

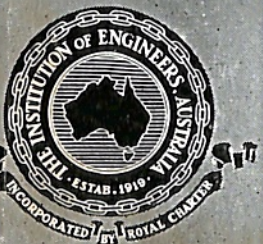
The Journal of The Institution of Engineers, Australia

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JUNE, 1963



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Presidential Address*

Moving People (Urban Public Passenger Transport)

BY MAJOR-GENERAL R. J. H. RISSON, C.B., C.B.E., D.S.O., E.D., B.E., M.I.E.AUST.

FOREWORD.

In doubt whether to speak this evening on *The Engineer and the Community* or on *Public Transport*, I consulted certain senior members of The Institution, whose judgment I respect, and, strange though it may seem, am following their advice. I have to, for they were unanimous.

I shall do my best to avoid controversy, but, in a subject commonly considered contentious—why I do not know—can scarcely expect to be wholly successful.

Introduction.

"There be three things that make a nation great and prosperous—a fertile soil, busy workshops and easy conveyance of men and goods from place to place."

—BACON.

No one will dispute the soundness of Bacon's dictum on the significance of primary and secondary industry. Scarcely less, if less, important now is the tertiary industry of transport.

This is an extract from the March 1954 "Report on Australia" by the National Security Resources Board, set up to advise the Commonwealth Government on the best use of Australia's resources in the interests of national security:

"A country cannot be defended or developed properly without a transport and communications machine big enough for its task and economically and efficiently run. Weaknesses in transport especially affect the whole economy, and retard the expansion of industry. Conversely, improved transport and communications will contribute to lower costs and to higher efficiency in industry."

As someone else has put it succinctly: "transportation is civilization".

Any industry that costs one-third of the national income must be of consequence. Sober estimates have shown that transport in Australia, including private transport, does cost one-third of the national income. It therefore merits close and informed study.

Industry, commerce, business and pleasure, social and cultural contacts are dependent on efficient transport. "No man is an island, entire of itself; every man is a piece of the continent, a part of the main." But, without transport, men would be islands.

The thread, or the broad band, of transport is woven through civilization from its very beginning. Early man, not needing or unwilling to trade, stayed home—except when venturing on war-like forays. Came trade, even primitive trade, and settlements, hamlets, many destined to grow into today's greatest cities, sprang up where trade routes crossed, at other favoured halting places, at harbours where boats put in and in like places. And, as they grew, it was transport, their own internal transport, in combination with geography, that determined how they grew. A German authority has lately been examining the sizes attained by the largest German cities from the Middle Ages on, and has discovered this common pattern among them: their radius at any stage of their growth

has roughly equalled the distance a man could travel in 30 minutes by the common transport of the time.

The branch of the industry I serve and will principally speak about—city (more particularly, metropolitan) public passenger transport—does not loom so large in the cost structure as some others. But it directly affects many people. Without adequate and acceptable transport, city workers will not be punctual at their work places or efficient when they get there, and if they are not, industry, and the nation with it, will decline.

Street Transport.

In city streets horse buses continued in use up to about the beginning of World War I in 1914. Famous 5th Avenue, New York, had them as late as 1908, London till about the same time. Members of this audience, not yet old, remember them clearly—remember, too, schoolboys riding surreptitiously on their back step—until some enemy called to the bus driver: "Whip behind!" . . .

Contemporaneous in part with horse buses were horse trams. They, if you will forgive a little prejudice, are responsible for some of the impositions tramway operators still bear. Horses' hooves wore out, made ruts in, the unpaved roads. Rails protruded above the road surface, grooved rails being unknown initially. Municipalities rightly set out to protect themselves. As part, therefore, of the price of being allowed to operate, tramway authorities were required to build and maintain the road area occupied by their tracks and eighteen inches outside them, wholly at tramway cost. They are still so required. In addition, they were obliged to pay rates—"track rates"—for their occupancy of the roads they so made and maintained. They still are.

Next in point of time came cable, steam and electric trams, motorbuses, trolleybuses.

The world's greatest cable tramway was in Chicago. Glasgow was probably second. Melbourne was not far behind: there they ran for more than 50 years (1885-1940) and were chiefly responsible for early metropolitan development.

There are still, in San Francisco, three well-known cable tramways in regular use—on grades too steep for reliance on normal friction traction: about 1 in 6. They continue thoroughly successful and highly regarded, carrying crush loads no Australian tramwayman would dare contemplate.

Electric trams developed overseas in the 1880's and became predominant in the late 1890's.

Motorbuses, just developing when war broke out in 1914, came into their own in the decade from 1922 onwards.

