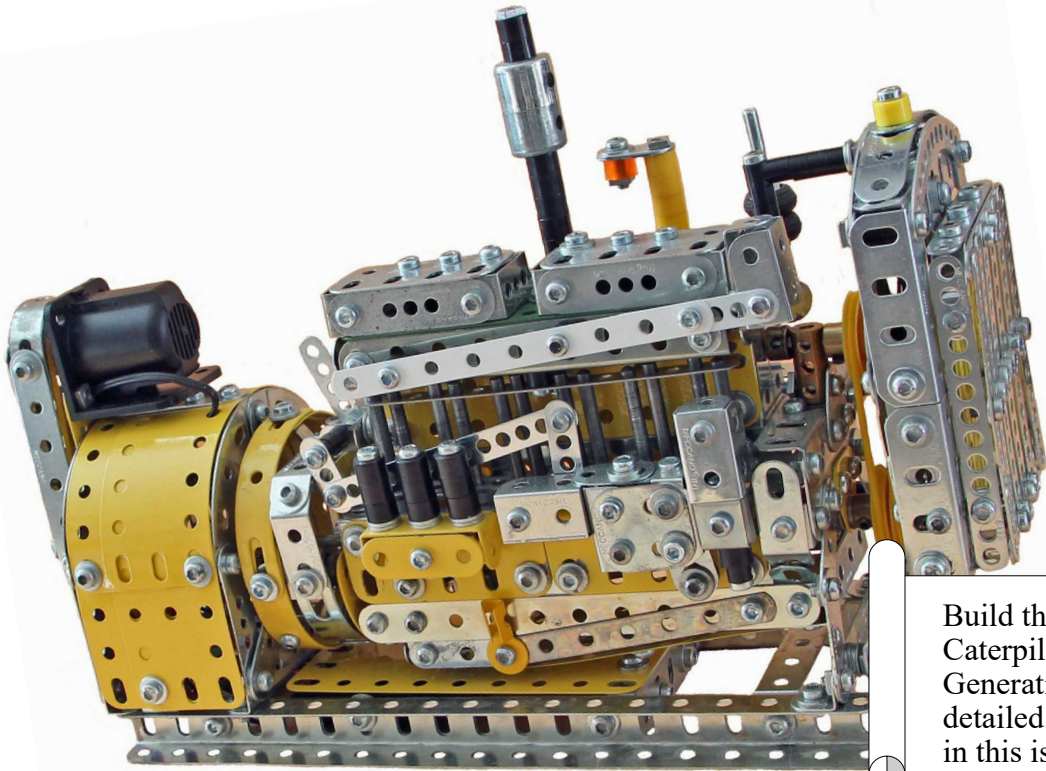




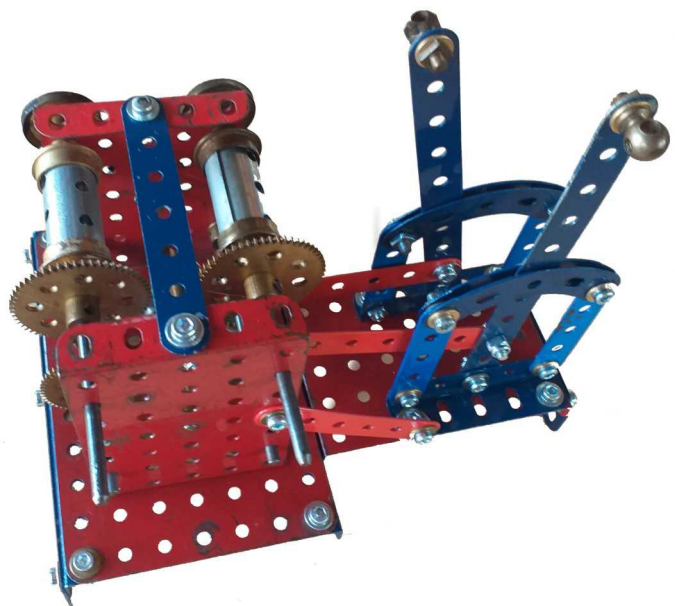
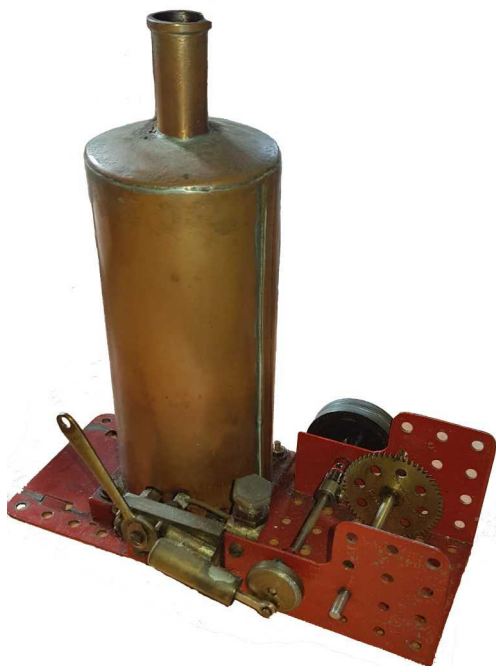
NZEMM MAGAZINE

Volume 44, No. 1

February 2020



Build this intricate Caterpillar D13000 Generating Set. Full detailed instructions in this issue.



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Letters to the Editor

Dear Richard,

With the date and format of the 2021 convention / exhibition set in concrete, I would like to convey to our members how we arrived at our decision.

We will start with the survey which we instigated to try to gauge interest and possible dates as there has always been a issue about the actual Easter dates. To be fair, the returns were disappointing, and I thank those who made an effort to correspond their thoughts. The actual results of the survey showed a preference for before Easter. We were at this time searching for a suitable venue, based on location, accommodation, external activities, car parking restaurants, but mainly price. This is why we agreed on the Waikanae hall. Upon checking possible dates, Easter was out due to another booking, even if we wanted it, and the dates we have chosen was the only dates available, which more or less fitted in with our survey results.

I would like to add here that another reason for the survey was to quell any mumblings that may occur.

Everyone has had a chance to voice their opinions.

Now format of the event.

This was decided by the WMC. We felt that it satisfied the two different factions. No public, members only, and the other faction wanting a public display. As a club, the additional funds that the public display will bring in will further our clubs resources, which is not great. At the moment, some of the projected expenses are being underwritten by some of our members.

