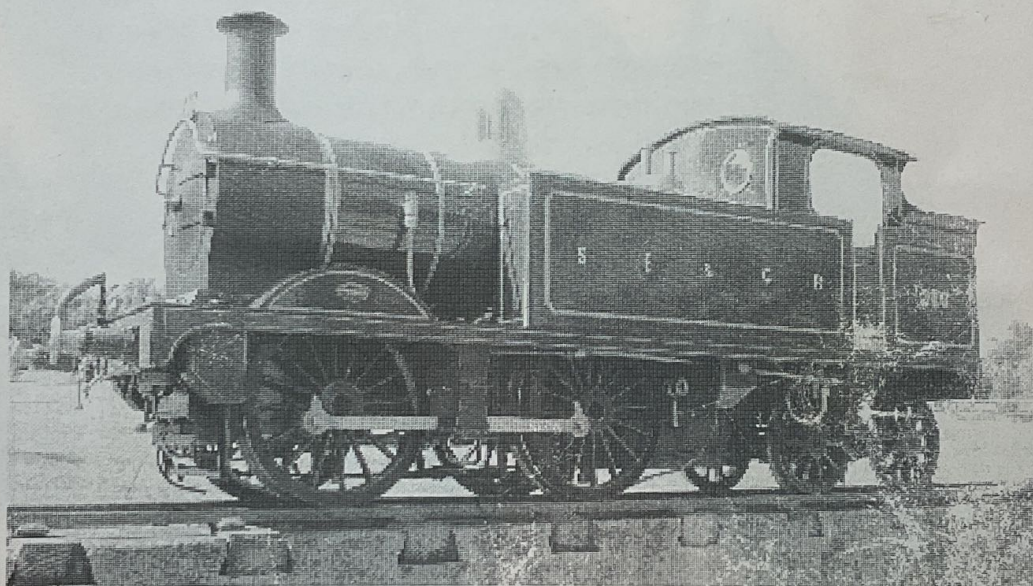


I.M.L.E.C.

2003

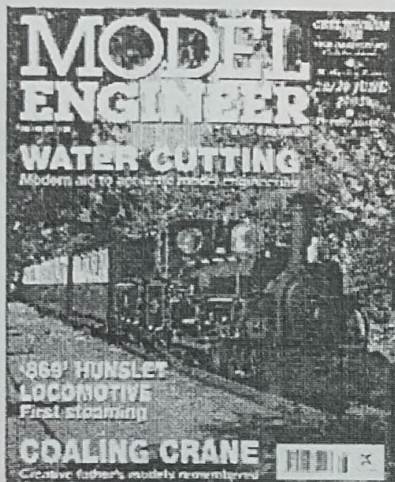


**THE 34th INTERNATIONAL
MODEL LOCOMOTIVE
EFFICIENCY COMPETITION
Saturday & Sunday
12th & 13th July**

for the MARTIN EVANS CHALLENGE TROPHY

Bristol Society of Model & Experimental Engineers

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The Thirty Fourth Annual

International Model Locomotive Efficiency Competition

for the

Martin Evans Challenge Trophy

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The Overall Winner of the Competition will receive the Martin Evans Challenge Trophy and £125; the Runner-up will receive £75 with £50 awarded to third place.

A Special Prize will be awarded to the best 3½ inch gauge locomotive, if not in the first three.

PRESENTATION OF PRIZES

Dr. John Wragg CBE, President of Bristol SMEE, will present the prizes at the close of the competition, late on Sunday afternoon.

IMLEC 2003

Hosted by

The Bristol Society of Model and Experimental Engineers

on Saturday 12th and Sunday 13th July 2003

ASHTON COURT BRISTOL

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Catering:	Roseanne Burnett, Sylvia North & Cherry Trotham

Programme content	Bob Lilley
Programme production	Colin MacEke
Entries and camping	Kate Canner
Traders	Geoff Sheppard

ACKNOWLEDGEMENTS

We should like to extend our sincere thanks to the following for their help and assistance:

To all the competitors without whom we would not have an IMLEC,
 To Bristol City Council Department of Environment, Transport and
 Leisure for their support and co-operation,
 To Guildford MES for the loan of the reserve dynamometer car,
 And to Leeds MES for the scoreboard and clock.

IMLEC Introduction

On behalf of the Bristol Society I would like to welcome you all to our site in the Ashton Court estate.

It is many years since we last hosted IMLEC, but in the intervening period the society has introduced many improvements to the site. This work has been carried out by a dedicated band of workers, generally working throughout the winter months.

I would like to take this opportunity to thank all of those who have worked tirelessly to make this event a success and to ensure that all members of the public, and competitors have an enjoyable weekend.

