TRAIN TIMING: A BEGINNER'S GUIDE
By John Heaton FCILT

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1. Introduction

Train timing has earned itself an air of mystique over the years and is viewed by many as an aspect of the railway hobby that is confined to boffins and statisticians. This reputation is both unfortunate and misleading.

Most participants enjoy a strong sense of sporting challenge. Even in these days of greater standardisation, there is a thrill to be gained from studying the form and assessing whether the conditions are right for a fast run; the weather conditions, temporary speed restrictions (TSRs) in force, likely signal checks, the requirements of the schedule and, not least, the motivation of the driver. Will the train be late enough to allow time to be regained or is it so late that it will lose its path? Paradoxically, of course, some of the best performances are obtained when the indications are unfavourable.

So, what benefit does the train timer receive that is denied to someone who just watches the scenery go by? Only a soul-less individual would choose to strain and time east coast main line Milepost 66 instead of enjoying the vista of Durham Cathedral from the famous viaduct, but deciding to compile an accurate log provides a stimulating mental challenge. It is necessary to be organised, quick witted and observant. The result is a permanent record of your journey which will survive the vagaries of personal memory.

2. Purpose

The hobby provides the ability to discover the best known performance by different forms of motive power over a multiplicity of routes. 'Best' can be defined however you want; fastest, closest to permissible speed limits, or in terms of adherence to schedule perhaps. The Railway Performance Society (RPS) runs a fascinating website archive which allows members to place their experiences into both modern and historical context. It also publishes lists of 'Fastest Times' for core routes and motive power (see below). Some of these have been adapted to show the fastest times achieved after on-train data recording equipment became compulsory.

By comparing the actual times with the schedule, an informed view can be made concerning the realism of the timetable. Calculating the effect of delays from TSRs and adverse signals enables the net time to be estimated. The skill of the driver in braking or observing restrictions can also be assessed. Always remember that the driver is the one who really knows what is going on, for instance if a train defect has necessitated a speed reduction. Finally, many recorders like to measure power outputs and a detailed log gives them the data they need.

Example of RPS Fastest Times:

	miles	m s	date	loco	veh	mph	rec	section	miles	m s	date	loco	veh	mph	rec	
								WEST COAST MAIN LINE								
	up/south							**Section 1: Euston - Liverpool/Preston - Glasgow**					**down/north**			
								LONDON EUSTON and:-								
	17.41	13 38	03.11.04	390028	8	76.6	DAd	**Watford Junction**	17.41	13 00	08.06.05	390043	9	80.4	CH	
		14 23	24.03.06	221107	5	72.6	JR	ditto diesel m.u								
	40.16	29 55	25.10.07	350114	4	80.5	IU	**Leighton Buzzard**	40.16	28 06	15.06.07	350114	4	85.8	BN	
	46.63	34 43	24.05.73	E3156	13	80.6	DAd	**Bletchley**	46.63	33 50	29.06.85	86234	11	82.7	WL	
#	49.80	29 37	20.03.10	390041	9	100.9	PMS	**Milton Keynes Cen**	49.80	29 13	04.04.09	390023	9	102.3	DA	#
								ditto diesel m.u		29 44	03.08.09	221105/14	10	100.5	BN	#
	65.78							**Northampton**	65.78	42 54	23.12.04	390006	9	92.0	CH	
#	82.49	46 24	30.07.09	390032	9	106.7	EG	**Rugby**	82.49	46 22	09.09.09	390016	9	106.7	DA	#
#		50 44	19.05.09	221105/113	10	97.6	JR	ditto diesel m.u		52 59	31.03.05	221128	5	93.4	JR	
	97.01	56 24	10.08.06	390033	9	103.2	JR	**Nuneaton**	97.01	59 55	10.08.06	390040	9	97.1	JR	
		70 08	11.07.05	221140	5	83.0	JR	ditto diesel m.u								
#	110.00	59 48	30.01.10	390037	9	110.4	JR	**Tamworth**	110.00	58 39	26.06.09	390023	9	112.5	EG	#
	116.21							**Lichfield**	116.21	72 10	12.11.97	hst	10	96.6	JR	
								ditto e.m.u		76 46	25.02.04	390003	8	90.9	JR	
		75 38	09.02.05	221109	5	92.2	JR	ditto diesel m.u		71 37	15.10.08	221113	5	97.4	JR	
#	133.54	74 21	05.5.09	390023	9	107.8	AV	**Stafford**	133.54	73 14	07.09.09	390007	9	109.4	DA	#
	158.04	87 43	24.03.09	390004	9	108.1	DAd	**Crewe**	158.04	89 50	28.01.09	390027	9	105.6	JHe	
		105 19	05.07.07	221104	5	90.0	JHe	ditto diesel m.u		108 38	27.09.04	221117	5	87.3	JHe	
		100 52	22.03.04	90001	10	94.0	DA	*ditto all-comers*								
	169.80							**Hartford**	169.80	116 47	11.03.89	87035	12	87.2	WL	
#	182.15	102 27	09.09.09	390034	9	106.7	DA	**Warrington BQ**	182.15	97 21	25.07.09	390010	9	112.3	MDR	#
										106 57	27.08.09	221115	5	102.2	AV	#
#	208.99	115 47	14.07.09	390015	9	108.3	AS	**Preston**	208.99	115 01	07.07.09	390045	9	109.0	EG	#
	170.50	126 05	15.03.75	86252	10	81.1	BN	**Runcorn**	170.50	123 41	06.02.88	86436	11	82.7	BP	
								LONDON WATERLOO and:-								
	50.79							**Milton Keynes Cen**	50.79	49 46	05.07.95	hst	10	61.2	JHe	
								WATFORD JUNCTION and:-								
	29.23	19 52	30.08.79	86213	12	84.0	BP	**Bletchley**	29.23	20 22	03.07.90	87019	11	86.0	AV	
	32.39	18 28	13.11.06	390013	9	105.2	DA	**Milton Keynes Cen**	32.39	17 41	07.08.08	390002	9	109.9	AV	
		19 43	19.07.08	221113/110	10	98.6	DAd	ditto d.m.u								
	48.37	42 00	13.04.04	390035	9	69.1	JR	**Northampton**	48.37							
	65.08	35 49	06.10.04	390040	9	109.0	JR	**Rugby**	65.08	35 04	24.05.07	390036	9	111.4	EG	
	79.74	45 06	21.05.05	390045	9	106.1	AB	**Nuneaton**	79.74	45 08	20.06.05	390052	9	106.0	AV	
	92.73	53 00	01.03.05	390008	9	105.0	AB	**Tamworth**	92.73	57 53	06.09.05	390007	9	96.1	JR	
		55 42	12.10.06	221113	5	99.9	AV	ditto diesel.m.u								
								ditto all-comers		56 44	27.05.92	87033	9	98.1	RK	
	98.94	61 11	03.05.04	390038	9	97.0	JR	**Lichfield Trent Valley**	98.94	55 07	20.04.05	390025	9	107.7	EG	#
#	116.13	62 24	06.04.09	390019	9	111.7	PJ	**Stafford**	116.13	95 25	09.01.03	390014	8	73.0	JR	
								ditto all-comers		71 07	23.04.97	90004	10	98.0	KR	#
#	140.67	86 55	28.08.09	390012	9	97.1	AV	**Crewe**	140.67	80 00	09.05.09	390015	9	105.5	LA	#
		91 42	24.03.06	221107	5	92.0	JR	ditto diesel.m.u								
		86 01	01.09.97	90012	12	98.1	GA	*ditto all-comers*								
	164.78	101 51	01.10.90	90003	11	97.1	CT	**Warrington BQ**	164.78	103 03	23.10.90	87018	10	95.9	WL	
	191.62	124 06	30.08.94	87009	12	92.6	AV	**Preston**	191.62	123 45	08.07.96	86207	10	92.9	AV	
	163.19	109 16	27.03.90	87035	11	89.6	RL	**Runcorn**	163.19	103 36	17.08.90	90044	10	94.5	BP	

