

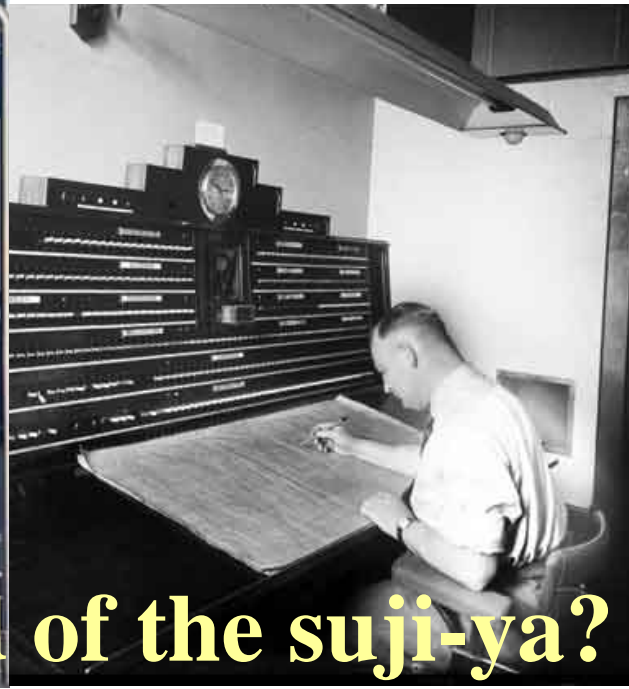
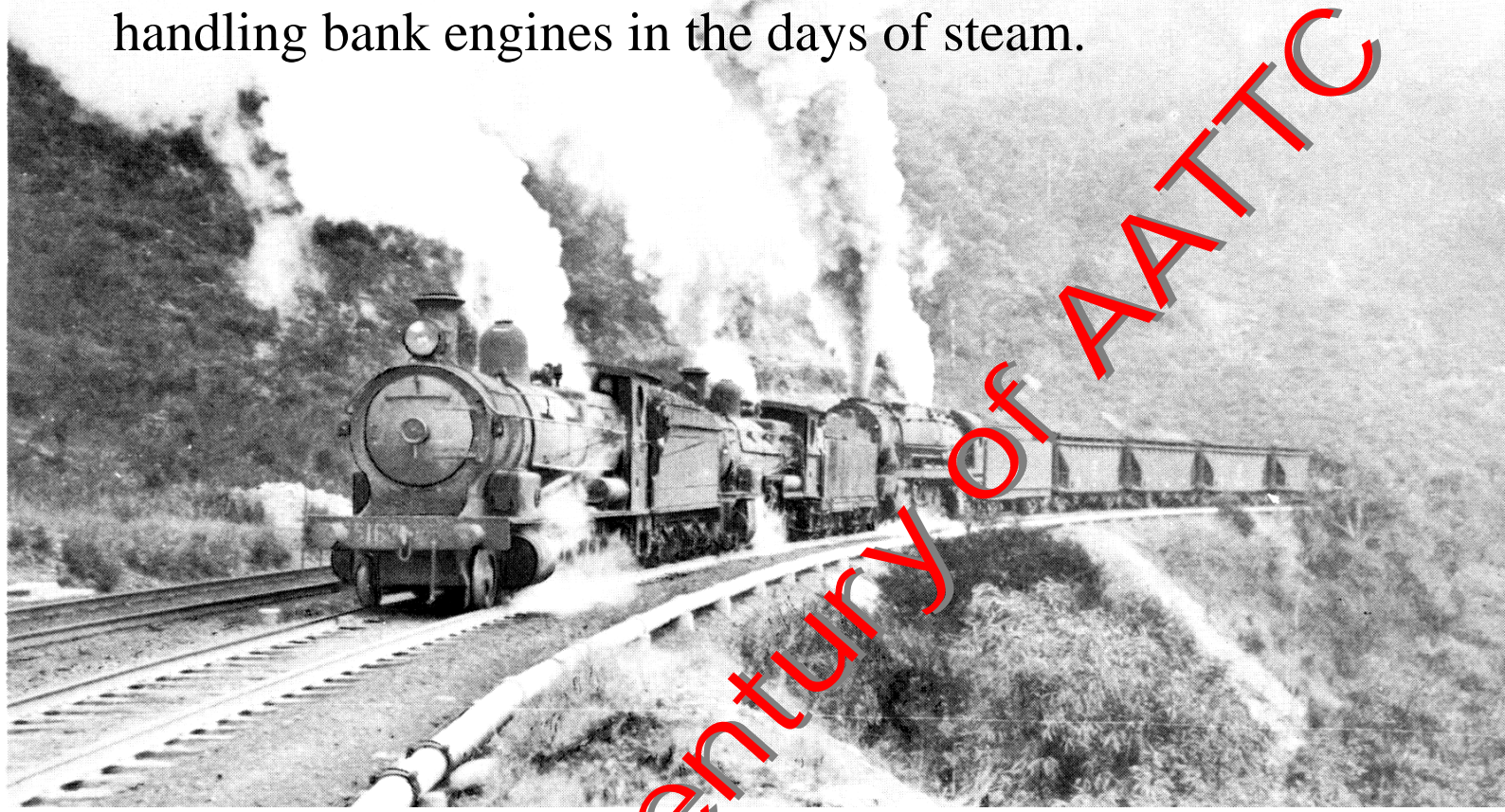


The Times

June 2009

A journal of transport timetable history and analysis

What happens when they get to the top?—
handling bank engines in the days of steam.



The end of the suji-ya?

Inside: Getting the bank engines to the bottom

A quarter century of AATTC

How computers are replacing the suji-ya

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The Times

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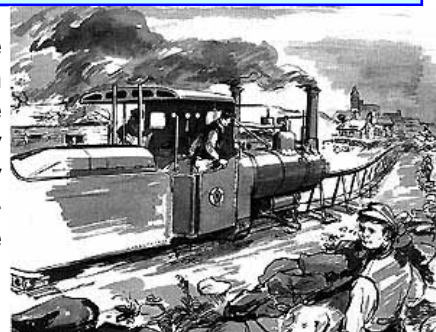
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On the front cover

(Upper) One of the famous 4-loco trains which heaved coal up the steep track out of Lithgow in steam days.

(Lower) These girls are examining the finished product of a suji-ya or "graph man"- still used in Japan to build timetables. This issue contains a story on how these chaps are losing out to the computer. An Australian suji-ya is seen at his desk in Train Control on the right.

As a child, I would lie awake at night, terrified by the noise created by the locomotives slipping as they attempted to ascend the Ingliston Bank with the Paper Train. In my wild imaginings I pictured them as looking like the drawing I had of the Ballybunion locomotive (right). Well, it was probably just an A2 after all. The locomotives had a hard job of it because they had to do it on their own. But 25 years previously, VR stationed a banking engine at the foot of the bank to ease the burden. Banking on the Ingliston Bank starts off this month's story on "Timetables for Bankers"



Derailments: The following acknowledgement disappeared under a picture in Jim Wells' NYC story in the May issue.

My thanks to Ian Brady for valuable assistance.

I apologize to both Jim and Ian

Contributors Geoff Lambert, Victor Isaacs, Ryo Tagaki
The Times welcomes articles and letters. Send paper manuscripts or word-processor files on disk or via e-mail to the editor at the address below. Illustrations should be submitted as clean sharp photocopies on white paper or scanned GIF or TIF format images with at least 300 dpi resolution on disk or via e-mail.

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Timetables for Bankers

GEOFF LAMBERT grew up by a bank where trains called for help to get over the top. What happened to the helpers when they got to the top?

It is well before dawn on a gelid Bacchus Marsh Monday. Nothing stirs—even the milkman’s horse dreams on in her stable. But wait... around the corner into Station St comes a wobbling pin-point of bright white light. It is the carbide lamp of a bicycle. Bent over the handlebars and surrounded by clouds of condensed breath is the local engine-cleaner. Dismounting under the pepper tree behind the signal box, he inches gingerly across the icy puddles to the tiny engine shed,

In the shed is a Y-class locomotive still ever so slightly warm from banking the Overland on Saturday night. By the light of an oil lamp, our hero sets to work, lighting old pages of the Bacchus Marsh Express and ironbark kindling to bring the engine to life. By 5 a.m. the occasional clang of the coal shovel and the muffled oaths accompanying a near-miss of the fire door echo around the station yard. Our man is working towards having his engine ready for her crew when they emerge from their camp cars in the carriage dock at 8 a.m. When they do, the train they are to bank, No 17 Passenger, is labouring over the dismal plains between Deer Park and Rockbank. Following it, and getting ready to depart Spencer St is No. 19 Express.

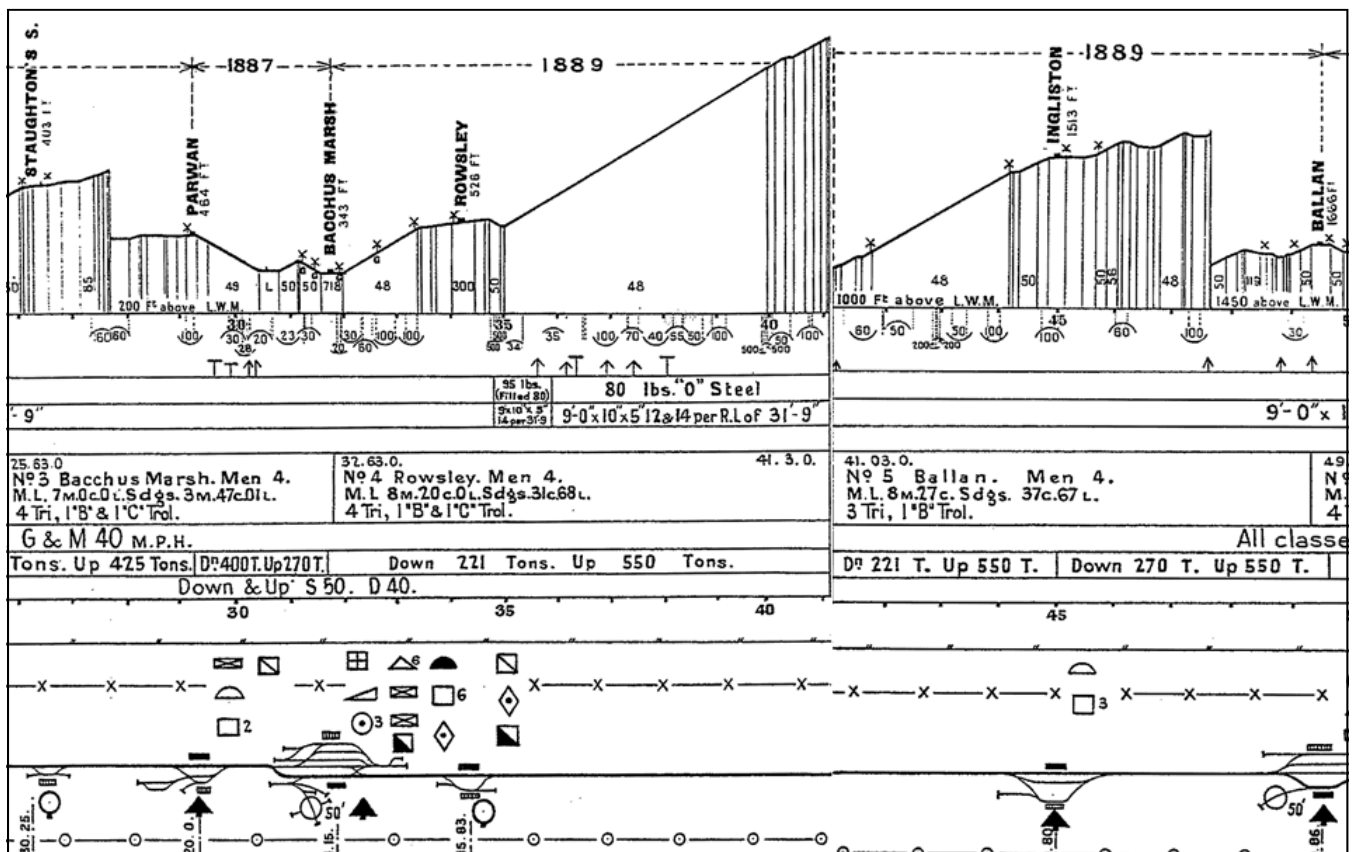
After an exchange of pleasantries and oiling around, the crew of the banking engine ease it out of the shed, trundle it around the turntable and back it out gingerly into Siding B to await the arrival of No. 17.