Finally I wish all the competitors good luck for their run.

B.Hacker.
 Chairman.

ABOUT IMLEC 2003

This is the thirty fourth celebration of the IMLEC gathering. The first event was held in Birmingham in 1969 and since then the event has become probably the major outdoor event in the model engineering calendar.

What is the basis of the competition? The 'E' in IMLEC stands for Efficiency and it is measured in the following way. At the start of the run, the driver is given a weighed amount of coal. He runs for about 30 minutes during which time the total amount of work the locomotive does in pulling the train is measured by the first vehicle in the train, the dynamometer car. At the end of the run, he returns any unburned coal. The winner is the driver whose work done per unit coal burnt is greatest. If you want more detail, the competition rules are printed elsewhere in this programme.

Does history give us a clue as to who might win this year? Locomotives in 3½ inch gauge have only won the event twice and have rarely been placed in the top three. A separate award is given to the leading 3½ inch gauge locomotive. So we must look at the 5 inch gauge locomotives. Whilst winners have come in a variety of sizes and wheel arrangements (single wheelers have won twice), large 6-, 8- and 10-coupled locomotives dominated the 80's and 90's. Many of these locomotives were loaded with ballast to increase their adhesive weight. Is that good engineering practice or should locomotives be as near a representation of the prototype as practicable? A lively debate has taken place within the fraternity about this practice and the consensus was that ballasting is acceptable provided non-prototypical outlines do not result. A pile of lead with a locomotive inside would not be accepted as an entrant.

Now if that were all there was to winning IMLEC, it would be a boring event, the heaviest loco would win and we could all go home (if we bothered to come at all). Enter the human factor.

To balance boiler water level, boiler pressure, fuel economy and still drive intelligently enough to maximize drawbar pull for half an hour, is a skill that is not acquired overnight. In addition to driving skill, the driver has to choose the size of his train bearing in mind the weather, the track, etc. Too big a train and he won't be able to keep it moving, too small a train and he will under work his boiler. Remember the IMLEC master drivers, Wood, Pritchard, Crossfield and Flippance, who re-wrote the IMLEC record book, and there you saw combinations of locomotive performance and driver skill honed to near-perfection.

What about the also-rans? To complete an IMLEC run is an achievement in itself. The same skills have to be mastered and nerves have to be overcome to put yourself on the line (literally!) in front of your friends and fellow enthusiasts. Many drivers enter

knowing they haven't a chance of winning but do it for the challenge and the sheer excitement of the event.

And what about the rest of us who turn up at IMLEC? The spectators are a knowledgeable bunch, the crises on the track transmit to them, they can sense who is in with a chance. They enjoy the spectacle of hefty locomotives straining to shift impossibly large loads or the good little'un showing the big boys how to do it. Finally there is the fellowship, spending more money at the trade stands than we intended, seeing friends we haven't seen since the last IMLEC.

Long may it continue.

IMLEC 2004

Your host for this event will be

**KINVER & WEST MIDLANDS
SOCIETY OF MODEL ENGINEERS**

On July 10th & 11th July.

THE BRISTOL SOCIETY OF MODEL & EXPERIMENTAL ENGINEERS

There is nothing quite like an impending IMLEC for spurring great activity at the track site. Jobs that may have been dragging suddenly speed up and the nearer to the great day, the faster they are completed.

Much has been done this year. In particular the much-needed carriage shed has been built, thus saving the lifting on and off of the raised track trucks and providing storage for all our rolling stock. This has been accompanied by the construction of the new traverser and associated raised track with modified unloading facilities and a turntable. As you can see work is continuing on extending the ground track and we expect to have this dual gauged by the end of the year. The necessary funding to allow this work to proceed has been largely due to the success of our Exhibition held in August at Thornbury, near Bristol. We were also fortunate to receive a substantial grant from the Lottery Fund for the Carriage Shed.

The Exhibition is again being held at Thornbury this year on the 16th, 17th and 18th of August and we hope to see you all there. I am sure you will have a very enjoyable day out. . There will engineering models of all descriptions, displays and demonstrations together with many of the well-known traders including Reeves, Myford and Warco. Do try and come along, you will not be disappointed.

We moved to Ashton Park in the early 70's after it became clear that the track at Canford Park Bristol was not suitable for the new larger 5inch gauge locomotives then under construction. The first sod was cut in November 1971 and such rapid progress was made jointly by the Society and Bristol Corporation, that the 1650 feet long track was opened in June 1973. Since there is a transition section on entering each of the large radii, super-elevated curves and the steepest gradient is 1 in 150, it has

become known as a fast track suitable for hauling heavy loads. This year is the fifth occasion we have hosted IMLEC since 1974 and the track was also used for the Curly Bowl and the first Don Young Designs Rally, the brainchild of a Bristol member. The 1st June this year saw us celebrating thirty years of running at Ashton Court.