I hope this answers any questions and thoughts that many of you may have.

If any readers would like to discuss further please communicate to me

on: reg_barlow123@hotmail.com or 021 955 488

Reg Barlow
 President WMC

Please also see page 8 for other communications.

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Smarten Up Your Meccano

Part 6: Controlling Motors

We've looked at the individual components in a "smart" system – now it's time to start putting them together. Since motors will probably be used in most Meccano projects, we'll look at how they can be controlled from an electronic system. We will look at ways to control the common permanent magnet DC motor first, then go into more detail on stepper motors and RC-type servomotors.

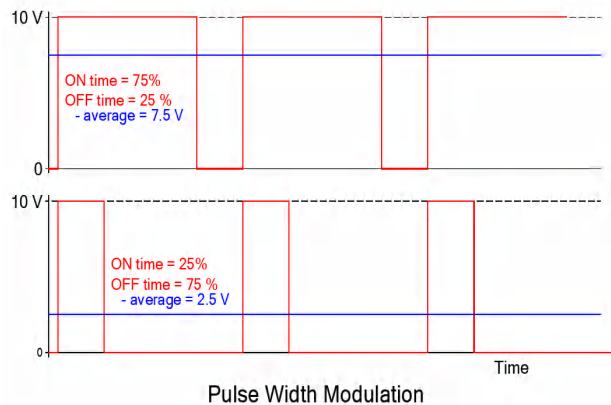
Permanent Magnet DC motors

In a standard DC motor such as those found in small toys or recent Meccano models, the speed depends on the applied voltage, and the torque is proportional to the current drawn. These motors are ideal for applications where we want to adjust the speed. A typical motor of this type will have a nominal voltage of between 3 and 5 V, and draw up to 1 A.

To control the speed of this type of motor, we need to somehow adjust the voltage used to supply the motor. Standard sources such as batteries are fixed-voltage – in order to use them, we somehow have to reduce the available voltage down to the required level. The easiest way to reduce voltage is to use a resistance, but because the voltage drop depends on current draw and therefore on the torque, a change in load will cause a large change in speed. As the battery ages, its output voltage also falls, making performance less predictable. The resistor option also wastes a lot of power and may cause heating problems.

We could reduce the impact of torque changes by using an electronic voltage regulator to drop the source voltage to a controlled level. However, the power dissipated in the regulating device is found by multiplying the voltage dropped by the current passing through it. If a regulating device has a relatively high voltage drop and is carrying a reasonable current, the power it must dissipate is high. For Meccano motors, the voltage range is relatively low and this can also be a limiting factor. It can be difficult to connect a digital device which primarily uses binary or two-valued signal levels to these regulators which require an analogue or multi-valued control signal.

We need a way to adjust the level of a DC voltage from a source that doesn't involve dissipating power or require carefully regulated source voltages. Fortunately, there is a technique that can be used for this – Pulse Width Modulation (PWM). This uses the energy storage capabilities of a magnetic field to convert a stream of fast pulses into an effective voltage that depends on the proportion of time that the pulse is applied. So if we take a 10 V source and switch it on and off rapidly, so that a complete On/Off cycle takes



only a few milliseconds, the effect on a connected motor is the same as if we had applied a reduced voltage. If the voltage is ON for say 0.2 ms and OFF for 0.8 ms, the effective voltage that results is 2 V. If the ON time is increased to 0.75 ms and reduce the OFF time accordingly, the effective voltage is 7.5 V.

An ON switch may handle a heavy current, but because the voltage across it is very low the power dissipation is also low. When the switch is OFF, it draws little or no current so even with a high voltage the power dissipation is again low.

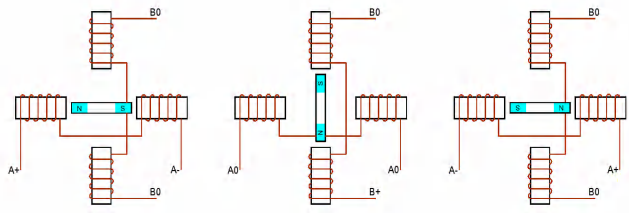
If we want to control the direction of movement as well as the speed, we need to change the polarity of the voltage applied to the motor. The A750 and A761 EMO2/battery box combinations include a reversing switch for this function.

Stepper Motors

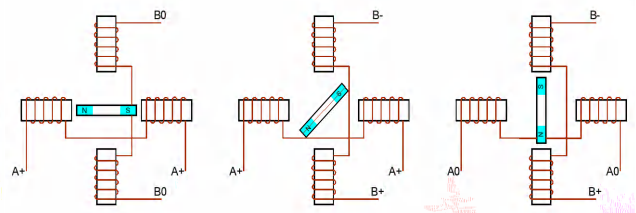
With the PMDC motor, it is not possible to drive the motor to a specific position without some sort of external sensor. If one of these is driven at a fixed speed until it reaches a target position, and is then switched off, inertia will usually mean that it will overshoot to some extent. In many applications we want to know exactly where the motor is, or be able to drive it to a specified location.

The stepper motor is capable of very precise movement. It is ideally suited for these applications. There are several variants. All have several sets of windings, called "phases", which are energised in a particular sequence. In the commonest version, a permanent magnet rotates to line up with the magnetic field set up by the energised coils. In a reluctance motor, a permanent magnet is not used: a specially shaped pole piece is used on the rotor instead.

In the diagram, a very simple two-phase stepper motor is shown. (In practice, a motor will have a number of pairs of magnets and associated windings, called "poles".) In the first position, phase A is energised with the polarity shown, and the magnet aligns with the phase winding. If winding A is de-energised



Stepper Motor Operation



Stepper Motor Operation - Half-stepping

and B energised as shown the magnet moves to the second position. In the third position, phase A is again energised, but in the reverse direction. The sequence to move this motor anti-clockwise through a complete rotation is $A^+ - B^+ - A^- - B^- - A^+ - B^+ \dots$. To move in reverse, the sequence is reversed.

