



July — August 2009

Ground Level Track

by Tony Jones

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This last month we have had good help in all areas as enthusiasm is increasing. The wet weather has kept us indoors, mainly welding up the last of the straights.

Now that the weather is improving, we can get out on the grounds and put all the remaining rails together to complete the track circuit to Stage 1.

Above: The Sleeper Gang hard at work fitting the concrete sleepers to the track near the crossing.

Photo: Nigel Sales

Ken Cooper is gallantly building the points for the loop at the station — one is nearing completion.

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CALENDAR OF EVENTS

Public Run Day	Club Track Site Vasto Pl, Balcatta	11:00 am—3:00 pm	Sunday 30 August
General Meeting	Club Meeting Room Vasto Pl, Balcatta	8:00 pm	Friday 11 September
Public Run Day	Club Track Site Vasto Pl, Balcatta	11:00 am—3:00 pm	Sunday 27 September
General Meeting	Club Meeting Room Vasto Pl, Balcatta	8:00 pm	Friday 9 October

July General Meeting

The July General Meeting was held on Friday 10 July 2009 at the Society's meeting room commencing at 8:00pm, chaired by Ken Austin.

The full Minutes of Meeting are enclosed with Steamlines as a separate Supplement for members. Some highlights of general interest are reproduced here.

Model Engineering:

Ed Brown had a selection of assemblies he has produced for the two WA Class ES locos Nos. 308 and 346 that he and **John Hagarty** are building. It included a reversing quadrant with a 6mm diameter two-start left hand threaded screw, a very neat fire door with baffle and air register, and a headlight with incandescent globe (none of this bright LED stuff, all as per the original). It was all produced to Ed's outstanding detail and finish.

Ken Austin demonstrated a compressed air operated braking system being developed by Richard Stuart. The brake handle was a commercial hand valve that allowed progressive application of the brakes.

The formal meeting closed at 9:00pm, then Ken Austin showed a DVD of Beyer Peacock Garretts in service in South Africa. This was followed by tea, coffee and a good yarn.

August General Meeting

The August General Meeting was held on Friday 14 August 2009 at Kentin Engineering in Malaga commencing at 8:00pm, chaired by Ken Austin.

General Business:

The Society is to establish a stock of model engineering materials. See Materials for Sale on page 3.

The Committee has agreed to co-hosting of the 2013 AALS Convention conditional on agreement being reached on registration fees, catering, etc.

A list of jobs to be completed by the end of November is to be posted in the Club Rooms for members to pick up and run with. Please have a look!

Model Engineering:

Members and visitors inspected the two large locos, rolling stock and a full sized traction engine boiler under construction at Kentin Engineering. Also on display was Ken's 4" scale Burrell traction engine, which was ticking over on compressed air.

Tea, coffee and biscuits were enjoyed by members.

The meeting closed at 9:30pm, after everyone had a chance for a good look around Ken's workshop.

Andrew Manning
Secretary



Above: Ed Brown's finely detailed assemblies for his ES locos at the July General Meeting.

Right: Lots of interesting engineering projects were underway for members to look at during the August General Meeting at Kentin Engineering.

Photos: Jim Clark



President's Report for July—August

As Ken is tied up getting himself ready for a well earned holiday, he has asked me to do the President's Report.

Although it has been a wet month things are progressing well at our grounds. Tony's crew are busy constructing track and points, Steve Reeves has been sleepiering the points, I have been installing soak wells and John and Colin have been installing the rails for the new fence.

All this activity at the grounds is reflected in our membership which is growing steadily. We are now at 45 members including the canteen ladies, with three prospective new members looking to join.

We have quite a few Birthday Run bookings for the next two months, which will really help with the cost of completing the ground level track and services. If you can help out on any of the following days, please do so:

19 September	12:00 to 2:00pm
10 October	12:00 to 2:00pm
28 November	12:00 to 2:00pm

The rain has brought the grass and weeds on a treat, so if you feel like helping out on the grounds for a couple of hours, we have all the gear you will require, just turn up with your gloves.

At the next run day a job list will be posted in the Club Rooms with a list of tasks to be completed in the near future. Some details will be provided. Would you please

have a look at the list, take on one of the tasks, and recruit some helpers if needed.

When this current burst of projects has been completed, hopefully by end of November, it is proposed that we spend the next 12 months in a more relaxed mode. We plan to put more effort into club activities, play days, driver training, workshop demos and setting up a stock of materials for members to purchase.