Later came trolleybuses, which have not enjoyed the success they deserve.

It is these vehicles that have made modern cities possible. Whatever one's views on the desirability of enormous cities (and I think it unfortunate that some 60 per cent of this country's population is concentrated in six capitals; nearly 40 per cent in two of them) they, and cities of more modest size, could not exist, would not have come into being, were it not for trams, buses, trolleybuses and, more recently in most cases, electric trains.

*To the Forty-third Annual General Meeting of The Institution of Engineers, Australia, at Adelaide on 30th April, 1963.

Continued Need for Public Transport.

Is public transport, street public transport, still necessary, and will it continue necessary?

Oh, yes.

And, apart from those who travel by it, all citizens who use the streets—especially those who use motorcars in the central city streets—have a very real interest in the public transport with which they must share those streets and also, if less directly, an interest in the railways that carry many of their fellow citizens. Why? Because public transport moves the overwhelming majority. If it did not, their automobiles would compete with those already there, and so clog the streets that all would grind to a halt. Then the city would wither. And that would be a calamity—calamity culturally and calamity financially.

Seventy-four per cent of the people coming into central Melbourne daily and going home again still travel by public transport, rather more than half of them by train and rather less than half now, alas, by trams and buses—but that is as is to be expected, with the centre of gravity of population of a large city moving further and further out. The proportion at peak hours, which is what really matters, is probably greater still. The tram and bus portion of that 74 per cent is exclusive of those who use trams and buses to continue their journeys after reaching the city by rail, or by motorcar necessarily parked up to a mile or even further from their destination. Even so, 74 per cent are three out of every four. Imagine what would happen if the other three or any substantial proportion of them tried to add theirs to the present number of private cars.

This is not something peculiar to Melbourne. Far from it. It is common to big cities the world over. The bigger the city the more marked it is.

In 1961, 91 per cent of the people who entered central London between 7 a.m. and 10 a.m. did so by public transport; 39 per cent by Underground; 36 per cent by British Railways, and 16 per cent by bus.

The comparable figure in New York is 90 per cent (it is possible to drive a private automobile in downtown Manhattan, but few try); in Chicago 86 per cent; in Philadelphia 75 per cent; in Boston 70 per cent; in Brussels about 70 per cent.

Without adequate public transport, big cities cannot flourish. If they cease to flourish, everyone doing business in their central business district suffers—most of all retailers, but every other type of business centred there as well. This includes public transport, which cannot succeed without adequate loading and which can give its best, its most frequent, service where passengers are numerous. That is why the Melbourne Tramways Board supported the proposal to build an underground railway in Melbourne, giving evidence in its favour before the Parliamentary Committee of Enquiry on it.

It is also one reason the Tramways Board, at the beginning of 1962, decided that it must put the trams in central Melbourne underground, the other reason being increasing congestion in the main streets. If Melbourne is to continue to grow as everyone is confident it will, it is only a matter of time before separation of public transport and private will be necessary. When that happens, it is accepted, as it has been in other great cities, that it is the public transport that can be most readily, and so should be, moved—but not at the cost of the public transport user.

Undergrounding has manifest advantages.

It frees the trams from the inescapable delays of traffic congestion on the surface, especially in peak periods. Tram operation costs approximately 9d. per minute. A few minutes at 9d. several times a day multiplied by several hundred trams approximately 300 days a year (omitting Sundays) amount to a considerable sum per annum.

It eliminates the delays caused by intersecting streets, notably at light controlled intersections. Intersecting tram routes will be grade-separated.

I am not prepared to estimate at present what the time saving will be. It is relevant, however, that overseas figures put the

capacity of tramways in subways at more than 50 per cent greater than on the surface with intersecting streets: 21,000 passengers per hour against 13,500.

Undergrounding also eliminates the considerable cost of traffic accidents: cost of repairs, of service delays and of public goodwill.

Shelter from bad weather for waiting passengers can be an advantage in some climates.

The greatest obstacle is the capital cost. There are other disadvantages, principal of which seems that, whereas most people wanting to go two or more blocks will freely take a surface tram, they may not be so ready to go down a flight of stairs, a ramp or even an escalator to an underground one.

Choice of Vehicle.

Granted then that public transport remains necessary, what form should it take? Disregarding railways for the time being, and disregarding also the special case of underground trams discussed above, the street surface choice rests between trams and buses. In Australia, four cities still use trams. Three of these I cannot speak for. The other, I assure you, intends to go on using them—but offers no opinion on what other cities should do, except that trams would be manifestly wrong for some, by reason of their size or because they have none now or for other reasons relevant especially to themselves.