It is possible to make the steps half the size by energising the second phase, then de-energising the first. This is known as half-stepping. In this case, the sequence for a complete anticlockwise rotation is $(A^+, B0) - (A^+, B^+) - (A0, B^+) - (A^-, B^+) - (A^-, B0) - (A^-, B^-) - (A0, B^-) - (A^+, B^-) \dots$

Stepper Motor Performance

The usual mode for a stepper motor is to be in a fixed position. With the more common permanent magnet motor, the magnet will tend to lock on to the iron core of the winding, and will stay there unless the load torque is too high. When the next phase is energised, it must accelerate from rest and move to the next position. This all takes time, and there will be a limit to the maximum speed of rotation which depends on the current available to accelerate the rotor and connected load. When the rotor reaches the next position, inertia will take it a bit beyond before it settles back and there may be some vibration effects that can be amplified by other mechanical elements in the system.

To move a stepper motor continuously, or through some distance, a series of pulses must be applied to each phase in the correct sequence. The difference between these pulses and those we looked at for the PMDC motor is that the pulse rate of the stepper motor must be matched to the natural behaviour of the rotor and load, and must be long enough to move the rotor almost to the next position. For a small stepper that I have tested, the minimum pulse width is around 3 ms. Longer pulses are acceptable but may cause an increase in current drawn. Usually, with the PMDC motor, each pulse is too short to allow significant movement of the shaft.

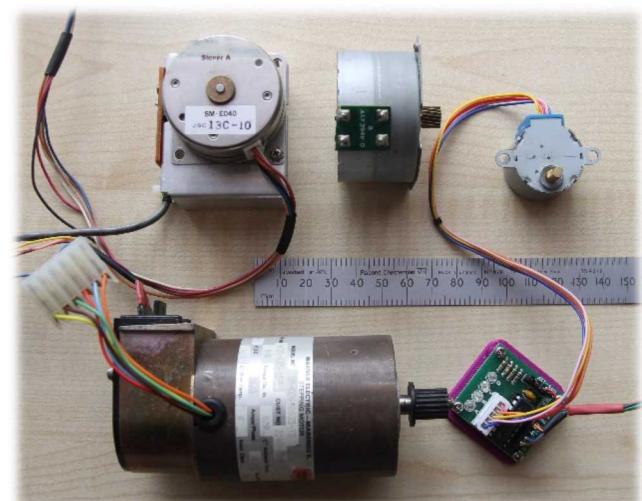
Each step in the sequence will turn the rotor through a specified angle. The angle can be reduced, and the torque increased, by adding a gearbox to the output

shaft. The actual angle per step, and the number of steps for a full rotation of the driven load, will depend on the motor.

Stepper motor types

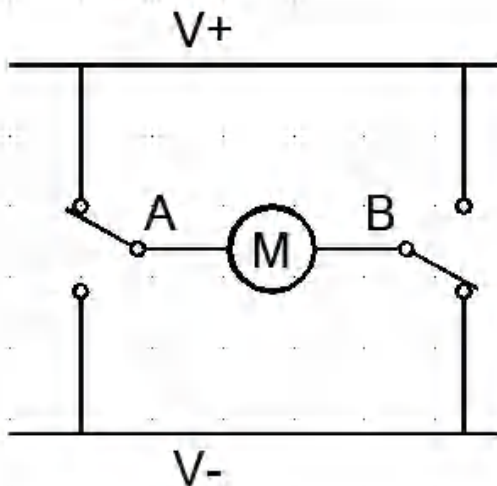
Stepper motors come in a range of shapes, sizes and power ratings. A widely-used arrangement is the NEMA series. This defines a size range but not the performance parameters. NEMA14 has mounting holes spaced 1.024" so is almost Meccano-compatible; the next size up is NEMA17 with hole spacing 1.22", so will require an adapter.

The next photo shows a small sample of what is available outside the NEMA range – many of these have been salvaged from defunct printers or scanners. The small one to the right is a commercially-available unit that comes complete with drive hardware, and is intended for use with Arduino and similar microcontrollers. The motor proper has 64 steps/rev in half-step mode, and the inbuilt gearbox has a ratio of 1:64, giving 4096 steps/rev of the output shaft.



The motor at bottom left is an older unit with an inbuilt position encoder. It is a three-phase unit, and can be operated either as a three-phase synchronous motor or as a stepper. The other two are from printers: one of these also includes a position encoder.

The H-bridge Circuit.



The stepper motor and the PMDC motor are both controlled by applying pulses to motor windings. A circuit that meets the requirements of both is widely available - the H-bridge. H-bridge modules are available for the Arduino and other microcontroller ranges and can be used to control motors of both types using standard software packages. One module available from Jaycar can drive four PMDC motors or two stepper motors (as well as two RC servomotors as described below).

The H-bridge has a circuit arrangement that gives it its name. It uses 4 switches or switching devices, arranged to give two changeover elements. The motor is connected as the central arm of the “H”, and each end can be connected either to positive or negative. If switch A is used to control the direction, PWM on switch B will control speed. The diagram shows a mechanical changeover switch on each side: in practice, various forms of transistor will be used as electronic switches.

There are a few complications to be considered:

- If the two switches in one side of the “H” are closed at the same time, the power supply will be short-circuited.
- Suddenly opening a circuit containing magnetic elements can result in very high surge voltage levels (see “Technical Stuff” below.)
- Turning off both switches in the bottom half, or both in the top half, of the bridge will have

no ill-effects – in fact, the circuit will then act as a brake.

- The voltage needed to operate the motor will usually be different from those used for the control element. Even if the two levels are compatible, it is wise to separate the high-current motor circuit from the low-current processor supply.

R-C Servomotors

The other type of motor that can be useful in Meccano projects is the servo motor as widely used in Radio Control models such as cars and planes. They also use a pulse for control, but in a different mode from either the PMDC or the stepper. While this mode is sometimes referred to as PWM, it is not the same as the PWM used to drive DC motors.

An R-C servo is driven to a selected position rather than continuously rotated. One difference between a servo of this type and a stepper motor is that the servo travel is limited – usually to $\pm 90^\circ$ from a neutral point. The position is set according to the width of a pulse applied to a control signal line, rather than pulsing the power circuit directly. The pulse repetition rate is usually around 50 Hz, but is not critical. The pulse duration controls the output position and is usually 1.5 ms for the neutral position, varying from 1 to 2 ms for rotation angles from -90° to $+90^\circ$. The absolute pulse duration sets the rotation of the output shaft, rather than the proportion of the time the pulse is high.

Unlike PMDC and stepper motors, the control signal used for R-C servos can be connected directly to a microcontroller without risking damage. However, the power circuit for the servo should be connected directly to a supply capable of developing a higher current than is normally available from the microcontroller module. This current will depend on the servo and the torque it is required to develop, and typically could be as high as 500 mA.

