the case of the Sydney-Brisbane line, was reduced from 4,450 ft to 800 ft.

Commonwealth-State discussions followed the 1921 Royal Commission's report, but a general agreement was not reached. In 1924 the Commonwealth, New South Wales and Queensland Governments agreed to the extension of the Sydney-Kyogle standard gauge line to South Brisbane. This line was brought into service in 1930. In 1935 an agreement was reached between the Commonwealth and South Australian Governments whereby the Commonwealth was to extend the Trans-Australian standard gauge line, completed in 1917, from Port Augusta to Port Pirie and South Australia to provide a broad gauge line from Port Pirie to link with the broad gauge network at Red Hill. The work was completed and opened to traffic in 1937.

During the 1939-45 War considerable difficulty was experienced in Australia in the movement of military equipment and troops by rail, mainly because of the existence of break-of-gauge points, the lack of interchangeability of locomotives and rolling-stock between the major railway systems and the lack of uniformity in the technical standards of tracks. Consequently, in March 1944, the Commonwealth Government requested Sir Harold Clapp, Director-General of Land Transport, Commonwealth Department of Transport, and formerly Chairman of Commissioners, Victorian Railways, to submit a report and recommendations regarding the standardisation of Australia's railway gauges on the basis of a 4 ft 8½ in gauge.

Report of Sir Harold Clapp and subsequent investigation

The report, which also covered the construction of certain strategic and developmental railways, was submitted in March 1945, and the projects recommended to be carried out in stages and estimated to cost \$153,502,000 overall, were as follows.

- (a) Construction of an independent standard gauge line from Fremantle-Perth to Kalgoorlie (419 miles).
- (b) Conversion to standard gauge of the entire South Australian 5 ft 3 in gauge system and the 3 ft 6 in gauge lines of the South Eastern Division (1,760 miles).
- (c) Conversion to standard gauge of the entire Victorian 5 ft 3 in gauge system, and the Upper Ferntree Gully-Emerald section of the Gembrook 2 ft 6 in gauge line (4,980 miles).
- (d) Acquisition of the Silvertown Tramway Company's line (36 miles) between Cockburn (South Australia) and Broken Hill (New South Wales) and the conversion to standard gauge of this line, as well as the 3 ft 6 in gauge lines of the Peterborough Division of the South Australian Railways (366 miles) to provide a standard gauge line between Port Pirie and Broken Hill.
- (e) Provision of a standard gauge strategic and developmental railway linking Bourke (New South Wales) with Townsville and Dajarra (Queensland) by the construction of a new standard gauge line between Bourke and Longreach, via Cunnamulla, Charleville and Blackall, and the conversion of the Longreach-Hughenden, Townsville-Dajarra and tributary lines.

- (f) Construction of a standard gauge strategic and developmental railway between Dajarra (Queensland) and Birdum (Northern Territory) and the conversion to standard gauge of the Birdum-Darwin line (961 miles).

Other recommendations were that, on agreement being reached between the Commonwealth and the States concerning the carrying out of the foregoing projects, arrangements were to be made for complete surveys, plans and estimates to be prepared for the standardisation of the Queensland and Western Australian Railways not covered by the proposals mentioned. For a detailed description of the report *see* Year Book No. 37, pages 146-8.

The conversion to standard gauge of the 3 ft 6 in gauge Central Australia Railway (Port Augusta to Alice Springs) and extension beyond the existing terminal at Alice Springs was not recommended, nor was the introduction of standard gauge in Tasmania.

As a further step towards standardisation, a Committee consisting of members of the Commonwealth Parliament, was formed in March 1956 to consider the practicability and desirability of standardising the main railway trunk lines on the Australian mainland. The Committee was invited to examine whether a more limited scheme than that envisaged in the Clapp Report could be devised without incurring the costs of complete conversion and without inhibiting the efficiency of operation of the various Government systems. The Committee recommended to the Commonwealth Government that standardisation of the major inter-capital routes was warranted. It was recommended that surveys should be carried out and plans prepared without delay, and that the Commonwealth should bear the cost of this detailed work. The Committee also examined questions of the method of construction, finance and timing, and the administration of the proposals, but did not make detailed recommendations on these matters.

Nature and scope of railway standardisation agreements

Arising out of Commonwealth-State discussions, which followed the report by Sir Harold Clapp, a Railway Standardisation Agreement was drawn up and signed by representatives of the Commonwealth, New South Wales, Victorian, and South Australian Governments. However, this agreement was not ratified by all Governments concerned and, therefore, was never implemented.

In October 1949 the Railway Standardisation (South Australia) Agreement was assented to by the Commonwealth Parliament. This Act authorised the execution by the Commonwealth Government of an agreement between the Commonwealth and South Australian Governments whereby a major part of the broad and narrow gauge railways owned and operated by the South Australian Railways would be converted to standard gauge. The agreement did not stipulate any period of time within which the works were to be undertaken or completed. The Act provided that the Commonwealth Government should undertake the conversion of other railways owned and operated by the Commonwealth Railways in South Australia and the Northern Territory, and that the acquisition and conversion of the Silverton Tramway should be carried out. The preamble to the agreement indicated that a uniform track gauge throughout Australia was desirable to assist in the defence and development of Australia, to facilitate interstate trade and commerce, and to secure maximum efficiency and economy in railway operation.