Melbourne keeps trams because to do so is the right decision in Melbourne, without regard to what is right anywhere else. It is right in Melbourne on financial grounds, a weighty consideration for the Tramways Board, which stands, is obliged to stand, always has stood, wholly on its own feet financially—the only enterprise of its kind in Australia that does; and there are not too many overseas now either. That is the real reason. It makes money on trams (has an annual surplus on tram operation) but loses it all and more to boot on buses (the bus deficit exceeds the trams surplus). That statement must be qualified, rather heavily qualified, by this: the trams operate on the more densely loaded, and so more remunerative, routes; if the buses were on these routes their financial showing would be better than it is; even so, it would not be as good as the trams', in Melbourne; let it be repeated, in Melbourne.

There are other reasons too.

With minor reservations, Melbourne's tram fixed assets are in excellent state of maintenance, and always have been. Their present depreciated book value, excluding land and buildings, is of the order of £6 million. Their replacement value less the same percentage depreciation is approximately £18 million. Tram abandonment would virtually entail abandonment of those assets, for their net recovery value would be small. Put another way, the capital charges on them would go on, with the capital charges on what replaced them added.

There is undoubted room for modernization of much of the tram rolling stock, especially in the interest of noise abatement. The Board is well aware of the problem—and of the cost of overcoming it. It has one tram, the only one ever used in Australia, incorporating all the features of the most modern overseas tramcars, even though, several years old, it is now by no means the latest model. It is virtually noiseless, and is relatively accident free. It can be taken that the underground tramway when built will be operated with this type of vehicle, but of the most recent models.

Overseas Vehicles.

What types of vehicles are being used overseas by street public transport authorities? Trains, trams, trolleybuses and buses. That needs some explanation.

I include trains because invariably, in Europe and North America, what Australia calls underground railways, London calls the tube, Europe calls the metro, metropolitana or the equivalent, and North America calls subway or rapid transit, are operated by the opposite numbers of the Melbourne Tramways Board and similar authorities in other Australian capital cities; that is, the authorities

that started off running trams, later used buses and trolleybuses and now, to keep pace with growing numbers and traffic congestion and mushrooming cities, have been obliged to go underground (or sometimes up in the air or otherwise on to private right-of-way) carrying more people much faster than they can do on the street surface.

Trams, everyone knows, are in decreasing numbers. Even so, they are still much more numerous than most people imagine or credit.

In North America, big cities like Toronto, St. Louis, San Francisco, Philadelphia, Boston, Pittsburgh, still use them, and until about three weeks ago Los Angeles did also.

In Great Britain, outside Blackpool, which still maintains and intends to go on running trams, there are virtually none left. They disappeared from London nearly ten years ago. Some have said that because London gave them up so should Australian cities—an untenable *non sequitur*. London is very different from tram-using cities in Australia. One of the differences is that London has had an underground railway for 100 years, doing largely the job that trams do here.

On the continent of Europe, with the major exception of Paris, which has none (but has its metro—underground railway—immediately below pavement level) trams are preponderantly the vehicles used in street surface public transport. They are a mixture of old and new, even the oldest normally in an excellent state of maintenance, and the new ones, articulated, still being built, the most modern in the world.

Trolleybuses are out of fashion and will gradually disappear—a great pity to my mind, if it is proper to express an opinion without having operated them. They were and are an excellent vehicle, with distinct advantages of their own, but when their biggest buyers discard them, as London has recently done, there is little incentive left to manufacturers to continue building them or for operators to persist with them.

Diesel buses, of course, are now the most widely used surface public transport vehicles. They are vastly different today from what they were as recently as ten years ago. Their reliability is immensely improved; their carrying capacity has gone up, though not in the same proportion; their transmission is fully automatic, just like that of the latest private automobiles; they have air springing in lieu of steel springs, and have power assisted steering; they are fitted with fluorescent lighting, immensely more attractive and efficient than the incandescent lighting of even the immediate past. The overall result is attractive, comfortable vehicles with, it is agreed, different riding qualities from those of private cars but little if anything inferior.

Traffic Congestion.

“The greatest domestic problem facing the United States is traffic congestion” said, some time ago, the then Chairman of the Studebaker-Packard Corporation, doubtless in a position to know. It is a problem no longer confined to the United States. It is acute in Australia, with its motorcar population per 1,000 people now little behind that of North America, and about double that of Britain and Sweden, which have the highest figures in Europe. It is a problem of great and growing concern to passenger operators striving to maintain timetables, as they must, both to render acceptable service and to avoid inflated costs.