Following the trend towards modeling in larger scales, a ground level track in 7¼ inch gauge was planned in the 70's and the official opening ceremony was performed in 1984. The main feature of the track is a bridge, designed and constructed by a single member, over a man-made cutting. Extensive improvements were made during 1989/90 to improve the quality of the ride on this track and 1990/91 saw the construction of steaming bays and service facilities.

This then is the Bristol Society of Model and Experimental Engineers in its most obvious and public form. However we are not solely a miniature steam locomotive society and there have been many superb examples over the years of road vehicles, machine tools, power boats, clocks, and so on made by our members. All aspects of amateur model making and craftsmanship are actively encouraged and practiced. Many examples are to be seen in the Exhibition Tent.

For the period of this weekend however, to the exclusion of our many other interests, we are celebrating our love for the steam-powered miniature railway locomotive.

Hotspur Designs

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**LNWR 0-6-2T 'Coal Tank' in 5" G;
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Bristol Society of Model & Experimental Engineers
IMLEC - Ashton Court, Bristol
Competition rules and Organization

1. On arriving at the track, report to Competitor Reception where a run number will be allocated to you and an approximate run commencement time given. One hour before the commencement of your run you will be called to prepare for your run and you will be allocated with an observer and assistant.
2. Welsh Steam coal will be provided in suitably measured quantities. You will be required to select the quantity of coal you need and the weight will be checked in your presence. Note,, you may take as much coal as you like, only that burnt will be debited to the run.
3. You must use your own discretion as to when to commence lighting up, but you must be ready to start your run at the time allotted. Any time slippage will be notified to you before you light up.
4. When ready to raise steam for the run, you will be provided with as much paraffin, charcoal or wood as required to raise steam. You may change over to coal when you like, but all coal used is included in the weighed amount for the run and hence in the calculations. You must have a good coal fire burning before going out onto the track.
5. The train will be prepared for you with the dynamometer car at the front and sufficient passenger cars to carry the number of passengers you require. The train will not include any empty passenger cars at the start of the run. The track marshal will tell you when to go onto the track and will assist in coupling your engine to the train.

6. The engine and train is driven light round to the station with just the driver and observer on board. The passengers will board at the station from where the official run will begin and time recording will commence. Work done measurement will commence from the initial start in the steaming bays and hence the light run up to the station will be included. The observer will tell you when to start.
7. The duration of the run is a nominal 30 minutes. No time allowance will be made for stops except for derailments. A competitor may opt to stop once 25 minutes have been completed but the run must terminate in the station. Any competitor not completing 25 minutes will be deemed to have retired. A lineside clock will be provided so that you can see the progress of your run. You will be advised when you have 10 and 5 minutes to go and when on your last lap.
8. The run will end at the station. Any competitor stopping short of the station because of lack of steam must raise sufficient steam to bring the train into the station before the run is deemed completed. All recordings will end at the station. The empty train will be run backwards to the steaming bays.
9. All the unused coal will be collected and weighed in your presence by one of the judges. Only the total coal burnt will be used in the calculations. No allowance will be made for any unburnt coal left in the firebox. The result will be calculated and put up onto the results board as soon as possible.
10. A maximum speed limit of 10 mph will be in operation for the competition. The dynamometer car provides a speed indication at the driver's position. The observer will give a reminder if your speed should approach 10 mph. He will give you a warning should you exceed 10 mph. Three such warnings will result in disqualification.

11. You must not lean on the locomotive tender or apply the hand brake in such a manner as to increase the drawbar pull. Infringement of this rule will also result in disqualification.
12. The use of the handpump is not permitted except when stationary. However, it may be used in emergencies when all other means of waterfeed have failed in which case the locomotive must be retired and the run terminated.
13. Water will be provided in suitable containers during the run to enable locomotive water tanks to be topped up without stopping. The amount of water used is not recorded or limited in any way.
14. Passengers and carriages may be dropped off during the run if the initial load proves to be too heavy but only when the train is stationary and it is safe to do so. However additional passengers may not be added at any time.
15. No external assistance is to be given to the train in any way whatsoever at any time during the run. The use of sand is not permitted except for starting the run.
16. Ballast (including water) added externally to the scale outline of the loco (or in the case of a freelance model, the likely scale outline) is not acceptable.
17. The decision of the Judges is final in all matters relating to the competition.

Judges are appointed by Bristol Society of Model Engineers.

