

# Universal Couplings (or Joints)

2019



First an article from Peter Stuart, Sydney Meccano Club.

Universal joints (UJs) do not transmit constant rotary motion when driving through any angle other than a straight line (zero angle). When driving through an angle, a UJ imparts a cyclical faster and slower rotation to the driven shaft on each half revolution. The amount of this speed variation is dependent on the angle; the greater the angle, the greater the speed variation.

It can be calculated that at an angle of 25 degrees, a UJ rotating at 100rpm will cause the driven shaft to briefly reach a maximum speed of 110rpm in the first quarter revolution then drop briefly to 91rpm in the second quarter. This higher and lower speed variation will be repeated in the next two quarter revolutions. Speed variation causes vibration and noise, and wears out the bearings. So what can be done?

1. Keep the angle of the UJ less than 25 degrees.
2. UJs should always be used in pairs so that three shafts are involved; input, intermediate and output. If the input and output shafts are made parallel then the angle through which the two UJs will be driving will be the same. Diagram 1 shows angle A to be the same for both UJs.
3. Align the forks of the two UJs so that the second UJ will cancel the speed variation caused by the first UJ. It is true that the intermediate shaft will rotate with speed variation, but not the output shaft. Correct alignment is achieved by having the forks aligned at each end of the intermediate shaft in line with each other. Diagram 1 (below) shows this.

Another way to picture the arrangement is that the second UJ is installed as a mirror image of the first. Provided the angles through which the two UJs are operating is the same, another arrangement is possible as shown in Diagram 2. If a drive has to go around a corner of say 30 degrees, then two UJs can be used provided each joint turns the drive through half the angle; 15 degrees in this example (angle B in the diagram). The alignment of forks still has to be the same as described above. The intermediate shaft can be short; in fact so short that the bosses butt against each other. This double universal joint arrangement can be seen in the final drive of articulated earth-moving machinery with all-wheel-drive.

Rear-wheel-drive vehicles have UJs at either end of their tail shaft, taking the drive from the gearbox to the differential. The gearbox shaft and the differential pinion shaft are kept parallel as much as the rear suspension will allow, and the forks of these UJs must be aligned as already explained. The arrangement can often be viewed on large trucks where the driveline is exposed.

Speed variation is the reason why UJs are not used in the drive shafts of front-wheel-drive vehicles. So-called Constant Velocity (CV) joints are used instead, to allow the front wheels to steer while the wheels are being driven. However, CV joints are expensive to manufacture and are not available in the small sizes needed for Meccano models.

## Now some of my own observations

Just how far can you increase the angle before it stops working? I built this neat little demonstrator using a protractor so people can play with it at expos. Even at 60 degrees it still works but you can feel the lumps and it seems to flick over quickly in spots. Watch the YouTube video of the action by following the link below.



<https://youtu.be/VB0JfPMM05Q>

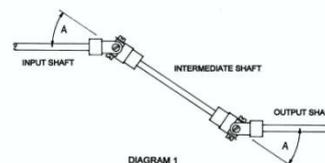


DIAGRAM 1

Diagram 1

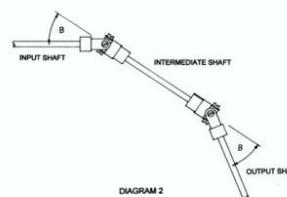


DIAGRAM 2

Diagram 2

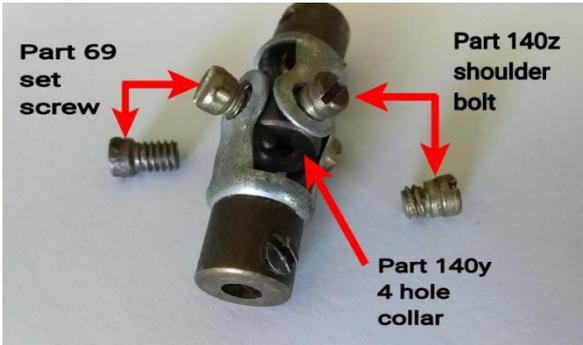


# Phasing

Rob Kirk from England has sent us some info and pics pointing out the importance of correct alignment of the forks when using 2 Universal Couplings. As you can see in the photo the forks must be lined up. To explain it I have included a WIKI extract.



# Shoulder Bolts



Genuine Meccano Part 140 Universal Couplings have Shoulder Bolts but it's common to find them with standard set screws instead. As you can see in the photo the Shoulder Bolt has a section between the bolt head and the thread. This section fits neatly inside the fork hole and prevents play in the fork. They are as rare as hen's teeth so if you see them, grab 'em! Stan Baker in New Zealand has some for sale. He can be contacted at [nzmeccanoman@gmail.com](mailto:nzmeccanoman@gmail.com)

"A configuration known as a double Cardan joint drive shaft partially overcomes the problem of jerky rotation. This configuration uses two U-joints joined by an intermediate shaft, with the second U-joint phased in relation to the first U-joint to cancel the changing angular velocity. In this configuration, the angular velocity of the driven shaft will match that of the driving shaft, provided that both the driving shaft and the driven shaft are at equal angles with respect to the intermediate shaft (but not necessarily in the same plane) and that the two universal joints are 90 degrees out of phase."