Public transport is not the only sufferer from congestion; private transport suffers too. But public transport delays affect many times more people than do delays of private traffic, even though they are represented by a mere fraction of the number of vehicles.

This last is something not normally recognized. It moved the General Electric Co. of America a few years ago to produce an excellent educational film entitled “Moving People” to emphasize that the basic traffic problem is moving people, or goods, and not, as commonly and erroneously supposed, moving vehicles. It is easy, too easy, for the average man to look at the obvious foreground of vehicles and assume that there is the essence of the matter, just as it is proverbially easy to fail to see the wood for the trees.

Congestion, or the consequence of it, is a matter of major concern to town planners, who realize that, if it continues to worsen at its present rate, cities as we now know them will perish from traffic strangulation. If all those working in major cities brought their motorcars there, much of it would have to be razed to accommodate them. And, if anyone naturally prescribe multi-storey parking, it will require three floors for every two floors of office space. And that leaves unsolved the equally great or greater problem of street space to get the cars to their parking stations and away from them—the bulk of them concentrated in the brief peak hour or half-hour morning and evening.

No wonder the Director of Studies in the Department of Town Planning, Melbourne University, said in a TV session in Melbourne on 21st April, 1963:

“I am a rabid public transport man. It's the motor vehicle that is out of place in the centre of the city, not the tram.”

Some years ago the Town and Country Planning Board of Victoria took a traffic census on outlets from the City of Melbourne in the evening peak period. On the most heavily trafficked outlet, Princes Bridge, it found that in the heaviest half-hour trams carried 5½ thousand people in one lane, while two lanes of motorcars and taxis working to capacity carried 727, a ratio per lane of 15 to 1 in favour of trams.

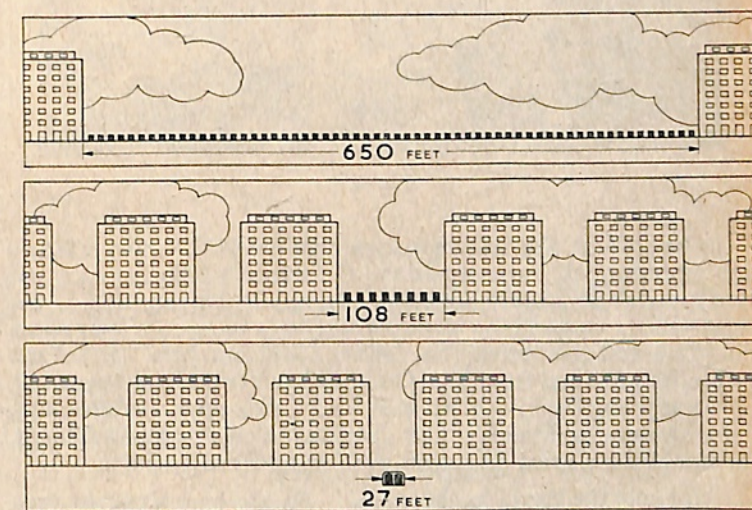


Fig. 1.

Fig. 1 is an American diagram showing how 100,000 people can be moved per hour (50,000 in each direction)—

- by a double-track underground railway in one subway 27 feet wide;
- by a surface roadway 108 feet wide, with four lanes of buses in each direction;
- by a roadway 650 feet wide, with 30 lanes of private cars in each direction.

The subway interferes with no buildings, the bus roadway with few, the private motorcar roadway with many.

Fig. 2 is an American scene, but could almost be Australian. All the people in the whole of the motor vehicles in it could be seated in five tramcars.

What to do about it, apart from the obvious remedy of leaving all or most of the cars at home and travelling by public transport?

Staggering of Working Hours.

There is one solution readily available, if everyone or most people will agree to it. It is staggering of working hours. Everyone, in fact, is in favour of it, in favour of staggering of hours, for the “other fellow”, provided he himself is not required to depart from the hours to which he has been accustomed, for it is very largely a mere matter of custom or habit.