DETAILS OF THIS YEAR'S COMPETITORS

Stephen Coles representing Sale Area MES with a 5in.gauge GWR Hall (5955 "Garth Hall"). A first appearance by this loco designed and built by T Curry. The loco will be driven by R Edisbury.

David Mayall from the Bracknell Railway Society. A 5in.gauge "Speedy" 0-6-0T. The loco was bought as a part built chassis and a pile of bits. It first ran in 2001 and was placed fourth in Leeds in 2002. David appeared in IMLEC at Bristol in 1991.

John Lloyd representing the Southampton club. His loco is a SR Merchant Navy class 4-6-2 ("Union Castle") in the original form. Construction started in 1975. It features chain drive valve gear, oil sump and pump lubrication, a steam reverser, thermic siphons and brick arch in the firebox. Reputed to be light on its feet on alloy rail, it will be interesting to watch on steel rail when driven by Dave Flynn.

Paul Tompkins from Guildford MES. A 5in.gauge 0-8-0 T9 from the North Eastern Railway. Loosely based on LBSC's Netta design of 1954 and completed in May 2003 after three years work by Paul and Uncle Dave. The valve gear has been greatly altered to Dave's own ideas. Bits from Firefly and Maid of Kent have been incorporated. Driven by Paul Tompkins.

Glyn Winsall representing Rugby MES Ltd. Glyn's loco is a 5in.gauge 2-4-0T Metro tank to Martin Evans' design. The loco ran in 1980, 1984 and 2002 when it finished in 5th place. Glyn was an entry in Bristol in 1991 with a different loco.

David Williams representing the host club, Bristol. His loco is a 5in.gauge Simplex 0-6-0-T to Martin Evans design. Winner of the first Welsh IMLEC at Llanelli, this loco appeared at Guildford 1990, Bristol 1991 (finished 4th) and Kinver 1995. Barbara Milton will be driving this year as she did on the previous occasions.

David Wrenn representing Fareham & District SME. The loco, a 5in.gauge Britannia class 4-6-2 70008 "Black Prince", was built by David's father, Arthur Wrenn, a founding member of the Fareham club. This is David's first attempt at IMLEC and he will drive the loco himself.

Geoff Moore is the Guildford MES representative. His loco is a 5in.gauge B1 4-6-0 8303 "Impala". Reference was made to works drawing, preserved locos, the Evans Springbok design and various other references during design and construction. Geoff will drive the loco that came in first place at IMLEC 2002 at Leeds.

Geoff Moore has decided to have two bites at the cherry! He is also driving a 5in.gauge 0-6-0 tender loco "Minx" to LBSC's design. The loco is fitted with a Belpaire boiler, Joy valve gear and vacuum brakes. Geoff ran the Minx previously in IMLEC in 1981 when he finished in 3rd place and improved on that with second place in Leyland in 1982.

David Neish is another entrant from Guildford MES. His loco is a 5in.gauge version of "Bessborough", a 4-6-2T built by the LBSCR in 1912 for fast passenger service. Rocking shafts drive the inside valve gear from outside Walschhaerts gear. The working pressure is 100psi and the cylinder bore is 1? inches. The model was awarded a bronze medal at the "Model Engineer" Exhibition in December 2002.

David Roberts represents the Urmston & District MES. His loco is a 5in.gauge Beyer Peacock narrow gauge 0-6-2 built to a scale of 1:7.2. The prototype was built for the La Guaira & Caracas Railway in Venezuela in 1888. This model is one of a pair completed by two colleagues in 2000. David will drive his own loco in the competition.

Michael Harrison represents Kinver & West Midlands SME Ltd. His loco is a 5in.gauge GWR Grange 6861 "Crynant Grange" 4-6-0. The loco, first steamed in 1999, is as close to scale as practicable and is painted black as in 1954. Michael will act as driver.

Dennis Pearson from the Llanelli club is driving a 5in. gauge GWR 4-6-0 Manor "Arden Manor". Construction was completed in 1989 and the loco ran in IMLEC at Gravesend in 1994 and Northampton in 1996. Dennis will drive his own loco in the competition.

Lionel Flippance from the Guildford MES is no stranger to IMLEC having won on three previous occasions with his 5in.gauge model of a BR proposed 2-8-2. This year he will be running his latest version of the design for the very first time. Important changes have been made from version one but they are for Lionel to reveal!

Mike Keighley is a member of the host club. He acquired his 5in.gauge SR King Arthur class "Sir Valence" a couple of years ago from the builder John Coleman. The loco is to John's own design and he drove it in the competition at Kinver in 1998. John will be at the controls again this time.