Mondays are special at the Marsh—the Up Overland does not run and the Ingliston Bank therefore has room for two Down trains in quick succession. Such quick succession indeed that the two trains must run on separate portions of a composite staff. No 17 slides into No. 1 road at 9 am and pauses to allow passengers to avail themselves of the refreshment rooms. While they are thus engaged they scarcely hear the crashing of levers in the signal box, nor the brief hoot of the “Y” as it shuffles forward and nudges up against the guard’s van of their train. The ringing of the station bell and an impatient exchange of engine whistles causes them to scurry forth to their compartments and the welcome foot-warmers.

With a crunch as the banking engine compresses the buffers, the train is away, two columns of steam and smoke ascending into the valley air. This is the moment that pupils and the teacher in the art class at the Higher Elementary school have been wait-

ing for. Dropping crayons, they crowd to the window to watch the spectacle of the train, engines fore and aft, as it charges through the level crossing gates and up and around into the cutting. It can be heard for a long time as it labours over the first steep climb.

Now by the racecourse—and on the level for a short respite—the train is picking up speed, the lead engine threatening to snatch the cars away from the banker. There are no passengers for or from Rowsley this morning, so the train does not pause, accelerating quickly into a dip before beginning another slog up to Bank Box. The line swings onto a long horse-shoe embankment, climbing again at an uncompensated 1 in 48 grade until it intersects the scarp of the Rowsley fault. Traversing this formation in a sidling fashion and still climbing, the line crosses Dog Trap Gully. For over two miles the passengers crossing this natural amphitheatre are treated to extensive panoramic views until the line finally slips into a long cutting. Except for a tantalising glimpse of the Werribee Vale, the cutting continues for a length of 3 mile until the line emerges into the open again at Bank Box. Here, we



Down.

MELBOURNE-BALLARAT-SERVICETON.

Height ab. Sea.	Miles	STATIONS.	1		3	5	7	9	11	13	15	17		19	21	23
			Steam Car. Mons. except.	Steam Car. Mons.	Steam Car. Mons. except.	Steam Car. Mons.	Steam Car. Mons. except.	Steam Car. Mons.	Steam Car. Mons. except.	Steam Car. Mons.	Steam Car. Mons. except.	Steam Car. Mons.	Steam Car. Mons. except.	Pass. Daily.	Express. Mon. only.	Express. Mon. only.	Express. Mon. only.	Goods Daily.
30	—	MELBOURNE W G	dep.	...	A.M.	A.M.	...	...	...	...	...	...	A.M.	A.M.	...	A.M.
18	1	North Melbourne	...	...	...	...	...	...	...	...	...	...	7 40	8 40	...	9 15
23	2 1/2	South Kensington	...	...	...	...	...	...	...	...	...	...	7 45	*	...	9 31
23	2 3/4	Maribyrnong Sdg. Jn.	...	...	...	...	...	...	...	...	...	...	...	...	...	9 35
53	3 1/2	Footscray	...	...	...	...	...	...	...	...	...	...	7 52	8 48*	...	9 35
60	4	Middle Footscray	...	...	...	...	...	...	...	...	...	...	...	...	...	...
80	4 1/2	West Footscray	...	...	...	...	...	...	...	...	...	...	...	...	...	...
101	5 1/2	Tottenham N U	...	...	...	...	...	...	...	...	...	...	...	...	...	...
125	7 1/2	Sunshine E S W	arr.	...	...	...	...	...	...	...	...	...	...	...	...	9 47
151	10	Federal Manure Siding N C	dep.	...	...	...	...	...	...	...	...	...	8 17	8 58*	...	10 05
184	11	Deer Park	...	...	...	...	...	...	...	...	...	...	8 9	*	...	...
366	18 1/2	Rockbank E S	arr.	...	...	...	...	...	...	...	...	...	...	...	...	...
394	23 1/2	Melton E S	dep.	...	...	...	...	...	...	...	...	...	8 25	9 17*	...	...
403	26 1/2	Staughton's Siding N C	arr.	...	...	...	...	...	...	...	...	...	8 33	*	...	...
464	29 1/2	Parwan E S	dep.	...	...	...	...	...	...	...	...	...	8 41	9 25*	...	11 30
464	29 1/2	Parwan E S	arr.	...	...	...	...	...	...	...	...	...	8 52	*	...	11 55
843	31 1/2	Bacchus Marsh W E S	dep.	...	...	...	...	...	...	...	...	...	8 56	9 35*	...	12 36
843	31 1/2	Bacchus Marsh W E S	arr.	...	...	...	...	...	...	...	...	...	9 2	9 42	...	12 45
528	34 1/2	Rowseley	...	...	...	...	...	...	...	...	...	...	9 11	9 45	...	1 20
1082	40 1/2	Bank Box (see note page 97)	...	...	...	...	...	...	...	...	...	...	9 5	*	...	...
1513	45	Ingliston E S	...	...	...	...	...	...	...	...	...	...	9 51	10 21*	...	...
1608	49 1/2	Ballan W E S	arr.	...	...	...	...	...	...	...	...	...	10 0	10 30	...	2 50
1681	52	Bradshaw	dep.	...	7 5	7 20	...	...	...	...	...	...	10 5	10 33	...	8 20

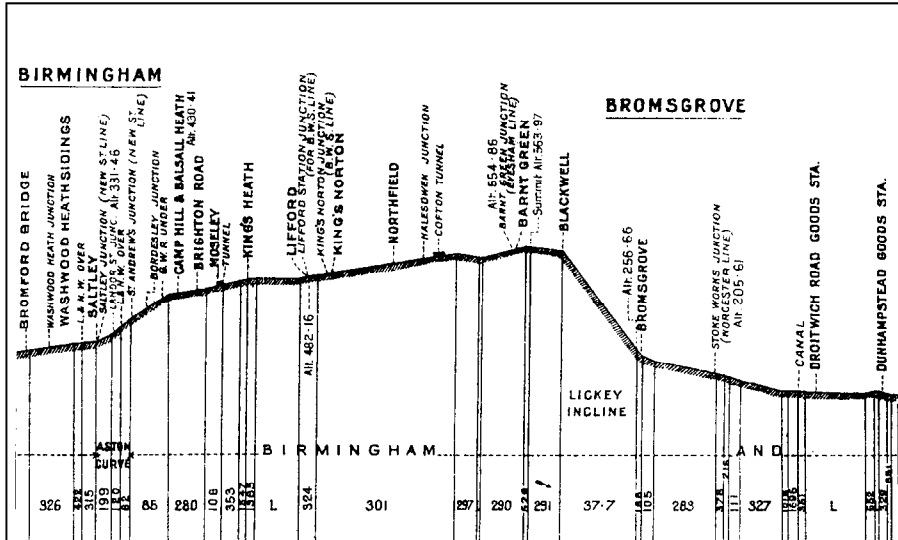
NOTE.—The 8.40 a.m. (No. 19) Express from Melbourne Mondays, will only convey passengers for stations beyond Ballarat (excepting North Ballarat and Wendouree), and is the through Serviceton train on that day. The stoppages at Bacchus Marsh, Ballan, and Bungaree are for Departmental purposes only. On Mondays, therefore, the 7.40 a.m. passenger terminates at Ballarat, and conveys all the roadside passengers and van goods for stations Deer Park to Ballarat inclusive, and for Branch Lines radiating from Ballarat.

Height ab. Sea.	Miles	STATIONS.	5 40		7 27		9 50		10 25		2 53		A.M. 1 0		5 55	
			Empty Cars Mons. only.	Express Suns. and Mons. exc.	Express Mons.	(See note F below.)	Pass.	(See note on page 102.)	Goods. Tuesdays.	Goods. Tues. exc.	Steam car. Sats. ex.	Steam car. Sats. ex.	Steam car. Sats. ex.	Steam car. Sats. ex.	Steam car. Sats. ex.	Steam car. Sats. ex.	Fast goods Daily (Suns. and Mons. exc.)
213 1/2	—	BALLARAT W G	arr.	...	...	...	...	...	...	...	...	...	...	...	...	...
213 1/2	—	Ballararat East	dep.	8 30	5 55	6 45	7 5	7 43	10 50	10 35	11 10	11 45	4 45	1 30	6 20	2 15
217 1/2	—	Warrenheip E S	arr.	5 33*	5 58*	6 49	7 9	7 47*F	10 54	10 38*	11 15	4 48	...	6 24	...	
219 1/2	—	Dunntown	dep.	5 43*	6 8*	6 59*	7 19*	7 57*	11 10	10 53*	11 55	12 35	4 58	1 56	6 40	2 41
223	—	Hungaree E S	arr.	...	...	...	...	...	11 17	10 53*	11 55	12 35	5 4	...	6 55	...
225 1/2	—	Wallace	dep.	5 55*	...	7 17*	...	8 7*	11 26	11 4*	1 10	1 30	5 11	2 10	7 0	...
226	—	Chaff Siding (Holden's) N C	...	...	...	...	...	8 12*	11 34	...	...	...	5 17	...	...	...
228 1/2	—	Millbrook	arr.	...	...	...	...	...	11 40	...	...	2 25	5 23	...	...	...
230 1/2	—	Gordon E S	dep.	...	...	7 24	...	...	...	...	1 50	...	...	...	7 19	...
233 1/2	—	Llandello N C	arr.	6 34	6 30*	7 25	7 44	8 19*	11 46	11 15*	2 20	2 50	5 28	2 28	7 27	3 12
235	—	Bradshaw	...	...	...	...	...	...	11 54	...	...	...	5	...	...	...
237 1/2	—	Ballan E S W	arr.	6 20	...	7 35	...	...	...	11 25	2 45	3 15	5 45	2 39	...	...
242	—	Ingliston E S	dep.	...	6 40*	7 36	7 55	8 29*G	10 45 B	12 2	11 27 N	3 30	3 55	7 16	2 45	7 42
246 1/2	—	Bank Box (see note page 97)	...	...	6 47*	7 43*	8 2*	8 36*	10 55	12 10	11 34*	3 44	4 15	2 54	7 49	...
252 1/2	—	Rowseley	arr.	...	7 6	8 3	8 21	8 55*	11 25	12 28	...	...	...	...	...	...
255 1/2	—	Bacchus Marsh E S W	dep.	...	7 10	8 21	8 39	9 4	...	12 54	11 51*	4 50	5 36	3 20	8 27	4 15

B. On Mondays excepted this Light Engine returns from Ingliston at 9.55 a.m. and arrives Bacchus Marsh at 10.30 a.m.
 C. In the event of No. 31 not running beyond Ballarat on Wednesdays No. 22a will depart Ararat at 9.55 p.m. and run correspondingly earlier to Ballarat.
 F. Passengers from Ballarat, Ballarat East, and Bacchus Marsh are to be allowed to travel by No. 10 on Sundays. This train stops at Ballarat East on Sunday to pick up passengers for Bacchus Marsh or Melbourne. On days when Dining Car is not attached to No. 10 20 minutes are to be allowed at Ballarat for breakfast. S.M. to see this time is not exceeded.—G. Stops at Ballan and Melton if required to set down on Sundays only, through passengers from stations beyond Ballarat, and at Ballan when required to set down Inter-State (only) passengers on week days.—H. Nos. 17 and 12 (14 if 12 not running) to set at Bank Box on Mondays to respectively set down and pick up Staff Worker.—N. Stops Ballan for departmental purposes only.

