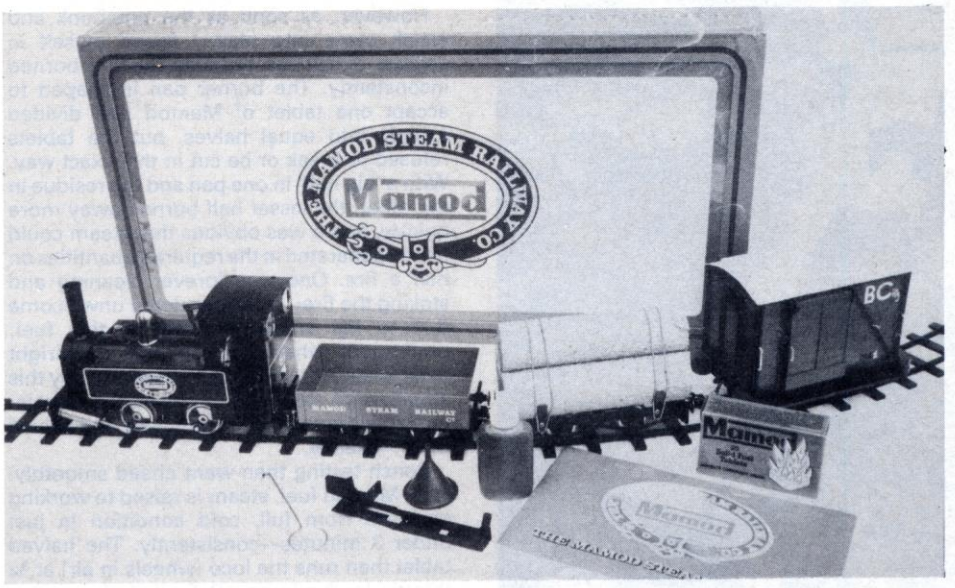
A Buyer's Guide To Steam

by Jack Wheldon

Mamod SL 1

The commonest 16mm. scale steam loco is under test.

Photographs by J. H. Wheldon.



The Complete Mamod Railway Set (plus, in the picture, an Archangel van). The set is fully in the best traditions of high-quality Gauge O Tinplate—not least in its packaging. One is immediately tempted to go out and purchase more track . . . Perhaps more to the point, this is the train that the little loco was able to haul continuously out of doors in cool breezy weather.

Made by Mamod 80 Ltd., Thorns Works, Thorns Road, Brierley Hill, West Midlands. Price (at time of writing) of loco; £44.95. Of railway set; £67.25.

Many years ago, I think in 1962, I wrote to Mamod suggesting that if they produced a steam railway locomotive scaled to run as a narrow gauge engine on Gauge O, it would be sure of a welcome. Malins Brothers (as the firm then was) replied politely and with great certitude that no market for such a model existed. Well, well. Perhaps they were right—then. But still, remembering that letter, it gives me just a touch of that prophet-in-the-wilderness feeling to be writing, nineteen years later, a road test report on Mamod Steam Locomotive Number One, built, as the leaflet says, to 16mm/ft scale to run on Gauge O.

The SL 1 is not a scale model of any particular prototype, but is highly distinctive in that it actually scales the proportions of a very small type of narrow gauge industrial engine. Its scale dimensions are; Length 12ft. 4½in., Width 4ft. 8in., Height (rail to chimney cap) 8ft. 0½in., and boiler pitch height 4ft. 0in.—a set of measurements that approximate closely to those of 'Townsend Hook' the perserved Dorking Limestone engine, except in the matter of width, for 'Townsend' ran on 3ft. 2½in. gauge, whereas the SL 1 represents a 2ft 0in. gauge engine. The point is that this class of engine was very tiny, and it is not easy to build a tiny live steam model with direct-acting oscillating cylinders, that combines strength with controllability and a good length of run. Many modellers choose to obtain these desiderata by enlarging a few dimensions while keeping to the general proportions, but Mamod, although catering primarily for the toy market, and therefore not bound to reproduce dimensions exactly to scale, have plunged straight in with the limiting measurements of a very small engine indeed.