Stuart Duncan is also a member of the Bristol club. His entry is a 5in.gauge LNER Hunt class loco "Sir Percy". Stuart bought the loco in 1997 and has made many minor improvements to it, although, in spite of much encouragement, the tender remains unpainted! The builder was that IMLEC stalwart Percy Wood who ran the loco in IMLEC in 1983 coming 3rd or 4th.

Bob Liddle from the local club at West Huntspill will drive a 5in.gauge Simplex to Martin Evans design.

Tony Huxtable is a member of North Devon MES and no stranger to the Bristol track. His loco is the only entrant in 3½in.gauge and is a SR 4-6-0 S15 to Martin Evans' "Greene King" design. Tony completed the loco about 10 years ago and will drive it in the competition.

Dick Payne is from the North London SME. His loco is of some historic interest. It is a 5in. gauge "Eva May", built in 1947 to LBSC's design. It is reputed to have been driven by the Great Man himself at

some stage though Dick will drive it in IMLEC. It is an 0-6-0 tank with outside cylinders and Baker valve gear.

George Golightly is from Llanelli club and has appeared previously at Bristol with his 5in.gauge LMS 4-6-0 rebuilt "Royal Scot" 6100 to Martin Evans design. George will drive this attractive looking loco in the competition.

Ray Hillman is from Fareham and District SME. His entry is a 5in.gauge Hunslet 2-8-4T "Dholpur" built from GLR castings. Since the prototype ran on 2ft 6in gauge track, this is a fairly hefty model weighing 405lbs. It took 11 years to build and includes steam operated brakes and drain cocks, a working headlight and a turbo-generator.

Andrew Harvey is from the local club, West Huntspill. His loco is in 5in.gauge and is described as a US narrow gauge 4-6-2 Pacific tender loco. Andrew will drive what sounds like another big beast!

Richard Linkins is representing the Maidstone club. He will be driving his 5in.gauge BR Standard Class 2 2-6-0. Completed about 5 years ago, it is based on Don Young's design but incorporates many modifications derived from principles established by the late Jim Ewins.

Dave Tompkins is another entrant from the Guildford club. He will be driving a 5in.gauge Railmotor to Don Young's design. The loco was completed as a small boilered No.2 version in the early 90's and ran at Kinver in 1994. For the last four years, it has carried the larger boiler and cylinders of the No.1 version and ran in that form at Northampton IMLEC in 1999.

Brian Clarke is another competitor from the Kinver & West Midlands MES. His loco is a 5in.gauge Hunslet narrow gauge 2-8-4T "Dholpur". It is about 10years old and will be driven by John Hurley also of the Kinver club.

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- **Polly IV 0-6-0 Tender Locomotive (approx. 6 - 8 person capacity)**
- **Polly V 2-6-0 Side Tank Locomotive (approx. 6 - 8 person capacity)**
- **Passenger Driving Truck**

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IMLEC 2003

Saturday 12th July

Run	Locomotive	Gauge	Wheel Ar'gement	Entrant/driver	Club/Society
1	Railmotor	5	0-4-0	Dave Tompkins	Guildford
2	Minx	5	0-6-0	Geoff Moore	Guildford
3	LNER	5	4-4-0	Stuart Duncan	Bristol
4	Speedy	5	0-6-0T	David Mayall	Bracknell
5	King Arthur	5	4-6-0	Mike Keighley	Bristol
6	Metro Tank	5	2-4-0T	Glyn Winsall	Rugby
7	GWR Hall	5	4-6-0	Stephen Coles	Sale
8	Eva May	5	0-6-0	Dick Payne	N.London
9	Merchant Navy	5	4-6-2	John Lloyd	Southampton
10	Simplex	5	0-6-0T	David Williams	Bristol
11	Beyer Peacock	5	0-6-2	David Roberts	Urmston
12	Britannia	5	4-6-2	David Wrenn	Fareham
13	Greene King	3 ½	4-6-0	Tony Huxtable	N.Devon

Sunday 13th July

Run	Locomotive	Gauge	Wheel Ar'gement	Entrant/driver	Club/Society
14	BR Class2	5	2-6-0	Richard Linkins	Maidstone
15	GWR 6861	5	4-6-0	Michael Harrison	Kinver
16	GWR Manor	5	4-6-0	Dennis Pearson	Llanelli
17	Dholpur	5	2-8-4	Ray Hillman	Fareham
18	Simplex	5	0-6-0	Bob Liddle	W.Huntspill
19	NER T9	5	0-8-0	Paul Tompkins	Guildford
20	LBSCR	5	4-6-2T	David Neish	Guildford
21	Royal Scot	5	4-6-0	George Golightly	LLanelli
22	Dholpur	5	2-8-2	John Hurley	Kinver
23	US Narrow G.	5	4-6-2	Andrew Harvey	W.Huntspill
24	BR	5	2-8-2	Lionell Flippance	Guildford
25	B1	5	4-6-0	Geoff Moore	Guildford