Ascending:—

10.—(a) No train must ascend the incline without an assisting engine being immediately behind the last vehicle, except passenger trains formed of not more than equal to six vehicles and freight trains equal to not more than eight wagons of mineral, which can go up the incline unassisted by a bank engine, provided the last vehicle is a brake van with a guard in charge.



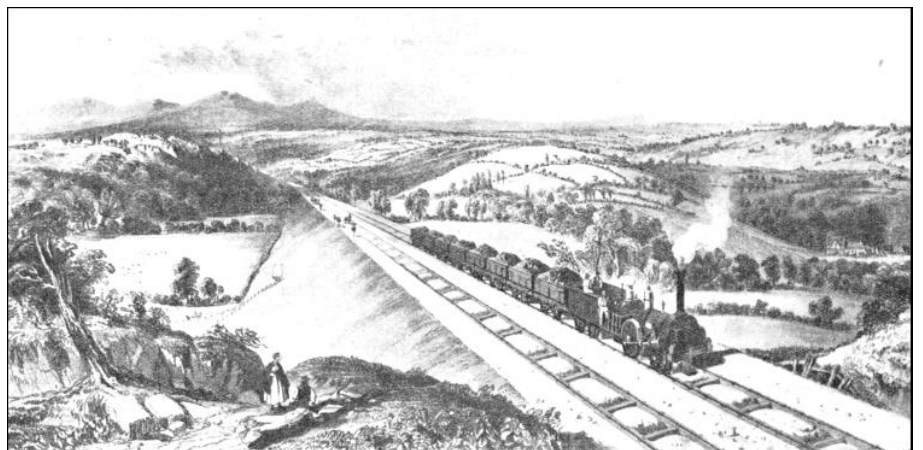
there is no need for divisible staff working, no need for a staff worker, and the engine-men will be keen to get home. With luck, they will have the engine back in the shed soon after its 7:45 pm arrival, when our engine cleaner is probably already in bed with his alarm set for a 3 a.m. wake up and that wobbly ride down the potholed streets to the station.

It was like that—it really was—although only for a brief period in the 1920s. Trains were banked out of Bacchus Marsh in both directions “with one or two engines in front” at various times and the Working Timetable contained instructions and loads for each as late as the 1960s. For several decades the bank engine was “borrowed” from a passing goods train, rather than being specially stationed in the town. Banking by a local engine was inaugurated in the Harold Clapp days of the 1920s, but did not survive the Depression and the engine-shed had gone by the mid-1930s.

Because of the long operating section, a composite electric staff was in use between Bacchus Marsh and Ingleston. However, it

glimpse the signalman at the door of his telegraph shack, before he ducks inside to signal the passing of the train to Bacchus Marsh. For, down in the valley, No 19 express has already come to a stand at the Down Departure signal, impatiently awaiting line clear and the remaining portion of the composite staff. Soon it too is charging up the hill in pursuit of No 17, which itself is climbing again through the Ironbark Forest on the lip of the Werribee Gorge and then through open grazing country to Ingleston. The panting engines come to rest here in No 1 road. The Y is uncoupled and the passenger train starts forward again to make a thirsty dash for Ballan and its water column. At ease now, the bank engine and its crew absorb the mid-morning sun while they await the arrival of the Express. It has two engines also, but both up front, and it makes slightly better time up the bank than did the Pass., shooting through the station on the auto exchanger at 10:20 a.m.

the Staff Worker from the Block Post. So, it is after 11:30 before the loco slips back into the engine shed. There will be nothing for it to do until late afternoon when the entire scene will be repeated with No 29 and 31 Expresses. At night, the two Expresses are sufficiently separated so that



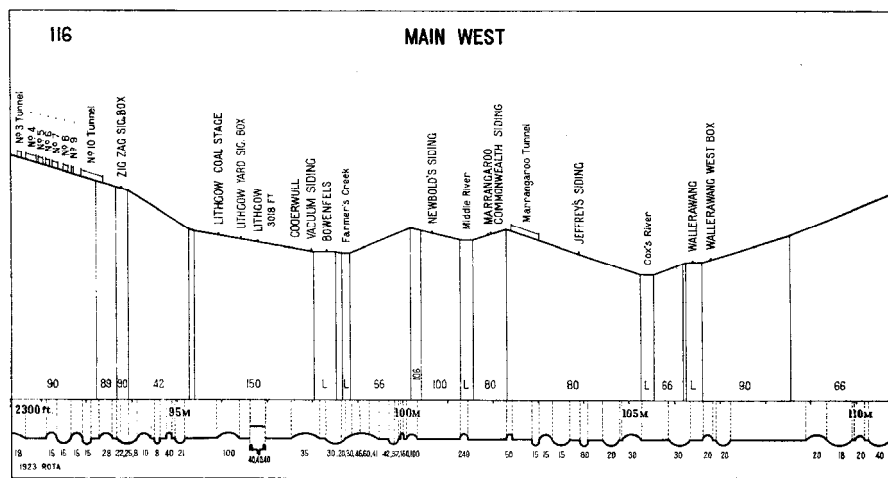
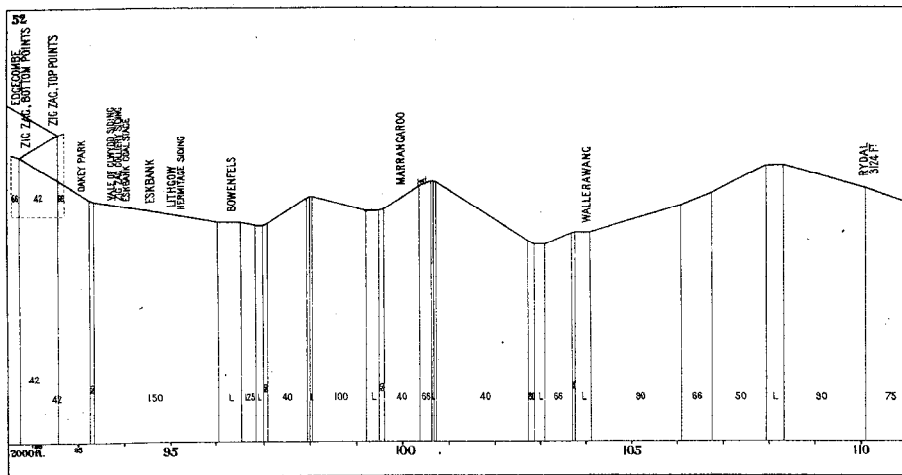
With the composite staff reassembled and inserted into the instrument and another withdrawn, the “Y” is now ready to back down the line to its starting point. It is a slow journey, made gingerly at the best of times because of the fearsome downgrade. Legend has it that once a crew of this light engine paused to pick mushrooms from beside the line and let their engine slip away and to come to grief in Bacchus Marsh yard. But this is an old tale, repeated wherever enginemen gather and unlikely to be true.

Tomorrow morning at this time, it will already have returned home because it will not have to await the following Express. Today is different for an extra reason. It must pause briefly at Bank Box to pick up



WEEKDAYS.

		530	531	532	533	534	535	536	537	538	539	540
		Express Freight to Ashchurch, thence through freight.	Engine and Brake.	Express Freight to Nottingham.	Block Coal Empties Braunston.	6.5 p.m. G.W. Goods Stoke Gifford to Tyseley.	Through Freight to Washwood Heath (S.X.) to Brom (80).	2.5 p.m. G.W. Express Goods from Southampton.	5.37 p.m. Express Freight Bristol to Water Orton.	5.37 p.m. Express Freight Bristol to Water Orton.	3.30 p.m. G.W. Goods Rogerstons to Stourbridge Junc.	5.50 p.m. Pitted Freight No. 2 from Avonmouth.
		SX	SX	MO				O	SX			O
		p.m.	p.m.	p.m.	p.m.	p.m.	p.m.	p.m.	p.m.	p.m.	p.m.	p.m.
GLOUCESTER.....	dep.	1	2	6 40	6 40	6 40	6 40	6 40	7 34	7 34	7 43	7 43
Tramway Junc.....		2	3									
BARNWOOD Sids.....		3	4	6 35	6 45	6 45	6 45	6 45	7 37	7 37	7 45	7 45
Engine Shed Sidings.....		4	5	6 40	6 50	6 50	6 50	6 50	7 37	7 37	7 45	7 45
Churchdown.....		5	6									
Lansdown Junc.....		6	7									
Cheltenham	arr.	7	8									
(High Street).....	dep.	8	9	6 56	7 5	7 10	7 36	7 31	8 2	8 2		7 56
Cleeve.....		9	10									
Ashchurch.....	arr.	10	11	7 9	7 45	7 19	7 22	8 2	8 19	8 17		8 11
Bredon.....	arr.	12	13	7 50					8 24			8 11
Eckington.....	dep.	13	14									
Defford.....	arr.	14	15									
Pirton Sidings.....	dep.	15	16									
Abbott's Wood Jc.....	arr.	16	17		7 30	Carries Rep. No. B19.						
WORCESTER		17	18									
(G.W.).....	arr.	18	19									
Tunnel Junc.....	dep.	19	20									
Droitwich.....		20	21									
Spetchley.....		21	22									
Dunhampstead.....		22	23									
Droitwich Road.....		23	24									
Stoke Works Jc.....	arr.	24	25									
	dep.	25	26									
Bromsgrove South.....		26	27									
Bromsgrove.....	arr.	27	28	11 7	8 8	8 10			9 17	9 6		8 53
	dep.	28	29	11 28	8 13	8 20			9 22	9 11		8 58
Blackwell.....	arr.	29	30									
	dep.	30	31									
Barnt Green.....	arr.	31	32	11 43	8 26	8 32			9 35	9 24		9 9
	dep.	32	33									
HALESOWEN ⊕	dep.	33	34	11 47	8 32	8 37			9 39	9 28		9 12
Hunnington.....		34	35									
Rubery.....		35	36									
Longbridge.....	arr.	36	37				9 10					
	dep.	37	38				9 15					
HALESOWEN Junc. ⊕		38	39									
Northfield.....		39	40									
King's Norton.....	arr.	40	41									
	dep.	41	42									
Junction from Lifford		42	43									
Bournville.....		43	44									
Selly Oak.....		44	45									
CENTRAL.....	dep.	45	46									
Church Road Junc.....		46	47									
CENTRAL.....	arr.	47	48									
New St. Station.....	dep.	48	49									
Exchange Sids.....	dep.	49	50									
Grand Junc.....	arr.	50	51									
Exchange Sids.....	arr.	51	52									
Lifford Station Jc.....	arr.	52	53									
	dep.	53	54									
Hazelwell.....		54	55									
King's Heath.....		55	56									
Camp Hill.....	arr.	56	57									
	dep.	57	58									
Bordesley Junc.....		58	59									
St. Andrew's Junc.....		59	60									
Exchange Sidings.....	arr.	60	61									
Landor St. Junc.....	arr.	61	62									
	dep.	62	63									
Duddeston Rd. Jc.....	arr.	63	64									
	dep.	64	65									
LAWLEY ST.....	arr.	65	66									
Saltley Junc.....		66	67									
Washwood Heath No. 1.....	arr.	67	68									
	dep.	68	69									
Washwood Heath Up.....	arr.	69	70									
	arr.	70	71									
	arr.	71	72									



Bank Engines—continued.

