

# Singapore City Focus

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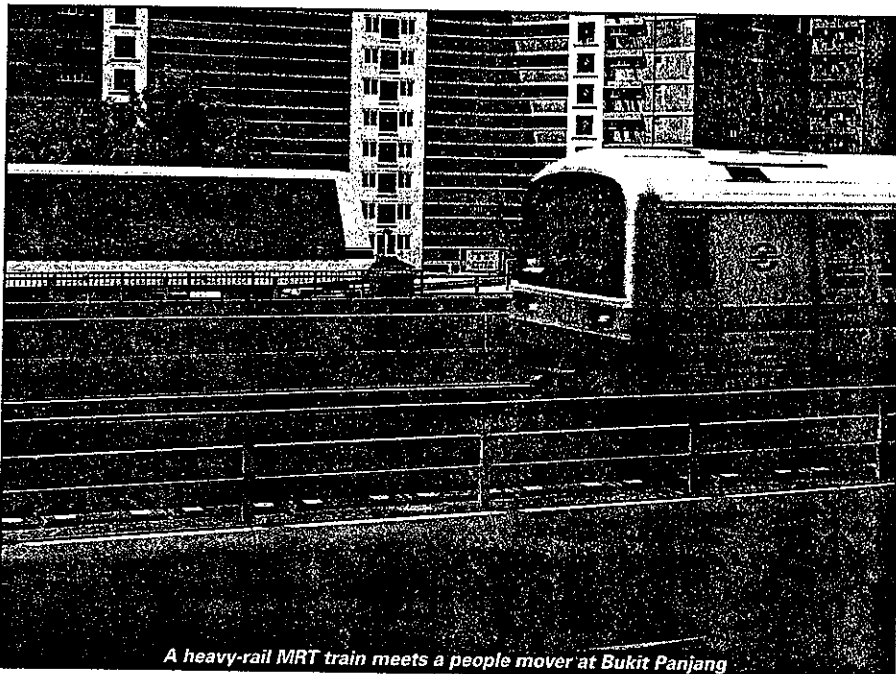
**T**HE island of Singapore is a regional anomaly transport-wise. Their system works, and it has to. Owing to a deliberate policy by the country's leaders in the 1970s (principally the former Prime Minister, Lee Kwan Yew), of building an efficient urban transport system, to the exclusion of cars, there are not many of the latter. Only one in nine inhabitants owns a car.

In Singapore, cars are for the rich, who can not only afford stinging import duties, but who also can pay the ERP – the Electronic Road Pricing tolls, extracted by machines on gantries straddling the roads into the cen-

on time to serve the local inhabitants. The present urban transport cover is now such that one in two inhabitants in the 648 Km<sup>2</sup> state now lives less than one kilometre from an MRT stop, and only 400 metres from a bus stop. At peak times, 85% of bus routes run at 12-minute intervals.

### Organisation of Transport

Both the MRT and the two bus companies are under the responsibility of the Land Transport Authority (LTA), a body set up by the government in 1995 to oversee the development of an efficient transport system. The government has made it mandatory for



A heavy-rail MRT train meets a people mover at Bukit Panjang

tral area and automatically deducting the requisite amount from the driver's account.

It was realised early on that, in order for the economy to thrive, people had to be able to get about freely and easily. First of all, buses were the main means of transport, and the two companies (Trans Island Bus Services – TIBS, and Singapore Bus Services – SBS, the results of many take-overs) still carry great numbers of Singaporeans to their work every day. But the big development came with the construction of the metro: two lines were built between 1983 and 1990 to the latest technological standards. The 16.5-kilometre 'Woodlands Extension' was completed in 1996 at a cost of S\$1.3 billion, bringing the total of the Mass Rapid Transit (MRT) to 83 kilometres. This extension served some of the new housing estates that were, and still are, being built all over the island, and the new line came in

transport companies to offer both high-quality and high-frequency services. So, one of the objectives of the LTA is to create a world leader in integrated transport systems, and to achieve this has set itself a number of goals. The public transport system has to be highly efficient and comfortable, guarantee traffic flow, have rapid links between the different transport modes and to provide passengers with virtually door-to-door services.