Because the control voltage is not connected directly to the servomotor but goes to some internal electronics (including an embedded H-bridge or equivalent) the level of the control signal is not related to the power voltage.

Technical Stuff

We’ve seen that motors rely on the interaction between magnetic fields to develop a torque. In most cases, one of the fields is set up by a permanent magnet while the other is produced by an electric current.

Developing a magnetic field from a current has a “good news – bad news” aspect. In simple electric

circuits, the applied voltage and the resulting current have a direct relationship, with the current resulting from an applied voltage being directly proportional to the voltage (Ohm's Law). If the current acts to set up a magnetic field, any changes to the magnetic field will also develop a voltage component and Ohm's Law must be modified to take this into account. The extra voltage component is proportional to the rate of change of the magnetic field strength.

Changes in the field can come from two causes. If the configuration of the magnetic elements (the magnetic circuit) changes, or if the magnetic field is set up by a moving magnet, a voltage will be developed – this is the process that allows us to generate electricity in the first place. However, if the magnetic circuit is more or less fixed, we can still alter the field strength by varying the current – this is how a transformer works. In this case, the magnetic component of the voltage depends on how fast the current is changing.

If a direct voltage is applied to a magnetic element, the current cannot increase immediately to the final value as set by Ohm's Law but will start to change with an initial rate that depends on the applied voltage. The increase in current causes an induced voltage due to the increasing magnetic field strength, that opposes the applied voltage. As the current increases, the rate of change falls off until the current reaches a steady value set by the element's electrical resistance and Ohm's Law. There are usually no problems with this action.

However, when the voltage is removed, the reverse happens. The current will start to fall, but this causes the magnetic field to fall as well. The falling magnetic field results in an induced voltage that acts to maintain the current flow. For any switching device, this induced voltage is of the opposite polarity to the original source voltage. The voltage level will depend on the circuit resistance: if the resistance is high, a much higher voltage will be induced than if the resistance is low. A high-voltage surge will last for a shorter time than a low voltage one.

The reason for this is that energy is stored in the magnetic field, and this energy is dependent on the current. When a current is first applied, energy must be added. Conversely, when the current is removed, the energy stored in the field must be removed and until this is done the current will continue. When breaking a circuit, the easy option to handle the energy is to dissipate it in resistance – since electric power is proportional to $I^2 \times R$, the energy will be dissipated faster if the resistance is high. However, a high resistance means a high voltage.

The bad news is that if we try to control the current in a magnetic element using electronic devices, the in-

duced voltage when breaking the circuit can increase to destructive levels. If a mechanical switch is used to break the circuit mechanically, the induced voltage **WILL** increase to a level that causes sparking across the switch contacts. These effects can be reduced by various methods, but all have their disadvantages.

The good news is that, by switching the control circuit fast enough, the magnetic field can be maintained through the switching cycle. This is what allows the PWM method to be effective.

Bruce Durdle

MWT

AMG REPORT PICTURES





Auckland Meccano Guild Meeting for November 2019

The meeting took place at the home of **Elizabeth** and **David Wall** in Orewa.

David Wall had built a Merryweather steam tram which operated most efficiently via switchgear of his own design.

Gary Higgins has been constructing a terror fish as seen in the TV series 'Stingray'. This involved the use of a plate and strip bender to form the body shape and two of the crazy inventors globes from the Crazy Inventors helicopter set. Gary also brought along a selection of his Dinky Toys including the mighty *Antar* and centurion tank, The mighty *Antar* and transformer, The mighty *Antar* and ship's propeller, a car carrier with a load of cars and a dump truck.

Mike Stuart is constructing the large block setting crane SML4 and had completed the base which he displayed.

Gerald Hart had built a German Eindecker aircraft from WW1 in green, red and yellow. It was the first plane to have the machine gun firing through the propeller arc, without of course destroying the propeller.

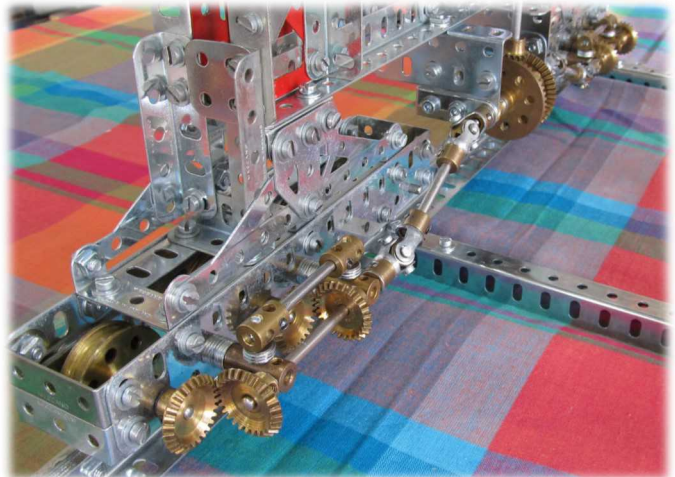
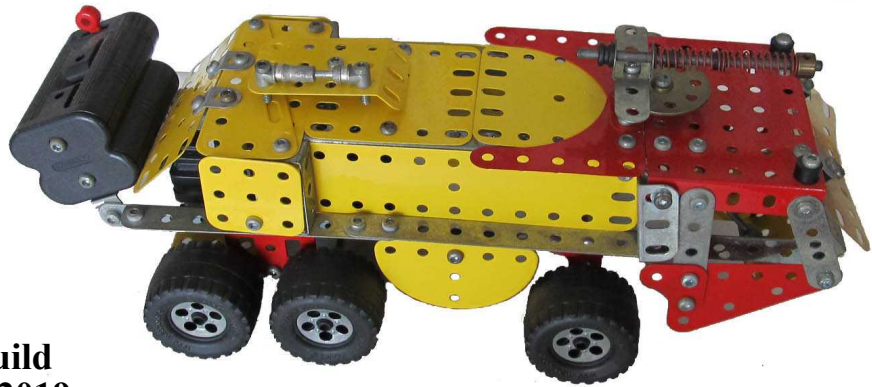
Keegan Wrightson had recently been on a trip to the UK where he scored some nice Meccano sets. He had on display a 1946 no 5 set in blue and green, a 1978 DKB DKY set in mint condition and a fire truck made from the Evolution set 5.

Anthony Caldwell had made a robot from the plans in the Anniversary set.