Saturday 12th July

Load (Adults)	Running Time (mins)	Distance (feet)	Total Work (ft/lbs)	Average Drawbar HP	Coal used (lbs)	S.F.C.	Efficiency (%)	Position

Sunday 13th July

Load (Adults)	Running Time (mins)	Distance (feet)	Total Work (ft/lbs)	Average Drawbar HP	Coal used (lbs)	S.F.C. (%)	Efficiency	Position

Previous IMLEC Winners

Year	Host Club	Engine	Gauge	Effic'y	Driver/Society
1969	Birmingham	Royal Scot	5	5.03*	J.Drury, Birmingham
1970	Whitney	Firefly	5	1.41*	L.Labram, Birmingham
1971	Southampton	Dean Single	5	2.28*	A.Haydon, Newton Abbot
1972	Tyneside	GWR 57XX	5	1.06	N.Spink, Chesterfield
1973	Chingford	LNER L1 Tank	5	1.6	B.Longstaff, S.Durham
1974	Bristol	Nigel Gresley	5	2.54	F.Winsall, Rugby
1975	Tyneside	GWR King	3 ½	1.55	L.Joyce, Chingford
1976	Kinver	Speedy	5	1.58	B.Perret, Southampton
1977	Chingford	Speedy	5	2.32	B.Perret, Southampton
1978	Guildford	Maid of Kent	5	1.61	P.Wood, Chingford
1979	Bristol	Stirling Single	5	2.17	D.Morris, Urmston
1980	Bedford	BR Class 7	3 ½	1.37	P.Wood, Private
1981	Bournemouth	LNER J39	5	2.41	P.Wood, Private
1982	Leyland	GWR De Glehn	5	1.5	R.Amsbury, Derby
1983	Guildford	Royal Scot	5	1.35	L.Pritchard, Harlington
1984	Bristol	Royal Scot	5	3.66	L.Pritchard, Harlington
1985	Urmston	Nigel Gresley	5	1.85	A.Crossfield, Private
1986	Bournemouth	Nigel Gresley	5	1.64	A.Crossfield, Private
1987	Birmingham	LSWR Adams	5	2.29	K.Moonie, Chingford
1988	Leeds	BR Prop 2-8-2	5	4.39	L.Flippance, Guildford
1989	Leyland	BR Prop 2-8-2	5	3.02	L.Flippance, Guildford
1990	Guilford	BR Prop 2-8-2	5	3.31	L.Flippance, Guildford
1991	Bristol	BR Prop 2-8-2	5	1.73	K.Ayling, Worthing
1992	Leeds	S & D 7F	5	1.88	D.Sutcliffe, Ribble Valley
1993	Leyland	LMS Stannier	5	2.08	J.Heslop, Rydale
1994	Gravesend	LMS Stannier	5	1.51	J.Heslop, Rydale
1995	Kinver	LNER P2	5	3.32	J.Heslop, Rydale
1996	Northampton	GWR Manor	5	2.43	A.Crossfield, Leyland
1997	Llanelli	Britannia	5	1.88	L.Steel, S.T.E.A.M.
1998	Kinver	BR Prop 2-8-2	5	2.27	K.Ayling, Worthing
1999	Northampton	Speedy	5	1.78	J.Elliot, Staines
2000	Leyland	BR Prop 2-8-2	5	3.13	L.Flippance, SMEE
2001	Competition not held due to Foot & Mouth epidemic.				
2002	Leeds	LNER B1 4-6-0	5	1.82	J.Moore, Guildford

*Note: The efficiency figures for 1969/70/71 have been calculated from data in Model Engineer Magazine assuming coal with a CV of 14,000 BTU/lb

CALCULATION OF RESULTS

The dynamometer car measures and gives readings of Total Work Done in foot-pounds and Total Distance Travelled in feet. In addition, the Overall Run Time (minutes) and Weight of Coal (pounds) are recorded. From these parameters the following calculations can be made.

$$\text{Overall Thermal Efficiency \%} = \frac{\text{Work Output X 100}}{\text{Heat Input}}$$

The calorific value of the coal provided is assumed to be 14500 BTU/lb.

The number of ft/lbs per B.T.U. is 778, thus:

$$\text{Overall Thermal Efficiency \%} = \frac{\text{Total Work Done X 100}}{\text{Weight of Coal Used X Cal. Value X 778}}$$

The locomotive returning the highest efficiency is the Winner.