A limited amount of staggering of hours does exist, but not much. It was introduced in Melbourne during the second half

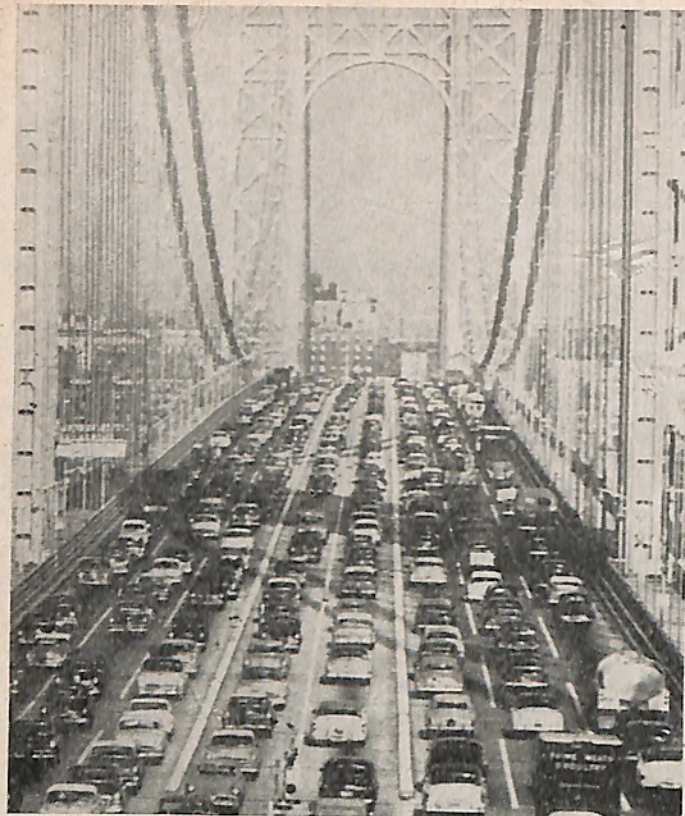


Fig. 2.

of the last World War by negotiation between the Tramways Board and big industries, especially in the Fisherman's Bend area and the Maribyrnong Munitions complex. It had to be introduced, because with the demands on its resources (there being then few private motorcars and less petrol) the Board could not have carried the loads offering to and from factories in these areas without staggering. This staggering has continued ever since, with some modifications, and with some additions. The Tramways Board is grateful for it, but would like a great deal more throughout its metropolis.

Not only the Board has benefited. So also have its passengers. They travel in greater comfort than they could otherwise hope for, and indeed, in greater comfort than the average in Melbourne's buses.

Persistent efforts have been made since the end of the war to get agreement on staggering generally throughout Melbourne: shops,

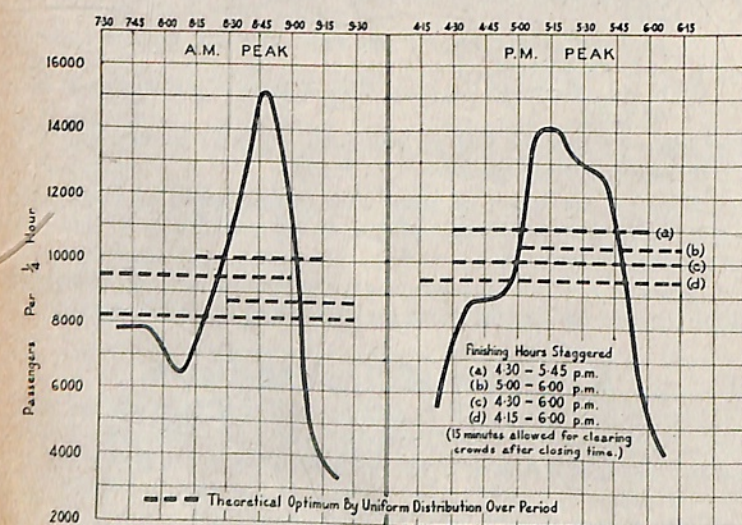


Fig. 3.—Graph showing Passengers per Quarter-hour Arriving in the City in a.m. Peak and Departing from City in p.m. Peak by Trams and Tramway Buses.

offices, workshops, factories. Success seemed within our grasp in the middle 1950's, but eluded it, and there appears less prospect of it now than ever. Nor, as far as one can learn, has anywhere else had any greater success.

Fig. 3 shows how sharply loading varies before, during and after peak hours. It is plotted from Melbourne figures, but the graphs of London and a representative collection of continental cities are of the same general shape.

Fig. 4 illustrates the same problem by showing the number of vehicles in services at various times of day, fluctuating between 151 at 6 a.m. and 812 at 5 p.m.

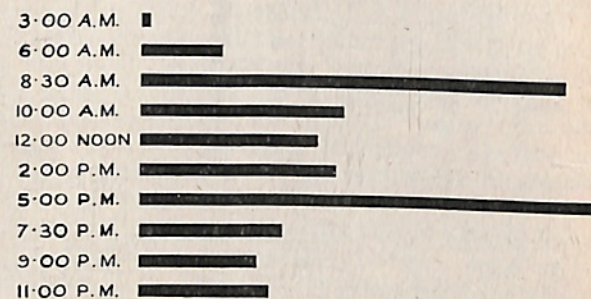


Fig. 4.—Number of Vehicles in Traffic—Trams and Buses.