In addition to Meccano Universal Couplings there are also Märklin which are very high quality and eBay has very inexpensive (around \$2.00) couplings that have 4mm holes to suit Meccano Rods but unfortunately they have tiny 3mm grub screws that are not compatible. You can still use them as they come but if you want to re-tap the boss threads to 5/32" BSW take a look at the video (above right) with Jazzy demonstrating how it's done.



**YouTube** <https://youtu.be/qYCITS8-VD8>

**Watch Jazzy make a \$2 UJ compatible with Meccano.**

Also the YouTube video below explains the non constant velocity by using a credit card to make an audible sound. The end of the video shows the effect of having the universal couplings out of phase.



**YouTube** <https://youtu.be/gmV4qwLfOMY>



**Hint:** If for some reason you can't click on the YouTube links, just copy and paste them into your browser.

# The Zipper

Jack VanDongen



Wikipedia image

Jack VanDongen loves building fairground attractions and decided to have a go at building an iconic Australian ride called The Zipper. Joe Attard from Malta once visited Australia and was so impressed with The Zipper he modelled it in Meccano and called it the Australian Fairground Model. You can see photos and a video of Joe's model in the nzmeccano gallery here. >> <http://www.nzmeccano.com/image-93620> After studying Joe's model Jack set out to build his own and after overcoming many hurdles he finally had it working but it couldn't rotate a full circle because the slip ring he used to get the power to the rotating motors didn't have a centre hole.



Left. The slip ring Jack got from eBay



Right. The slip ring required with a 5mm through hole for the shaft to pass through.



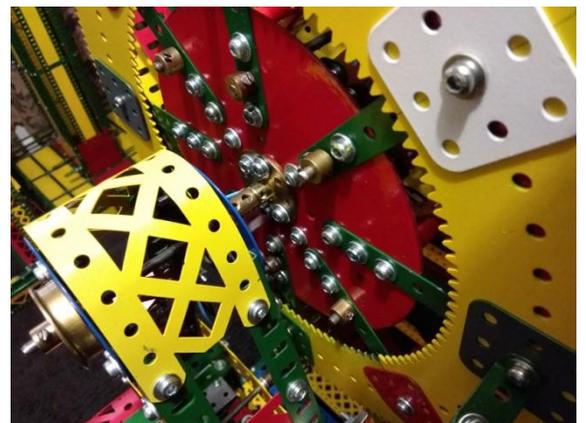
It was going to take months to order another slip ring so Graham Jost, Johnny and myself set off for a wonderful afternoon playing with Meccano at Jack's house. The idea was to install a wiper and commutator but rather than use Elektrikit parts, I opted to make my own using wipers salvaged from old motors and a commutator fashioned from a PC board. See how it's done on the next page.



Top right photo shows the rotating arm. See the blue wire? It has to go.



Left. Jack trying to figure out how we're going to support the whole thing when we pull the rod out.



Right. Where our home made commutator and wiper needs to go.

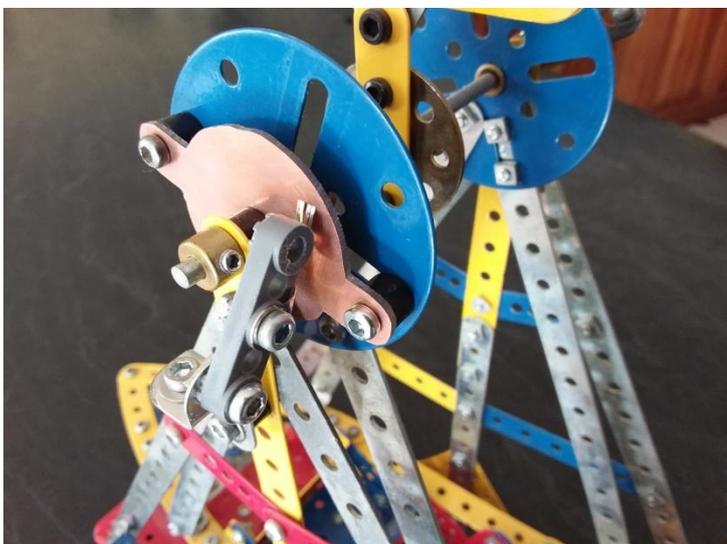
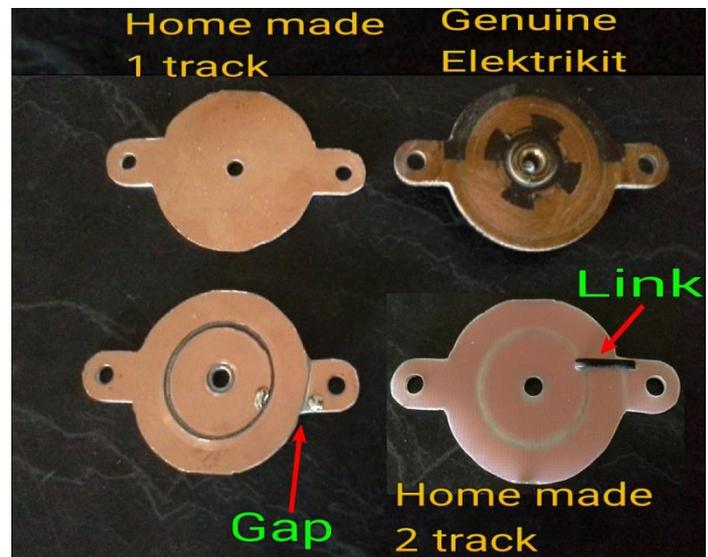