As Bank Engines are employed on the undermentioned sections, the Staff along the line must at all times, whether any previous advice has been received or not, be prepared for their running, either assisting trains, or, returning light:—

Section	Banking on the
Kingswood to Penrith.....	Up journey.
Valley Heights to Katoomba.....	Down "
Zig Zag to Bakbank Coal Stage.....	Up "
Bowenfels—Marrangaroo Loop.....	Down "
Marrangaroo Loop—Wallerawang.....	Up "
Cullen Bullen—Capertee.....	" "
Raglan—Bathurst.....	" "
George's Plains—Tumulla.....	Down "
Tumulla—Wimbleton.....	" "
Blayney—Stanfield.....	" "
Yamboyna—Orange.....	Up "
Eulomogo—Dubbo.....	" "
Dubbo—Minore.....	Down "

The Regulations contained in current General Appendix and Western Local Appendix relative to working of Banking Engines to be strictly adhered to.

was hardly a representative example of this particular variant of the electric staff system and special instructions applied to its use. There were two intermediate block posts at Rowsley and Bank Box. The 1941 Working Time Table shows Rowsley open for the two Sunday morning excursion trains, but Bank Box open for the two closely-spaced trains on a weekday. Although both could be opened for Down (up hill) trains in the normal fashion, only one train was allowed between Ingleston and Bacchus Marsh in the Up direction. Apparently, the Ingleston Bank had the railways bluffed and they were rather frightened of the consequences of a runaway when more than one up train was in the section. Rowsley closed as a Telephone Block Post

at the same time as it was closed to all traffic on 1 September 1955. Bank Box remained in use as a block post for down trains for a further 8 years.

Scenes like this were common all over Australia and indeed all over the world in steam days. For a long journey with a heavy train, it made more economic sense to station "helpers" for the short steep sections than to provide the requisite power for the entire journey.

Lickey Incline

Fear of grades must also have been a reason behind the near-universal use of bank engines on the famous Lickey Incline between Birmingham and Gloucester. In Britain a railway grade steeper than 1 in

200 is officially regarded as "steep" and catch points were required. O.S.Nock, in his *British Steam Railways*, described a grade of 1 in 89 as "fierce", though Nock's fear was for the ability of the rather puny British engines to cope with the grade. Early engineers were not so sure that iron wheel on iron rail could surmount such grades and many early lines (the Stockton & Darlington, for instance) were assisted over them by winding engines. Winding engines were used widely for some time even in rather surprising places such as Euston station in London and Queen St Station in Glasgow.

The adhesion-worked Lickey Incline, with its grade of 1 in 37, must therefore seemed an appallingly risky venture. It was part of the Birmingham and Gloucester Railway, surveyed by Isambard Kingdom Brunel in 1832, who suggested a route well to the east. William Moorsom, who had been associated with the Cromford and High Peak Railway, was asked to take over, with his remuneration linked to the savings he achieved. The climb is just over two miles, at an average gradient of 1 in 37.7 (2.65%), between Bromsgrove and Blackwell (near Barnt Green). The Lickey Incline is the steepest sustained adhesion-worked gradient on British railways. While many have suggested a gentler route could have been taken, and others have pointed out that there are steeper climbs elsewhere, the Lickey has acquired a mystique all of its own.

Early woodcuts show trains ascending unassisted (page 5), but it wasn't long before specialised banking engines were kept at Bromsgrove at the foot of the incline. The first locomotives were American Norris 4-2-0s, English manufacturers having declined to supply. In 1845 a large 0-6-0ST, *Great Britain* was built in Bromsgrove Works. In 1919 the specialised 0-10-0 No. 2251 "*Big Bertha*" was introduced to complement the existing 0-6-0Ts.

The 1937 LMSR Sectional Appendix to the WTT (top, page 5) makes it plain that only short trains were allowed to ascend the bank without a banking engine in the rear. On our page 6 is a page from the LMSR's Freight WTT of 1941, showing some typical traffic up the hill. The numbers at the top of this table are not train numbers, but column numbers, and they indicate the intensity of traffic—some 600 freight trains appear in these tables, a very high proportion of them had to traverse the Lickey. In addition there were some 30 passenger trains per day.

All the trains climbing the Lickey incline on this page paused at Bromsgrove to take water and to allow the banking engines to snuggle up. The bankers ceased to push at the summit, and returned to Bromsgrove. There is no separate timetable shown for the returning bank engines, but they would

Time Table for Light Engines returning from Katoomba to Valley Heights.

Engine off Nos.....	61	61	63	65, 65a	99, 99a, 149	151	67	19	9, 87	185
KATOOMBA	dep. 12 18	ME 12 52	a m 1 30	ME 3 20	a m 4 20	a m 5 45	a m 6 10	ME 7 2	a m 8 30	SE 9 30
Leura	arr. ...	12 55	...	...	...	5 48	...	...	...	...
Wentworth Falls ...	dep. 12 21	1 0	1 33	3 23	4 23	5 52	6 13	7 5	8 33	9 33
Lawson	dep. 12 29	1 13	1 48	3 31	4 31	6 10	6 21	7 13	8 50	9 41
Woodford	dep. 12 39	1 23	1 58	3 41	4 41	6 20	6 31	7 23	9 0	9 54
Linden	dep. 12 47	1 31	2 6	3 49	4 49	6 28	6 39	7 31	9 8	9 19
Springwood	dep. 12 52	1 40	2 21	3 54	4 54	6 42	6 44	7 36	9 22	10 7
VALLEY HEIGHTS...arr.	1 5	1 53	2 36	4 7	5 7	6 57	6 57	7 49	9 38	10 22

S.M. Katoomba to arrange special table when No. 24 and 24a are running.

Engine off Nos.....	183	11, 7, 7a, 93, 93a	23	31	37	45	29, 47	21	121
KATOOMBA	dep. 10 30	SE 11 30	a m 12 10	p m 1 0	p m 2 10	p m 2 45	p m 3 30	S 4 21	p m 5 8
Leura	arr. ...	...	...	...	...	2 48	...	...	...
Wentworth Falls ...	dep. 10 37	11 37	12 13	1 3	2 13	3 52	3 31	4 24	5 11
Lawson	dep. 10 45	11 45	12 30	1 11	2 21	3 10	3 47	4 32	5 23
Woodford	dep. 10 55	11 55	12 40	1 21	2 31	3 20	3 57	4 42	5 33
Linden	dep. 11 3	12 3	12 48	1 29	2 39	3 28	4 5	4 50	5 41
Springwood	dep. 11 11	12 18	1 2	1 46	2 44	3 42	4 20	4 55	5 48
VALLEY HEIGHTS...arr.	11 24	12 32	1 17	1 59	2 57	3 57	4 34	5 8	5 55

S.M. Katoomba to arrange special table when No. 24 and 24a are running.

Engine off Nos.....	41a, 177, 25	163	107	117	57	147, 53a	...
KATOOMBA	dep. p m 6 5	SE 6 30	p m 7 20	S 8 20	SE 8 25	p m 9 20	...
Leura	arr. 6 8	...	...	...	...	...	...
Wentworth Falls ...	dep. 6 15	6 41	7 31	8 23	8 28	9 23	...
Lawson	dep. 6 26	6 51	7 41	8 31	8 36	9 31	...
Woodford	dep. 6 34	7 9	7 49	8 39	8 46	9 41	...
Linden	dep. 6 39	7 10	7 54	8 44	8 54	9 49	...
Springwood	dep. 6 49	7 20	8 4	9 12	9 15	10 14	...
VALLEY HEIGHTS arr.	6 52	7 23	8 7	9 15	9 35	10 17	...

S.M. Katoomba to arrange special table when No. 102 is running.

S.M. Katoomba to arrange special table when No. 102a is running.

S.M. Katoomba to arrange special table when No. 30a is running.

S.M. Katoomba to arrange special table when No. 52 is running.

S.M. Katoomba to arrange special table when No. 52 is running.

S.M. Katoomba to arrange special table when No. 52 is running.

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S.M. Katoomba to arrange special table when No. 52 is running.

S.M. Katoomba to arrange special table when No. 52 is running.

have effectively doubled the number of descending movements.

South Wales

One of the more spectacular feats of banking occurred on the slog (a ruling 1 in 34 grade) from Abergavenny to Brynmawr on the L&NWR, later LMS. A splendid sight on this 300 metre climb would be a two-engined freight train of which the front portion would be for Merthyr, followed by the wagons for the Blaenavon Branch, the engine which was to work the latter forward from Brynmawr acting as banker in the rear, with the front and rear portions

moving-off in opposite directions at Brynmawr (1 in 88 and 1 in 40 respectively). The Blaenavon train likely as not would also be banked and, when it arrived at the Wales' highest railway station at Wae-navon, it was liable to meet another banked train coming up a 1 in 40 grade from Blaenavon, 200 metres below.

The Blue Mountains

The grades of the NSWGR's Main Western Line over the Blue Mountains make the Lickey seem a trifle by comparison. Here there is a ruling, uncompensated 1 in 30 grade between Valley Heights and Ka-

toomba. Many of the early railway lines in NSW were built with steep grades and sharp curves as an economy measure— at one time it was proposed that they have wooden rails and even be horse-drawn. Bank engine working over these grades was quite common, particularly on the Main South. Most grades and curves were eased by extensive deviation works a few decades later and the use of bank engines disappeared. No such recourse was possible on the Blue Mountains line where it ascended from Glenbrook to Katoomba, the line being built along a narrow ridge with nowhere else to go.

As with the Lickey, most trains were assisted in the rear but, unlike the Lickey, the return of bank engines was always meticulously tabled. An engine shed was built at Valley Heights with a roundhouse that could accommodate 10 locomotives. As many as half a dozen of these engines might be out on the job at busy periods. It took 7 minutes to attach the banker at Valley Heights and then 2 hours or more for a goods train to ascend to Katoomba. The banker could spend an hour or more here before there was a "path" for it to return to Valley Heights, a journey of another three quarters of an hour. There the engine would need another hour to spruce up before it was time to shove again. The whole cycle took 4 to 5 hours, and there were at least two dozen returning bank engine movements on week days.

On the left is a page from the 1915 Western Division Working Timetable showing these return engine movements. An interesting feature of this table is the listing of the trains which these engines had helped up the hill. Look at the table for the 1130 Light Engine— 5 Down trains are listed for it. Perusal of the main table shows that on weekdays, this movement consisted of two light engines coupled; these had banked trains 7 and 93. On Saturday mornings the movement ran with three engines coupled— off Nos. 711, 7a and 93a.

Lithgow zig-zag

Our next table (page 8) shows the return bank engines for trains which were coming the other way, up past the site of the Lithgow Zig-Zag. When the Zig-Zag was in operation, the concept of a "bank engine in the rear" was a curiously complicated one, with the train engine and the bank engine swapping identities at the switchbacks (see the way the grades book handled this on our page 7, top). Not all that many trains were assisted though because the limited space in the dead-end sidings meant that really heavy trains could never be assembled. This can be seen in an early graph of the Zig-Zag traffic shown in the September 1995 issue of The Times.

This changed when the Zig-Zag deviation was completed in October 1910. The first section of the new line used the lower arm

of the Zig Zag which had a 1 in 42 grade (a planned diversion never eventuated). The rest of the new line was more modestly graded at 1 in 90 (page 7). The deviation had therefore turned the line into classic "helper territory", where assistance was needed for only a short section. If bank engines were used in the early years, then our 1915 WTT does not show them— but later WTTs did.

In time, this became the most famous helper territory in Australia, where ascending coal trains with one, two or three engines in front could all be assisted in the rear from Lithgow Coal Stage to Zig-Zag— an example is shown on our cover. The train engine was usually a 57-class or 58-class. The two engines assisting in front and the banker pushing from behind would usually be Standard Goods engines, but passenger engines could also be used.