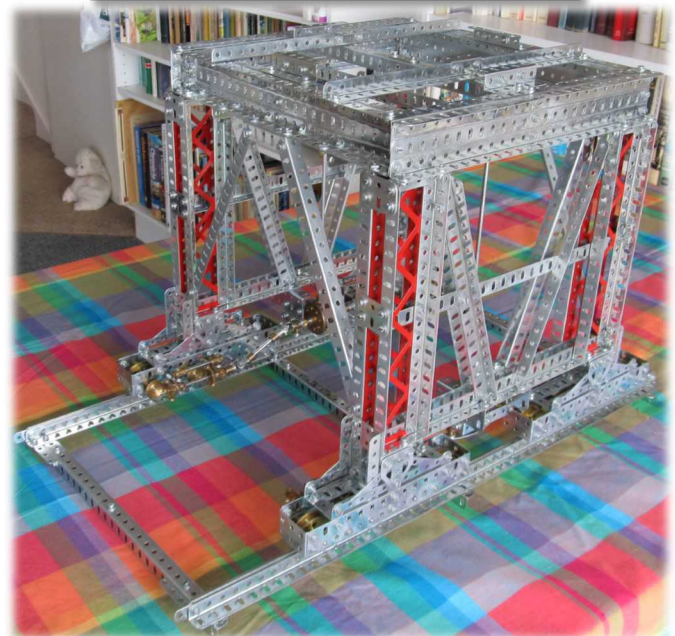
Neil Carey and **David Barnard** also attended the meeting.

A number of members passed on their apologies, **Les Megget** almost made it but was waylaid by car problems.

The meeting closed after an enjoyable afternoon tea courtesy of the ladies.



Mike Stuart's block setting crane.
Definitely a work in progress.
Drive detail (*above*) Overview (*below*)



Hear ye, hear ye:

AMG 2020 Meeting Hosts will be:

- Feb 8: **Les Megget** Aug 11: **David Wall**
- May 9: **Neil Carey** Nov 14: **Les Megget**

The Lament of the Damned

The Damned are, of course, the ragtag bunch of entrants in Competition No 1. My only claim to lament for us all is my inclusion in the honourable mentions – but I cannot see that anyone else has a better claim. So here goes.

It is a fair cop – collectively we all fell at the first hurdle, by failing to identify the correct part 52 from the 1928 parts list. How foolish we all are. However, the results show just what a great mind-bending challenge it was and full credit to our Editor for launching it. In retrospect, the clues he trailed (the bloodied thumb, the mid-red paint, etc.) were brilliant – well done that man. Because of the collective failure already mentioned, none of us got near the model answer; but even more interesting, none of our answers are within a bull's roar of each other! This proves it is a toughie.

We now have the model answer, and is it the last word on the subject? I think not, and I offer the following critique.

1. There is a claim that reversal of the bolt is not allowed by the conditions. I have searched carefully for this instruction and failed to find it. I don't care one way or the other – but it obviously affects the answer by a factor of 2 (approximately: I found one configuration where one cannot reverse a one-and-one-eighth bolt) and I need further assistance on this point.
2. What is with this sliding the bolt along the slot for 0.02 of an inch? What is magic about this distance? This seems to imply that the slot is made up of 25 individual holes 0.02 inches apart – but it is not. It is a slot and one can equally argue that there are 42, or any other number, of different positions there. The only sensible view, given the nature of the competition, is to say the slot counts as one hole. Note also that the same clearance of 0.02 inches with the bolt also occurs on every single hole, which by the same logic would provide at least two “different positions” 0.02 inches apart on every single ordinary configuration.
3. The model answer claims part 52 is asymmetric and all holes count. This is wrong. Imagine a mirror down the centre of the length – both sides are different, because the slot is offset and there is no symmetry. But now imagine the mirror across the long axis and parallel to the slot. This is an axis of symmetry. This means that only 46 of the total 86 holes should count, (counting the slot as one hole).
4. Given that 48d can fit through the slot, there are further positions missing from the model answer. An example is in figure 1. I calculate the configurations with a one-and-one-eighth bolt as 516, without bolt reversal
5. Part 52 comes in at least 3 different forms. The picture in the answer shows a single slot, but I have one with a second, narrow slot connecting four holes (see fig. 2). This probably was originally mid-red in colour – who knows? Anyhow if so, it provides another 60 configurations when 48d is in the narrow slot. Aside from the tab hole, connection is possible only through the slot. This is very conservative, with absolutely no stress on the parts. If some flexing – (i.e. flexing is not inducing a permanent distortion, whereas bending would be permanent) is permitted then there are further positions available. But - we would need an international jury to sort that out. As I say – it's a toughie!
6. Finally, Mr Editor, the petty niggles. You have a typo in your table: two “52LFO”s and no “52RLO”. And, my name appears twice – misspelled the first time, correct the second time. Remember children – “neatness counts”. (*Mea culpa. Ed*)

Ross Quayle (MWMC and WMC).

Fig 1

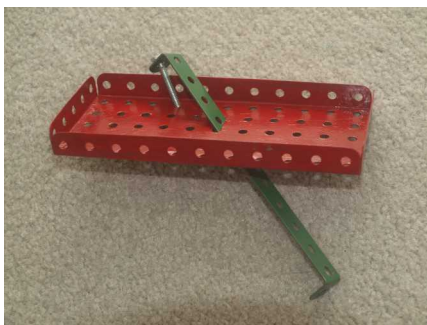


Fig 2



Meccano Caterpillar D13000 Generating Set.

By Bruce Geange, MWT

These units (*figs 1 & 2*) had the Caterpillar D8 Engine connected to an AC generator producing 70KW for the self regulating unit and 90KW for the external regulating unit. The generators I have seen have all been mounted on frames as a complete unit. Pictures for this model were taken during the initial construction and some changes have been made as the model progressed. These will be mentioned as the model progresses.