## How to make your own wiper and commutator.

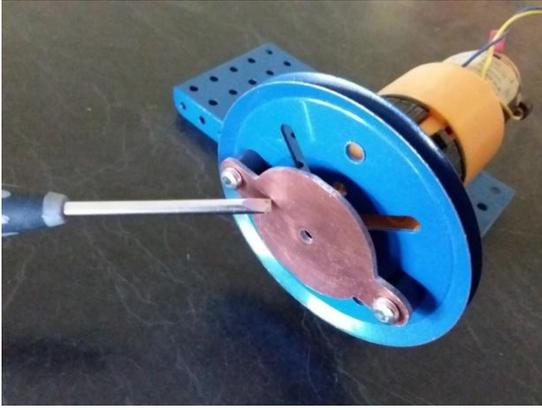
For the wiper you need to buy some solder lugs with 4mm holes to allow a Meccano bolt to fit through. Then you salvage any old DC motors (not stepper) and pull the wipers out. You may have to break the plastic housing or even cut them out with side cutters. Then it's just a matter of soldering the salvaged wipers onto the solder lug. You can mount your newly fashioned wiper onto Meccano plastic parts as shown left. The lug can be bent if required.



In the example above I have mounted the wiper onto a Meccano part number 260c Narrow Plastic Spacer but if you need the wiper to be orientated 90 degrees the solder lug can be bent around the 260c as shown in the example below.



The commutator is rather more difficult as cutting the shape out of a copper clad printed circuit board requires a lot of careful filing. I tried a scroll saw but the blade kept going blunt so I resorted to the mini bench grinder followed by a hand file. You need to remove some copper around the centre hole to prevent the rod coming in contact with it. Paul Dale gave me a good idea to cut the circle out to make the 2 track version. You mount the commutator on a 3" pulley and spin it on a motor. While it's spinning, you push a sharp screwdriver into the copper cladding and it cuts through quite nicely.



After you've cut the copper clad board to shape and drilled the holes you can mount it on a 3" pulley and spin it up. As you push the screwdriver blade in it will score a line through the copper. Much easier than etchant!



**You Tube** <https://youtu.be/mf82Dlxvg9M>

See Jack's Zipper here! 



Robin Rye from New Zealand attempted to convert all his imperial measurements to metric with disastrous results!



**Free Subscription** Email [MeccanoNews@gmail.com](mailto:MeccanoNews@gmail.com) with your email address.



Watch Johnny making Meccano.

**You Tube** <https://youtu.be/KkNIGNaBaes>



After a big day in Melbourne and a long trip on the train it was time for this little Meccanoboy to have a nap and dream of all the skills he learnt making his own Meccano parts. See video link on the right.



# Rob Kirk – Builder, Cartoonist and Hero of Meccanomen.



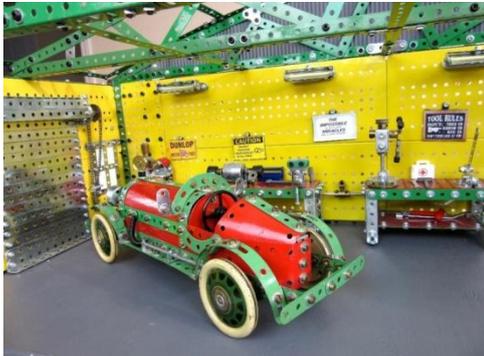
Follow Robin on **YouTube** <https://www.youtube.com/user/lyndakirk>



Rob Kirk from England has developed a Meccano niche with his use of Meccanomen slideshows and cartoon type speech bubbles that make for a most entertaining comic strip style of presenting his worthy Meccano models.



If you follow the YouTube link above to Rob's channel you will be entertained by enthusiastic Meccanomen building planes, trains and automobiles. They even help out Santa with his sleigh!



Ever wondered why Meccanomen have holes in their back?



The memes with the LEGO and Meccanomen are by Johnny Meccano, the garage photos are by Rob Kirk.



I'm going to build a wall..... and the legomen are paying for it!



Let's encourage the Meccanomen and the Lego men to get along and play together nicely.