At as little as 17 minutes (10 minutes push, 2 to uncouple and 5 minutes to return), the cycle time for this working (Coal Stage—Zig Zag—Coal Stage) was relatively short compared with the Valley Heights section. Probably only a couple of engines were engaged in rear banking at any one time.

An example of return bank engines, from the 1958 Western Division is shown on the right. Note that many trains are actually assisted all the way up the hill to Newnes Junction.

The Bank Engine Key

Some banks were shorter than the length of line between the two stations concerned. Time could be saved by having the bank engine push only to the top of the hill, after which it would return to its starting point. This posed problems, especially on block-worked single lines. The answer to this problem was to give the bank engine driver a "bank engine key" (in America, they called it a "pusher attachment"). The key disconnected the electric staff circuit when removed and thus prevented withdrawal of another staff until the key had been replaced. Similar machinery could be used on double track. In many places, the point at which engines ceased to push were marked with a "Stop Board". One difference between this type of working and the earlier ones described was that the bank engine usually ran uncoupled and thus dropped away from the train at the Stop Board.

How did the timetable cope with this? In many instances it didn't, because the banking section was short and the engine would be back at home base in short order. A typical example of this was on the double line out of Seymour in Victoria, in the Down direction. However, if we return to NSW, we again find that such movements might be timetabled. At lower right is a banking engine timetable for the Wimbledon-Bathurst track, taken from the same WTT as the extract above it. This is for a Sunday, when only two trains were banked. On weekdays there could be twenty such workings, split roughly 60:40 between workings from the "Stop Board" and those from Wimbledon itself. It was only two miles between these two spots, but enough time could be saved to make the shorter stopping point worth having.

Light Engines returning from Zig Zag to Lithgow Coal Stage.

WEEK-DAYS.

Engines off Nos.	82 TH	612 ME	282 W	570 ME	200 ME	200 MO	244 WO	574 S	246 WO
NEWNES Jct. ....dep.	a m	a m	a m	a m	a m	a m	a m	a m	a m
ZIG ZAG	12 28	12 a 55 1 4	1 12	1 38 1 51	1 55 2 4	2 23 2 32	2 26	4 40 4 49	4 48
COAL STAGE ...arr.	12 33	1 9	1 17	1 56	2 9	2 37	2 31	4 54	4 53

Engines off Nos.	574 SE	284 S	78 MS	284 SE	78 ME SE	248 WO	572 WE SE	572 S	576 SE	362 W
NEWNES Jct. ....dep.	a m	a m	a m	a m	a m	a m	a m	a m	a m	a m
ZIG ZAG	4 50 4 59	4 58 5 7	5 27	5 24 5 33	5 52	6 12	6 26 6 35	6 34 6 43	7 0	8 20
COAL STAGE ...arr.	5 4	5 12	5 32	5 38	5 57	6 17	6 40	6 48	7 14	8 25

Engines off Nos.	576 S	266 WO	580 S	256 WO	50 WO	40 W	582 WS	372 WS	584 Sat.	584 Sat.
NEWNES Jct. ....dep.	a m	a m	a m	a m	a m	a m	a m	a m	a m	a m
ZIG ZAG	7 25 7 34	8 55	9 0 9 9	9 15	10 12	10 31	10 35 10 44	11 22	11 38 11 47	11 52 12 1
COAL STAGE ...arr.	7 39	9 0	9 14	9 20	10 17	10 36	10 49	11 27	11 52	12 6

Engines off Nos.	62 WO	62 S	614 S	274 WO	616 S	586 S	586 SE	236 ME	236 S
NEWNES Jct. ....dep.	p m	p m	p m	p m	p m	p m	p m	p m	p m
ZIG ZAG	12 27	12 27	12 27 12 36	1 17	1 18 1 27	1 54 2 3	2 1	2 27	3 5
COAL STAGE ...arr.	12 32	12 32	12 41	1 22	1 32	2 8	2 15	2 32	3 10

Engines off Nos.	588 S	588 SE	238 Wed. Sat.	590 S	590 SE	592 S	132 WO
NEWNES Jct. ....dep.	p m	p m	p m	p m	p m	p m	p m
ZIG ZAG	3 16 3 25	3 32 3 41	3 39	3 56 4 5	4 15 4 24	5 43 5 52	6 45
COAL STAGE ...arr.	3 30	3 46	3 44	4 10	4 29	5 57	6 50

Engines off Nos.	596 p m	42 WS p m	598 p m	600 p m	602 p m	12 WO p m	604 S p m	604 SE p m
NEWNES Jct. ....dep.	7 27 7 36	8 17	7 42 7 51	8 15 8 24	8 56 9 5	9 15	9 26 9 37	9 45 9 57
COAL STAGE ...arr.	7 41	8 22	7 56	8 29	9 10	9 20	9 42	10 2

Engines off Nos.	84 WS p m	606 S p m	606 SE p m	338 W p m	608 p m	338 Sat. p m	610 p m	34 SE p m
NEWNES Jct. ....dep.	9 59	9 56 10 5	10 14 10 23	10 44	10 35 10 44	10 37	11 4 11 13	11 57
COAL STAGE ...arr.	10 4	10 10	10 28	10 49	10 49	10 42	11 18	12 2

The return of engines to Coal Stage must be accelerated, and should it be necessary in promptly returning engines to depart from tables laid down, altered tables must be issued by the "Control" Officer. For notes see page 192.

Light Engines returning from Wimbledon or Mileage 161 m. 45 c. to Bathurst—continued.

SUNDAYS.

Engine off Nos.	71	153
WIMBLEDON .....dep.	a m	p m
Mileage 161 m. 45 c.	5 20	10 57
Tumulla.....dep.	5 32	11 0
GEORGE'S PLAINS {arr. ....	...	...
{dep.	5 41	11 9
BATHURST .....arr.	6 1	11 29

Time-tables for engines returning from Mileage 161m. 45c. and Wimbledon provide for such engines running tender first. Should it become necessary to depart from times laid down, Control Officer must arrange altered running and issue amended time-tables.

Our first 25 years

A History of the Australian Association of Time Table Collectors. Dedicated with gratitude to JACK McLEAN, the founder. by VICTOR ISAACS

For the past 25 years, many pages of the Times have been devoted to chronicling transport history as recorded in timetables. It is well overtime that we also fully recorded the history of our Association. Indeed, in the September 1998 Times Jack McLean wrote “A detailed history of the AATTC will be written one of these days”. Well, here is an attempt at the first 25 years.

Establishment

In 1983, Jack McLean saw the need for an organisation to bring together all those in Australia who enjoy studying and/or collecting timetables. For many years, many such people had gathered every Friday night in his garage in suburban Mont Albert. Residents of Melbourne did so regularly - for many it was the highlight of the week, and for visitors, no trip to Melbourne could be contemplated without a trip to the famous garage. The Friday night gatherings really were not to do with timetables directly. They were to operate his Wingrove model railway on Victorian Railways safe-working principles. Trains operated to a clock speeded up by 7 times real time, and were signalled on block bells, etc.

Jack's garage was an overflowing cornucopia of timetables of every era from throughout Australia and the world. Many had arrived back in tea chests after his war service. As an airman, Jack helped defeat the enemy, and he certainly defeated the short-sighted people who wanted to salvage old timetables. Ever since, he has exercised his persuasive and language skills by writing to railways everywhere in the quest for more timetables.

Jack modelled his proposal for an Australian timetable association on the National Association of Timetable Collectors of the United States. He was elected the inaugural President. From the first, it was recognised that a magazine was necessary to keep people in touch in this vast country of ours. The obvious title suggested itself. So, the Times commenced with no. 1 dated September 1983. It is worth quoting the introductory item:

“From Jack McLean:

A letter and questionnaire were recently sent out to fellow timetable collectors. The questionnaire about the interests of collectors, brought in an encouraging response. The letter called a meeting for 1st September [1983]. Because of the few people who were able to come the meeting was cancelled. This rather gives the idea that the Association isn't going to be strongly meeting oriented.

However, in the meantime, a society has been formed with a “working title”, a pro-tem committee and a magazine. We have taken the obvious title – “Australian Association of Timetable Collectors” which becomes AATTC. I personally think there is value in an obvious name like this, but there are others who would like an exotic name such as “Horariologists” a home-made Latin word meaning those who study timetables. If anyone has any brilliant ideas, please let us know.

Despite what has been said above we will have to have a meeting, possibly early next year, at which things would be formalised. In the meantime we have a working committee of three, all pro-tem of course. I am acting as President, Mick Guiney as Secretary/Treasurer and Albert Isaacs as Editor.

We hope this magazine will give you a better idea of what we hope to achieve. Albert and I came up with the same name for the magazine from different directions... “The Times”. If anyone has a better idea, let us know. But a lot of decisions (such as the name of the magazine), may have to be made in a rather undemocratic manner because the members are spread all over the atlas like small pox.

Our discussions seem to indicate that we could issue a couple of magazines for the money we have received so far. We suppose that the magazine will come out every two months which enables the Editor to come up for air, and for that matter for the writers to come up for ink. So, if you might get a couple of issues this year, say September & November, and then we will start square in 1984. We probably have enough material from your letters and questionnaires to help with a few copies of the magazine. But we do want you to do three things. We have sent two copies of this first issue of “The Times”. We want you to give the extra one to one of your friends who is interested. Secondly, will you please think about writing a short article for “The Times” – perhaps some observation you might want to make about something in your collection. Thirdly, send us in your Want Ads. This will be a free service to members. Some already known wants appear in this issue.

We think an important role of the Association is to facilitate the exchange of information about timetables and the exchange of timetables themselves., as well as related items such as Rule Books, G.A.s [General Appendices] etc. Whilst “The Times” will facilitate this to a great extent, so will the circulation of the list of members. We have only included one copy of this, so don't give it away with the second magazine. Nevertheless, please use the list and contact any other member who you feel may help you with your own interests.

Now, some background to the formation of the

AATTC. Several years ago, I saw a small ad in “Trains”, from which you could become a member of the National Association of Timetable Collectors, a US society. I sent my \$15 and since then have been receiving their two magazines, the monthly “The First Edition” and their quarterly journal “The Collector”. I feel my dollars were well spent! I put an advertisement along the lines of “Jack McLean has several old USA public timetables to exchange or sell”. I added that I would like to receive some Employee Timetables (“Workers” in Australia) from the Canadian Northern or the Grand Trunk Pacific, both of which went out of business in 1919. I was asking if anyone had anything sixty-two years old! I was delighted to find that a member in Illinois was quite happy to buy my Milwaukee 1915 Public for \$US15, and that another member sent me photo-copies of the Grand Trunk Pacific Employees Timetables for the Province of Alberta for 1915 & 1917, which all goes to show the power of advertising.

After a few years, I had the idea of an Australian equivalent to NAOTC. I wrote to the American secretary and president who were most obliging and encouraging. And so now, here we are, our first magazine.

Let us hope that members get the same results from our society, as I got from the NAOTC. Let me quote my correspondence with Jim Ferguson of Kent, UK. Jim certainly has a wide collection of more than 1,700 timetables. (I measure mine by weight – I think I have more than half a ton.) Among other things Jim has an 1883 Victorian Railways Working Timetable, which he is photocopying to send out here. But further than that – I am interested in the two parallel lines built across Alberta in 1915 or so, one of which was pulled up in 1917. So is Jim Ferguson! So you never know what is going to come out of ads, or letters, and I hope you will have some similar experience.

As well as thanking the NAOTC for the idea and help, I also wish to thank the ARHS (Vic), ARHS (NSW), AREA and ARE who notified their members of the proposal to form this Association.