The CBD is totally accessible to commuters, so with 2,000 passengers on every metro train, the hourly passenger delivery rate is 20,000 per line. Given that four lines cross in the centre, the total is 80,000, not including those arriving by bus and taxi. Ferries, too, bring people into the port from the island of Sentosa. A White Paper by the LTA called for S\$20 billion of investment in the next 15 years.

coach) is the maximum that passengers will tolerate. It is estimated that an additional ridership of 15% during peak morning service could have been carried in 1999 if more capacity had been available. An SRT plan provides for 16 new motorised Mark I coaches to be added to the fleet, bringing the total to 44 coaches. These vehicles would be received in 2003 and 2004, at an estimated cost of CAD71.7 million.

### CHINA

- The Paris CDG Airport Soulé SK shuttle, that never worked properly, has now been dismantled and partly re-built on the outskirts of Shanghai.

### CZECH REPUBLIC

- Brno, the second-largest city in the country, has issued a tender for 25 articulated, low-floor trams with delivery between 2001 and 2004. The tender includes two types of vehicles: 20 trams will be uni-directional with a length of 22 metres, and the remaining five will be bi-directional and 32 metres long. The city currently operates 316 trams of 13 types, but only 11 have any low-floor areas.

### ICELAND

- Within the next 20 years, Iceland plans to become a model for a hydrogen-based economy using fuel-cell technology. Renewable energy sources already fulfil 67% of the energy needs the country's 270,000 inhabitants. Hydro-electric and geothermal power will split water into oxygen and hydrogen via electrolysis, and the resulting gases will be used to make fuel. Research teams from the companies Elkem and Icelandic Alloys are currently designing a 42-megawatt metal-processing facility near Grundartangi. They plan to use the carbon oxide gases created, together with 10,000 metric tonnes of hydrogen, to produce 87,000 tonnes of methanol. If used in fuel-cell vehicles, this amount of methanol could replace between 76,000 and 87,000 tonnes of petrol, of which the island imports 137,000 tonnes per year.

### MALAYSIA

- Over 36% of the new 57-kilometre Express Rail Link (ERL) between Kuala Lumpur Sentral and the KL International Airport has now been completed. ERL hopes to have 80% of the civil work (53.8% at the moment) done by the end of the year and overall completion by January 2002. The airport service will be non-stop, but the rails will be shared by some suburban services stopping at Bandar Tasik Selatan, Putraya and Salak Tinggi.



**FRANCE**

- The Parisian suburb of Montreuil has bought up three old London taxis and is using them to improve public transport in the borough. People who cannot get to their destination by bus or metro can phone for one of the taxis, which are subsidised by the civic authorities and have flexible itineraries, and get a trip for a fare of FRF10, whatever the distance.

- The Greater Paris Region (Ile-de-France) has voted FRF73 million to increase security in several zones: FRF6.6 million will equip SNCF trains on the outer ring with radio security. Some night bus services will be fitted with radio-positioning equipment, which will allow drivers to alert a central command post by pressing a pedal. Police will thereby be able to localise the vehicle and come to the aid of the driver; FRF3.2 million will be used to equip lycées with alarm systems, and FRF46 million will go towards the creation of a number of police posts in "sensitive" areas.

- The Regional Council has published 10,000 copies of a 30-page booklet showing how people with handicaps can travel around the Greater Paris area most easily. Information on trip organisation, tariffs and timetables of the suburban trains, metros, RER, Orlyval, etc. can be found, together with the possibilities of organised special services for such people.

- On the occasion of the opening of the new RER Line C station at "Bibliothèque François Mitterrand", the French Minister of Transport indicated that a decision on the construction of a direct rail link from the Gare de l'Est in the centre of Paris out to Roissy-Charles de Gaulle Airport, should soon be announced. If a positive decision is made, a quarter-hour service lasting 15 minutes should be running by 2007. An examination of the various possibilities will take place, and the project should go ahead without resort to public funds.

- The RATP is to buy a Gateway accelerated moving walkway (See UTI No. 28) from CNIM to fit in the long tunnel between Montparnasse main station and the metro. The RATP will buy the prototype for FRF9 million and fit it between the end of 2000 and the beginning of 2002.