These sharp fluctuations necessitate capital outlay to provide vehicles and other fixed assets adequate to meet the peak demand, for which there is no use during the greater part of the day. They also necessitate the employment of staff to man the peak services, many of whom cannot be profitably used off-peak, but still have to be paid. Staggering would not only mitigate congestion: it would lower costs. An American consultant has said that transport authorities in his country would be better off financially with half their present passengers—if they could choose which half to lose: the peak half.

Fares.

Much is heard from time to time about today's allegedly exorbitant cost of tram and bus travel. It is not exorbitant. It is cheap: cheaper in purchasing value than a quarter of a century or more ago, or at almost any time since then; too cheap if the transport authority is to rely wholly on its own earnings from fares to give the service its patrons demand—and nothing would please it better than to give such service if it could.

This raises the question whether a publicly-owned transport system, meaning city trams and buses and the like, should be treated as a business enterprise or regarded as a public service to which citizens are entitled without being required to pay the whole cost of it, but with the shortfall made good from the public purse, whether from State Consolidated Revenue, municipal rates or otherwise. No one seems to have answered this question specifically and clearly. In practice, Melbourne, or the State of Victoria, treats it as a business, obliged to pay its own way, and at the same time, incidentally, give concession travel to various categories of passengers—school children, students, blind, certain incapacitated ex-servicemen, pensioners—that costs it the greater part of £500,000 per annum, apart from almost another £500,000 per annum it saves municipalities by making and maintaining the roads on its tram tracks. Other States, all of them, have taken contrary action.

A British Parliamentary White Paper sets out what is expected of comparable nationalized industries in Britain: pay their way, including depreciation on the book value of their assets, plus unspecified additional amounts towards the increased cost of replacements at today's higher prices. Not all the nationalized industries achieve this. London Transport, probably the biggest urban public transport authority in the world, does.

Fig. 5 shows how Melbourne's average fare per mile and its cost per vehicle-mile have gone up since 1939; fares 3.4 times, costs 4 times. Graphs of other capital cities in Australia would not be greatly different. Closing the gap between fares and costs is what management is paid for.