Let a Committee member know if you would like to have some training or help with a project that you are working on or planning to do. We have a wealth of knowledge and capability within the Society, it is there for you to use.

Andrew Manning for Ken Austin, Acting President

Materials for Sale

Over the next couple of months the Society proposes to procure steel, brass and stainless in round and hex sections in a range of smaller sizes to cut up in short lengths for sale to members. We will also look at getting some bronze and silver solder.

If there are specific materials you would like us to stock, please make your needs known to a Committee member. If you have any surplus materials that you would like to donate to the Society, please let us know about that too.

Memorial for Ron Date

At the request of Ron Date's family, his ashes were interred at the Society's track site during a short ceremony on 12 July, a perfect sunny Sunday morning.

Kevin Date spoke of Ron's life, his involvement with coaching soccer, playing golf, and later with the NDMES, his passion for fairness and his desire to see that everyone enjoyed themselves. He spoke also of Ron's determination to get things done, to which there are many testaments around the Society's grounds

including the largest project the Society has tackled — the construction of the Club Rooms.

George Palmer spoke on behalf of the Society members, remembering Ron and the friendships that he shared with many of us over the years of his involvement. George also said how pleased Ron would be to see the ground level track finally in place and soon ready to use.

Our thanks to Kevin Date and his family.



Left: Kevin Date placing Ron's ashes prior to the tree planting.

Right: President Ken Austin completes planting of the *Eucalyptus Ficifolia*.

Photos: Jim Clark



May The Flow Be With You...

by Jim Crawford

This is the first of an ongoing series of articles on loco operations by Jim Crawford, the Society's Driving Licence Examiner. If you have any comments, or topics you'd like covered, please contact Jim Crawford direct, or email the Steamlines Editor.

From time to time, we see fellow locomotive drivers experiencing a boiler water delivery failure. This can, and usually does, occur at an inconvenient time, such as while hauling paying passengers or at a point along the line where assistance is not readily available. Murphy's Law comes to mind.

With an influx of new members to our Club, many of whom are planning to qualify as steam locomotive drivers, I thought it was a good opportunity to have a look at some aspects of this vital process. I hope that my thoughts may help others and also generate discussion among us, to our mutual benefit.

Let me start by saying that I am still learning from others, as well as my own experiences and mistakes. I reckon the day you think you know it all, is when you should consider taking on another pursuit.

In the beginning there was a tank, be it tender, side, saddle, well or driving car, as per our Blowfly setup. This tank needs to be filled with clean water, suitable for use in a steam boiler. Clean water in this case can be described as being as free from contaminants and dissolved solids as reasonably possible. In our case the Society's rainwater collection, filtering and storage system provides the basic need.

It is true that you can use WA scheme water in a boiler, however the penalty is likely to be a concentration of dissolved solids, as steam is drawn. Occasional use may be OK, but ultimately these solids will cake onto internal boiler components and prevent adequate heat transfer from fire to water. The result is decreasing efficiency and eventual overheating of boiler plates, particularly around the firebox.

At this point, we are all using copper boilers. When we start operating steel boilers, the above considerations still apply. However, there are additional aspects to take into consideration with steel, such as dosing the feed water and long term storage of the boiler.

Speaking of clean water, it is advisable to fit on-board filtering. A strainer at the fill point will do much to prevent the ingress of grit. Our Blowfly has suffered from digesting small pieces of char, that found their way into side tanks and ultimately to the axle pump, with unfortunate results. *(To be continued...)* **Jim Crawford**

Air Brakes (Part 2) by John Shugg

Continuing from the last issue of Steamlines...

At the July Monthly Meeting Ken Austin borrowed and demonstrated for us Dr Richard Stuart's Air Brake Display System. Castledare Miniature Railway will probably adopt Richard's fail-safe system in principle if not in precise detail.

The display unit borrowed from Richard was quite impressive and worked very effectively. It consisted of commercial air fittings and equipment which makes for a quick retrofit to passenger cars.

A mild concern to some of us was the size of driver's brake valve, which, being a commercial truck fitting, was rather over sized for a 5" gauge or even a 1½" to the foot scale locomotive, as a permanent practical fitting.

In the February 1983 issue of Live Steam magazine, Dick Bagley described a 1½" scale driver's brake valve suitable for air, vacuum or steam application. This valve, when scaled, would readily fit on the cab footplate of a 5" gauge locomotive. I am intending to make one.

Watch this space in a future Steamlines for a working semi-scale driver's air brake control valve!