I must also thank you for your replies to the questionnaire and your letter. Some of your comments will be used in this edition of “The Times”, others in later editions.”

The Times has, of course, gone from strength to strength since then. Contrary to Jack's expectations, meetings have become popular, but the “Wants” ads in the magazine were a failure. Perhaps we should try this idea again (see June 2009 Table Talk)?

One early member described the Association, accurately, as “A fringe interest of a fringe interest”.

While we were based upon the NAOTC of the US, we were the inspiration for an attempt to found a European Association of Timetable Collectors. Unfortunately, this did not succeed. More successful was a member, Victor Isaacs, who used the AATTC as a model when he founded the Australian Newspaper History Group.

It is believed that there is also a timetable collectors' association in Japan.

The Times

Albert Isaacs was the inaugural editor of the Times. He continued in this role, for the phenomenal period of 14 years and 165 issues! His dedication never flagged. At times, Albert was simultaneously also our Vice-President, our Auctioneer, our Membership Officer and editor of Table Talk. It is very fitting that Jack and Albert were recognised as our first and second Honorary Life Members.

From the beginning the Times attracted an enthusiastic range of contributors. It was never short of articles, although then as now, inevitably many came from the keyboard of the editor. Albert's slightly quirky style is remembered. For example, from the first issue, the Times included news relating to timetables. Each month this appeared under the heading Currant Raisinings on the Grapevine. Each month too a particular timetable was singled out for review in a first person style under the title of Mr Bradshaw's Column. Albert also established the tradition of every editor contributing a large proportion of the content himself.

From the start reproduction of extracts from timetables have been an important feature of the Times. However, the view has always been that there have to be more than just reproductions. Thus, the Times always includes some description or analysis of timetables.

Given its enthusiastic reception and the number of contributions, after only a year, the Times moved from bi-monthly to monthly publication, from November 1984.

The Times originally included a Traders' Column under the title "Matthew 7:7", from the biblical quote "Seek and ye shall find". For some time from January 1985 it included a "Street Corner" feature by Graeme Cleak, devoted to road transport timetable news.

The July 1992 issue appeared with a glorious full colour cover as it was issue no. 100. Subjects were a 1988 Victorian Royal train timetable and a London Transport timetable. A full colour cover again appeared for the September 1993 issue (no. 114) to commemorate our tenth anniversary. Subjects were the Queensland Railways centenary public timetable of 1965 and very similar South Australian Railway

and Rock Island Railroad public timetable covers.

Currently, all issues of the Times are produced with colour illustrations, but this is only apparent in the internet versions, as cost precludes it for print editions.

The Times was originally printed by amateurs on photocopiers, and for this reason and its A5 size it has to be admitted that early editions do not meet current standards of appearance.

The amateur copying saved money, but significant expense was incurred through typing by a professional typist (this was in pre-personal computer days). In 1990 the Association instead subsidised the purchase of a word processor for use by Albert in preparing the magazine.

As mentioned, the Times was originally A5 size. This did cramp its style and made layout sometimes a problem, especially when there were large extracts from timetables. The size was maintained, however, because it meant that the Times and Table Talk could be posted in standard envelopes at letter rate, saving a considerable amount of money. From January 1995, the Times was converted to its present A4 size.

In 1998 Albert relinquished the editorship. Graham Duffin in Brisbane took on this onerous but satisfying role from January 1998 until October 1999. Graham further developed the Times. There continued to be a good variety of articles in each issue. Unfortunately, work commitments overwhelmed Graham. Or perhaps fortunately, because the Times was then taken over by Geoff Lambert in Sydney. Under his editorship, it has further developed to its present state of perfection with issues of very high quality, both in content and appearance. Geoff might even overtake Albert's long period in the position.

The Times moved from production on a word processor to computer production when Graham Duffin took over in 1998, and then to publishing software from the July 2000 issue edited by Geoff Lambert.

Letters to the editor have always been a feature of the Times – expanding on articles which have appeared and expanding our knowledge of the topics raised. An interesting feature from time to time has been publication of lists attempting to catalogue all timetable issues by the various Australian and New Zealand Railways.

Each editor has had his own style. The present editor continues the tradition of conscientiously contributing a large proportion of the content. He is known for his very analytical dissection of the how timetables are compiled, both past and present. He is perhaps notorious for April Fools' editions, such as the alleged discovery of Cleopatra's barge timetables written on stone, and Sigmund Freud's timetable

collection.

A popular feature of the Times from 1995 to 2003 was Graphic Insight, in which each month Chris Brownbill (and occasionally others) presented a timetable problem or solution in graph form, using imagination and skill to do so. This covered all modes, even extending to outer space. A long-running and interesting feature in recent years has been Jim O'Neill's timetable histories of Sydney bus routes. Recently there has been an occasional series by Geoff Lambert of "Timetable Oddities".

The task of any editor is very difficult. He devotes considerable time and effort to every month's issue. Then it is despatched, and – nothing! There is almost always no reaction, except in the rare event that someone does not like something. Yet the success of the magazines can be measured. As the flagships of our Association, they must be the major reason why almost everybody renews their membership every year.

In 2001 Duncan MacAuslan produced for members a CD containing the first 40 issues of the Times. The Times has also been on our website since January 1998.

In writing this article I consulted my full file of copies of the Times. This was most enjoyable as the Times for the past 25 years contains an enormous amount of valuable information relating to timetables. Anyone who has, or has access to, a collection of old issues will derive immense enjoyment and information from them.

Table Talk

The current news section of the Times became larger and larger. Eventually it grew to the extent of needing to become a separate magazine. Thus Table Talk first appeared in August 1992. Albert was editor in addition to editing the Times and his other roles. It was originally, like the Times, in A5 size. News about the Association also passed to Table Talk. From June 1996 Table Talk followed the example of its big brother, the Times, in going to A4 size.

In January 2004 it passed to Duncan MacAuslan. The appearance changed greatly as modern computing methods were introduced. In 2006 Steven Haby took over. The task is a big one. Following difficulties in late 2007, Victor Isaacs and Geoff Mann therefore took it over on a joint basis. Victor for rail and tram, air, and ferry sections, and Geoff Mann for buses. Victor also co-ordinates the final product.

Copies of Table Talk have been placed on our website since July 1998.

Members' Newsletter

Yet another piece of paper regularly pro-

duced by the Association is the Members' Newsletter. This originated in December 1996 because Table Talk was then offered for sale in rail fan bookshops, so it was decided that it might be inappropriate to include internal members' news. In fact, it was varied since then. Sometimes it is a stand alone sheet, and sometimes included with Table Talk. Today, this depends on whether Table Talk has a spare page or not.

Other publications

In 1981 and 1984 we published a monograph by Albert Isaacs entitled *Railway Refreshments in Victoria* about the Railway Refreshment Rooms of the Victorian Railways. Additional information about this, and also arising from an article called the *Travelling Pie* by Roderick Smith about on-train refreshments in Victoria, led to a second edition in 1992.

In 1987, in conjunction with the Ringwood Historical Society, the AATTC published a reproduction of the Victorian Railways Public Timetable of 2 February 1875.

In the early 1990s for a short time, a third AATTC magazine was published and available as an extra. This was the *Urban Times*, recording bus timetable news and edited by Robert Henderson and usually appearing monthly. It included the "Bus Stop" column of bus timetable news by Graeme Cleak which was transferred from the *Times*.

Membership Lists

A feature of the early years was the circulation of annual membership lists, which were useful to get in touch with colleagues. A feature was an analysis of members' interests by means of a code – which was probably far too complicated. The lists later fell into disuse. Perhaps they could be revived. The code, much simplified, survives on the annual membership renewal forms, as a means of keeping in touch with members' interests.

Production Manager

Having all these publications printed requires considerable liaison with the printer, and then organisation of the monthly mail out. Originally Albert handled mail outs on his own. Then from 1983 Melbourne members under the leadership of David Hennell handled this in conjunction with their meetings. Graeme Cleak took over this exacting task, also in Melbourne. It was then decided that it was somebody else's turn. The task passed to Sydney, and has been handled ever since by Geoff Lambert (and Judy who has to front up to Mr Grumpy at the Post Office every month). Currently, every third mail out is timed to coincide with Sydney branch meetings, which helps to decrease postal costs. The mail outs were for many years done at working bees which became

social events.

Membership

A peculiarity of the AATTC is that the greatest number of members has always been in Victoria, and of these most in Melbourne's eastern suburbs. Indeed, Melbourne's eastern suburbs could be called the "heartland" of the AATTC. The *Times*' special 20th anniversary issue, September 2003, page 13, had a map showing how 16% of AATTC members lived along Melbourne's Eastern railway line within 16 km of Jack McLean's home.

We are now what is called a "mature" organisation, in the sense that we seem to have tapped all people in Australia who are interested in the subject, and inclined to join organisations. Our membership is steady.

We have been fortunate to have had overseas members at various times in Britain, the United States, Switzerland, Germany and Japan.

We have a significant number of members who are professionally involved in the transport industry, especially in the production of timetables. Accordingly in 2000, some Canberra members thought a change of name to something like Australian Timetable Study Group would give a more professional image. This proposal was very unpopular with other members.

The Association started with 28 members. After one year, we had 53. By 1993 membership was 97.

We have only ever had two female members, both for only short times.

At the end of 2008 we had 146 members. Three are Honorary Life Members (Jack McLean, Albert Isaacs and David Hennell – our second President), 139 ordinary members and four student members.

They are located:

Victoria 56
NSW 53
Queensland 15
ACT 9
South Australia 8
WA 3
UK 3
US 1 (exchange with the NAOTC)
Switzerland 1

Divisions

One of the great strengths of the AATTC has been its geographical divisions. Originally, meetings were in Melbourne only. Soon meetings were also being organised in other major cities.

Melbourne

The first meeting of the AATTC was on 9 February 1984 in Jack McLean's garage, followed by meetings there about every six months. Then they moved to David Hen-

nell's home with occasional meetings at Albert Isaacs' home (and at Brian Sherry's and Stephen Ward's). Note that these meetings (except two) are all in the eastern suburbs – the locale for a high proportion of AATTC members. The meeting were called "Open House" until a separate Melbourne division was formed.

It is an oddity that the Melbourne branch was, formally speaking, the last branch to be constituted. As the AATTC had originated in Melbourne, all the meetings since 1984 were therefore regular AATTC meetings. It was not until late 1996 that it was decided that the position of Melbourne should be brought into conformity with other cities and a local branch formed.

Sydney

Graham Duffin was the founder of this branch. Even after he moved to Brisbane, Graham was a regular attendee at the Sydney meetings, often travelling two nights overnight to do so.

The first Sydney meeting was in 1986, variously reported to have been held at the Railways Institute Building or the NSW Environment Centre. Jack McLean was guest speaker.

The AATTC has always catered for people interested in timetables for all forms of public transport. Nevertheless, it has always been mainly composed of people with railways as their main interest. That is, except in Sydney, where a significant proportion of members is also interested in buses.

Sydney meetings were originally held every six months, then from about 1995 three-monthly. They have been held in a variety of locations. A few have been in out-of-town, but easily accessible by train locations – Dapto (courtesy of Neville Fenn) and Newcastle (courtesy of Len Regan). Most meetings were held in Robert Henderson's Chatswood and Brookvale homes until he moved to an outer suburb. Since 1998 they have been held in the comfortable and convenient surroundings of the Roseville Uniting Church hall. They are particularly noted for the large quantities of timetables exchanged, and for Katrina Henderson's famous fruit cake.

It is interesting that there are more regional members in NSW than there are in all other states combined.

Brisbane

Having moved to Brisbane, Graham Duffin was now instrumental in founding a second geographical Branch of the AATTC. The first Brisbane meeting was held on 5 August 1989. Most [all?] meetings have been at Brian Webber's home, as they still are.