3. Distances

The task of compiling a log is far less daunting than it might seem, particularly in these days of cheap, accurate watches, calculators and computers. Many timers now use global positioning system (gps) receivers to supplement stop points and arrivals. This guide concentrates on stop watch techniques but Section 11 discusses basic gps equipment and techniques.

It is necessary simply to record the precise times at precise points and research the accurate mileage of the locations selected. If the chosen points are mileposts, the distance is apparent. Yes, some are misplaced, but this will soon be discovered and the worst are highlighted in RPS material. The actual mileages of features such as bridges, level crossings or station exits are listed in a variety of publications including the comprehensive and extensively researched RPS line charts (see below). Official sources are helpful but even these can contain some inaccuracies. The Quail series of maps is useful. Mention should also be made of the information contained in the British Railways Main Line Gradients book published by Ian Allan. Although the speed restriction and station details are out of date, the gradients remain unchanged.

Table 125c

Swindon - Gloucester

Decimal Miles							Centre		PSR - mph	
E'bd	W'bd	M	C	Location		Point	M	C	E'bd	W'bd
36.84	0.00	77	23	SWINDON (no access from platform 4)			77	23	20 pf1	30 pf3
		77	26	Swindon (platform 2 - bay)		BS				
36.79	0.05	77	27	SWINDON (Pfm 2 log purposes 2 car MU)					20	
36.68	0.16	77	36	Swindon Junction		Pts			30	30
36.38	0.46	77	60	Milepost		MP			30	90
36.03	0.81	78	08	UB	} Great Western	UB			40	90
35.98	0.86	78	12	UB	} Way	UB			40	90
35.88	0.96	78	20	Single Line Junction(Loco Yard)		MP/pts			40up/90dn	
35.25	1.59	78	70	River Ray		UB			90	
34.86	1.98	79	21	UB	M & SW Jn Rwy	UB			90	
34.70	2.14	79	34	UB		UB			90	
34.45	2.39	79	54	OB	Thamesdown Drive	OB			90	
34.44	2.40	79	55	OB	Purton Road	OB			90	
34.13	2.71	80	00	Bremell Sidings		MP			90	
34.08	2.76	80	04	UB		UB			90	
33.75	3.09	80	30	OB	B 4553	OB			90	
33.01	3.83	81	09	Purton Collins Lane		LC			90	
32.70	4.14	81	34	Purton	Station Road	OB			90	
32.68	4.16	81	36	*Former Purton station site*					90	
32.31	4.53	81	65	Purton Common		LC			90	
31.96	4.88	82	13	OB		OB			90	
31.64	5.20	82	39	UB		UB			90	
31.44	5.40	82	55	River Key		UB			90	
31.26	5.58	82	69	UB		UB			90	
31.25	5.59	82	70	PSR		PSRM			90up;90/100Hdn	
30.78	6.06	83	28	OB		OB			90/100HST	
30.41	6.43	83	57	Gambols Crossing		O/A			90/100HST	
29.81	7.03	84	25	OB	Braydon Road	OB			90/100HST	
29.31	7.53	84	65	Gryphon Lodge Crossing		O/A			90/100HST	
28.68	8.16	85	36	Minety	Station Road	OB			90/100HST	
28.66	8.18	85	37	*Former Minety station site*					90/100HST	
27.90	8.94	86	18	UB		UB			90/100HST	
27.68	9.16	86	36	UB		UB			90/100HST	
27.23	9.61	86	72	Minety LC		LC			90/100HST	
26.35	10.49	87	62	UB		UB			90/100HST	
25.69	11.15	88	35	*Former Oaksey station site*					90/100HST	
25.66	11.18	88	37	Oaksey	Somerfield Keynes Rd	OB			90/100HST	
25.16	11.68	88	77	UB		UB			90/100HST	
24.76	12.08	89	29	UB		UB			90/100HST	
24.09	12.75	90	03	OB		OB			90/100HST	
23.61	13.23	90	41	} Kemble Tunnel (409 yards)					90up;90/100Hdn	
23.39	13.45	90	59	}					90up;90/100Hdn	
23.36	13.48	90	61	Single line junction		Pts			90up/40dn	
23.28	13.56	90	68	PSR		PSRM			90	90
23.21	13.63	90	73	OB	Station Road	OB			90	90
23.20	13.64	90	74	Kemble		GF			90	90
23.14	13.70	90	79	KEMBLE		SFB	91	00	90	90

Signals can provide useful timing points at night but distance information on these is relatively sparse. However, a daylight run allows a recorder to interpolate the distance by timing adjacent mileposts. If, for instance, you time 4.5sec from Milepost 145 to a signal and 4.5sec to Milepost 145¼ the signal is at 145m 10c. Other figures work proportionately. This method does not work if the train is accelerating or braking.

The RPS recommends that the distance that corresponds with the centre of the train should be used as this avoids double-counting the length of the train which can sometimes occur, especially if the buffer stop distances are taken at terminal stations. It could be argued that you should really use the distance that corresponds with your position on the train but this is perhaps a step too far.

If you are making comparisons with working timetables, it is worth noting that working timetable schedules are based on the moment the front of the train passes an intermediate point., which can be significantly different from the time you record, all the more so if you are sitting at the rear of a long, slow-moving train.

4. Speeds

By taking a series of times at known distances, average speeds can be worked out. If your readings are closely spaced, maxima and minima can be computed. Bear in mind that the effect of slight differences in, for instance, reaction times is greater at higher speeds. Using the simple formula of Velocity = Distance divided by Time, the 'miles per hour' figure emerges.