John Shugg

SANDGROPPERS 2009

Jeff Clifton has confirmed that the event will be staged as always on the second weekend in November, that is Saturday and Sunday 14-15 November 2009.

Invitations will be issued in September by Ian Morrison. The Saturday evening meal (which may well be "catered out" this time) is expected to be around \$20, with registration for the two days of around \$15. Final details and costs will be confirmed in the mail out.

This is always a great weekend with lots to see and do and a convivial gathering — so put it in your diary now!

NEWS ITEMS WANTED

As always, I need more items for Steamlines. Don't leave it all up to the few stalwart correspondents — surely you have seen, been or done something of interest to other Model Engineers recently?

How about a few words and photos showing your current project? Or an article about somewhere you've been? Or a short article on how you solved some workshop problem? Please email your material to:

jimclark@hardwareandsoftware.com.au

or post c/o Secretary, PO Box 681, Balcatta, WA 6914

Fowler—the “King” of Traction Engines

by Ron Collins

Concluding a short dissertation on the building of a pair of Fowler Traction Engines under construction by Ron Collins and Paul Costall — continued from the May-June issue.

It was resolved not to install the rivets in the conventional hammer-swear-hammer-swear method, so it was decided to consult some of our peers and defer to their superior knowledge and experience.

At this point there was some disappointment: Clive Jarman fell off his bike and his ribs hurt so he couldn't help. It was noted that the completion of the wheels rapidly accelerated his recovery.

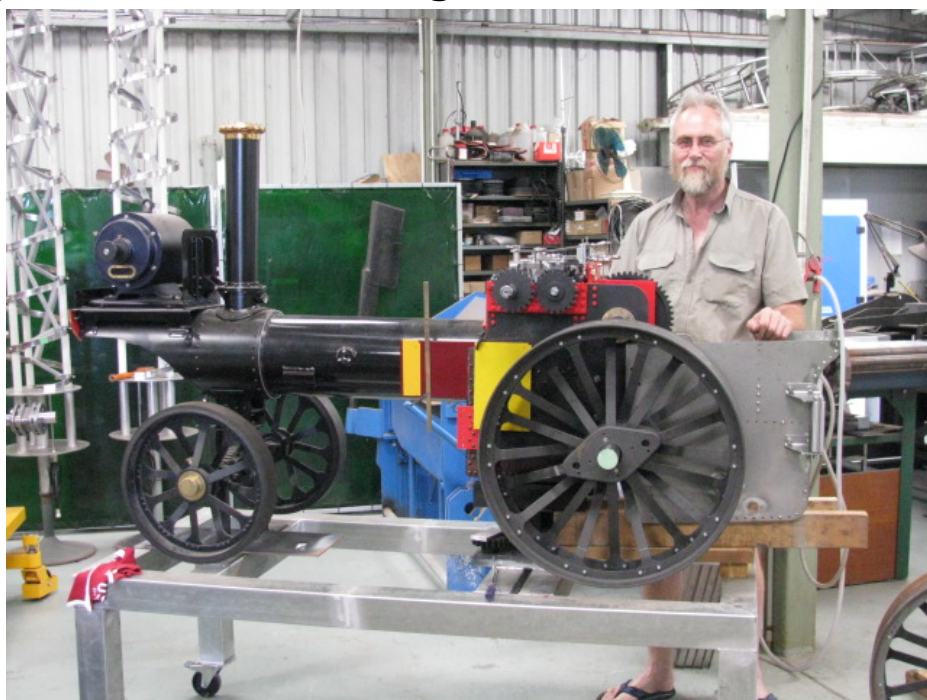
Jim Clark vanished when riveting was mentioned, the next time Jim was spotted was at the Easter Convention and he really was not too talkative until he found out that the wheels were complete. (*whew!—Ed*)

Ken Austin offered plenty of moral support and the lending of his riveting set (but no mention of any physical assistance).

Initially there was some reluctance to use a rivet set that had been contaminated by riveting up Burrell wheels, however expediency overcome this apprehension.

The rivet set was decontaminated and worked extremely well, all 320 rivets were pressed into position using a hydraulic press, with only the occasional expletive.

Currently all wheels are awaiting the application of vulcanised rubber banding to the rims.



Top: Paul Costall with his Showman's version of the Fowler

Below Left: Stainless steel tender assembly fitted to the hornplates.

Photos: Ron Collins

Tender:

The tender was the next item to be tackled and it was decided to make the tender from Grade 316 stainless steel. Stainless steel is about the same price to purchase as brass, however it is much stronger, and although harder to work it will last as long as brass.