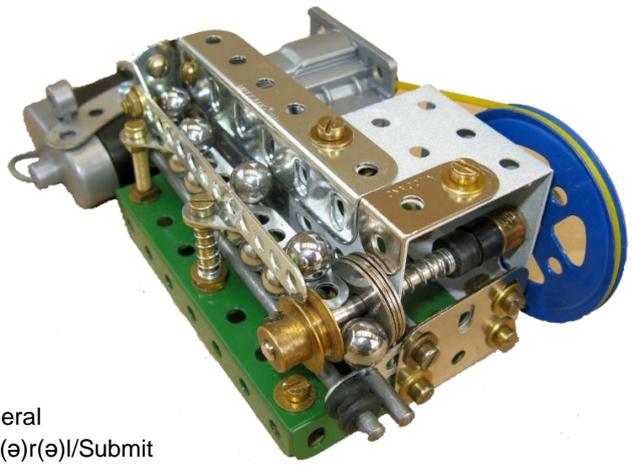
Rob's Instagram



<https://www.instagram.com/robkirk7392/>

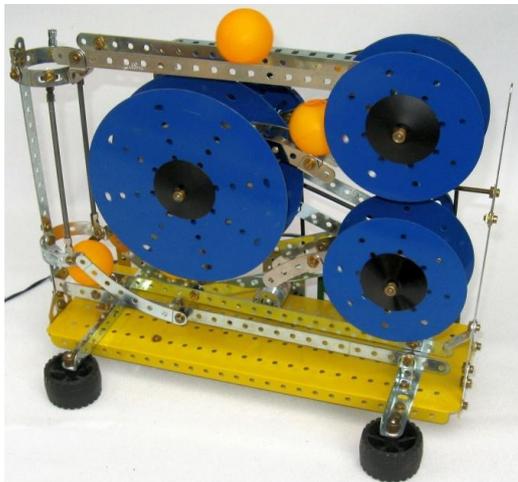
# Peripherators

What are they? Well you won't find the answer in the dictionary, (I checked) but you will find the word peripheral and its derivative periphery. Robin Schoolar came up with the name 'peripherator' 40 years ago to describe the action of ping pong balls following the peripheral path of various components in his ping pong ball rollers. Graham Jost expanded on the idea of this particular breed of ball rollers and graduated from the ping pong ball (which is not a Meccano part) to Meccano balls part number 168d. Now you will nearly always find these referred to as ball bearings, but in fact they are just balls and being described as such leads to much frivolity and hilarity amongst Meccano boys.



peripheral  
/pə'ri:f(ə)r(ə)l/Submit  
adjective

1. relating to or situated on the edge or periphery of something.  
"the peripheral areas of Europe"  
Synonyms: outlying, outer, on the edge/outskirts, outermost, fringe, border, surrounding.
2. (of a device) able to be attached to and used with a computer though not an integral part of it. "A peripheral control processor"



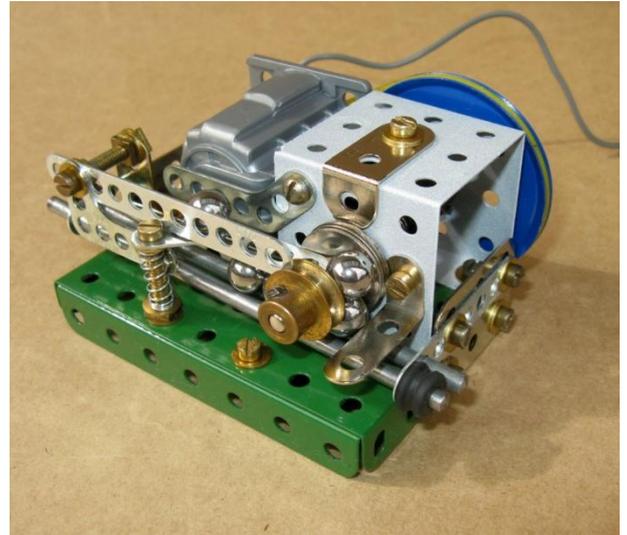
See Graham's  
Ping Pong  
Peripherator here >>



<https://youtu.be/1r8ip6q7pmE>

Now Graham Jost being of enquiring mind and competitive nature started a bit of a challenge to get as many balls as possible circulating at once. You will find 7 versions titled Mark I – Mark VII in Graham's gallery here >> <http://www.nzmeccano.com/image-117673>  
Pictured below is one of his earlier metal ball peripherators.

It's interesting to note that Graham's peripherators are 100% Meccano.



5 Balls



6 Balls

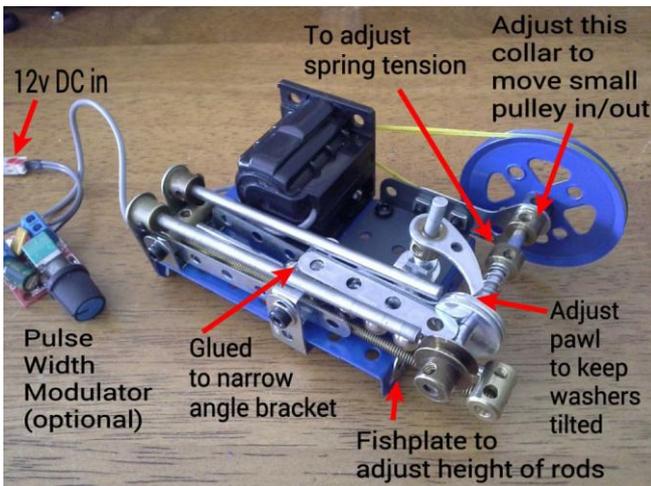


14 Balls!



Above. Using three of Robin Schoolar's ingenious devices to capture and raise ping-pong balls. I have retained Robin's very apt name, describing the paths the balls take near the peripheries of the Meccano Circular Plates.