Take the decimal distance in miles and multiply by 3600, then divide by the number of seconds to travel the distance. So, 1½miles in 90seconds is 1.5x3600 then divide by 90 = 60mph. If your distance is in chains (units of 22yds still used as a standard Network Rail unit) it is necessary to multiply by 45 instead of 3600. So 1m 27ch is 107 chains (80 to the mile) x 45 divide by say 70sec =68.8mph.

Kilometres per hour can be calculated in exactly the same way as decimal miles by using the decimal kilometre distance.

Rail joints used to be the easiest way of finding out the speed of your train. By counting standard rail joints of 20yds and ensuring you start counting at zero and not 'one'. Simply count the joints in a given time and work out the V=D/T formula. There are some shortcuts available. Count the joints in 20sec and double the figure to get the approximate miles per hour. Or take the time over 22 joints and use it like quarter-milepost timing. Beware of short rail lengths that are sometimes used. With the advent of continuous welded rails, and the quality of modern welding, this method does not work very well, although it remains the best way of trying to estimate the maximum or minimum speeds in tunnels.

For shorter tunnels you can time the entrance to exit by stopwatch and use the normal formula using the easily obtainable yardage either from publications or boards sometimes visible at the tunnel mouth.

At night with double-glazing and sealed windows, and in difficult timing situations such as nearside mileposts in low sunshine or deep shadow, then timers often resort to skeleton timings of passing times. In such situations extra points might be added such as overbridges, which can often be heard at night. GPS is a fantastic aid on such occasions.

5. Equipment

What equipment is needed? Well, the most expensive item might well be a valid ticket! A notebook, pen (plus spare!), watch and basic calculator are the only other accoutrements you need. A hard-back notebook might prove a wise investment as soft-back ones will deteriorate as the years pass and is easier to use if, for instance you need to jot down a time while standing.

For detailed milepost timings a stopwatch or wristwatch with a chronograph is desirable. Preferably the watch should have a lap facility that allows a passing time to be frozen and noted without interrupting the progress to the elapsed time for the full journey you are timing.

A specialist stopwatch can be purchased for around £30 but it is sometimes difficult to see exactly what features the watch possess when looking on line. At the time of writing (summer 2010), the CASIO HS-30-W has received good reports and is on sale at Amazon for £29.01 including delivery.

6. Choosing your route

On your first stopwatch outing, choose a line with which you are familiar, preferably in the direction where mileposts are on your right hand side, across the opposite track on double-track railways so that visibility is easier, such as westbound from Paddington and northbound from St. Pancras or southbound towards Euston and King's Cross.

This will make a lesser call on your reactions but you will need to guard against parallax errors, especially if a milepost is set back from the next one perhaps across sidings. Such errors can be minimised by timing the post at a certain spot in your scope of vision.

It is advisable to choose a relatively low speed route for your first timing expedition at an off-peak time when there will be a choice of seats and space to record. If you want to catch the bug though, you might risk a fast service instead.

If the mileposts are on your near side then better reactions will be needed, so prepare to miss more than if they were on the other side. The advantage will be that you are more likely to pick up signal checks and see TSR boards or electrification neutral section signs.

Do not be discouraged if you have difficulty spotting mileposts in city areas as many are missing but the civil engineers sometimes paint chainage figures on structures in order to compensate. More posts are visible in the country but their maintenance is variable.

7. Before Departure

It is often a good idea to write down the points you have selected before you set off to save time when on the move. Most timers record all open stations. Certain points are used in working timetable schedules, so it is a good idea to choose those. If there is likely to be a long gap, then your points can be supplemented with closed stations, structures and mileposts. It is a good idea to look at the gradient profile and pick summits and dips.
Decide just how much detail you want to collect. If you try for too much too soon you might lose more than you gain, but remember the adage that you can always delete unnecessary detail but cannot replace what you have not taken. This does not really apply to gps recording which enables a recorder to upload data from the receiver to a computer after the event. See Section 11 for further details. Above all, work to the degree of detail with which you are comfortable and if you find that indulging in more detail means you get less enjoyment then settle for less.

When you find your train, note the loco, unit, or power car or driving vehicle numbers. If you get the chance, note the weights of all the vehicles (or their painted number so you can investigate afterwards). Estimate the passenger load to get the gross weight, working on 14 passengers per tonne (some use 16) on a typical InterCity train and using some common sense if it seems inappropriate. Try to make a realistic estimate of passenger numbers, allowing for some coaches being fuller than others. Most recorders just guess and of course the load can vary tremendously along the route.

If you add on the weight of the locomotives or power cars you get the total weight of the whole train. If you divide this weight into the horsepower available you get the power/weight ratio, usually in horsepower per tonne. Many vehicles have data panels affixed to help with obtaining their weight but they are sometimes inconsistent.

Make sure that any watch you are going to use is showing the correct time.

Write down the full title of the train (e.g. 09.25 Plymouth to Aberdeen even if only travelling from Birmingham New Street to Derby). The date and day of the week are also important. In the future you will have forgotten whether it was a summer Saturday or a midweek trip.

The weather and your position on the train are the remaining basics. Weather can affect trains, mainly through adhesion and wind strength/direction. The position on the train will affect your starting and finishing time compared to elsewhere in the train. If in the 9th coach you will pass your first point later than if you are in the first. Your recorded speed will also be lower until the train has ceased to accelerate. Noting where you are sat also helps comparison between two timers on the same train. Vehicle names, train operating companies and allocations can also be noted. If you cannot obtain it before you set off, try to get it after arrival.

8. On the Train

Be vigilant and watch for the first moment the train moves. Immediately start your stop watch and note the clock time. Note the lap time at each of your timing points and quarter-mileposts on your stopwatch. Some recorders prefer to use their stopwatch only for full mileposts as there is often insufficient time to press and note times at both. Best practice discourages using two different watches but it can be easier and safer if you press the wrong button and zero your stopwatch inadvertently. If using two watches enables you to gather material you might otherwise fail to note, it will ultimately result in a fuller log. Timing every quarter milepost is ambitious but if you decide to time every full milepost or every half mile you will miss some and have big gaps and even if you do not miss any it is likely that you will fail to record maxima and minima.

Take ‘lap’ times on your stopwatch at the mileposts you select or manage to spot. Take ‘split’ times at passing points. It is desirable to have a watch that displays both simultaneously. Only re-set these to zero when you are sure you have noted the information at the end of a run

At station stops or the end of the journey, stop your watch the moment the train comes to rest and note the clock time. If you are alighting do so anyway, even if you risk being crushed by people joining or are stood in the vestibule. Do not rely on memory, there are so many distractions it might let you down.