- The towns of Bayonne, Anglet and Biarritz have formed a Syndicat Mixte d'Etudes with a FRF5-million budget to study the possibility of building a tram-train between the centre of Bayonne down to Hendaye on the Spanish border. Here it would make connection with the Spanish "Topo" or "Mole", along the Basque coast to San Sebastian. With a minimum of

**Singapore**

**Expansion**

As the population rises from the current 3.8 million to an expected five million in the long term, the government is planning more and more new towns, and related rail connections.

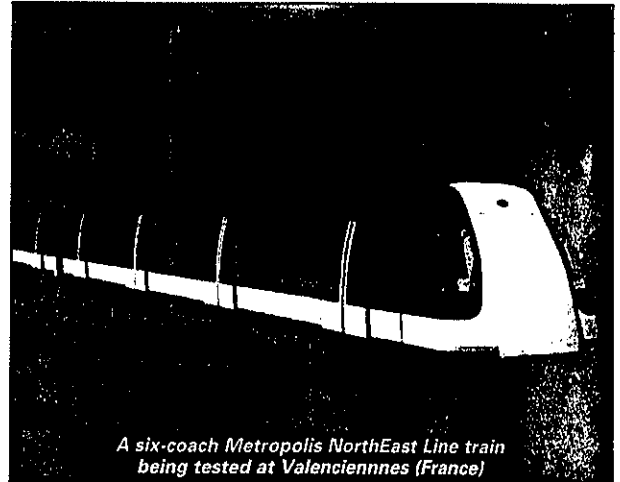
One that has already been built is a people mover built by Adtranz at Bukit Panjang. An elevated structure, this is an 8-kilometre, S\$280-million route running east from the Choa Chu Kang metro

station to serve a large housing estate with its 13 stations. Two other such lines are being built at Sengkang and Punggol, which will be supplied with rolling stock from Mitsubishi.

**The North East Line (NEL)**

A third metro line 20 kilometres long is now under construction linking the port (Harbour Front), the CBD and numerous shopping centres with the North East part of the island, where the new towns of Hougang, Sengkang and Punggol are currently being built. The S\$5-billion line, which is entirely underground, will initially have 13 stations, but a further three will be added as soon as the housing estates and shops have been built. Interconnection with existing lines will be at Dhoby Ghaut and Outram Park.

At the same time at the NEL is being built, two fully-automatic light rail lines are under construction to serve the Sengkang and Punggol new towns. Of 10 and 12 kilometres length respectively, with a total of 33 stations, these lines are being integrated at the building stage, and, not like Bukit Panjang, being 'retrofitted'.



A six-coach Metropolis NorthEast Line train being tested at Valenciennes (France)

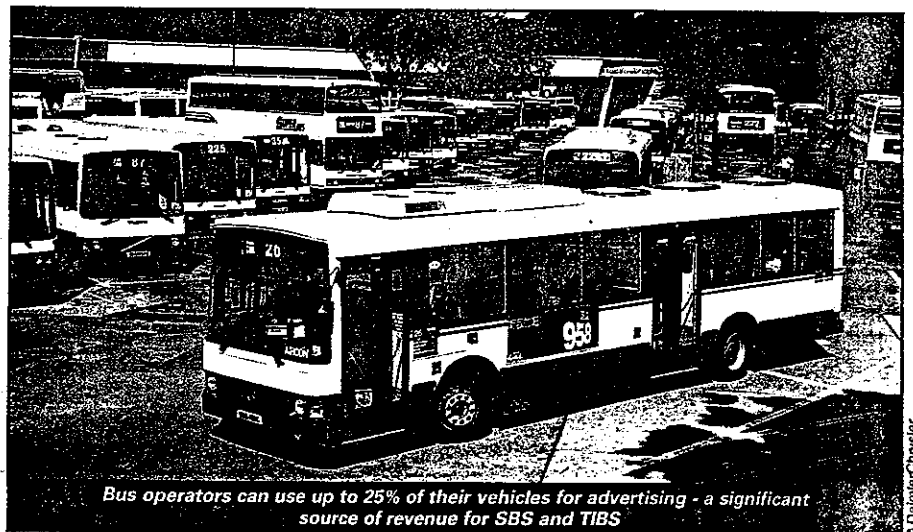
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**Changi weak point corrected**

The fact that the Singapore airport does not yet have a rail extension weighs heavily on the reputation of planners. It does have a bus service, costing S\$0.90 for a single trip, but the total journey time is almost an hour. This has goaded the authorities into building the Changi Airport Line (CAL), a 6.4-kilometre branch, from Tanah Merah station, with underground arrival platforms at the airport. It will also serve the Exhibition Centre (Expo), and will open at the end of this year. 21 six-coach trains from Kawasaki/Nippon Sharyo will ferry passengers.