Below. Johnny's 6 baller trying to 'one-up'



Johnny's 6 ball [YouTube](https://youtu.be/aZx3xHZwL0c) <https://youtu.be/aZx3xHZwL0c>

Graham's 14 ball [YouTube](https://youtu.be/LZjLg0YYU7I) <https://youtu.be/LZjLg0YYU7I>

I give up. Graham wins!



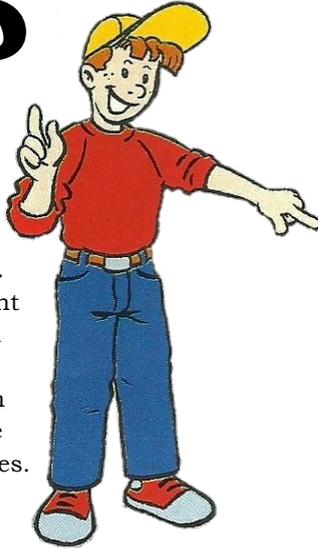
# Smiling Happy Faces



This collage is what I see when exhibiting Meccano.



# Meccano Storage



These Meccano cases are excellent for storage. I've separated my building stock into 9 different categories hence the 9 cases. The trouble with this many case is Murphy's Law dictates that the part you want will always be in the bottom case! With my home made wooden shelves the worst case scenario is you have to move 2 cases. (*Pun intended*). Woodwork is not my greatest strength however this wooden shelf was not particularly difficult and I think the average Meccanoboy would be able to manage it with little more than a hammer, nails and some PVA wood glue. Clamps would be an advantage but it can still be done without them.



Did you know there's a bolt sized in the case?

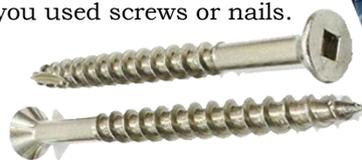


You will need 19mm thick dressed pine that is 275mm wide. These are standard sizes in Australia but near enough is good enough so long as each shelf is cut to exactly the same length. For this reason, you can specifically ask the timber store to use a jig to make sure each piece is cut to identical lengths. Measuring then cutting each shelf by sawing along pencil marks is doomed to fail. Most timber stores will cut to length and usually for free.

After you've had your timber cut to size you should have 6 pieces being 2 sides at 1020mm x 275mm and 4 shelves at 430mm x 275mm. The sides are 1020mm to allow 3 cases on each shelf and takes into account the 19mm thickness of the wood. Run a bead of PVA wood glue along the end of each shelf and clamp the whole unit together as shown below. Each case can be labelled to show what's in it. I have grouped my building stock into 10 groups as shown on the next page. Strips, Girders, Flat Plates, Flexible Plates, Gears, Motors, Narrow Strips and Plastic can all go into Meccano cases but the Fasteners and Brackets are better suited to plastic parts cases that are available from hardware stores or even fishing stores. I like the Tactix brand parts cases (Pictured next page) that have removable tubs in assorted sizes. It's difficult to fish a bolt out of a case but the removable tubs allow you to just pick up the tub and tip the parts you want into your hand.



Before the PVA glue dries you can tap the shelves to get them perfectly square and flush then it's just a matter of screwing them in. I used 75mm square head screws but nails would do. I doubt the shelves would hold the heavy cases laden with parts unless you used screws or nails.





**Strips**



**Girders**



**Flat Plates**



**Flexible Plates**



**Gears**



**Motors**



**Narrow Strips**



**Plastic**



**Fasteners**



**10 GROUPS**



**Brackets**

# Cha Cha

This model began life as a Keith Cameron Carousel, documented in MMGG #13. After the usual struggle to follow Keith's instructions, I lobbed onto Max Morris' model and decided to change course. This model is a close copy of his in all essentials.

I have now found though that the fairground Cha Cha is rather different, being light in construction, sited on a much smaller base, and has four chairs per arm which rotate counter to that of the arms drive. Oh well, never mind: you get the general idea.

The drive is by 15" Binns Road Rubber Band from a tiny 100 rpm N20 motor - you can see it below attached to the base.



The Rubber Band is pressed into service to provide a drive that has built in redundancy. Better to replace a Rubber Band than a motor!  
THE motor is running at about 4 volts and you can see the speed by clicking on the YouTube link below.

**A couple of nasty-looking customers ...**  
I have Meccanomen for all chairs, but not two for every chair.



<https://youtu.be/HzV30i2u9fc>

## Cha Cha the Movie!

The action in starting and stopping is shown here. The rubber band drive copes with the associated inertia inherent in both phases, readily. It should also cope with any little fingers that get in the way.