Some interesting subsidiary calculations are:

$$\text{Average Draw-bar Horsepower} = \frac{\text{Total Work Done (ft. lb.)}}{\text{Overall Run Time (mins.) X 33000}}$$

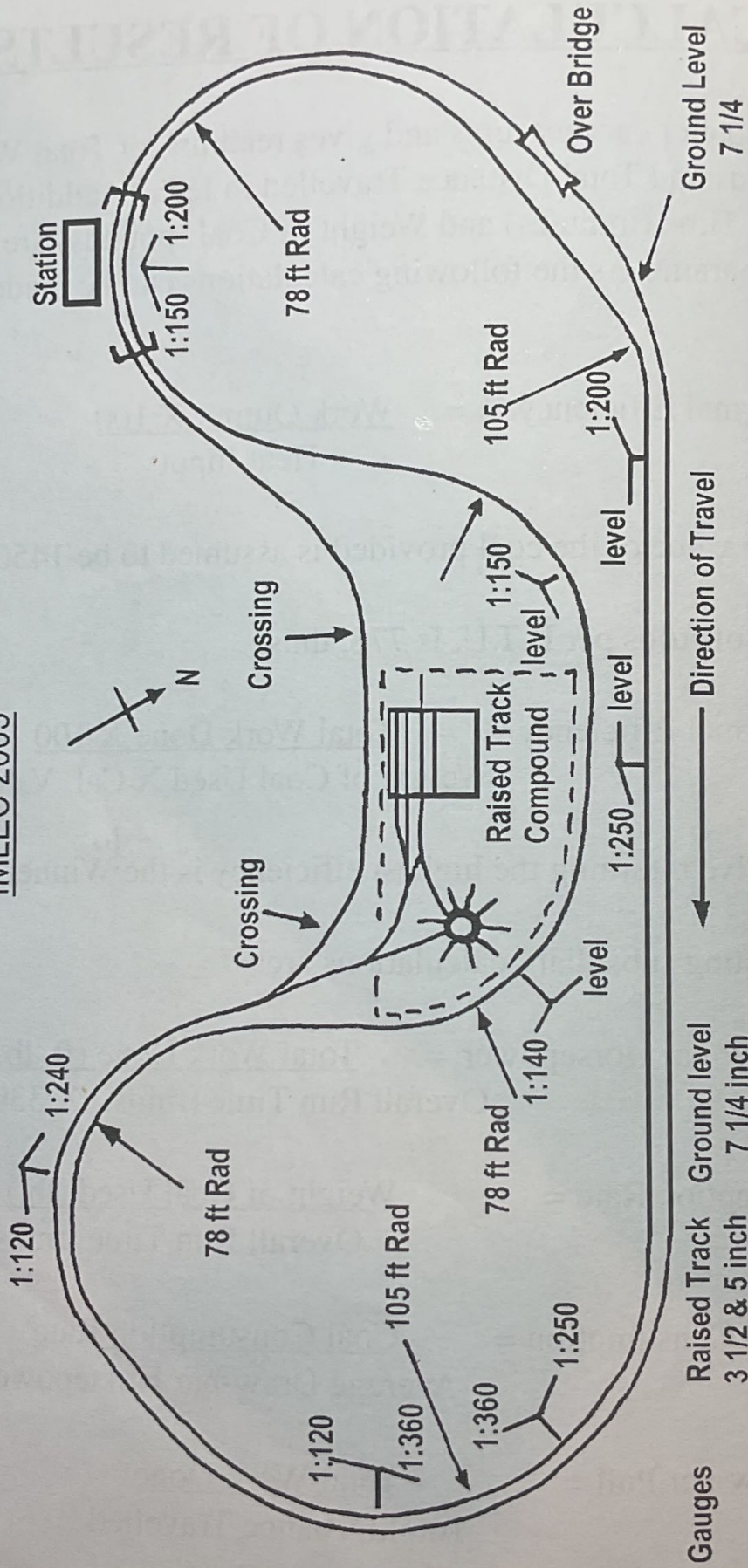
$$\text{Coal Consumption Rate} = \frac{\text{Weight of Coal Used (lb.) X 60}}{\text{Overall Run Time (mins)}}$$

$$\text{Specific Fuel Consumption} = \frac{\text{Coal Consumption Rate}}{\text{Average Draw-bar Horsepower}}$$

$$\text{Average Draw-bar Pull} = \frac{\text{Total Work Done}}{\text{Total Distance Travelled}}$$

Bristol Society of Model & Experimental Engineers
 Ashton Court Estate Miniature Railway

IMLEC 2003



Gauges	Raised Track	Ground level
	3 1/2 & 5 inch	7 1/4 inch
Min Radius	78 ft	80 ft
Nominal Length	1640 ft	1638 ft