**Marina Line**

This 13-kilometre, 20-station development is to be built as a first link in a 36-kilometre, EUR1-billion network, which will circle the island and link other existing lines. Initially, it will provide better connections from Marina South to the city centre, and should open in 2005. A consortium made up of Singapore Technologies Electronics and Alstom will build the line and supply the rolling stock (seven 3-coach trainsets)



Bus operators can use up to 25% of their vehicles for advertising - a significant source of revenue for SBS and TBS

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UNITED STATES

- A testing accident occurred on Washington's new 10-kilometre Green Line track in Saint George's County. This is the last stretch of a 165-kilometre network and follows a south-eastern route from Anacostia station with stops at Congress Heights, Southern Avenue, Naylor Road, Suitland and Branch Avenue (rail yard storage for 116 coaches). A train travelling at 24 km/h passed a red light and rolled into another train standing at Naylor Road Station. No one was hurt, but engineers are looking into driver error, deficient track circuitry and faulty ATC to find out why the train did not stop automatically.
- Houston, Texas, has voted to allow the Metropolitan Transit Authority to use streets for the construction of a 12-kilometre, USD300-million, light-rail line from the University, through the city centre and out to Reliant Park, formerly the Astrodome. Tenders for rolling stock and the electric power line system were issued in December.
- The US government's transit funding for the fiscal year 2001, at USD6.3 billion, is 8% up on the 2000 level.
- In November last year, the Los Angeles MTA suffered a 32-day strike by its drivers, who were demanding better wage conditions. In exchange, the LAMTA won timetable changes that will help it cut costs, although it felt it necessary to award the public a compensatory five days' free travel after the return to work, which was negotiated by the Reverend Jesse Jackson.
- A citizens' group has proposed the building of a 48-kilometre, elevated, light-rail branch of the Los Angeles Blue Line, costing USD2.3 billion, from Irving to Fullerton. Already the Orange and Santa Ana Counties have been pushing for construction of the so-called CenterLine within two years. There is much polemic about the routing, but it is expected that it would pass through or near enough Central Business Districts for it to be profitable, with an estimated 82,000 boardings daily. Passengers would be ferried to such sites as Disneyland, Edison Field, South Coast Plaza, John Wayne Airport and the Irvine Spectrum. Roughly three-quarters of the construction costs would be paid with federal rail and anti-pollution funds and the rest would be raised by the Measure M, a local half-cent sales tax. The line, for which LACTA has the right-of-way, could be part of a new 140-kilometre network, the planning of which will make it possible to travel around the city easily in 20 years' time. A decision is

At S\$338.7 million, passenger revenue accounted for 92% of the total revenue turnover of S\$368 million. Net profit after tax was S\$115.4 million, a year-on-year improvement of 22%. Total operating expenses were S\$283.1 million, or 77% of turnover. Pre-tax profit was S\$160 million compared with S\$130.3 million in the previous year, mostly due to higher passenger revenue, but also lower elec-

tricity costs, lower property tax and higher levels of interest and investment income. SMRT surpassed the standards set for them by the LTA in performance: service punctuality meant that 95% of trains arrived on time and 99% left on time. Trains service availability remained high at 99%. Ridership grew from 346 million the year before to 367 million (+6.1%). ◀

## LTA goes smart

**I**N 1999, the ERG Motorola Alliance won a contract in Singapore to design and install an integrated smartcard ticketing system for the Land Transport Authority (LTA). The Alliance will provide a complete smartcard issuing, settlement and clearing system, including 22,000 smartcard processing devices throughout Singapore's rail, light rail and bus fleets.

A standard part of any system implementation, the contract required that the Alliance build a trial of the full system for testing and acceptance by the Land Transport Authority prior to proceeding to full implementation. During the second half of 2000, 100,000 contactless smartcards were issued for use in two major trials.