In 1996 Queensland Railways formally

sought comments from the Association on their timetables.

Canberra

The first Canberra meeting was on 26 January 1985. Canberra members used to meet every second month in people's homes. In alternate months, there were meetings of people associated with Transit Australia magazine and/or interested in current transport developments. In 2000, recognising that the two groups were basically the same people, the meetings were combined and held monthly. The branch currently meets every month at the Ainslie Club.

Perhaps the most dramatic and traumatic event in the AATTC's history occurred to the tiny Canberra branch in 1999. While its very jolly November 1999 meeting was underway, a vicious murder and assault was occurring elsewhere. In the subsequent criminal investigation, when a member told the police that at the time of the murder he was at a timetable collectors' meeting, this was met with scepticism. He was however cleared by the alibis provided by AATTC members. The clincher was when the police sighted, and took possession of, copies of the AATTC Members' Newsletter which had advertised the meeting.

At about the same time, the Canberra branch was also tangentially involved in an espionage case. A Canberra resident, convicted of this crime, had applied for AATTC membership, but did not carry through, possibly because of his legal distractions.

Adelaide

The Adelaide branch has been meeting since March 1989. It currently meets twice a year at Roger Wheaton's house.

Auctions

Albert Isaacs inaugurated the idea of having auctions of desirable timetables when the Association received a donation of a considerable number of valuable items. Drawing on his expertise in the philatelic business, he organised and ran these from the first in September 1992 until 1995. Mark Peterson then took over until 2001. Graham Duffin conducted an auction, and then it reverted to Albert until 2004. Stephen Ward has been our most capable Auctioneers since then still assisted by Albert and by David Hennell. Auctions raise significant sums of money which support other Association activities. Auctions are usually held twice a year. They involve very considerable work valuing items, preparing catalogues, processing bids and despatching the goods.

The Auction is now known as the Ted Downs Memorial Auction in honour of this notable member, railway enthusiast and donor of his collection.

Grab Tables

The AATTC meetings have provided the opportunity for the exchange of copious amounts of timetables on an informal basis. This is known as *Grab Tables* or *Grab Boxes*, but referred to by one spouse as the "Drool Table". These even predate the holding of regular meetings. Until 1988 the Melbourne box was situated at Albert's business where members (including interstate visitors) picked up free material. Some people have an uncanny ability to obtain large quantities of material to contribute. The late Bruce Cook of Sydney came to meetings laden with large amounts of current NSW Working Timetables. Stephen Gray of Melbourne attends every Melbourne meeting and travels to Sydney for every meeting (and occasionally also to Canberra), every time toting huge quantities of Melbourne timetables for the Grab Table.

Sydney and Brisbane branches exchange large boxes of Grab Table material on a regular basis, but members in other cities have chosen not to face the terrors of the parcel postal system for this.

Distribution Service

The Distribution Service (originally called the Sales Service) originated in a very small way as an adjunct to the Times magazine. When the Times editor had finished with timetables for the news section ("Currant Raisinings on the Grapevine"), he mentioned within the text of news items that the timetable in question was available. Members interested then wrote a letter to the Sales Officer, Peter Carwardine, requesting the item(s). When the items arrived, members were invoiced for the cost (and requested to return the postage stamps for Peter's collection).

In April 1988, the system passed to Victor Isaacs. It was now organised on a stand-alone basis, with its own list of items available. This was included in the members' monthly mail out. The Service was designed to be self-financing. This was achieved, and indeed has been maintained to this day.

Victor ran the Distribution Service from Canberra for 13 years. It then passed to Steven Haby in Melbourne who ran it on a similar basis for a short while.

In 2003 Len Regan of Newcastle took over. Under his very enthusiastic approach, the System has expanded greatly in scope and quality.

A recent very successful innovation has been the inclusion in the Distribution Service of CDs of a wide variety of timetables, usually compiled by Geoff Lambert.

So the Association is heavily into the exchange of timetables – and indeed also of many other publications issued by transport organisations. We have the Auction,

the Grab Tables and the Distribution Service. How do these relate to each other? It has never been possible to lay down hard and fast rules about the division of material. But it roughly works like this:

Distribution Service: Current timetables, i.e., material valued for its present usefulness; plus some historical material, particularly if it is photocopyable.

Auction: Historical material. This is usually highly valued, and as mentioned above, raises significant funds.

Grab Tables: Some current material, especially if available in bulk, but mainly the great mass of intermediate material which is neither current nor historical.

Website

The website has become one of the most valued features of the Association. It provides information about the Association, links to a very wide range of current Australian and overseas timetables, copies of both the Times and Table Talk. A popular feature is lists of both current and historical timetable series.

Our website was established by Chris Brownbill in February 1997. Since January 1998 it has included copies of the Times and since July 1998 copies of Table Talk. For a number of years the site has been maintained in a very competent fashion by Lourie Smit of Sydney. The website has a very high hit rate of up to one thousand visits per day.

Constitution and Incorporation

As the Association expanded, a need was realised for a formal Constitution. In particular, this was necessary to retain tax-free status. Accordingly, a Constitution was hammered out based on a draft prepared by Roger Wheaton, and adopted at a Special General Meeting in May 1992. A number of members were unhappy with the formality and rigidity imposed by the Constitution. They feared that the Association would lose its friendly, informal character. Accordingly, simultaneously with the adoption of the Constitution, the Committee made the following statement and appended it to the Constitution: "*The Committee will make every endeavour to maintain the Association as an informal and friendly Association. The Committee is aware that in pre-Constitution days, it had a reputation for friendliness, openness, informality and assistance to the hobby. This Committee pledges to make every endeavour to continue along these lines, whilst working within a Constitution designed with past procedures in mind. Further, the Committee urges its successors to continue this practice.*"

It is a matter of celebration that this sentiment has continued.

As the Association further expanded in

both membership and activities, it was realised that its members should be protected by it becoming incorporated. A very early decision in this process was that incorporation should be carried out in Victoria. This was for two reasons:

More members reside in Victoria than anywhere else, and

Victoria had the original and most suitable legislation.

As a legally "Victorian" organisation our Public Officer must be a resident of Victoria. Stephen Ward has always undertaken this function. We also maintain the practice of sending copies of our magazines to the State Library of Victoria, even though at the present time they are, in fact, mainly physically produced in NSW. We are legally required to also deposit copies with the National Library of Australia.

Incorporation required us to provide ourselves with a new Constitution in line with the Victorian legislation. Constitution making is not a pretty process. The Committee had what seemed endless discussions about the minutiae of the Constitution. Indeed, at times Committee discussions have ever become heated. The new Constitution of the incorporated Association was approved at the AGM of 14 September 2002 and registered on 29 January 2003.

Annual General Meetings

Far from being dry events, Annual General Meetings have become for many members an annual highlight. This is because they are the opportunity for members from all over the country to meet. They are notable social weekends. I recall, for example, my pleasure at travelling to Melbourne or Sydney for AGMs and getting no further than Southern Cross or Central stations before coming across fellow members with whom I had only had phone contact for the past year.

The first AGM was held in Jack McLean's famous garage, and the next in Albert Isaacs' home. The first AGM held away from Melbourne was aboard the former Manly ferry *South Steyne* in Sydney in September 1996. Next year it was held in Canberra. Recent AGMs have usually been held in a transport themed location, for example, working railway stations (Melbourne, Queanbeyan, Tallarook), a closed station (North Carlton, Melbourne twice), the *South Steyne* again (Sydney), a railway museum (Canberra), or a timetable publishing office (Canberra). Convivial dinners are now usually part of AGM weekends.

Once AGMs moved from Melbourne, they rotated around SE Australia: Melbourne, Sydney and Canberra. From ??? Brisbane was added to the roster. They all depend on people in the local branch putting in

time and effort to make them successful.

Our Annual Report under President Lambert developed into a very complete, informative and illustrated publication in its own right.

Committee meetings

Committee meetings were originally held in the most convenient city, usually Melbourne. This meant out-of-town Committee members rarely attended. In 1999, one Committee meeting was held on a train between Sydney and Dapto, on the way to an out-of-town Sydney branch meeting. They are now held by telephone hook-up.

The number of people who have devoted time, energy and skill to the Association over the years is many:

Publicity and AATTC's effect on public debate about public transport

The AATTC is a hobby organisation, not a public advocacy organisation. Yet, almost in spite of itself, it has had an effect on public transport.

Mindful of the very unusual nature of our hobby, we have been wary of some publicity, for fear of being depicted negatively. Thus, we have rejected at least one approach from a mass magazine. Positive interviews were conducted by 3AW Melbourne (Albert Isaacs) and ABC local radio Melbourne (Stephen Ward).

In 2006-2008 we had a remarkable run of positive publicity. Firstly, we were approached by ABC TV's "Collectors" program (who had found us through our website). Steven Ward of Melbourne volunteered to be interviewed. He gave a most admirable interview about how he got involved in the hobby, and the joys that it gives.

In 2004, timekeeping on Sydney's suburban railways was woeful, to the extent that it became a major political issue. The Sydney Morning Herald tracked down our then Vice President, Geoff Lambert, and drew upon his considerable timetable analytic abilities. A number of Sydney radio stations and newspapers also ran stories and interviews. After this, the SMH regularly quoted him in its articles. The SMH had found exactly the right person to provide detailed analysis of Sydney's railway timetables and comparisons with the past and suggestions for improvements. Geoff also alerted the SMH to some internal railway planning documents. Publication of this information precipitated an announcement by the then Premier of New South Wales of major capital expenditure on the Sydney network.

This developed further. The Sydney Morning Herald then interviewed Geoff about his interest in timetable collecting. This became a major article occupying most of a page in the high circulation Saturday

edition of 21 June 2008, including a photograph of Geoff standing in front of part of his timetable collection. This then led to Geoff being interviewed on ABC national and local radio.

This publicity led to us receiving a number of other approaches for information or offers of timetables for the Auction. Strangely, however, it led to almost no inquiries about membership. This confirms the view expressed above that the Association had already tapped just about everyone in Australia who might join.

We cannot quantify the following, but it also seems almost certain that membership of the AATTC by some timetable professionals, and analysis and examples in the Times of what makes good or bad timetables, has, in at least a few cases, led to improvements in timetable presentation.

Bruce Cook and Joe Freidman occupied the position of Publicity Officer to propagate our role among kindred groups. Later Committees have had difficulty filling the role. Ian Cooper took up this task last year (2008).

National Timetable Collection

Recently the Committee has been considering the desirability of maintaining Australian timetables for posterity. This is to both have a resource available for current and future researchers, and to provide somewhere where timetables can be lodged upon the gift or demise of members. The State Library of Victoria has expressed interest in hosting a National Timetable Collection and discussions are currently underway. In 2008 Geoffrey Clifton was appointed Archives Officer to oversee this project.

Conclusion

The AATTC has met and exceeded every expectation that Jack McLean foresaw when he founded it 25 years ago. It has provided a dynamic platform for the exchange of timetables and other transport related paper. It produces two high quality magazines of permanent value. It runs enjoyable meetings. Above all, it has provided good fellowship, for like minded individuals pursuing an unusual interest.

APPENDIX – HONOUR ROLL:

LIFE MEMBERS AND OFFICE HOLDERS

Life Members

Jack McLean
Albert Isaacs
David Hennell

Presidents

1983 - 1989 Jack McLean, Melbourne
1989 - 1998 David Hennell, Melbourne
1998 - 2000 Duncan MacAuslan, Sydney
2000 - 2002 Chris Brownbill, Melbourne
2002 - 2004 Graham Duffin, Brisbane
2004 - 2005 Steven Haby, Melbourne

2005 - 2008 Geoff Lambert, Sydney
Since 2008 Victor Isaacs, Canberra
Vice-Presidents The 1st Vice Presidents were Albert Isaacs and Graham Pack. Currently (2008) Geoff Mann is VP. Other VPs are not mentioned separately here as most have in time moved up to the Presidency.