Note the length of signal stops, sometimes taking both the elapsed time and the clock times provides more interest. Note or estimate the minimum speed at signal checks and TSRs. It will be useful when comparing other journeys on the same route and help you calculate the net time (the actual time after allowing for delays).

It might be safer, at least initially, to work out the speeds after the journey has finished but you will soon find you know the speed that corresponds with your readings. Many timers use a ready-reckoner as they go along.

9. Compiling the Log

The stopwatch timings you have taken en route will enable speeds to be calculated. Set out the locations that you have timed, culling ones that you no longer consider necessary (for instance if they are close together and speed has not varied or does not show a maximum or minimum during acceleration or after braking). When braking is taking place many recorders show ‘brakes’ as quarter milepost timings can be misleading. However, it is not impossible if the timing point is near the middle of consistent braking and an estimate is probably better than nothing. If you want to get into great detail you can graph deceleration or acceleration to find the appropriate on the curve you will draw. GPS makes the process easier (See Section 11).

Usual statistical conventions apply, so it is normal to round up 0.5 to the full figure above but some timers prefer not to do this if it is a maximum or an illegal figure as evidence does not exist fully to justify the claim. Showing half-mph figures in the log is usually unnecessary, sometimes visually confusing and usually not supportable from the inaccuracies in the data from which they are derived. However, there is a contrary argument that gps readings at consistent speeds do not justify rounding up or down.

If you pass one of your timing points (say Maidenhead) at say 90mph and accelerate to say 92mph before speed is reduced to 89mph at the next timing point (say Twyford), then enter 90/92 at Maidenhead and 89 at Twyford. If speeds are found to be 90 at Maidenhead then 92 then 87mph before reaching 89mph at Twyford then the first line would be 90/92/87mph with 89mph on the second. In such circumstances it is a good idea to find an extra timing point even if it is a milepost.

The accuracy of your times and speeds can be assessed by working out the average speed (arithmetic mean) between the two points as shown in Section 4. In the above example where the Maidenhead line reads 90/92 and Twyford 89mph then the average should lie within the 89-92mph range. In the second example where 87mph was touched the average will be within the 87-92mph range and obviously be lower than the first example.

If your average does not fit then there has been an error either in the time you noted, the stopwatch milepost timings or the distance you have used. On examination, the error is usually evident. If you have two consecutive averages that do not match and one is too high and the other too low then this is likely to be a compensating error. Correct one figure and both averages will probably fit.

day	Mon 5-Oct-09
	1500 Plymouth-Paddington

Motive Power				43198/43002				
Load (tons)				2+8				
Weather				Cloudy				
				???				
Miles	**M**	**C**	**location**	**Sch**	**m**	**s**	**mph**	***ave***
0.00	177	26	TIVERTON PKWY		0	00		
3.32	174	00	Whiteball		3	48	77	*52.5*
7.13	170	16	Wellington		6	20	98/78tsr	*90.0*
12.31	165	01	N Fitzwarren		9	52	98	*88.1*
14.16	163	13	TAUNTON		12	14		*46.9*
0.00	163	13	TAUNTON		13	54		
2.41	160	60	Creech J		3	07	73	*46.4*
4.76	158	32	Cogload J		4	48	87	*83.8*
5.09	158	06						
5.09	137	66						
7.92	134	79	Athelney		6	46	96/98/78tsr	*86.6*
12.89	130	02	Langport E		10	15	91	*85.5*
15.05	127	69	Long Sutton		11	35	97	*97.3*
17.26	125	52	Somerton		12	56	99	*98.3*
20.35	122	45	Charlton Mackerell		14	48	96/95	*99.2*
22.83	120	07	Keinton Mandeville		16	21	96	*95.8*
25.46	117	36	Alford		18	00	99	*95.9*
27.58	115	27	CASTLE CARY		19	25	88/93	*89.5*

It is worth starting to build a library of logs to compare both your own runs and those published elsewhere. Most of those published are simplified from the originals to please a wider audience, even in the RPS magazine. Most timers now use spreadsheets to compile their logs which can be set to work out decimal miles from the miles and chains that you enter, and averages can be calculated automatically from your minutes and seconds.

If you are adept at using computer spreadsheets, there is an interactive template on the RPS website that you can download and alter for the stretch of line over which you have travelled.

10. Specimen Logs

Let us look at three specimen logs. The first two were recorded by RPS former treasurer Bruce Nathan, albeit forty years apart. Note that all starting and terminating points reflect the middle of the train. Also note that the railway has changed in the forty years that have elapsed requiring different mileages for not only Woolmer Green but also Stevenage station. At Woolmer Green the signal box has been demolished and the new two-to-four track junction is now easier to time. At Stevenage the old station was closed and a new one has been opened nearer London. Bruce has used a different mileage for the middle of the train at the Welwyn North stop compared to the point the times on modern non-stop trains.

In the first log the claimed speeds at Langley and Stevenage do not match the average. Perhaps the 63mph was an error combined with an odd second on one or both the timings. Or perhaps the Stevenage time was 3sec out. In the second log the average does not quite balance the speeds from Welwyn North to Woolmer Green. The facing two-four track junction is slightly staggered from the southbound four to two line junction so it is possible the times are slightly out. A 2sec adjustment would put the averages either side of Woolmer Green Jct about right. Note how all the others fit perfectly, even at high speed using half seconds when necessary

If you want to compare runs over a long period, a delicate balance needs to be drawn between having a log that reflects the current railway and the need to retain comparable locations. Accordingly, some timers would choose to continue timing at the old station as well as taking times at the new one.

The usual way of showing the position on the train is shown as say 1 / 4. This is first of four. Travelling in the rear passenger coach of a 2+8 HST the figure would be 9 /10, 10/10 being the rear power car and 1 / 10 the front power car.

Table 1: King's Cross to Hitchin

Loco/Set				D5301 (Cl. 26 1160hp)				317305			
Load*				7 Mk1/234/255/233/3.5				4emu/137/142/142/9.3			
Train				09.25 KX-Cambridge				14.40 KX-Cambridge			
Date				Sat. 28/2/59				30/12/2008			
Rec/Pos/GPS?				B. Nathan/not noted/no				B. Nathan 1/4 N			
M.	Chns	Dec. Mls	Timing Point	Min.	Sec.	M.P.H.	Ave.	Min.	Sec.	M.P.H.	Ave
0	08	0.00	KING'S CROSS d.	0	00	½L		0	00	3L	
1	53	1.56	*Holloway*					2	46	66	33.9
2	41	2.41	Finsbury Park	5	34	46/51	26.0	3	28	77	73.7
4	00	3.90	Hornsey	sigs				4	31	90	84.3
5	00	4.90	Wood Gn/Alex P.	8	48	40	46.2	5	10	95	92.3
6	37	6.36	N. Southgate	10	54	44	41.8	6	08	91/94	91.6
8	30	8.28	Oakleigh Park					7	22	93	93.0
9	13	9.06	New Barnet	14	29	49	45.2	7	52	94/95	93.0
10	44	10.45	Hadley Wood	16	10	50	49.5	8	45	94	94.2
12	60	12.65	Potters Bar	18	53	48	48.6	10	09	94	94.3
14	40	14.40	Brookmans Park	20	43	63/68	57.3	11	14	100	97.7
17	56	17.60	Hatfield a.	24	22	sig stop	52.6				
17	56	17.60	d/p.	25	10			13	06	107	102.4
19	00	18.90	*MP 19*			-		13	50	108	107.6
20	26	20.23	WELWYN GC a.	29	59	1.5L	32.7				
20	26	20.23	d./p.	30	46	1L		14	36	99	103.7
21	76	21.85	Welwyn North								