More than 14 million transactions have been generated during the trial of the rail system that operates on a limited number of gates across the entire Singapore Mass Rapid Transit (MRT) network. Following the success of the trial, the LTA accepted the system enabling the next phase in the project's implementation to proceed - the complete development of the system.

The second trial commenced in November 2000 and involves buses operating on selected routes intersecting with train stations. This has enabled Singaporean public transport travellers to experience the benefits of a multi-modal transport system. The buses in Singapore will be among the most technologically advanced in the world, as the complete system will include a GPS vehicle monitoring system and wireless LAN technology.

At present, public transport passengers purchase and load value to a magnetic-stripe ticket. When passengers board a bus, they insert their ticket into a validating machine and select a fare in accordance with the distance they intend to travel. The new system will be a closed system: a smartcard reader at the front of the bus will record where each passenger's journey commences. At the end of their journey,

passengers will present their card to a reader positioned at the back of the bus, at which time the system will calculate and deduct the correct fare.

Full-scale production for bus equipment has commenced with the Singapore bus fleet of almost 4,000 to be fitted out by the third quarter 2001. Training for operators is well underway. The final system is expected to see the six transport operators process more than four million passenger journeys each day.

One of the unique aspects of the system design is that seven major suppliers' products, such as ticket-vending machines and gates, will be combined to form a seamless system. This will represent a new operational standard for multiple vendor integration.

When fully operational, five million smartcards will be used within the public transport system. It is also expected that the cards will be used within Singapore's public telephone network. Smartcard readers have been developed to recognise the Sony contactless smartcards within 200 milliseconds if presented within a range of approximately 120mm. The system also provides for compliance with types 'B' or 'C' smartcards.

The introduction of state-of-the-art graphical interfaces locally and remotely will enable advanced control of a fully integrated rail system. This is in keeping with Singapore's light-rail fleet which itself is extremely sophisticated, with driverless trains and windows which become opaque when approaching residential areas thereby protecting the privacy of residents.

Singaporeans will enjoy the benefits of a fully integrated smartcard ticketing system. The introduction of a closed system will simplify the process of travelling, as they will no longer be required to select the appropriate ticket for each journey. Unlike magnetic-stripe tickets, there is no limit to the number of times value can be reloaded on a smartcard. Many options are avail-

### Metrorail's image tarnished by collisions

**M**ETRO RAIL, the commuter trains division within South Africa's rail industry, has suffered three accidents in the greater Gauteng area in a month! The frequency of these accidents has frightened and angered the commuting public. The accidents, two on Soweto lines and one near Germiston, have resulted in 145 injured with three fatalities. The one Soweto accident embraced two trains converging on each other resulting in a side-swipe. A second Soweto accident was the result of a rear-end collision. Three people were killed, including the two train drivers, when a train travelling to Kattlehong collided head-on with another en route to Elsburg, near the city of Germiston.

With three incidents within a four-week period, passengers, who depend on the Metrorail services for their daily commuting needs, are apprehensive about the services and also deeply angered by the apparent lack of safety. Some commuters have been turned away from the train service in favour of alternative, road transport. The Government has set up an independent commission of inquiry over and above Metrorail's own investigation procedure. The SA Footplate Staff Association (SAFSA) said that it had warned Metrorail management mid-year about the signalling system and the lack of safety, particularly between Kattlehong and Elsburg. A Safsa official said the only way to curb the increased incidence of accidents was to have a rail regulator in place. Safsa has urged the Government to supply the necessary capital to improve safety.

Driving cabs on the suburban trainsets had been designed 30 years ago and their features were no longer suitable. Specific attention needed to be paid to reports of train drivers warning their superiors of unsafe conditions and a concern over signalling system operators, who were not satisfactorily trained for their portfolio. Meanwhile, legislation to establish an independent rail safety authority is due to be completed in draft form in January 2001 to be tabled in Parliament thereafter.