The agreement provided that the parties to the Agreement should set standards of design and construction essential to the establishment of standard gauge railways and to the safe and efficient operation of interchange traffic, including locomotives and all classes of rolling-stock over the unified railways of Australia. It was agreed that 70 per cent of the cost of standardisation should be borne by the Commonwealth and 30 per cent by the State. The Agreement also provided that the Commonwealth should meet the initial cost of the works specified and that the State should repay the Commonwealth 30 per cent of the expenditure over a period of fifty years together with interest. The agreement included stipulations regarding the cost of betterments and replacements, annual budgets of expenditure, audit, accounts, and records. The Agreement, with modifications, has been the basis on which subsequent agreements between the Commonwealth and the States of Victoria, New South Wales and Western Australia have been formulated.

The major Agreements which have been made and implemented since 1950 include:

- (1) The Brachina to Leigh Creek North Coalfield Railways 1950;
- (2) The Stirling North to Brachina Railway 1952;
- (3) The Leigh Creek North Coalfield to Marree (Conversion to Standard Gauge) Railway 1954;
- (4) The Railway Standardisation (New South Wales and Victoria) Agreement 1958;
- (5) The Railway Agreement (Western Australia) 1961.

The first three agreements refer to the construction of the Port Augusta to Marree standard gauge railway, which was completed in 1956 at a cost of approximately \$24,000,000. The main purpose of these Agreements was to provide standard gauge access to the Leigh Creek brown coal deposits and was, therefore, in a different category to other standardisation works. This railway is operated by the Commonwealth Railways.

The New South Wales and Victoria Standardisation Agreement

The New South Wales and Victoria Standardisation Agreement followed the general format of the 1949 South Australian Agreement, but differed from it in substance in several important respects:

- (a) the Commonwealth Government agreed to provide all funds to meet expenditure on the standardisation works as and when required by the States;
- (b) the Commonwealth was not obliged to meet expenditure on any of the standardisation work incurred at any time subsequent to twelve calendar months after the commencement of a regular service on the standard gauge railway;
- (c) provision was made to authorise variations of cost due to unforeseeable circumstances;
- (d) the Agreement was appended by Schedules indicating:
 - (i) the route of the standard gauge railway;
 - (ii) the estimated cost of major items in the standardisation work;
 - (iii) the standards to be adopted;
- (e) the standardisation works were limited to the construction of a standard gauge railway on the main intercapital (Melbourne-Sydney) route.

The standardisation work comprised the construction of a main line permanent way and crossing loops between Albury Railway Station and Melbourne (Spencer Street), the construction of bridges and culverts, alterations to station yards, grade separation and level crossing protection, the provision of rolling-stock maintenance and freight handling facilities at Dynon Road in Melbourne, alterations to signalling, the installation of automatic power signalling with centralised traffic control, and the construction and conversion of rolling-stock.

Under the Agreement the States of New South Wales and Victoria were responsible for the execution of the standardisation works, and, with the approval of the Commonwealth Minister for Shipping and Transport, called public tenders for the execution of the works where desirable. There was a provision that expenditure was not to be incurred without the concurrence of the Commonwealth Minister. The States prepared detailed plans, specifications and estimates of costs for all works under the Agreement in collaboration with the Commonwealth.

The Western Australia Railway Agreement

The Railway Agreement (Western Australia) 1961 is an agreement ratified by the Commonwealth and Western Australian Governments to undertake certain standard gauge railway works, including the provision of rolling-stock, in Western Australia at an estimated cost of \$82.4 million. The proposal is linked with the establishment of an integrated iron and steel industry at Kwinana, south of Perth. The new railway facilities will be used to transport iron ore from the Koolyanobbing deposits some thirty-three miles beyond Southern Cross. These railway facilities will also link Kalgoorlie with East Perth and Fremantle by a standard gauge line which will be open to passenger and general freight traffic.

It has been agreed that the project has standardisation and developmental components in approximately equal parts, and initially the Commonwealth will, in effect, provide finance for all the standardisation portion of the works and 70 per cent of the developmental portion. The State will repay with interest 30 per cent of the standardisation costs over fifty years and all the advance for developmental works over twenty years. Work on the project commenced in 1962 and is planned to be completed by December 1968.

The Agreement covers decisions in cases of disputes between the parties, the completion date, the definition of the nature of the work required for standardisation purposes, the preparation of programmes, plans and estimates, the authorisation of expenditure, expenditure after the completion date, the submission of annual estimates, and collaboration between the parties concerned regarding the standards of design, construction and operation of rolling-stock (including locomotives) for the facilitation of efficient inter-system traffic and co-ordinated services. The Schedules to the Agreement may be varied with the approval of the Commonwealth Minister for Shipping and Transport. There is provision also for the review of rolling-stock for conversion to standard gauge and other factors.