The Institution of Engineers, Australia

MELBOURNE & METROPOLITAN TRAMWAYS BOARD

BASED ON 1938/39 = 100%

COSTS VERSUS FARES

1939 - 1962

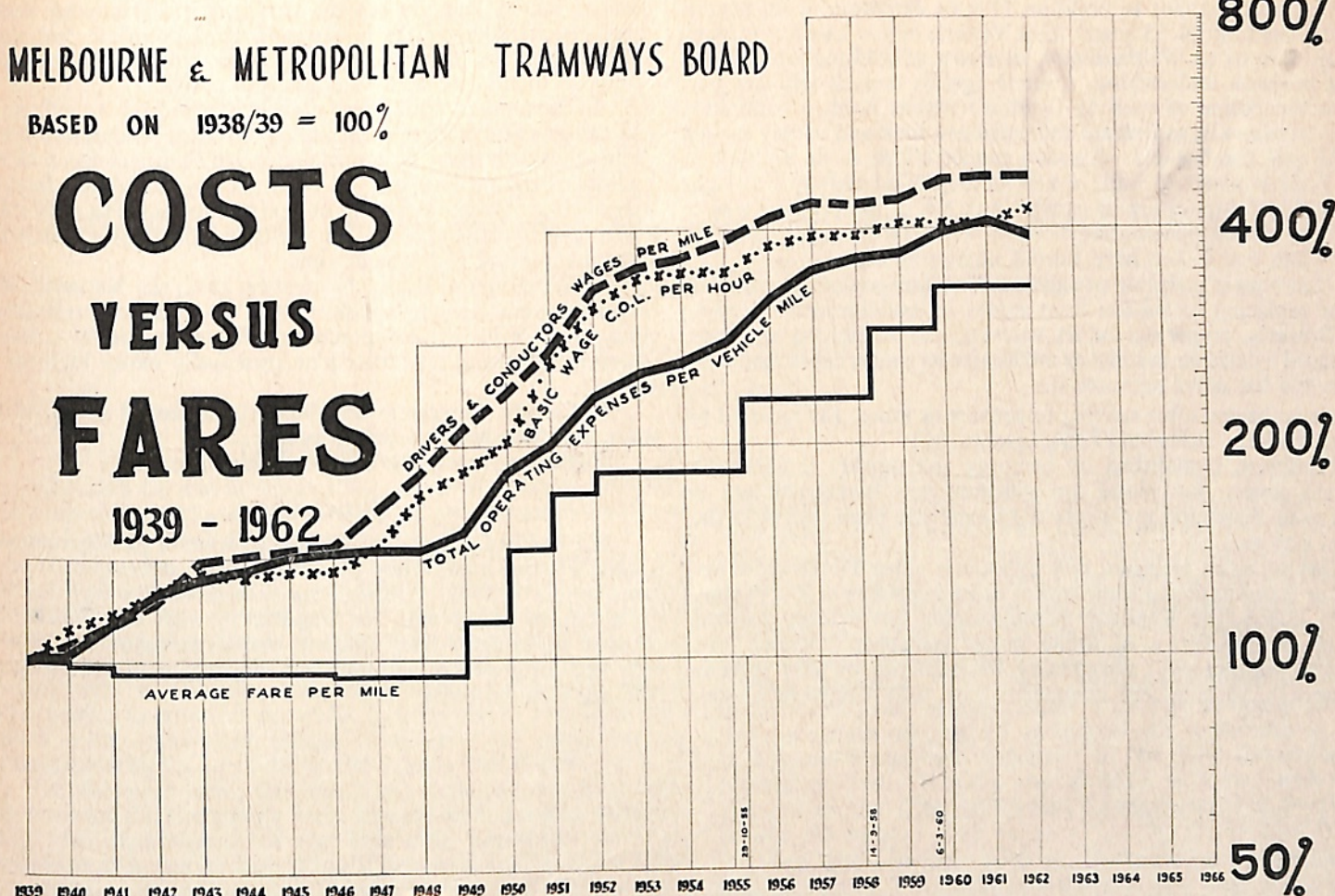


Fig. 5.

Rostering and Computers.

Rostering, as it is called here, scheduling in Britain, is the compilation of timetables and the allocation of drivers and conductors to work them on a rotating basis, with strict regard for the conditions prescribed by their Award and sometimes other conditions also. It is a lengthy, painstaking, meticulous task, a gigantic jigsaw puzzle. Efficient rostering can save a lot of money; inefficient, lose a lot.

Fluctuations in demand require rosters to be revised and altered from time to time. The aim of revision is often reduction of costs, sometimes quite appreciable reduction. It takes time: even in Australian cities, several weeks. In some cases the new roster can be introduced piecemeal as sections of it are completed: in some, not. Until it can be completely introduced, the prospective savings cannot be achieved. This can be serious enough in a small organization; more so in a large one.

In London, for example, a complete revision can take from six to nine months, and the London system is so interwoven that, perforce, a new roster is not introduced piecemeal but waits until the whole revision is completed. So London can, and does, go on losing substantial potential savings for six to nine months.

It is readily understandable, therefore, that strenuous efforts have been made to mechanize rostering, more for the above reason even than for the saving in roster staff that would result. Computer manufacturers and large transport undertakings have spent tens of man-years and hundreds of thousands of pounds in endeavours to programme the rostering problem for processing on computers, so far with only partial success. No doubt the problem will be solved in time—and there should be rich rewards in quick sales for the first computer manufacturer who completely solves it.

The Journal, June, 1963

Traffic Control.

Centralized traffic control is essential, especially in face of the unpredictable delays in modern traffic. Examination overseas in 1962 showed no difference in principle, and very little in detail, between European and American and Australian practice: basically, a central traffic control room in telephonic and two-way radio communication with senior uniformed inspectors in motorcars, controlling foot inspectors and, through them, crews and vehicles. In that way accidents, delays and other irregularities are quickly reported, appropriate instructions given, relevant inspectors, breakdown crews and others directed where they are needed, stoppages cleared and services adjusted.

Headway recorders, operating through contractors on trolley wires and recording in the control room, are normal in America where trams are still in use. They have never been used more than experimentally here.

Motor buses having no trolley wire, London has been experimenting over the past six years with electronic scanners which identify each bus as it passes (recognizing a distinctive identification code pattern built into the side of each bus at scanner height) and report it to the control room. Until 1962 this experiment was limited to two routes. Having established its worth, it is now being extended to others. Punctuality has improved most noticeably on the routes where it is used, obviously because bus drivers know that their time-keeping is under observation: no other explanation is apparent.

Current Public Transport Moves Overseas.

An indication of the virility of public transport abroad is afforded by major schemes now afoot.