Description

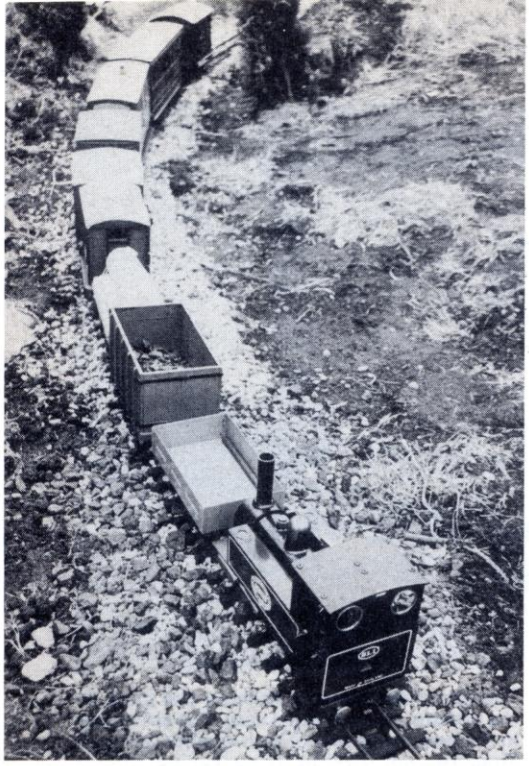
a) Boiler. This is a plain seamless brass tube approximately 4½in. long × 1⅜in. dia., with safety valve, working dome, whistle, and water-level sight glass, the latter being very smartly retained within a properly D-shaped brass backhead, The dome consists of a hollow brass hexagon plug screwed 7/16in., concealed within a perkily shaped brass dome cover. The steam pipe originates within this dome, passes vertically down through the boiler within a sleeve cleverly designed to obviate priming, and on emerging within the fire zone, passes forward to a rotary steam distribution valve between the cylinders.

b) The Fire. A tinplate slide provides a grate of a size to accommodate one Mamod solid fuel tablet broken exactly in halves. It has lugs which rest on the frames at front and rear, and its location is easy, quick and positive. It is retained in place when the cab back sheet is clipped into place. A tinplate firebox surrounds the fire and boiler sides, leaving a cool air space between itself and the side tanks, and ensuring that the cab end of the loco remains cool enough to handle after the fire is lit.

c) Cylinders and Valve Chests. The cylinders are oscillating and double-acting (that is, steam is admitted at both ends, alternatively, to push the pistons to and fro, making every stroke a power stroke). Their metric dimensions approximate to ⅜in. bore × ¾in. stroke. A rotary steam distribution valve reverses the engine by reversing the steam and exhaust flow to and from the cylinder ports. Partial movement of the reversing lever has the effect of throttling the steam, thus giving a measure of speed control. The pistons are not fitted with rings but are machined to very fine tolerances to give a close sliding fit, and as the loco has no lubricator to send oil directly into the cylinders, they depend for lubrication on water condensing from the steam, which is used at the relatively low pressure of 10 psi (.7 BAR). A little drop of steam oil put into the boiler now and then is helpful. The bottom cylinder cover through which the piston rod moves has no gland; again, the idea is that fine tolerances give steam tightness, but how long this lasts when lubrication of the rod relies on dabs from the oilcan at irregular intervals, is anyone's guess.

d) Frames and Superstructure. The frames are of 16 gauge steel and so are amply strong for their size. They are spaced front and rear by the buffer beams, which are cast in a strong light alloy; and midway by a steel rod. The axle slots carry brass bushes. The superstructure is smartly designed and beautifully pressed from 23 gauge tinplate, a much stronger material than that usually associated with 'tinplate toys'—indeed, a heavier gauge of steel than is used on some motor-car bodies. The enamelling and lining-out are of first quality and appear unaffected by the loco's heat, oil, or hot water. The chimney, smokebox, front running plate and buffer beam are in one die-casting, which is neat and good-looking, but not good practical design, for not only does it render the front of the loco exceedingly hot when in steam (whereas the firebox keeps the tinplate end nicely cool), but it makes dis-assembly an untidy business, which otherwise would be quite straightforward, as only one size of screw (6 BA) is used, and all screws are nicely accessible. The exhaust is led into the smokebox, but not concentrically to the chimney, and as the pipe is a mere stub, the greater part of the exhaust impinges on the smokebox wall and condenses, wherefore the exhaust emerging from the chimney when running is weak and meagre, while hot water accumulates in the bottom of the smokebox.