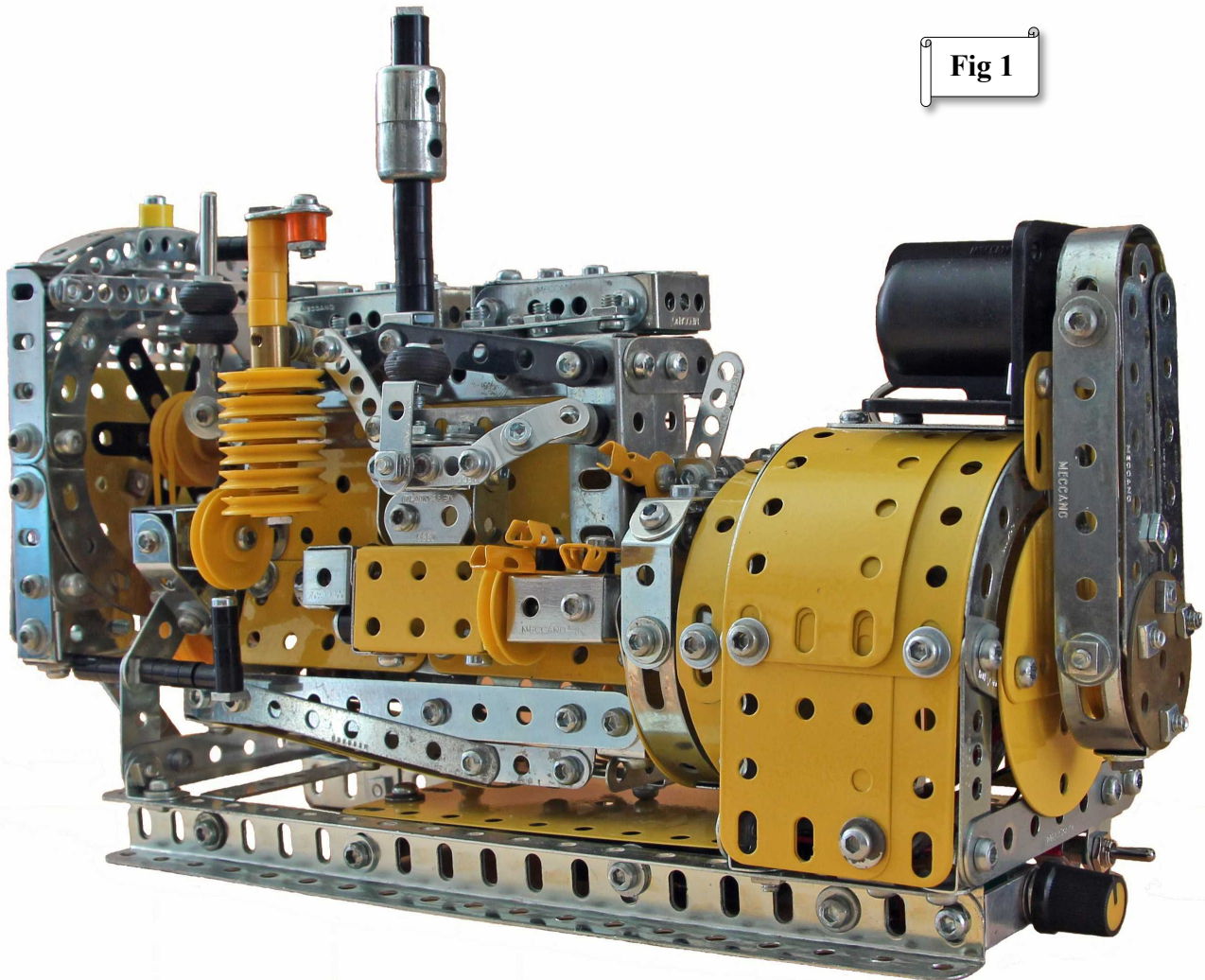


Fig 1

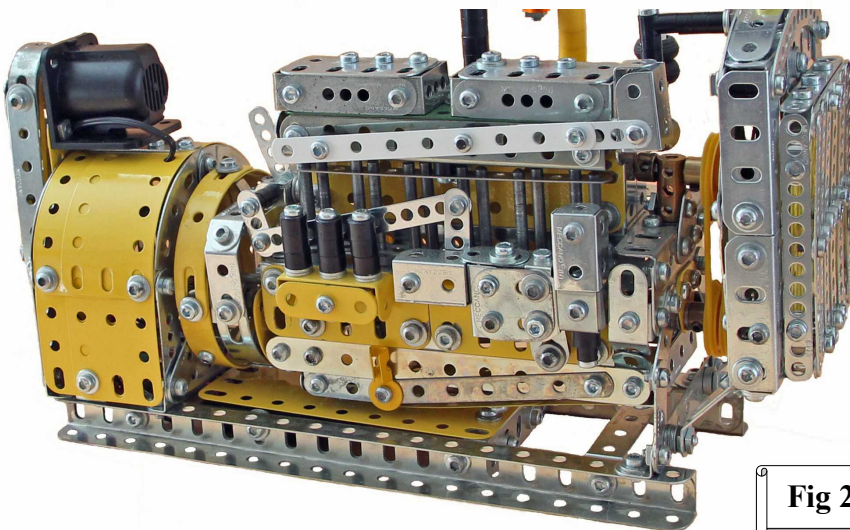


Fig 2

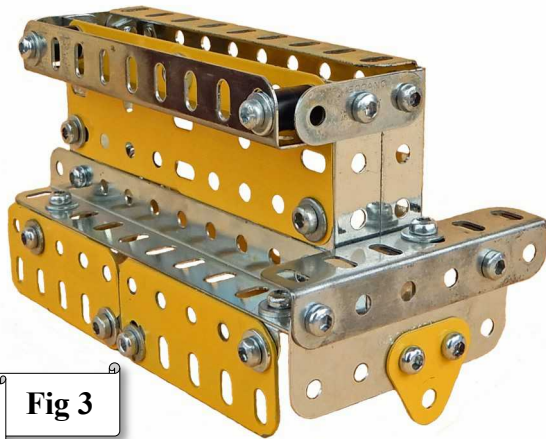


Fig 3

Start by bolting two 2" Angle Girders beside each other by the round holes to a 1 1/2" Strip at one end (**figs 3, 4 & 5**). Make a left and right pair of these for the front and rear of the engine with the spare hole on the 1 1/2" strip facing the right side.