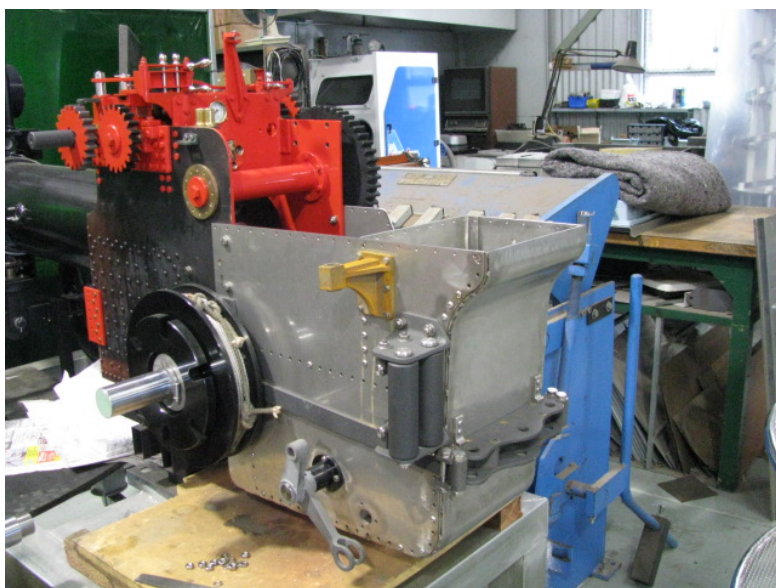
The tender was laser cut to shape and the curved rear panels were pressed into shape using custom made temporary press tooling.

The sides and rear panels were TIG tacked together and the tender offered up to the hornplates. There must have been two mistakes made — the tender must have been drawn wrong and then assembled wrong as it fitted perfectly! (*see photo bottom left*).

This about sums up the progress to date. Painting is being undertaken as construction progresses and it is anticipated that by the end of the year most items will be complete and assembled, with exception of the cylinder and motion gear.

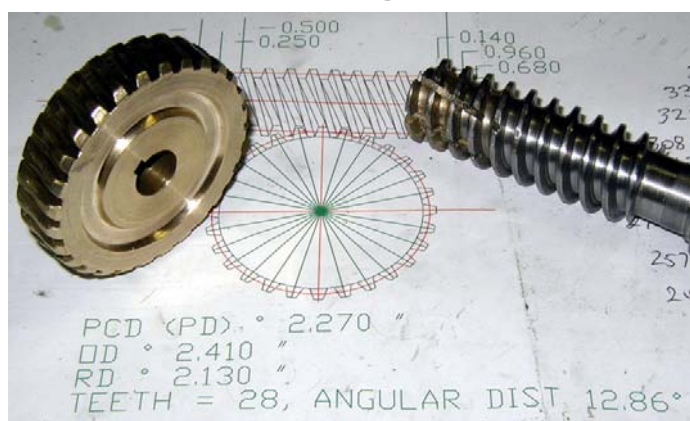
It was decided to purchase the castings for the cylinders as it was determined that to make patterns and associated core boxes would extent the construction time into the 2020's, and we hope to finish the traction engines whilst there is still a '2' in the date.

Ron Collins



Making a Worm and Wheel

by Jim Clark



I needed a worm and wheel for the steering gear of my Allchin traction engine, which at 3" scale is twice the size of the popular model described by Bill Hughes. A suitable gear set is hard to find – some people have stripped down reduction gearboxes (it's hard to find a suitable one), while others have had gears made commercially (expensive!) The Allchin Builder's Group in South Australia have not yet resolved this problem, but they will be having several sets made so they will probably get the gears done on a gear hobbing machine sometime in the future. I have never made gears of any sort before, so given the difficulty of finding something ready-made, I thought I would take on the challenge and see if I could make my own worm and wheel.

My first tentative step was to work out how to make a two-start worm using the coarsest thread cutting pitch available on my lathe (2 tpi). The worm needs to be at least two-start otherwise the gear ratio would be so high that I would be spinning the steering wheel dozens of turns one way or the other whilst steering the engine. A ratio of about 10:1 is needed for a direct steering action.

I consulted the excellent booklet "Gears and Gear Cutting" by Ivan Law (No.17 in the Workshop Series) which has all the formulae necessary to calculate the gear tooth proportions, the pitch circle of the gear, the helix angle of the worm (which depends on the diameter of the worm). I sketched this up using CAD to get an idea of the tooth shape and how the two-start worm would look using a few different diameters. About 1" dia. for the worm and 2.5" for the worm wheel seemed to be about the right proportions. With 28 teeth this gave a ratio of 14:1, which seemed reasonable.