e) Wagons and Rails. These items are built to an equally high standard with the locomotive, and in my opinion are superior in most respects (although not perhaps in richness of colour printing) to those of the earlier tinplate railway manufacturers whose products are now so eagerly sought by collectors. The wagon axles are properly journalled within die-cast axleboxes; the wheels give a satisfying rumble when in motion. One may regret the polystyrene 'logs' of the lumber wagon, but one is at liberty to replace them with sawn and planed mahogany—and we are promised vans and a coach this year. The Mamod track is cast in alloy, and locks together with a simple but positive knuckle joint. The radius



Maximum Haulage Test. A train of 20 axles weighing three times as much as the engine. The SL 1 hauled this train 25 yards at a time, with intervals resting to accumulate the full blow-off pressure!

of the curves is 2ft. 6in., which some people might consider rather tight, but in fact I have run a variety of large and heavy engines on this track, with trains of surprising length being wheeled dizzily around behind them—and entirely without derailment.

Running Tests

The first tests were made on the bench, wheels in air. With the help of a little Shell Valvata in the right places, very little running in was needed, and I was able to settle down to timing the fire and the boiler.

However, as soon as the notebook and watch came into play, I found myself in serious difficulties because the fire burned inconstantly. The burner pan is shaped to accept one tablet of Mamod fuel divided exactly into equal halves, but the tablets refused to break or be cut in this exact way. With a 'big half' in one pan and the residue in the other, the lesser half burned away more quickly, and it was obvious that steam could not be generated in the required quantities on half a fire. One was forever cleaning and stoking the fire—a task rendered unwelcome due to the smells emitted by this fuel; unpleasant when burning and downright eveil when smouldering. Exasperated by this stop-and-go steaming, I took all the remaining tablets across to the bandsaw and halved them—exactly.

Bench testing then went ahead smoothly. With Mamod fuel, steam is raised to working pressure from full, cold condition in just under 3 minutes—consistently. The halved tablet then runs the loco (wheels in air) at ¾ throttle for 9 minutes. Refuelled, the engine picks up at once and runs another 6 minutes, when, the water being at the bottom mark on the glass, the fire must be extinguished. Thus, in ideal conditions, 15 minutes' running is possible on one boiler-full from cold, for the price of 2 fuel tablets; that is, nearly 10p at the time of writing.

Although the loco had achieved consistent running on the bench, I noticed that the boiler was scarcely master of its work. The cylinders need all the steam it can make, and if the burner is removed momentarily, the engine slows and stops at once. Calculation shows that the boiler's working capacity of 66 mls should yield 4173 cu in. of steam at the working pressure of 10 psi. I judged the loco's cruising speed to be 30 mph (this proved later to be an accurate estimation) and worked out that at this speed the rpm would be 384, wherefore the boiler would provide a surplus margin of only .13 cu. in. of steam per revolution—under ideal conditions. It would be interesting to see whether this surplus would be maintained under the give-and-take of everyday operating conditions.

The first running tests proved to be very disappointing, due entirely to the tablet fuel. First, I experimented with some tablets *broken* to approximate size. I found that uneven burning did not allow the loco to remain in steam longer than a very few minutes—and burning fragments of fuel dropping from the pan caused two fires on creosoted outdoor track. Running indoors was very little better. It was obvious that the draught from the loco's movement, even indoors, was sufficient to accelerate the burning, but with no commensurate increase in steam raising. As soon as one half of the tablet was expended the engine stopped. If only *that* half was replaced, the other half hastened to burn out as quickly as possible . . . my memories of that series of tests are entirely of cleaning and refuelling the fire, punctuated by sudden realisations that with this preoccupation with the fire, time was slipping and a look at the water level was overdue.