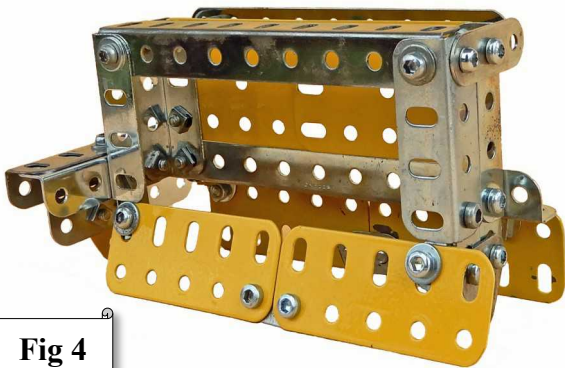


Fig 4

These end pieces are spaced apart on the right side with a 4 1/2" Angle Girder fixed by the slotted holes and spaced with two Plastic Spacers, a Washer and two 2 1/2" x 1 1/2" Flexible Plates using a 3/4" Bolt at either end. Two more bolts fix the flexible plates and below these bolt a 5 1/2" Angle Girder by the round holes. Bolt one Angle Bracket to the slotted hole 3 and two at hole 11 along with a 1 1/2" Narrow Strip on the AG that fits across the rear of the engine. The angle brackets facing the side bolt two 2 1/2" Flat Girders by the round holes and a Fishplate joining the lower edges.

Part of the sump (**fig 6**) is made up using a 5 1/2" Strip, 3 1/2" and 1 1/2" Narrow Strips and a Rod and Strip Connector for the dipstick. This is held together with Fishplates. Each end hole on the 5 1/2" strip has a Threaded Boss fitted and spaced with a Washer, the front also having an Obtuse Angle Bracket. On the back rear left side 2" AG bolt a Rod and Strip Connector in the third hole and spaced with a Mini Plastic Spacer with a 3/8" Bolt. The opposite hole on the right side has a 1/2" x 1/2" Narrow Double Bracket spaced with three Washers using a 3/8" Bolt. Secure a 1 1/2" five hole Narrow Strip to the left side (**fig 1**).

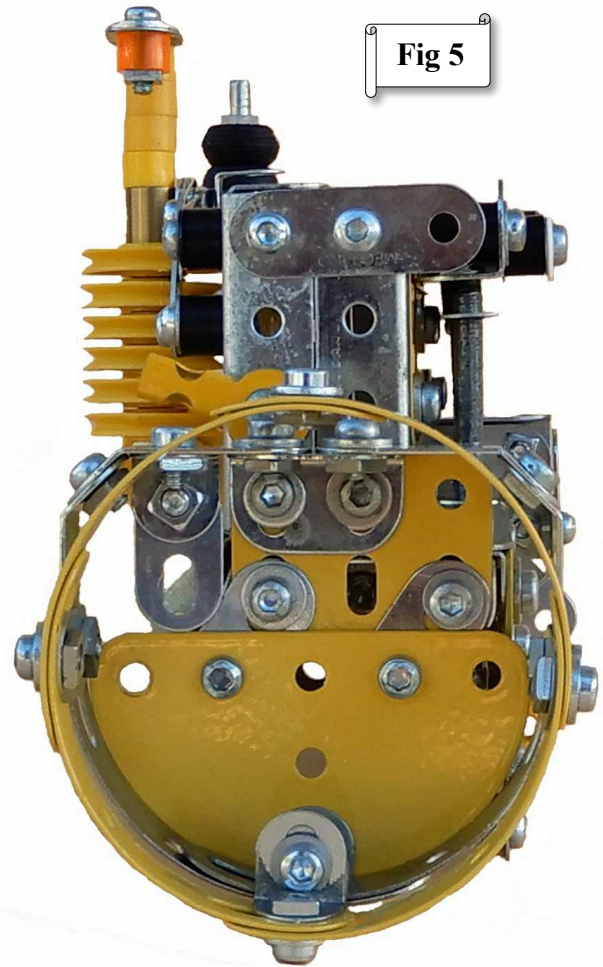


Fig 5

On the left side (**fig 7**) at the top of each 2" AG bolt a 2 1/2" Narrow Strip (I used Black) with a Plastic Spacer next passing through the top hole and the round hole on a 4 1/2" Angle Girder using a 1/2" Bolt. To the centre hole with a 3/4" Bolt fix a Threaded Boss spaced with two Washers and two Plastic Spacers. This is used to hold the tappet covers on. The top of the 4 1/2" angle girder has a 4 1/2" 17 hole Narrow Strip with six Nuts and Bolts representing the injectors in holes 1, 4, 7, 11, 14 and 17. Bolt these to the angle girder in holes 5 and 13 with 3/8" Bolts. Join the two 2 1/2" narrow strips together with a Narrow Angle Bracket for the exhaust pipe at a slight angle. The remaining gap is filled in with two 2 1/2" x 1 1/2" Flexible Plates with a 4 1/2" Narrow Strip at the top spaced with a plastic Spacer held by 1/2" Bolts with a Narrow Obtuse Angle Bracket at the front. Bolt a 2" Angle Girder to the lower front of the engine (**figs 4, 8 & 9**) with the extra holes to the left side.

Fig 6



Add a Fishplate to the left side AG by the round hole with an Angle Bracket fixed to the slotted hole at an angle for the lower engine side plates. Bolt a 3" Angle Girder using holes 3 and 5 without washers to the 2" AG by the slotted holes with a 2 1/2" Flat Girder bolted to the front by the slotted holes. The round end holes on the FG have Angle Brackets with the remaining holes having a 1 1/2" Strip, 1" Triangular Plate and a second 1 1/2" Strip. To these strips add another 1 1/2" Strip with the left side joined with a 2" Threaded Rod for the lower radiator hose and at the ends with a 3 1/2" Strip with Angle Brackets fixed by the slotted holes facing the rear. In hole two from either side secure a 3/8" Bolt from the rear, two Washers and a Nut. The radiator mounts on here. The water pump consists of a 1" Loose Pulley and a 1/2" x 1/2" Double Bracket fixed with a 3/4" Shoulder Bolt. Bolt on each side a 1" x 1/2" Obtuse Angle Bracket to the angle brackets.