22	00	21.90	Welwyn North pass	3	12	47	31.4	15	36	96	100.5
23	40	23.40	*Woolmer Green SB*	5	01	52	49.5				
23	65	23.71	*Woolmer Gn Jct*					16	46	94	92.6
26	00	25.90	*MP 26*					18	07	99	97.2
26	56	26.60	*Langley Jct*	8	27	69	55.9				
27	47	27.49	STEVENAGE a.					19	41		60.8
28	44	28.45	STEVENAGE p.	10	05	63/70	68.0				
				tsr		30					
31	72	31.80	HITCHIN a.	14	25	1½L	46.4				

*=Vehicles net weight /gross/incl loco/ power to weight ratio

On modern trains, Bruce times to half a second. Running times are more standard so this aids differentiation and it helps to balance the averages. Some timers use 1/10th of a second but others think anything less than a full second is unnecessary and presents visual clutter that obscures the clarity of a printed log. You can show full seconds and still work out averages to a tenth very easily, especially in a spreadsheet with an automatic formula working out your averages and the seconds column set to 'no decimal place'.

Bruce's method of showing punctuality and station stops gives extra interest to the run. It can be seen that the Welwyn Garden City stop by D5301 took only 47sec and regained ½min. Note also the mileage change at Shepreth Branch Jct where the GN series changes to GE, but the decimal mileage is unaffected. Normally, a schedule column would be used.

In the timing columns the convention is to italics for locations that are not open stations and capitals for important stations (an arbitrary decision).

In table 2, Bruce has zeroed the mileage to start again from Letchworth. It is a matter of personal preference whether to do this or use a continuous figure from the starting point for the whole journey.

Traditionally, it has been the convention to put an asterisk next to speeds where the infrastructure has caused speed to be limited, an intermediate speed restriction for instance but some consider this to be out-dated. An IC125 travelling form Exeter to Newton Abbot could have an asterisk next to it at every point from Exminster onwards, for instance.

Table 2: Hitchin to Cambridge							
Loco/Set				61330 (B1 4-6-0)			
Load*				6 LNER/191/205			
Train				14.05 KX-Cambridge			
Date				Tue. 13/1/53			
Rec/Pos/GPS?				B. Nathan.not noted/no			
M.	Chns	Dec. Mls	Timing Point	Min.	Sec.	M.P.H.	*Ave.*
31	72	0.00	HITCHIN d.	0	00	7L - /36	
34	51	2.74	Letchworth a.	5	32		*29.7*
34	51	0.00	d.	6	16		
36	48	1.96	Baldock	3	22	54	*35.0*
39	00	4.36	*MP 39*	6	05	52	*53.0*
41	00	6.36	Ashwell	8	05	66	*60.0*
44	72	10.26	Royston	11	53	56/59	*61.6*
47	74	13.29	Meldreth	15	03	56	*57.3*
49	67	15.20	Shepreth	17	07	49	*55.5*

50	77	16.33	Foxton	18	29	51	*49.4*
52	48	17.96	Harston	20	22	56	*52.2*
55	26	20.69	*Shepreth Br Jct*	23	34	36/45	*51.1*
53	04	20.69		sigs			
55	46	23.22	CAMBRIDGE a.	29	34	5½L	*25.3*
*=Vehicles net weight /gross							
a=arrive d=depart L=Late							

Table 3 shows a modern run with a Pendolino from Euston to Manchester which shows the best of modern running. Modern running is relatively uniform compared to previous generations but it is often very interesting. Table 3 shows a comparison between two Pendolinos with one working to a maximum of 110mph with its tilt mechanism inoperative.