How long that little motor will last is anyone's guess. Its load is pretty light though, so I'm not anticipating any dramas.



**4 out of 3 people are bad at maths.**

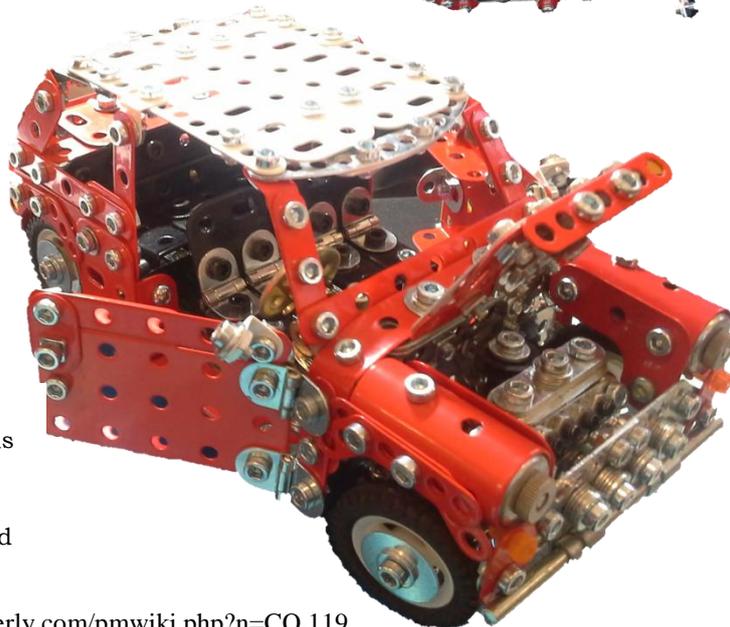
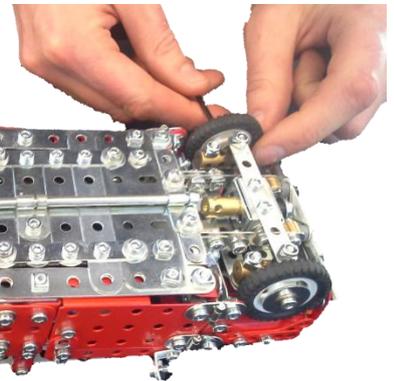


# Mini Cooper

by

**Steve Butterworth**

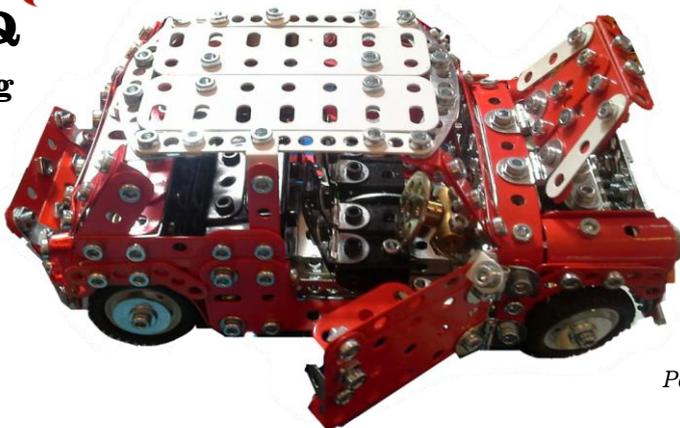
At the Melbourne Meccano Club Expo in October 2017 we were honoured to have Steve Butterworth showing his Mini Cooper. The detail is extraordinary so I took the opportunity to grab some close up photos using my phone. You can see Steve's imaginative use of Meccano parts such as a part number 147 Pawl as a handbrake. Have a close look at the amazing detail in my photo below. Steve must have unsurpassed patience and slender fingers!



Steve attends many meetings and expos in Melbourne and I've taken these photos at various times so you may notice slight changes as the model has evolved. The original roof rack shown bottom right has gone. More details can be found in Constructor Quarterly No.119.

<https://www.constructorquarterly.com/pmwiki.php?n=CQ.119>

**CQ**  
mag





**Graeme O'Neill from New Zealand sends us the following building hints and tips.**

**EXAMPLES OF LOCK NUTTING**

Nut A is adjusted against washers to allow strip X to pivot . Nut B is then used to lock strip Y to bolt..

Nut A is adjusted against washers to allow the strips X and Y to pivot .  
Nut B is then used to lock nut A to the bolt.

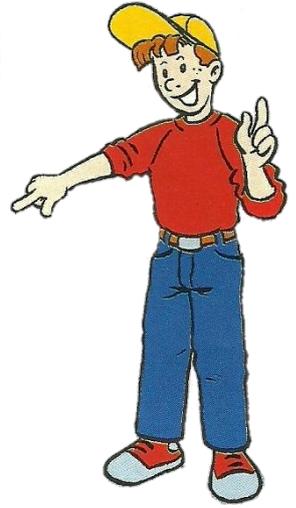
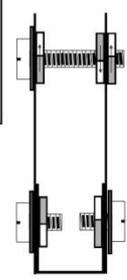
Bolt is fastened to Part M and Part N is loose.  
Nut A is adjusted to give play to part N. Nut B is locked to Nut A  
Nut C and D are adjusted to appropriate distance between parts N and M.  
Nut C and D are locked against part M.