Secretaries

1983 - 1985 Mick Guiney
1985 - 1988 Graham Pack
1988 - ? Chris Brownbill
? - 2001 Glenn Cumming
2001 - ? Stephen Ward
? - 2007 Steven Haby
2007 - 2008 Victor Isaacs
Since 2008 Geoff Lambert

Treasurers

1983 - 1984 Mick Guiney
1984 - 1992 Roger Wheaton
1992 - 1997 Graham Duffin
1997 - 1999 David Cranney
1999 - 2001 Duncan MacAuslan
2001 - 2008 Dennis McLean

Since 2008 Len Regan

Membership Officers

1989 - 1998 Albert Isaacs
1998 - ? Stephen Ward
? - ? Chris Brownbill
? - ? Steven Haby?
2001 - 2002 Victor Isaacs
Since 2002 Dennis McLean

Times Editors

1983 - 1998 Albert Isaacs
1998 - 1999 Graham Duffin
Since 1999 Geoff Lambert

Table Talk editors

1992 - 2003 Albert Isaacs
2004 - 2005 Duncan MacAuslan
2006 - 2007 Steven Haby
Since 2007 Victor Isaacs and Geoff Mann (joint)

Production Managers

1983 - 1992 David Hennell
1992 - 2002 Graeme Cleak
Since 2002 Geoff Lambert

Distribution Officers

1985 - 1988 Peter Carwardine

1988 - 2001 Victor Isaacs
2001 - 2003 Steven Haby
Since 2003 Len Regan

Auctioneers

1992 - 1995 Albert Isaacs
1995- 2001 Mark Petersen
2001 Graham Duffin
2001 - 2004 Albert Isaacs
Since 2004 Stephen Ward

Webmasters

Before 2002 Chris Brownbill (albeit not officially designated)
Since 2002 Lourie Smit

Promotion Officers

? - ? Joe Freidman
2000 - 2001 Bruce Cook
2001 - ? Steven Haby
Since 2008 Ian Cooper

Public Officer

Since 2002 Stephen Ward

Archives Officer

Since 2008 Geoffrey Clifton

Advice to fill gaps will be appreciated.

The end of the suji-ya?

DR RYO TAKAGI, *Kogakuin University, Tokyo, Japan*

Automatic generation of train schedules using computers is a dream shared by railway managers and operators alike. Although its realisation is believed by many to be a distant goal, a joint research project team that includes several Japanese universities has been working with several JR companies, and is actively pursuing ways of using the Sujic programme to develop a system that will support train control on a four-track commuter line belonging to one of them.

The author's research group at Kogakuin University is one of these research centres. The origin of the group dates back to the 1970s when Professor Satoru Sone, then at the University of Tokyo, launched research on optimising train schedules. At the core of Sone's proposals was the way train schedules must be evaluated, together with the development of a computer programme to perform simple evaluations.

This must have been one of the first attempts to develop train scheduling methods using a systems engineering approach, which broke away from traditional scheduling done by Suji-ya, meaning men who draw lines on a graph. Sujic is derived from the Japanese word Suji, which means line.

The first Sujic programme was written in 1987 by a research student under Professor Sone's supervision. Two decades later, it is still being maintained and used by undergraduate and research students conducting final-year and MSc projects on train scheduling and/or rescheduling after disruption.

The basic concept underlying Sujic is that evaluation of planned timetables must be approached mainly from a passenger's point of view. This means that two impor-

tant criteria being optimised are travel time and overcrowding inside the carriages, normally expressed as a percentage congestion rate.

Here it is important to stress that using traditional statistics on scheduled train speed and overcrowding to optimise timetables will not be satisfactory. If a train schedule has too many fast trains calling only at stations irrelevant to the majority of passengers, it will not be a good schedule because most passengers cannot benefit from the short travel time provided by those fast trains, even if their average scheduled speed is high.

Also, there is frequently a gap between 'average congestion' and what passengers actually experience. Consider two trains, one with twice as many passengers as its rated capacity and the other empty. The average congestion rate is 100% because two trains carry twice the nominal capacity of one. In reality, all the passengers experience severe 200% congestion! For these reasons, Sujic evaluates aggregated passenger travel time and the 'effective congestion rate'.

Travel time for each passenger is calculated from entering the station of origin to exiting the destination station. The train(s) this passenger will take must be identified, together with the location and time spent changing trains where necessary. Individual travel times are then added to get the aggregated passenger travel time.

The effective congestion rate is the average that passengers experience. Suppose there are n trains and train i

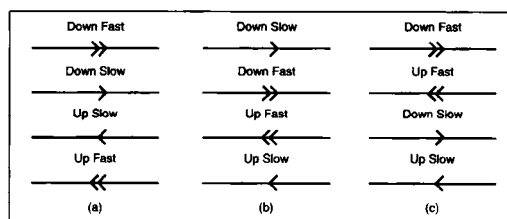
has capacity and passengers on board of C_i and P_i respectively; the average congestion rate can be calculated as $(SP_i)/(SC_i)$. On the other hand, since the passengers on train i will experience congestion P_i/C_i the effective congestion rate is $(SP_i^2/C_i)/(SP_i)$.

A simple passenger flow model is used by the Sujic program to calculate aggregated passenger travel time and the effective congestion rate. Passengers are assumed to take one of two actions. One enters the origin station at a random time and boards the train(s) that will get them to their destination quickest. The other decides what time they need to arrive, and then consults the timetable to find the latest train that will get them there by that time.

If desired, Sujic can be used to estimate the cost of a given timetable to the train operator. This is calculated by aggregating train-hours, representing the cost of the train crews, and car-hours, representing the cost of rolling stock provision.

Intensive use of Sujic was undertaken to evaluate various types of timetables on different railways. One of the most significant achievements that came out of this research was the finding that zonal separation scheduling is ideal for radial commuting railways.

Typically, such railways are predominantly used for travel between a suburban station and the city centre terminus. Zonal scheduling sees these stations grouped by geographical zones, with each zone enjoying a dedicated service calling at all stations after running non-stop through the zones closer



to the city.

Compared with timetables combining fast and slow services, zonal timetables have been very successful in increasing line capacity through the zone nearest to the terminus, and shortening travel times without excessively increasing car-hours.

Throughout the research stages, it has been recognised that non-linear evaluation functions must be used for some criteria. For example, research suggests the disbenefit passengers feel when they experience 200% overcrowding is much more than twice the disbenefit of 100% congestion.

In addition, the 'fairness' of service provision must be considered. A numerically optimal timetable may serve the interest of the majority of passengers, but it may be unacceptable to impose too much disbenefit on a smaller group of passengers. For example, zonal separation scheduling tends to make travel between suburban stations in different zones more difficult. Such journeys require passengers to change trains at a frontier station between zones.

Mizuno, in his MSc project at Kogakuin under the supervision of Professor Sone and the author (2007), proposed the use of an 'OD Service Index' to evaluate the fairness of a timetable. The basic idea is that the number of passengers between a given pair of stations must have a certain 'desirable relationship' with the frequency of trains between them. Note that this relationship is not 'proportional'.

Sujic provides an evaluation tool which can be embedded in an automatic train timetable generator. It will start from an initial timetable and perform an iterative cycle of evaluation, gradually improving it to reach an optimal solution.

As one of the first attempts to generate train schedules automatically, Kaneda's MSc project in 1994 used a 'brute force attack' approach to generate a very complicated train schedule for a four-track railway. Obviously this is not an efficient use of computational resources, and the technique could not be used for practical, large-scale problems.

Thanks to recent advances in the theory and implementation of combinatorial optimisation, the idea of automatic schedule generation now looks very promising with many researchers striving to create such a system. However, it is commonly believed that - at this stage - there is still a huge gap between real-world scheduling and what such software can do.

Real time rescheduling for train control

purposes in response to disruption is as important as creating timetables. This is an area where the development of automatic scheduling systems attracts keen interest, because most railway operators in major countries - including Japan - struggle to provide effective operational control in the event of disruption.

Evaluation tools such as Sujic can also be applied to rescheduling. The functions are similar, in the sense that a timetable is generated for future operation of trains, and numerically very similar methods can be used for both tasks.

However, applying scheduling techniques to rescheduling is not straightforward, mainly because decisions must be made quickly and often under rapidly-changing circumstances using insufficient or inaccurate information on the extent of disruption. Despite rescheduling aids, the line controller must also deal with situations which had not been foreseen when the normal timetable was planned.

Four-track railways

A four-track railway inevitably makes scheduling and line control tasks more complex, although the possibilities for keeping trains moving are greater. The figure above shows three arrangements of fast and slow tracks commonly used. The line controller and passengers will normally prefer arrangements (a) and (b) where tracks used by trains in the same direction are adjacent to each other.

This type of four-track railway is generally better than (c), which has two pairs of up and down lines, because passengers normally have cross-platform interchange. In layout (c) passengers must use a footbridge or a subway, and switching a train from the fast track to the slow track or vice versa conflicts with trains going the opposite way — difficult on busy lines.

Around Tokyo the less convenient track layout is widely used. Operationally, a four-track railway of this type is simply two double-track lines in parallel, although the fast line can have longer station intervals and hence faster services.

More sophisticated operation can be done using track layout (a), as on JR West's Kobe Line linking the major cities of Osaka and Kobe which are 43 km apart.

The JR Kobe Line has three major classes of trains: all-stations Local, Rapid services with fewer stops, and the fastest New Rapid services. During the day, Local and Rapid services share the slow tracks while New Rapid trains use the fast tracks. How-

ever, at Ashiya, an intermediate station served by all three classes, New Rapid and Rapid trains occupy platforms 1 and 4 while Locals occupy platforms 2 and 3. The timetable is designed so that passengers can change between Local and either New Rapid or Rapid trains. Through tracks are provided so that long-distance trains running at off-peak times which do not call at Ashiya can overtake both services while the passengers are interchanging.

At the university laboratory level, a four-track railway can have more capacity or capability than two double-track lines. This is made possible by complex use of two tracks. For example, assume there are three classes of trains: fast, semi-fast and slow. Fast and semi-fast trains share the fast track while the slow trains use the slow track. With this arrangement the semi-fast trains must make occasional stops at passing loops to allow fast trains to overtake.

Kaneda (1994) showed that these long stops can be avoided by applying the complex scheduling method, in which each class of trains can run on both tracks. When a fast train approaches the semi-fast train in front, the semi-fast is re-directed to the slow line to make way for the fast instead of waiting in a passing loop.

Similar techniques can be used in train control. Generally, if a disruptive event blocks one track in a four-track line, two tracks will be shut down while the remaining pair keep running. Mizuno (2007) showed that by using all three remaining tracks in such cases the reduction in line capacity can be minimised.

The author is currently part of the joint research project team which is developing a system that will support train control on a four-track commuter line. In this joint research project, evaluation methods like that implemented in Sujic have been used successfully without major problems.

However, some minor issues have arisen which are connected with the fact that interchange between fast and slow tracks in layout (a) is easy. This is not compatible with some assumptions that must be made in 'simple' evaluation methods. For example, it is not realistic to believe that passengers will change from one train to another when they are running in parallel with a difference in timings, say, of less than 1 min. Because of its assumptions, in the simple evaluation result passengers are assumed to concentrate on the faster train, even when this train is only 10 sec faster.

This project is still actively pursuing various ways to devise automatic generation of timetables and/or train control decisions, which will probably take the form of a decision-support tool when the development is proved to be successful.

This article is taken from Railway Gazette 5-May-2009