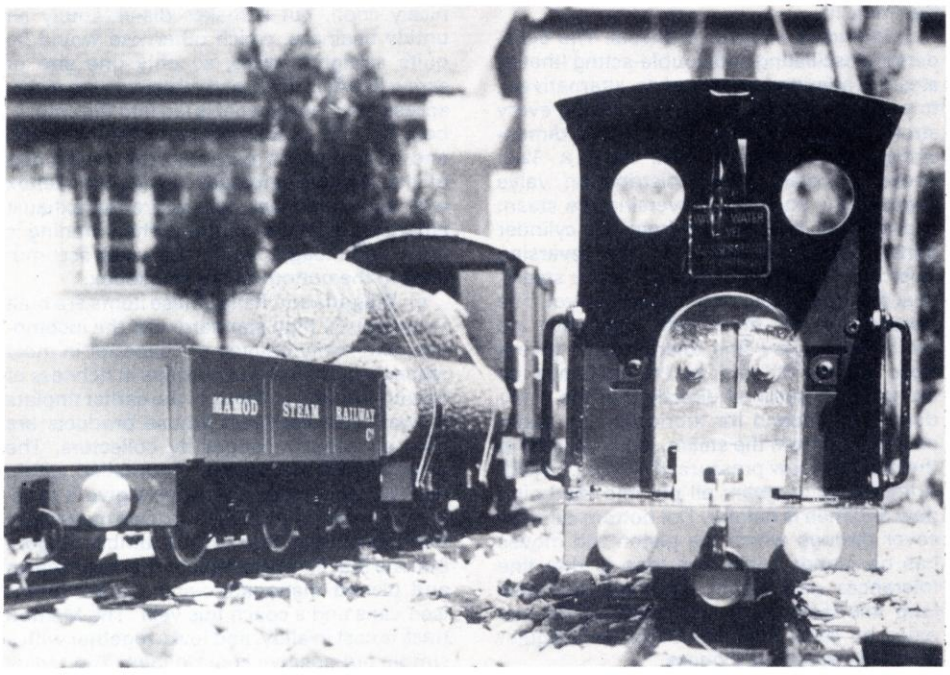
Hopefully I switched to accurately sawn tablets, but with little more success. The longest run I obtained out of doors, on a bright cool day with a moderate breeze, was 4 minutes, and that without a train. Always, the fire burned at uneven rates and far too quickly, yet with no gain in steam production. So far as haulage was concerned, the engine was strong and willing—so long as there was steam being raised! It hauled a 10 axle train weighing 3lb. 7oz. for 60 yards, and a 4 axle train weighing 1lb. 4oz. for 150 yards, but these performances were, so to speak, opportunist, and repetition could not be guaranteed. At all times the need to refuel was unpredictable, and preoccupation caused time to slip, so that I can truthfully say that only luck saved me from ever letting the boiler go dry!

At this stage I recalled the many disparaging remarks I had heard or read concerning these solid fuel tablets. Indeed, in the 16mm Society journal, Mr. Bert Coules categorically states that they yield as much heat as the throat lozenges to which they bear a resemblance. I resolved to test then for heat—for the power to turn water into steam. I mounted a Reeves' test pressure gauge on a stationary boiler, and then devised a liquid meths burner that gave a flame equal in size and shape to the Mamod tablet burner's. I then timed the two burners separately at the task of raising 75 psi from 120 mls of cold water, emptying and cooling the boiler after each test several times, and on every occasion the Mamod fuel beat the liquid meths by between one and two minutes. So it would appear that there is nothing wrong with the tablets as fuel (apart from their atrocious smell and their high cost) and therefore if they cannot steam the SL 1, it is not for lack of heat, but for lack of a fire that can make full use of it. In other words the blame must lie with the design of the burner pan and the firebox.