**THREADED RODS CAN BE USED WHEN GREATER DISTANCES ARE ENCOUNTERED BETWEEN PARTS.**

The bolt is fastened to Part H and Parts K and G are loose to pivot.  
Nut A is adjusted to give play to part K.  
Nut B and Nut A are locked against Part H  
Nut C and D are locked together allowing part G to pivot.

Nuts and Bolts A and B hold the threaded crank Z  
Parts X are bolted on later using Bolt C screwed into the threaded bore of the crank.

The coupling (part 63) X is attached with bolt A to part part Y,  
at an early stage of construction.  
Parts Z are bolted on later with bolt B.



**PYTHAGORUS MAKING SQUARE CORNERS**

Sometimes an obscure shape is needed to be built that is based on a square frame. Below are some guides to making Cornered shapes up to 25 holes long.

side 1 holes	side 2 holes	diagonal holes
4	5	6
6	13	14
7	9	11
8	25	26
9	16	18
10	13	16
11	25	27
13	17	21
16	21	26
19	25	31
21	22	30

And a few of the larger combinations.

22	29	36
25	33	41
28	37	46

# What's On



## 38th Sydney Meccano Exhibition

Saturday 27<sup>th</sup> April 2019

Frenchs Forest Baptist Church, 615 Warringah Road, Forestville



Admission: Adults \$6 Children \$2  
 Family: \$12 (max 2 adults 2 kids)  
 Hundreds of models to see. Some working, some interactive.



### Special section for children to play hands-on.

Meccano Modellers Association Sydney <http://www.sydneymeccanomodellers.org.au/>



## Kyabram Vintage Machinery Rally

**MARCH 16 & 17, 2019**  
**Kyabram Showgrounds**

THE 8th AUSTRALIAN WHITE TRUCK MUSTER  
 VINTAGE ENGINE & MACHINERY DISPLAYS  
 MEMORABILIA DISPLAYS  
 FEATURING "ANYTHING BIG, OLD & INTERESTING"  
 VINTAGE & CLASSIC TRACTORS & TRUCKS  
 VINTAGE, VETERAN & CLASSIC CARS & STEAM

**Entry \$5**  
**Under 16 free**  
**Free to exhibitors**

- NH&MRA RALLY GUIDELINES APPLY
- ON-SITE CAMPING FOR RALLY EXHIBITORS ONLY
- SATURDAY EVENING MEAL CATERED FOR EXHIBITORS (BY ARRANGEMENT)
- SUNDAY BREAKFAST AVAILABLE
- STRICTLY NO DOGS ALLOWED IN COMPOUNDS

  
 Kyabram Vintage Engine & Machinery Restoration Group Inc.

For more information and entry forms contact  
 Barb Thomson: 0439 448 444 or Peter Fletcher: 0403 846 412

## The big one.

3 days.



10,000 people each day!

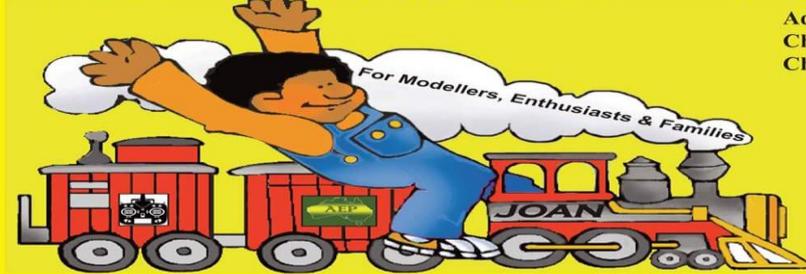
Last year



## On again in 2019, Sat-Mon, 9-11 March.

# TRAIN and HOBBY SHOW

incorporating: **The F1 Air Race**, Model & Hobby Displays plus MORE  
**Sandown Racecourse**, 591-659 Princes Hwy, Springvale. Enter via Princes Hwy (Melways p80, C10)



Adults (16+ years) \$15  
 Children (4-15 years) \$5  
 Children 3 & Under Free.