Table 3: Euston to Wilmslow												
Loco					390027 Pendolino				390010 - non tilt			
Vehicles/tare/gross tonnes					9/460/475				9/460/480			
Train					14.40 Euston-Man. P.				14.40 Euston-Man. P.			
Date					Wed. 28/1/09				Tues. 10/2/09			
Weather					Fine				Fine			
Rec/Pos/GPS?					J. Heaton 7/9 Yes				J. Heaton 6/9 Yes			
M.	Chns	Dec. Mls	Timing Point	Sch.	Min.	Sec.	M.P.H.	*Avge*	Min.	Sec.	M.P.H.	*Avge*
0	04	0.00	EUSTON Pfm 5 d.	0	0	00	1½L -/26/20 tsr18	*1½L*	0	00	½L 20mph tsr	
1	08	1.05	*Camden S. Jct.*	3	2	46	41	*22.8*	3	15	38	*19.4*
2	33	2.36	South Hampstead		4	17	64	*51.9*	4	43	58	*53.7*
3	01	2.96	Kilburn High Road		4	47	81/85tsr	*72.0*	5	18	73/87/ 85tsr	*61.7*
3	55	3.64	Queens Park		5	15	89/100/rbt	*86.8*	5	50	85/rbt74	*75.9*
5	20	5.20	*West London Jct.*	6	6	18	85/84	*89.3*	7	00	83	*80.4*
8	04	8.00	Wembley Central	7½	8	02	111	*96.9*	8	44	110	*96.9*
9	34	9.38	South Kenton		8	46	116	*112.5*	9	29	110	*110.0*
10	25	10.26	Kenton		9	13	118	*118.3*	9	58	110	*110.2*
11	31	11.34	Harrow and W.	9½	9	45	123/124	*120.9*	10	34	109/110	*107.5*
12	47	12.54	Headstone Lane		10	20	123/120	*123.4*	11	14	108/110	*108.0*
14	57	14.66	Carpenders Park		11	23	122/107/110	*121.4*	12	24	106	*109.3*
16	00	15.95	Bushey		12	04	109/110	*113.0*	13	06	111/108	*110.4*
17	34	17.38	WATFORD JCT	12½	12	51	109/108	*109.1*	13	53	110	*109.1*
19	44	19.50	*Watford TNP*		13	59	116	*112.5*	15	03	109	*109.3*
20	76	20.90	King's Langley		14	42	122	*117.2*	15	49	110	*109.6*
23	07	23.04	Apsley		15	45	123	*122.1*	16	59	109/110	*109.9*
24	39	24.44	Hemel Hempstead		16	26	124	*122.9*	17	45	108/112	*109.6*
26	25	26.26	*Bourne End*	17	17	19	123	*124.0*	18	46	107	*107.7*
27	73	27.86	Berkhamsted		18	06	124	*122.6*	19	41	97	*104.7*
31	56	31.65	Tring	19½	19	56	125/126	*124.0*	21	48	109	*107.4*
33	79	33.94	*Tring Cutting*		21	02	124	*124.8*	23	02	111	*111.3*
36	09	36.06	Cheddington		22	04	125/124	*123.4*	24	11	110	*110.9*
37	40	37.45	*Ledburn Jct.*	22½	22	44	125	*124.9*	24	56	110/111	*111.0*
40	13	40.11	Leighton Buzzard		24	01	124/126	*124.5*	26	29	95/89	*103.1*
46	52	46.60	Bletchley	27	27	19	90tsr 88	*118.0*	30	25	90tsr 87	*99.0*
49	66	49.78	MILTON K. CEN.		29	04	123/125/120	*108.9*	32	13	109	*105.8*
52	33	52.36	Wolverton	28½	30	20	122/124	*122.6*	33	38	112	*109.6*
52	78	52.93		[1]								
52	76	52.93										
54	58	54.70	Castlethorpe		31	30	110tsr 111	*120.2*	34	54	109	*110.7*
56	58	56.70	*Hanslope Jct.*	32½	32	31	124/125	*118.0*	36	00	109	*109.1*
59	65	59.79	*Roade o/b*		34	01	122/125	*123.5*	37	42	109	*109.0*
62	68	62.83	*Blisworth*		35	29	124/123/125	*124.3*	39	22	110	*109.4*
67	00	66.98	*Heyford*		37	30	124	*123.5*				
69	63	69.76	*Weedon Jct.*	39	38	52	117/125	*122.4*	-	-	100	
75	20	75.23	*Welton*	[1]	41	33	123	*122.1*	46	21	108	*106.5*
76	64	76.78	*Kilsby TSP*		42	20	111/-	*118.7*	47	13	109	*107.3*
78	13	78.14	*Kilsby TNP*		43	05	110	*109.0*	47	58	110	*109.0*
80	24	80.28	*Hillmorton*	46	44	09	123/124	*120.2*	49	08	111	*109.9*
82	40	82.48	RUGBY	46½	45	13	123	*123.8*	50	25	99	*102.9*
83	20	83.23	*Trent V. Jct.*	47	45	35	125	*122.7*	50	52	100	*100.0*
88	00	87.98	*Brinklow*		47	53	123	*123.9*	53	39	103	*102.4*
91	29	91.34	*Shilton*		49	31	124	*123.5*	55	36	108	*103.5*
93	40	93.48	*Bulkington*		50	33	124/125	*124.1*	56	47	108	*108.4*
97	04	97.03	NUNEATON	53½	52	16	124/127	*124.1*	58	44	110	*109.2*

M.	Chns	Dec. Mls	Timing Point	Sch.	Min.	Sec.	M.P.H.	Avge	Min.	Sec.	M.P.H.	Avge
99	36	99.43	*Hartshill S.*		53	25	124/99	*125.2*				
102	23	102.26	*Atherstone*		54	57	100/125	*111.0*	61	42	89	*105.9*
106	39	106.46	*Polesworth*		57	05	124/123	*118.1*	64	05	110	*105.7*
110	00	109.98	TAMWORTH	60½	58	48	120	*122.8*	66	01	107	*109.0*
113	41	113.49	Hademore		60	33	124	*120.4*	67	56	110	*110.0*
116	20	116.23	LICHFIELD T.V.	63½	61	52	125	*124.7*	69	26	109	*109.5*
121	31	121.36	*Armitage Jct.*		64	20	125	*125.0*				
124	21	124.24	Rugeley	67½	65	47	sigs103/28	*119.0*	73	53	90/sigs -/ 50tsr	*108.0*
127	09	127.09	Colwich	[1] 70	69	27	51/101	*46.6*	77	12	49	*51.6*
129	36	129.43	*Milford*		71	11	95/100	*80.9*	79	15	79/-	*68.4*
132	25	132.29	*Queensville*		73	00	85/84sigs	*94.5*				
133	43	133.51	STAFFORD	74½	73	51	87/107/sigs 81	*86.5*	82	15	73/115	*81.8*
136	69	136.84	*Great Bridgeford*		75	57	86/91	*95.0*				
138	68	138.83	Norton Bridge	77½	77	20	88/sigs 78	*86.2*	85	30	90	*98.1*
141	09	141.09	*Badnall*	(½)	78	56	92/108	*84.8*	86	57	110	*93.6*
143	30	143.35	*Standon Bridge*		80	15	sigs104/103/111	*103.1*	88	11	110	*110.1*
147	40	147.48	*Whitmore*		82	36	sigs100/95	*105.3*	90	25	111	*110.8*
149	74	149.90	*Madeley*	83½	83	58	122/126	*106.5*	91	44	110	*110.5*
153	13	153.14	*Betley Road*		85	32	125/sigs 60	*124.0*	93	30	111	*110.0*
156	22	156.25	*Basford Hall Jct*	87½	87	31	74/sigs 40/64/38/62	*94.2*	95	20	58	*101.9*
									sig stop 97.56-100.09			
158	03	158.01	CREWE a.	90½	**89**	**50**		*45.6*	**102**	**11**		*15.4*
158	03	158.01	d.	93	91	44	-/92		103	49	-/91	
162	46	162.55	Sandbach	5½	5	21	88/111	*50.9*	5	11	89/113	*52.5*
166	38	166.45	Holmes Chapel		7	35	108/113	*104.8*	7	22	109	*107.2*
168	28	168.33	Goostrey		8	37	108/106/111	*108.9*	8	27	103/111	*103.8*
172	14	172.15	Chelford		10	44	106/sigs 75	*108.4*	10	35	110	*107.6*
175	20	175.23	Alderley Edge	12½	12	44	84	*92.2*	12	18	103	*107.5*
176	71	176.86	Wilmslow a.	14	**14**	**28**		*56.7*	**14**	**00**		*57.8*

14.20 Euston to Manchester P. had been cancelled on the second run as a result of set shortages after bad weather, mainly broken windows caused by icing between coaches.

[x] recovery minutes (x) pathing min. rbt= running brake test

11. GPS

The difference between stopwatch and gps recording is rather like driving a car with a manual gearbox compared to an automatic. It is also true that to time by gps it helps to know how to time with a stopwatch in the same way as automatic drivers could do with knowing how to use a gear stick. For one thing an ‘automatic’ might not always be available.