As reported in UTI No. 31, Metrorail signed a concession agreement in August, which saw its annual government subsidy fixed at some ZAR800 million. Part of the conditions of the concession was that Metrorail would assume responsibility for infrastructure and facilities maintenance, customer services and train operations and security services. The three accidents mentioned will impact on Metrorail's financial situation, since the company has so far just carried the costs of the funerals of the victims of the Germiston collision. A batch of Metrorail (Gauteng) trainsets are currently being refurbished at the well-known Union Carriage & Wagon Works, Nigel, on the East Rand. ◀

John Batwell

lable, from ATM-style, value-add machines, to automatic debits from bank accounts, by telephone, the internet or transferring funds from one card to another. Mobile phones, such as the Motorola StarTACTMD Dual Slot Phone, are now available with a built-in smartcard slot making them a virtual pocket ATM. This is a substantial improvement in flexibility when compared to options available for purchasing traditional tickets.

#### User benefits

The system will also offer Singapore's public transport operators a number of significant advantages. Large quantities of coins are required to operate paper and magnetic-stripe systems, making it necessary to maintain cash floats on each vehicle. Cash handling and processing costs can be significantly reduced following the introduction of a smartcard system. Revenue collection may also be increased, as the correct fares will be charged for each trip. Settlement between operators will occur on a daily basis.

Experience has shown that, once introduced, there is a high acceptance of smartcard ticketing systems and Singaporeans are keen acceptors of new technology. Once passengers become familiar with smartcard systems, they have been known to actually switch from one transport operator to another where they have a choice of travelling using smartcard ticketing as opposed to a paper or magnetic-stripe system.

This system will provide the LTA and participating transport operators with information at a detailed level not economically feasible under most traditional based systems. This will enable the operators to adjust their schedules to meet passenger travel patterns and to optimise fleet utilisation.

Maintenance costs in relation to smartcard ticketing systems are significantly lower than costs for magnetic stripe systems, as smartcard readers do not have moving parts and therefore are not subjected to the same sort of equipment wear and tear. This alone has underwritten many business cases for smartcard systems in transit.

As attractive as the introduction of a smartcard ticketing system is to passengers and operators alike, the uses for smartcards extends beyond transit ticketing. By adding an electronic purse, for instance, cardholders would be able to pay for items such as newspapers, cups of coffee and calls from public telephone booths. Other uses include security access to buildings and loyalty schemes where, for example, every nth journey is provided free. ◀

expected in mid-February.

- The LA MTA has approved a USD20.8-million contract to begin engineering work for a ten-kilometre light-rail line east from Union Station to the area between Atlantic and Beverly Boulevards. The contract was awarded to a joint venture of PBQ&D and Jenkins/Gales & Martinez. The line is about twice as long as the previously rejected Red Line rapid transit extension to East Los Angeles.

- In Washington DC, Metrobuses will have new fare boxes by late 2002, which will accept SmarTrip cards, as well as cash and tokens. At a cost of USD31 million, Cubic will install the new equipment on 1,543 buses. Plastic fare cards with magnetic stripes will still be accepted on the underground services.

- The Maryland governor, Parris N. Glendening, has announced that new technology smartcards will be used on buses in Baltimore, shuttles in Silver Spring and virtually every transit line in the state at a cost of USD104 million. This purchase would be part of a USD750-million programme for new services, improvements and technology statewide.

#### ITALY

The average speed of a bus in Rome is 14 km/h, but despite this, 20% of motorists have decided to leave their car at home in 2000. Three billion hours are wasted in traffic jams in Italy, 70% within the city. The average Italian spends nearly seven years of his or her lifetime in his/her car and two years looking for a parking space. In Italy, in 1997, of 860 billion kilometres travelled by passengers, 71% were by car, 10% by bus or coach, 7% by railway, 6% by plane and 6% by motorbike or scooter.

- At the recent Ertico fair in Turin, it was announced that field surveys have shown an improvement of 19% in the journey times for public transport vehicles, and of 21.6% in those of private traffic after the city had set up the 5T (Telematic Technologies for Traffic and Transport in Turin) intelligent transport system. The 18,000 square-metre Exhibition (200 exhibitors) and conferences had a record attendance with 3,400 congress participants, 2,300 on the exhibition and 1,600 visitors.

#### UKRAINE

- Skoda and Russian metro coach producer Vagonmas, based in Saint Petersburg, presented their new metro coaches in the Ukrainian capital, Kiev, on 7 November last. The steel-bodied coaches are equipped by Skoda's pneumatic asynchronous traction equipment.