The estimated cost of \$83,220,000 is based solely on the cost of materials and labour and on operational requirements prevailing at the end of 1960, and is specified in the Agreement as an indication of the extent of the works and the relative amounts to be expended on the various components and does not impose any limitation on the amount to be expended by the State Government.

The South Australian Standardisation Agreement

The conversion of the South Eastern Division of the South Australian Railways from 3 ft 6 in to 5 ft 3 in track gauge, completed in 1959, was carried out under the 1949 Railways Standardisation (South Australia) Agreement as a preliminary step toward eventual standardisation. The conversion to standard gauge of the narrow gauge line between Port Pirie and Cockburn, as part of the East-West standard gauge link, is also being carried out under this agreement. The South Australian Government has submitted to the Commonwealth Government a proposal

in outline for the standardisation of the existing railway line between Port Pirie and Adelaide. The Commonwealth Government has made available \$30,000 to South Australia for the surveying of this line without committing the Commonwealth to any further action.

Standards adopted

The basic standard adopted for standardisation works is a track gauge of 4 ft 8½ in with appropriate minimum structure and maximum rolling-stock outlines. Both in the conversion of tracks of other gauges to 4 ft 8½ in and the construction of new standard gauge railways, it is essential to ensure the efficient and economic interchange of rolling-stock, the facilitation of inter-system traffic, the co-ordination of designs and specifications of rolling-stock, and the co-ordination of services.

The standards of tracks, including weight of rail, sleepers, ballast, dogspikes, sleeper plates, and rail anchors, have varied slightly from project to project, depending on the nature of the traffic and other factors. Australian standard 94 lb rail, welded into lengths of up to 360 feet, and hardwood sleepers have been generally used. Earthworks, bridges and culverts also have varied from project to project according to the nature of the traffic, geological and topographical conditions, and nature of existing structures.

Grading has frequently been determined by the alignment of the existing track. On the major part of the Kalgoorlie-Perth standard gauge track currently under construction the ruling gradient will be 1 in 150. For curvature, a minimum radius of not less than forty chains is standard but has been reduced to ten chains where circumstances justify such a reduction.

Signalling and communications equipment standards have been determined mainly according to the nature of traffic requirements, terminal and intermediate marshalling facilities, the density and speed of traffic, and the peak line capacity. Centralised traffic control of one form or another has been a feature on trunk routes. Signalling and communications standards and techniques have been improved particularly to achieve higher average speeds made possible by the use of diesel locomotives and bogie rolling-stock.

In general, where railway authorities have undertaken works or provided for capacity or equipment in excess of standards established under the Agreements, such betterments have been undertaken at the expense of the State concerned. Works carried out under the Agreements have generally included the acquisition of land, the purchase, construction, alteration and conversion of railway lines, bridges, buildings, structures, workshops, plant, locomotives and rolling-stock, and other factors essential for standardisation. Work regarded as being outside the scope of the standardisation agreements includes the operation and maintenance of the standard gauge railway, betterments, and any rehabilitation programme which would be necessary independently of standardisation works.

The adoption of relatively uniform technical dimensions of track and equipment for standardisation projects has had the effect of encouraging the co-operation and simplification of other features of railway operations, including inter-system tariffs, documentation, maintenance and repair practices, and accounting procedures.

Operations of Government railways

Route-miles open for traffic

The following table shows the route-mileage of each Government railway system, according to gauge, at 30 June 1966.

GOVERNMENT RAILWAYS: ROUTE-MILEAGE^(a) OPEN, SYSTEMS, 30 JUNE 1966
(Miles)

System	Gauge					Total
	5 ft 3 in	4 ft 8½ in	3 ft 6 in	2 ft 6 in	2 ft 0 in	
New South Wales	..	(b) 6,055	..	..	..	6,055
Victoria	(c) 3,977	202	..	9	..	4,188
Queensland	..	69	5,686	..	30	5,785
South Australia	1,650	..	828	..	..	2,478
Western Australia	..	..	3,747	..	..	3,747
Tasmania	..	..	500	..	..	500
Commonwealth	..	(d) 1,330	(e) 922	..	..	2,252
Australia	5,627	7,656	11,683	9	30	25,005

(a) Mileage of railway irrespective of whether it consists of single or multiple track. Excludes sidings and crossovers. (b) Includes 234 route-miles which are electrified. (c) Excludes 202 miles of 5 ft 3 in gauge line which almost parallels the uniform gauge (4 ft 8½ in) line between Melbourne and the New South Wales border. Includes 263 route-miles which are electrified. (d) Trans-Australian Railway, Australian Capital Territory Railway and portion of Central Australia Railway. (e) North Australia Railway and portion of Central Australia Railway.