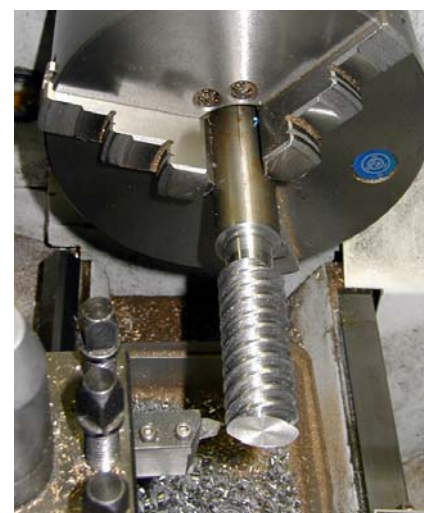
I ground up a form tool to cut the worm teeth with 75° angled sides and a slightly rounded tip. I shaped it by comparing the tool to the drawing of the tooth shape until it looked about right. Then I took a piece of 1" dia. mild steel bar and screwcut two threads into it, one starting 180° from the other. This gave a worm with 0.25" pitch and 0.5" lead (i.e. the worm will move horizontally 0.5" for every revolution).

I cut the worm a bit more than twice the length I needed so that I could cut four longitudinal slots into the end half and file some relief into the segments, just like the flutes of a tap. The end of the worm then became a makeshift hob which I used to free hob the worm wheel. As I was only making one gear set, I didn't bother with hardening the worm, but this could be done using suitable heat treatable steel or a case hardening compound. As it turned out, the unhardened mild steel proved quite adequate as a one-off cutter for the brass worm wheel blank. The finished worm will have a light load and low duty cycle, so hardening is not really necessary.

One catch for young players is that the blank for the worm wheel needs to be bigger for a given number of teeth than the blank for a corresponding spur gear. This is because the teeth are at an angle and to maintain a given tooth spacing they will take up more circumferential distance. The blank size is found by dividing the pitch diameter by the cosine of the helix angle of the worm (in my case 0.981, which while small is significant in achieving the proper tooth shape on the finished worm wheel).

I had a brass disc off-cut that I had been keeping "because it will come in useful one day" and I used that for the worm wheel. I mounted the blank on the mill in a rotary table packed up from horizontal at the correct helix angle (in my case 11°), then using a 2mm slitting saw I gashed in the 28 teeth to the correct depth.

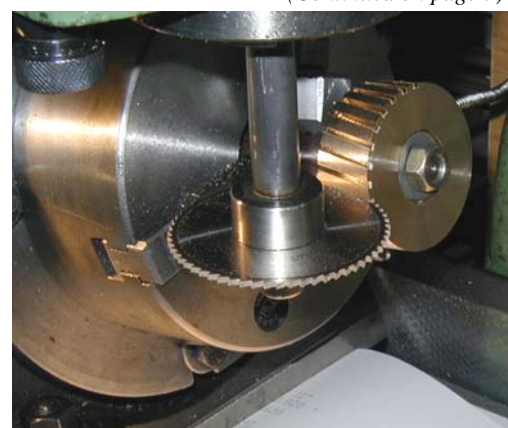
(Continued on page 7)



Above: Cutting the two-start worm.

Right: Gashing out the teeth on the wheel.

Photos: Jim Clark



Ground Level Track Progress (cont...)

by Tony Jones

(Continued from page 1)

One bottleneck is the lack of ties (25x3 flat bar). We are running short of this material again, as I weld up one to one and a half lengths each work period and that means 60 ties and they need to be drilled as well. There are 2 lengths of flat to every 6m of track, 2 holes per tie, so you work it out. It makes a lot of swarf!

We the welders need to play with trains for a while, we need a break. *(Looks like you already did that, Tony. See photo below, Tony testing the finished track — Ed).*



Above: The Concrete Gang setting out the level crossing during July.
Photos this page: Nigel Sales

The tunnel needs cleaning out. There are other items that need addressing such as ditch cutting for services, and making of signals for instance. I'm sure our Secretary could think of lots more. If you want to help on a Sunday, come to the Birthday runs and we can find you a job.

This month I have included a report recently done for the Committee to show what needs to be done for completion. See the Committee report for a list of jobs left to do.