Writing a negative report is not an enjoyable task, and so when the postman called with a parcel from Merlin Models, and I found inside it a neat little liquid meths burner designed expressly to fit the Mamod SL 1, I lost no time in fitting it and resuming tests. This burner is a well-made, hard soldered job. The tank tucks neatly and exactly between the frames, and the two burner tubes coincide with the ventilation holes in the frames. The retaining clip pops into place as soon as one has drilled a hole to clear 6 BA through the footplate. Ample wick material was supplied, from which I cut 6-strand wicks having 1/16in. tufts (after damping the asbestos wick with meths to obviate dust). From these wicks I obtained coned flames with just the right amount of combustion space.

On the bench I found that steam raising from cold was marginally slower than with

The Backhead. Shown here with the Merlin meths burner in position, and the backhead rivets replaced by screws and nuts, to facilitate repalcement of the 'glass' in the event of fire consequent on derailment. On the left is the continuous-run train of 6 axles, its weight slightly less than the engine's.



the Mamod tablets, but that maintenance of working pressure was markedly superior because there was no variation of the fire. The engine started as soon as working pressure was raised, and it then ran non-stop, at whatever throttle position I set, until the water was approaching the bottom mark on the glass, when I bent to blow out the fire. But Merlin Models got there before me! Before I could blow the fire—it went out! Merlin had arranged the fuel capacity to last until half-a-minute of the water, at continuous steaming. And of course, whatever actual use was made of the water, one could be certain that the fire would last 14½ minutes, and the boiler could not go dry.

Out of doors at once! It was a fine spring day, warm and sunny in sheltered places but with a cool breeze elsewhere. And what an enjoyable afternoon it proved to be. Operation was now straightforward and always reliable. The engine could have been run by the clock. Continuous running was achieved at once, with a 3-wagon train weighing 1lb. 11oz. The boiler balanced cylinder consumption at speeds varying between 25-35 (scale) mph. Running ceased promptly after 15 minutes, and in that time the train had covered 600 yards, or 7½ scale miles, thus averaging 30 mph exactly. Later, when the cold wind grew stronger, the loco was slowed and sometimes stopped on an exposed part of the line that also featured an adverse gradient. When this happened, the drill was to shut the throttle, count ten, then open up again. The loco always then started vigorously, accelerated its train up the bank, and ran to make up lost time until its head of steam was expended, when it would settle down once more to its 30 mph jog-trot. One may surmise that in very cold and wintry conditions continuous running would be possible only on well-sheltered lines.

The length of run obtained with heavier trains depended on the head of steam accumulated before starting, although with a safety valve pre-set to blow at 10 psi that could not be so very much. However, a train of 20 axles weighing all of 8lb. 7oz. was hauled 25 yards. A train of 12 axles weighing 4lb. 7oz. was hauled 40 yards.

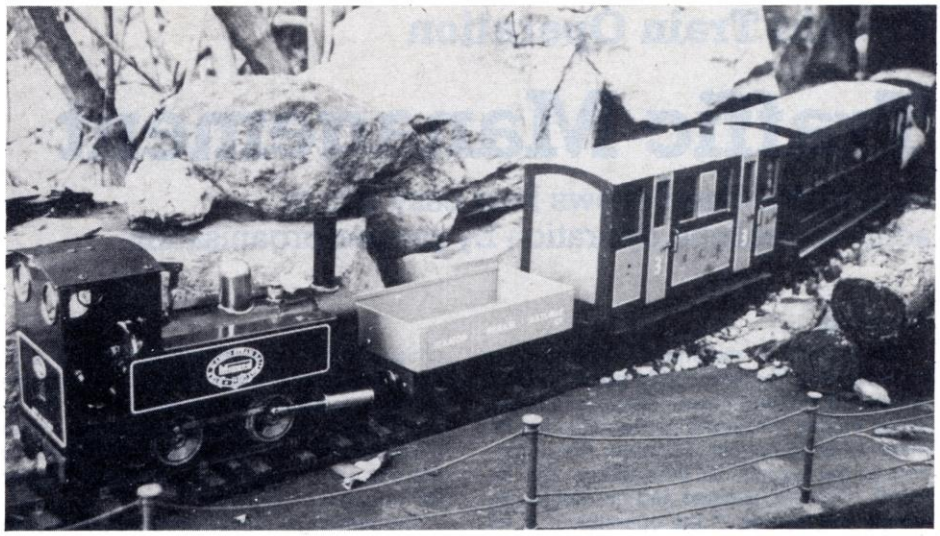
The most important development, however, was that whatever type of running one chose to carry out, the SL 1 performed its duty willingly, obediently, one might even say cheerfully! From an irregular smelly nuisance it had been transformed—by Merlin magic, I suppose—into a hard working and absolutely reliable little loco that was a pleasure to drive. An added bonus was that the weight of the burner made the engine steadier on rough rail joints.