To a large extent, gps has superseded stopwatch timings of mileposts. Yes, gps sometimes does not work, it occasionally freezes or jumps but for the vast majority of the time it represents the most reliable means of obtaining speeds. At night, there is simply no contest with other means of timing. If you are undertaking a long journey, it is also far less tiring and makes time available for enjoying other aspects of the journey.

Receivers are now readily obtainable, especially on line. The Garmin GPS 12, for so long the ‘must have’ gadget of progressive train timers can now be picked up for a few pounds on e-bay and, at the other end of the scale, more specialist GPS equipment designed specifically for accurate timing and speed measurement, starts at around £350 and can verge on four figures.. It has the advantage of being more accurate than consumer-grade equipment and produces a staggering range of results, including speed graphs, ideal for technofiles.

The favourite of most train timers is currently the Garmin 60CSx. The ‘S’ refers to the altimeter which is more reliable for comparative measure meant than absolute readings, its effectiveness being inhibited from being inside a vehicle. The 60Cx model gives identical readings but costs less. The ‘x’ refers to its Sirfstar chip which makes the equipment stand out from earlier models due to its outstanding responsiveness. For instance, leaving a tunnel, it registers a speed reading immediately. No gps works inside a tunnel!

The 60CSx receives signals from up to 20 satellites using just two AA batteries. It then uses the information to compute the change in position compared with the time gap and therefore calculates the speed, usually every second. The battery life varies between models and around 12hrs is average, but re-chargeables can bring the session cost down to a few pence. Better to turn it off when not in use though. The ‘satellite’ display page shown which satellites are being picked up and the strength of the signal.

Modern stock often employs windows with a protective coating that inhibits gps transmission but the 60CSx can cope with everything except Class 220-222. Desiros and Pendolinos cause some trouble and performance and responsiveness are slightly degraded.

A gps can be set up to display the criteria a recorder prefers such as total distance travelled, actual speed or maximum speed attained between re-setting (which can be done on the move).

The gps can capture fleeting maxima and minima over through turnouts, over speed restrictions or before power is eased, whereas a stopwatch can normally record nothing more refined than the average speed over a quarter mile. Imperial and metric measurements can be selected at the press of a gps button.

Another significant advantage of gps is the ability to programme it with ‘waypoints’ (essentially important points along the way) and the display page can be set up to give an automatic countdown in distance, time or both to the next point. This is helpful in most conditions but invaluable on unfamiliar routes and in rural area at night. It is a relatively complicated procedure but certain RPS officers can download most of the major routes in Britain just by plugging in their gps to yours.

If you follow the manual it is relatively easy to upload data from a gps to a PC, so you can cross-check your recorded data and even fill in any gaps. The upload can be adjusted to give a line of entry by time or distance. Every 0.1 of a mile is a popular choice. Some people set it up for every second but if you do a lot of timing it can become overwhelming. Armed with this degree of detail, it is possible to produce a log in either graphical or traditional tabular format. The example shows a journey from the Peterborough area to Grantham

Position	Time	Elevation	Dist	Elapsed	Speed
N52.52957 W0.24277	11:34:24	76 ft	0.4 mi	00:00:15	97 mph
N52.53359 W0.24337	11:34:35	76 ft	0.3 mi	00:00:11	91 mph
N52.53677 W0.24386	11:34:45	78 ft	0.2 mi	00:00:10	79 mph
N52.53916 W0.24419	11:34:54	78 ft	0.2 mi	00:00:09	66 mph
N52.54231 W0.24465	11:35:07	76 ft	0.2 mi	00:00:13	61 mph

N52.54535 W0.24508	11:35:20	76 ft	0.2 mi	00:00:13	59 mph
N52.54816 W0.24510	11:35:32	75 ft	0.2 mi	00:00:12	58 mph
N52.55094 W0.24466	11:35:44	75 ft	0.2 mi	00:00:12	58 mph
N52.55161 W0.24454	11:35:47	67 ft	246 ft	00:00:03	56 mph
N52.55416 W0.24418	11:36:00	64 ft	0.2 mi	00:00:13	49 mph
N52.55682 W0.24377	11:36:15	60 ft	0.2 mi	00:00:15	44 mph
N52.55892 W0.24348	11:36:28	59 ft	0.1 mi	00:00:13	40 mph
N52.56113 W0.24317	11:36:44	56 ft	0.2 mi	00:00:16	35 mph
N52.56288 W0.24304	11:37:00	51 ft	0.1 mi	00:00:16	27 mph
N52.56444 W0.24330	11:37:15	56 ft	0.1 mi	00:00:15	26 mph
N52.56588 W0.24384	11:37:32	62 ft	0.1 mi	00:00:17	22 mph
N52.56738 W0.24477	11:37:50	67 ft	0.1 mi	00:00:18	22 mph
N52.56836 W0.24542	11:37:59	67 ft	388 ft	00:00:09	29 mph
N52.56955 W0.24629	11:38:08	67 ft	475 ft	00:00:09	36 mph
N52.57146 W0.24798	11:38:20	60 ft	0.2 mi	00:00:12	45 mph
N52.57392 W0.25000	11:38:33	59 ft	0.2 mi	00:00:13	53 mph
N52.57704 W0.25198	11:38:47	65 ft	0.2 mi	00:00:14	59 mph
N52.58019 W0.25399	11:39:00	75 ft	0.2 mi	00:00:13	65 mph
N52.58435 W0.25661	11:39:16	82 ft	0.3 mi	00:00:16	69 mph
N52.58906 W0.25961	11:39:33	86 ft	0.3 mi	00:00:17	74 mph
N52.59377 W0.26276	11:39:49	87 ft	0.4 mi	00:00:16	79 mph
N52.59739 W0.26588	11:40:01	86 ft	0.3 mi	00:00:12	85 mph
N52.60076 W0.26936	11:40:12	76 ft	0.3 mi	00:00:11	90 mph
N52.60430 W0.27395	11:40:24	71 ft	0.3 mi	00:00:12	93 mph
N52.60743 W0.27886	11:40:35	70 ft	0.3 mi	00:00:11	98 mph
N52.61241 W0.28697	11:40:52	65 ft	0.5 mi	00:00:17	103 mph
N52.61813 W0.29635	11:41:11	65 ft	0.6 mi	00:00:19	106 mph
N52.62431 W0.30655	11:41:31	65 ft	0.6 mi	00:00:20	109 mph
N52.63009 W0.31619	11:41:49	68 ft	0.6 mi	00:00:18	114 mph
N52.63306 W0.32206	11:41:59	71 ft	0.3 mi	00:00:10	115 mph
N52.63439 W0.32517	11:42:04	73 ft	0.2 mi	00:00:05	115 mph
N52.63680 W0.33178	11:42:14	70 ft	0.3 mi	00:00:10	117 mph
N52.63834 W0.33750	11:42:22	76 ft	0.3 mi	00:00:08	118 mph
N52.64037 W0.34467	11:42:32	78 ft	0.3 mi	00:00:10	120 mph
N52.64200 W0.34860	11:42:38	81 ft	0.2 mi	00:00:06	120 mph
N52.64264 W0.34979	11:42:40	84 ft	352 ft	00:00:02	120 mph
N52.64482 W0.35302	11:42:46	82 ft	0.2 mi	00:00:06	122 mph
N52.65122 W0.36191	11:43:03	86 ft	0.6 mi	00:00:17	123 mph
N52.65843 W0.37209	11:43:22	84 ft	0.7 mi	00:00:19	124 mph
N52.66203 W0.37781	11:43:32	89 ft	0.3 mi	00:00:10	125 mph
N52.66361 W0.38108	11:43:37	86 ft	0.2 mi	00:00:05	126 mph
N52.67017 W0.39500	11:43:58	87 ft	0.7 mi	00:00:21	127 mph
N52.67539 W0.40618	11:44:15	97 ft	0.6 mi	00:00:17	125 mph
N52.68139 W0.41886	11:44:34	105 ft	0.7 mi	00:00:19	128 mph