(Continued on page 8)

Making a Worm and Wheel (cont)...

by Jim Clark

(Continued from page 6)

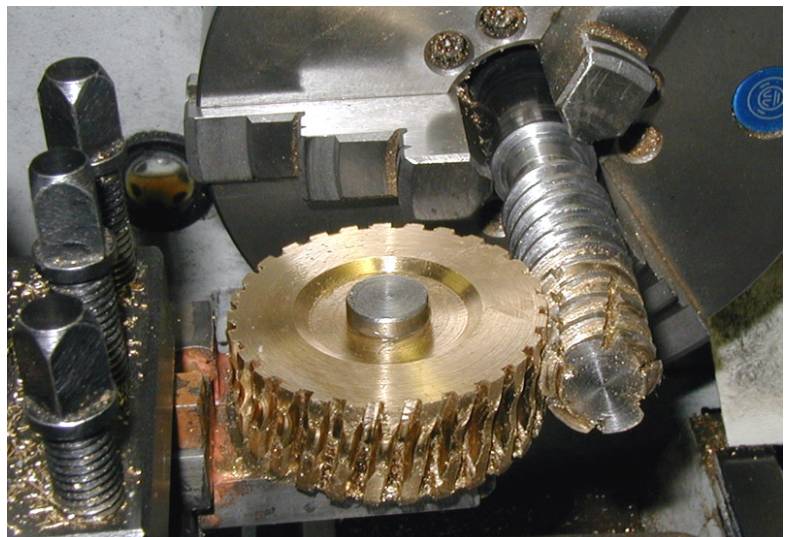
This would give the makeshift worm hob something to grip on so that I would be able to free hob the final tooth shape of the worm wheel in the lathe.

Finally, I made a simple fixture to fit into the lathe toolpost that held the worm wheel blank allowing it to rotate against the worm hob (*see photo at right*). I could then advance the worm wheel blank into the end of the worm using the cross slide, allowing the spinning worm to cut into the brass until the worm wheel teeth were formed to my satisfaction. This only took about 15 minutes to do and was a bit of an anti-climax after all the tense work that preceded it.

It was then a simple job to finish off the worm wheel blank into a nice looking gear and cut off the used hob end of the worm, leaving a worm that perfectly matches the worm wheel.

I would certainly recommend having a go at this even if you feel gears and gear cutting is too technical – a perfectly satisfactory one-off gear set can be produced without expensive gear cutters and with relatively simple tools.

Jim Clark





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Committee Report on GLT Progress



Track progress at the turntable and S.W. corner.

Photos: John Martin



(Continued from page 7)

Section 1 — Steaming Bay

- Steam raising rail is installed complete, but needs checking for level.
- Needs latch for traverser to hold in 7.25 track.
- Needs sliding anchor at turntable to be concreted in.
- Parking rails are drawn but no manufacturing done yet.
- Air supply required for large locos. Also rain water supply.

Section 2 — Turntable to Points

- Turntable needs a clean up and sand fill to make level, also requires handrails and walkways. Position shot bolt required to hold in 4 positions.
- The rail from turntable to points needs to be graded and super-elevation checked.
- It also requires an anchor to turntable wall.

Section 3 — Points and S.E. Corner

- Corner rail needs grading and super-elevation set at 3mm, the telescopic joint needs to be cut and pins inserted.
- Points need improved springs fitted.
- Mechanism needs cover — suggest inverted second hand gutter suitably screwed to supports.
- Sleepers are about finished by sleeper supervisor.
- West side of points need telescopic joint to be cut and pins fitted.

Section 4 — Points to S.W. Corner

- Welded joints need to be checked and cleaned up. Any dips to be raised by special tool.
- Sleepers require nutting up and camber checking.
- 1 curve yet to be made to suit tree alignment.

Section 5 — Twin Trees to N.W. Corner (Container)

- Five curved rails are ready to be laid but held up due to wet weather, need sleepers and welding together.

Section 6 — The Long Straight (This is the one we are all waiting for). Someone has dug a dirty big hole right in the middle of the track because of flooding work in hand. Joking aside, each end of the straight will have telescopic joints to control the Nullarbor type expansion. There will be 3 straights in the loop in front of the station — they are made but due to the hole, not placed. Each end of the loop is a standard type point — one nearly finished, one to go.

Section 7 — Well, you have all seen this bit, it crosses the drive and is now laid forever in concrete.

- A little tidy up around exposed sleepers and a bit more tweaking at the Balcatta-type points. They are not in favour, so this will be the only one with a clickety-clack sound. The straight is finished.
- A concrete pad is required for the scissor lift. Ron Collins to advise.

Tony Jones

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