BRISTOL MODEL ENGINEERING AND HOBBIES EXHIBITION

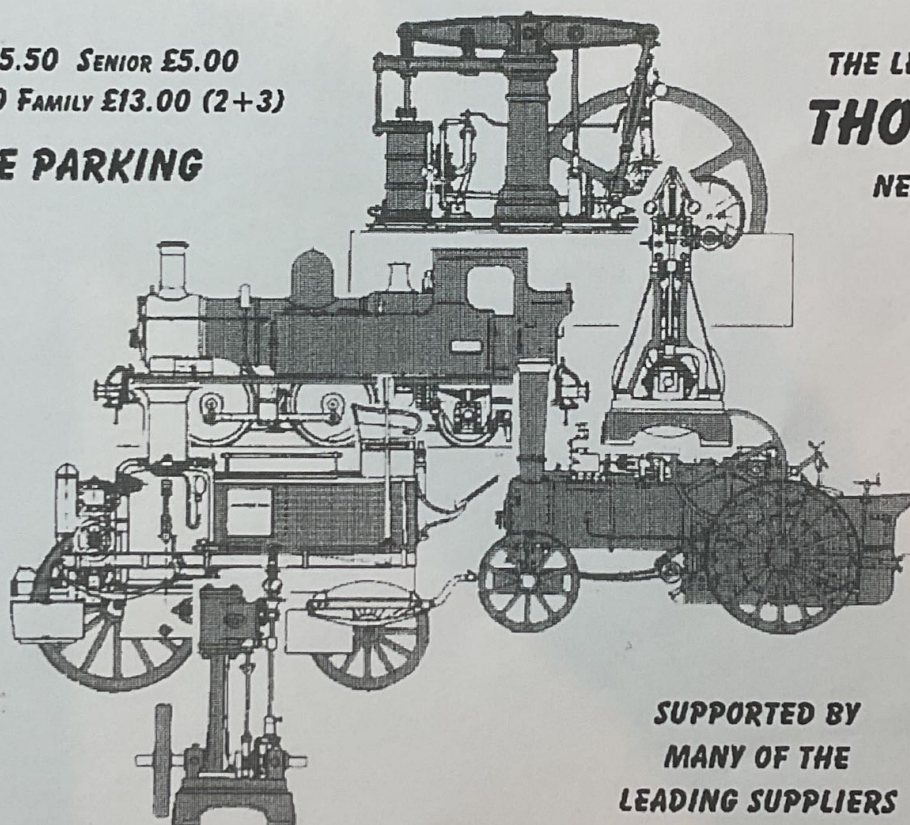
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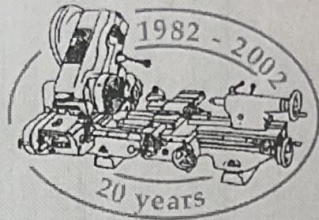
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- | | | |
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| BOXFORD TUD 4 1/2 x 20" MK11 3 jaw chuck, cabinet stand, hand feeds | | £995 |
| BOXFORD CLU 4 1/2 x 20" changeheels, 3 jaw chuck, cabinet stand | new selection just in | £760 |
| BOXFORD LUD 3 1/2 x 22" MK11, changeheels, 3 jaw chuck, 4 way toolpost | | £1,400 |
| BOXFORD BUD 5 1/2 x 22" MK11, changeheels, power cross feed, T-slotted cross slide | | £1,400 |
| BOXFORD AUD 5 1/2 x 22" MK11, gearbox, power cross feed, T-slotted cross slide, cabinet stand | very nice | £1,625 |
| BOXFORD AUD 5 1/2 x 22" MK11, gearbox, power cross feed, T-slotted cross slide, cabinet stand, even nicer | | £2,250 |
| COLCHESTER CHIMPMASTER 5 1/2 x 20" gearbox, variable speed 3 jaw chuck, face plate | | Just £950 |
| 4 way tool post | | |
| COLCHESTER BANTAM 1600 model, 5 1/2 x 20" geared head, power feeds, gearbox | | £1,400 |
| COLCHESTER BANTAM 800, 6 1/2" centre height, 1.30", between centres 1 1/2" core, 16 speeds, | | |
| D13 carlock fitting, 3 & 4 jaw chucks in very nice condition and 240 volts from new | | £3,450 |
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| maxim power cross feed & gap bed, dust chals 3 Jaw chuck, lathe turning, coolant, etc | | £2,950 |
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| COLCHESTER MASTER 2500, short and long bed lathes, well equipped | | JUST IN |
| CVA LATHE | COMING IN | |
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| MYFORD SUPER 7B 3 1/2 x 19" gearbox, Power Cross Feed, 3 jaw chuck and tooling on stand | | |
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