N52.68385 W0.42414	11:44:42	106 ft	0.3 mi	00:00:08	126 mph
N52.68634 W0.42942	11:44:50	109 ft	0.3 mi	00:00:08	126 mph
N52.69067 W0.43857	11:45:04	119 ft	0.5 mi	00:00:14	125 mph
N52.69296 W0.44297	11:45:11	125 ft	0.2 mi	00:00:07	125 mph
N52.69684 W0.44942	11:45:22	128 ft	0.4 mi	00:00:11	125 mph
N52.69918 W0.45259	11:45:28	138 ft	0.2 mi	00:00:06	126 mph
N52.70328 W0.45744	11:45:38	142 ft	0.3 mi	00:00:10	126 mph
N52.70849 W0.46258	11:45:50	142 ft	0.4 mi	00:00:12	126 mph
N52.71902 W0.47279	11:46:14	149 ft	0.8 mi	00:00:24	127 mph
N52.72553 W0.47914	11:46:29	161 ft	0.5 mi	00:00:15	126 mph
N52.72597 W0.47956	11:46:30	160 ft	184 ft	00:00:01	126 mph
N52.73424 W0.48743	11:46:49	169 ft	0.7 mi	00:00:19	125 mph
N52.73796 W0.48986	11:46:57	175 ft	0.3 mi	00:00:08	125 mph
N52.74407 W0.49376	11:47:10	188 ft	0.5 mi	00:00:13	125 mph
N52.74550 W0.49459	11:47:13	193 ft	0.1 mi	00:00:03	125 mph
N52.74991 W0.49650	11:47:22	202 ft	0.3 mi	00:00:09	126 mph
N52.75533 W0.49879	11:47:33	213 ft	0.4 mi	00:00:11	127 mph
N52.75582 W0.49903	11:47:34	213 ft	186 ft	00:00:01	127 mph
N52.75912 W0.50123	11:47:41	218 ft	0.2 mi	00:00:07	126 mph
N52.76370 W0.50463	11:47:51	229 ft	0.3 mi	00:00:10	125 mph
N52.76416 W0.50497	11:47:52	229 ft	184 ft	00:00:01	125 mph
N52.76554 W0.50598	11:47:55	234 ft	0.1 mi	00:00:03	125 mph
N52.77255 W0.51072	11:48:10	245 ft	0.5 mi	00:00:15	126 mph
N52.77681 W0.51348	11:48:19	256 ft	0.3 mi	00:00:09	127 mph
N52.78343 W0.51778	11:48:33	272 ft	0.5 mi	00:00:14	127 mph
N52.78390 W0.51809	11:48:34	270 ft	186 ft	00:00:01	127 mph
N52.78720 W0.52024	11:48:41	275 ft	0.2 mi	00:00:07	126 mph
N52.79375 W0.52454	11:48:55	286 ft	0.5 mi	00:00:14	125 mph
N52.79422 W0.52484	11:48:56	287 ft	185 ft	00:00:01	126 mph
N52.79516 W0.52546	11:48:58	291 ft	370 ft	00:00:02	126 mph

12. Power Outputs

Last, a word about the calculation of traction power outputs from timing data. It might be folly for true beginners to attempt to produce accurate figures until more aware of the pitfalls. Many timers would agree that it is impossible to be precise and necessary to be aware of the range that can safely be claimed.

Nevertheless, if you wish to try your hand there is no arithmetic reason not to do so. It is necessary to know the gross train weight, the gradient, the speed at the start and finish of the section to be measured, the numbers of vehicles and their type.

Resistance figures are calculated for stock, gradient and any acceleration. Simply add these together to get the equivalent draw bar horsepower. Add the locomotive resistance, if applicable to find the rail horsepower. There is a download available from the website that does the calculation automatically for selected motive power and there is a helpful pamphlet available that shows the detailed calculations.

An example of the RPS power output calculator is shown overleaf.

13. Conclusion

It is hoped that this guide will encourage you to develop your train timing skills and consider joining the Railway Performance Society at the following address:
Peter Smith, 28 Downside Avenue, Storrington, West Sussex RH 20 4PS

John Heaton
Railway Performance Society
Dawlish
Feb 2012

THE RAILWAY PERFORMANCE SOCIETY HORSEPOWER CALCULATOR

Input data

Total weight of the train =	355	tons	*(including locomotive)*	
Initial speed =	66	mph		
Final speed =	84	mph		
Distance over which horsepower is to be calculated =	5	miles	0	chains
Time taken to cover this distance	240	seconds		
Average speed =	75.0	mph		
Average gradient = 1 in	350		*(Positive uphill, negative downhill)*	

Type of rolling stock

	Number of coaches	Resistance (hp)	
Mark 1 B1 or B4	1	74	
Mark 1 CW bogies	0	0	
Mark 2 non airconditioned	7	516	
Mark 2 airconditioned	0	0	
Mark 3	1	48	
Mark 1 outline EMUs	0	0	(Classes 303-309;411-432;501-506)
Mark 2 outline EMUs	0	0	(Classes 310-317;455;507/8)
Modernisation plan DMUs	0	0	
HST formation	0	0	(Number of coaches should exclude power cars)

Results

Horsepower to overcome gradient	454	hp
Horsepower to overcome rolling resistance	638	hp
Horsepower required to accelerate train	597	hp
DRAWBAR HORSEPOWER	1689	hp