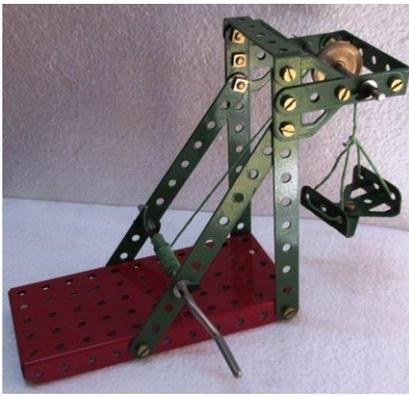
**Applications Open for**  
 Exhibitors, displays, clubs, layouts, traders, retailers, associations, racers, modellers & activities

Sunday 10th March incorporates:

## ALL HOBBIES SWAP MEET AUSTRALIA

[www.trainandhobbyshow.com.au](http://www.trainandhobbyshow.com.au) or [www.facebook.com/trainandhobby](http://www.facebook.com/trainandhobby)





## My First Meccano Model

By Subrata Ghoshal - India

To be very honest, the title of this article should have been “OUR first Meccano model” as it was a joint venture of my late father and me. He gifted me my first Meccano set, Set 1 (and later, a Set 2) about 60 years from now, when I was about 5, The red box had the picture of the giant block-setter crane and opening the cover I was thrilled to see the green, red and brass parts, so elegantly strung over the yellow card. It was evening and he told me that next morning he will help me to takeout the parts and show me how to use those. Meanwhile I may go through the instruction manual. At that age I was not able to read English. So I simply went through the pictures of various models, all new to me. Either at the first page or at the last page of the manual there was a parts list, through sketches of parts. I noticed that some parts were not visible in the box and asked my father about the reason. He replied that those are smaller parts and must be in the small box at the centre of the yellow card.

The next morning we sat together and he unstrung all parts and took out all small parts from the small parts’ box. I was satisfied to see nothing is missing. In fact a few bolts, nuts, washers and spring clips were extra. My father then asked me which model I want to construct? I was not sure which one to start with and he suggested one model, ELEVATOR, model number 0.10 of the manual. Why he suggested that I am not sure. May be instead of constructing a table or a chair, that model would give me a feel of mechanism.

To start with my father said that I should separate out the required parts which were included in the list presented by the side of the model. Then as per his directions I started the construction. Soon I became comfortable with nuts and bolts and usage of spanner and screw driver. However, I was not able to fix the spring clips, where my father came to rescue. All string related works were also done by him. Finally the model was complete. I started rotating the crank shaft and the tray moved up or down.

This movement was too thrilling for me and I became a fan of Meccano immediately. I placed the model at the side of a table and overjoyed to see that the tray almost touched the floor and again moved up. Another thing drew my attention. It is the rotation of the pulley when I operated the crank handle. I thought that the string should slide over the pulley, without rotating it. Another feature of this model drew my attention. How two upright eleven-holed perforated strips are perfectly vertical? I was not aware of Pythagoras theorem at that time.

I reconstructed this model many times and it was my most favourite model. Later I became expert to construct this model without the help of the manual. Today on 14th February 2016, after about sixty years I have constructed it again using all parts from Ashok. Other models are dismantled by me after photography. However, this one would remain with me as I feel the touch of my late father through this model. The touch which still conveys his love and affection to me and introduced me to a very interesting universe of Meccano modelling.

You can see Subrata’s videos here  [https://www.youtube.com/channel/UC6t9pzq\\_ev0Q7f9MV6OkLGA](https://www.youtube.com/channel/UC6t9pzq_ev0Q7f9MV6OkLGA)





# Help!

Send in articles before I run out of ideas.



# Find the Nut

Anthony Els from South Africa has emailed this high resolution photo of his 'Find the Nut' AKA 'Where's Wally' challenge. See if you can find the nut. There are extra points for finding the bolt that has a slotted head and Anthony tells me there's also a grub screw in there. I've found the nut and the bolt but I can't for the life of me find that grub screw. Answer will be revealed in the next edition. High res copy on nzm. <http://www.nzmeccano.com/image-133772>

## MECCANO

ENGINEERING FOR BOYS

### Contribute

Send your questions or stories to [MeccanoNews@gmail.com](mailto:MeccanoNews@gmail.com)

### OUR MAIL BAG



In this column the Editor replies to letters from his readers, from whom he is always pleased to hear. He receives hundreds of letters each day, but only those that deal with matters of general interest can be dealt with here. Correspondents will help the Editor if they will write neatly in ink and on one side of the paper only.



IT'S REAL - IT WORKS - IT'S MECCANO



Do you remember the Meccano Magazines of days gone by that had sections such as Our Mail Bag and From Our Readers? I'd love to get something like that going again so no matter where you are or what you have to say, if it's Meccano related even in the slightest, write to us. You can even advertise your events here and it's all free! Questions will be answered if I can find the answer, if not I'll just publish the question. Someone will know!

## A few of my favourite things.

Our YouTube channel



[https://www.youtube.com/channel/UCIf9tpy\\_JWZOqLSpbVlFERA](https://www.youtube.com/channel/UCIf9tpy_JWZOqLSpbVlFERA)

Sydney Meccano Club <http://www.sydneymeccanomodellers.org.au/>

Online Parts Museum <http://www.nzmeccano.com/Parts.php>

Oscar's list of Meccano part hosted by Tim Edwards <https://www.meccanoindex.co.uk/Misc/partslist.php>

Tim Edwards Meccano Drawings <https://meccanoindex.co.uk/Drawings/Index.php>



We are John & Johnny. A father and son team who like Meccano. We're nothing to do with Spin Master who own the brand. Contact us at [MeccanoNews@gmail.com](mailto:MeccanoNews@gmail.com) Follow Johnny Meccano on