London is about to build an 11-mile extension of its Underground (its first for 55 years) from Victoria across London through Oxford Circus to Walthamstow, at a cost of £65 million sterling. As a business undertaking, revenue against cost, it will not pay. From the points of view of London's urgent need, a continuing viable metropolis, individual and collective time and money saving, it will pay handsomely. London cannot afford to do without it.

Paris is about to build a new underground railway line right across Paris, duplicating its present line No. 1, not on steel wheels and rails but on pneumatics.

Milan and Rome have started undergrounds.

Hamburg is spending two and a half million pounds (Australian) a year replacing its busiest tram routes by underground railways.

Brussels, preparing for its International Exhibition six years ago, faced a decision to scrap or modernize its trams, chose modernization and has never regretted it.

Copenhagen, after starting to convert to buses, has reverted to trams, modern, articulated German ones.

Frankfurt, demolished by bombing and quickly rebuilt with widened streets, has found the widening now inadequate and is about to underground the whole of its extensive tram system in the central city area.

Twelve other German, two Swiss and some Dutch cities are doing or going to do the same sort of thing in greater or less degree.

In U.S.A. the Kennedy Administration has evinced marked concern for the future of urban public transport ("transit" in American terminology) recognizing its influence on city growth (or decay!), housing and commerce. In 1961 Congress appro-

priated 100 million dollars for free grants and capital loans to transit undertakings. It is expected to appropriate 500 million dollars over the next three years. The President's message to Congress in 1962 devoted 15 minutes to transit.

In November, 1962, San Francisco approved by referendum the construction of 75 miles of rail rapid transit (underground in the central business area; by tunnel under San Francisco Bay; elevated railway in the median strip of highways beyond it) at a final total estimated cost of one thousand million dollars, equal to £450 million Australian. The trains will be wholly automatic. Trams will be put underground at the same time.

In Washington, also in November, 1962, the National Capital Transportation Agency appointed by the President submitted a transportation plan based predominantly on rail rapid transit, in contradistinction to an earlier plan principally motor highway and freeway.

In Canada, Toronto is now building its second and third subways, and Montreal has begun its first.

These are merely the most outstanding cases.

Conclusion.

If I had had any doubts about the future of public transport—naturally I had none—they would have been dissipated by what I saw overseas in 1962. Outside Australia it is safe to say that every great city is seized with its importance, with a realization that without up-to-date, fast, efficient public transport the city not only will not grow but will not maintain its vitality and prosperity. Nor will it in Australia.

TECHNICAL NEWS ITEM

OFFICIAL OPENING OF INSTITUTE OF HIGHWAY AND TRAFFIC RESEARCH

The Institute of Highway and Traffic Research was officially opened on Friday, 10th May, by the New South Wales Minister for Local Government and Highways, the Hon. P. D. Hills, M.L.A.

The Institute has been established by the University of New South Wales. It is situated in King Street, Randwick, and occupies part of the 3½ acres of the old tram depot. The main building has a floor area of 23,000 sq. ft., and additional accommodation is being provided. The buildings house also the Schools of Highway Engineering and of Traffic Engineering, and the laboratories and other facilities provided are used in common.

On the ground floor of the main building are laboratories for concrete, bitumen and soil mechanics, a crushing room, an aggregate room, an air-conditioned chamber for tests under controlled conditions of temperature and humidity, and a "fog-room" for curing test specimens of concrete under controlled conditions of moisture and temperature. Special provision has been made for the storing of radioactive materials.

On the first floor are the offices of the Executive Director, (Mr. H. M. Sherrard, M.C.E., M.I.E.Aust., formerly Commissioner for Main Roads, N.S.W.) and of the Professors of Traffic Engineering and Highway Engineering (Professor W. R. Blunden, B.Sc., B.E., A.M.I.E.Aust., and Professor D. F. Orchard, B.Sc.(Eng.), Ph.D., M.I.E.Aust.). Offices for staff, library, lecture room, conference room and separate laboratories for Traffic Simulation and Control, for Data Reduction and for Human Factors research are also on this floor.

A wide range of instruments and testing and research equipment is being installed, the largest items being a 200-ton Universal testing machine and an IBM.1620 electronic digital computer. The workshops are equipped with a wide range of machine tools.

The facilities of the Institute will be available to carry out highway and traffic research for Government and Local Government authorities and for other clients.

The Institute is managed by a Board of Directors, under the Chairmanship of Professor A. H. Willis, B.Sc.(Eng.), Ph.D., A.M.I.E.Aust., Dean of the Faculty of Engineering, his co-directors being Mr. Sherrard, Professor Orchard and Professor Blunden.