Nevertheless, it must be made clear that derailments do occur on garden lines, and up-ended locos having liquid meths fires can get fire in the cab. No blame attaches to engine or burner; and when a blackbird searching for nesting material left a twig in the path of the SL1, it was inevitably derailed, and fire spread into the cab. I got that extinguished quickly enough, and was pleased to see that the Mamod paintwork was entirely unharmed. Not so the water sight glass! This now showed itself to be not glass at all but a transparent plastic material. The heat had melted a little hole in it and the water was let out. It helped put out the fire.

The sight glass is retained by the brass back-head, which is secured to the boiler endplate by two copper rivets. I drilled out the rivets, tapped the rivet holes 4 BA, then soldered in two appropriate lengths of 4 BA brass studding, after which the holes in the brass back-head were drilled to clear the studs, the holes being counter-sunk on the inside to clear the solder fillet. A new perspex 'glass' was cut and fitted, and the assembly nutted up. After which I made a few reserve glasses . . . Merlin tells me that they are producing a butane gas burner to fit the SL 1, and this will of course give the same consistent performance as the liquid meths burner but will obviate any fire risk following an overturn.

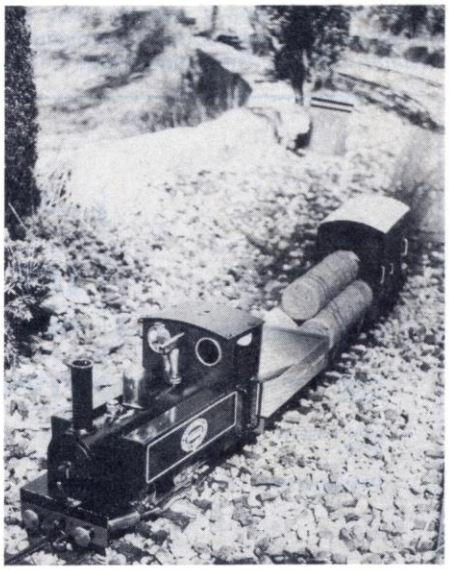
I have dwelt a little on this minor contretemps because I appreciate that it might not seem so very minor to a very young garden railwayman, or to an older one who had never, hitherto, found the exercise of metalworking skills at all necessary. With steam, and even with steam engines that are designed for ease of operation by people who are not, and have no wish to be, practical engineers; sooner or later, if these engines are run on outdoor lines subject to all the hazards of British wild life, then a bit of metalwork in the way of repairs will creep in . . . and before we know where we are, we have progressed from soldering iron and hacksaw to a fully equipped blacksmith's hearth and an 18in. swing capstan lathe . . . Let no one doubt the need of occasional repairs. The most disastrous accident on my line, with widespread fire, and a vehicle shattered on the rocks below, was caused at dusk, to a train travelling most sedately, by a large snail crossing the track.

Looking back over this article, I see that it amounts to a sort of Cinderella story, with the nasty smelling tablets cast in the role of Ugly Sisters. I wonder how the presiding genius of Merlin Models relished the role of Fairy Godmother?



Second Haulage Test. The SL 1 could move this 12-axle train, nearly twice its own weight, a distance of 40 yards once blow-off pressure was attained. At all times this example of the Mamod engine was stronger when running bunker first.

My grateful thanks are due to Mamod 80 Ltd., who submitted their SL 1, plus wagons and track, for this review; and to Tom Cooper of Merlin Models, who sent his meths burner designed specifically for the SL 1.



SL 1 in action, with the two wagons supplied, plus an Archangel brake van.