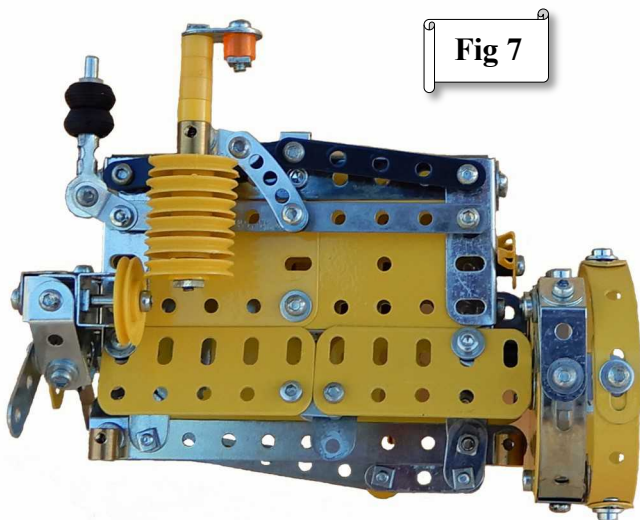


Fig 7

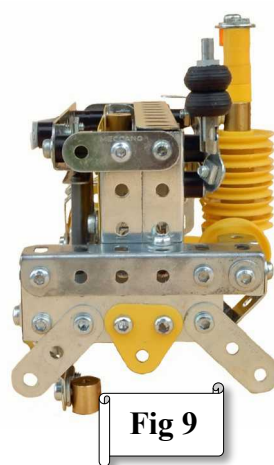
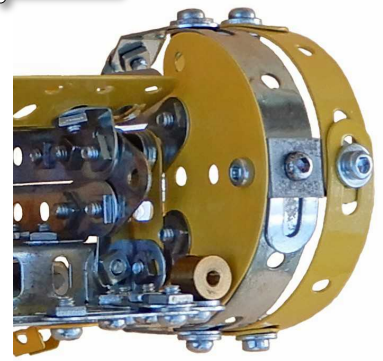


Fig 9

Fig 10



At the rear end (*figs 5,8 & 10*) extend the 2" AGs with Fishplates by the round hole. Bolt a 1" Triangular Plate to the right side fishplate. The left fishplate has a Fishplate (slotted hole), 1 1/2" Flat Girder (slotted hole), three Washers, Plastic Spacer and then through the 1" TP and fishplate with an Angle Bracket by the slotted hole facing out at an angle with a 3/4" Bolt. Two 2 1/2" Flat Girders to complete the left side of the engine secured to the angle brackets by their slotted holes and joined at the lower sides with a Fishplate. A second Fishplate fixes to the rear of the first and spaced with two Washers. At the rear end bolt a Semi-Circular Plate to the fishplates. At the top of the FG bolt a 1" Angle Girder to the left side by the slotted holes. To the round holes bolt two 1" x 1/2" Obtuse Angle Brackets by the slotted holes as part of the bell housing and extend these with another two 1" x 1/2" Obtuse Angle Brackets by the round holes. To these bolt two Formed Slotted Strips with Fishplates by the round holes. Bolt a 1/2" x 1/2" Double Bracket to the Semi-Circular Plate and secure the formed slotted strips. Roll four Formed Slotted Strips (yellow and part of generator) to a smaller radius to make a circle and join at the top with an Angle

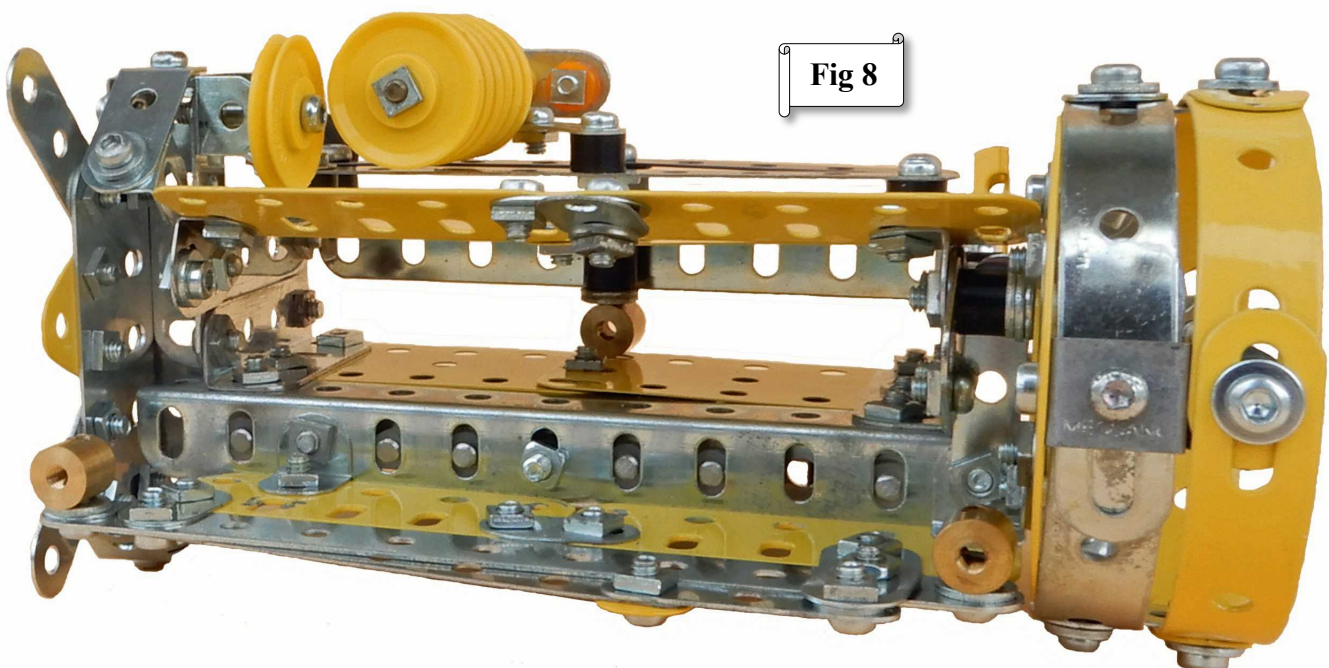


Fig 8

Bracket by the slotted hole with the sides Bolted to the fishplates. The lower ends Bolt to an Angle Bracket by the round hole and fixes to the double bracket. Bolt Angle Brackets by the round holes to the lower round holes on the formed slotted strips facing out. Bolt $1\frac{1}{2}$ " Strips to the angle brackets. Two $2\frac{1}{2}$ " Curved Stepped Strips (*fig 11*) bolt to a Fishplate and Angle Bracket by the round holes. The fishplate bolts to the angle bracket at the top of the clutch housing. The CSS are extended with 2" Strips and Angle Brackets by the round holes. These join with the $1\frac{1}{2}$ " strips and have a $3\frac{1}{2}$ " Strip across the base with Angle Brackets by the slotted holes facing the rear.

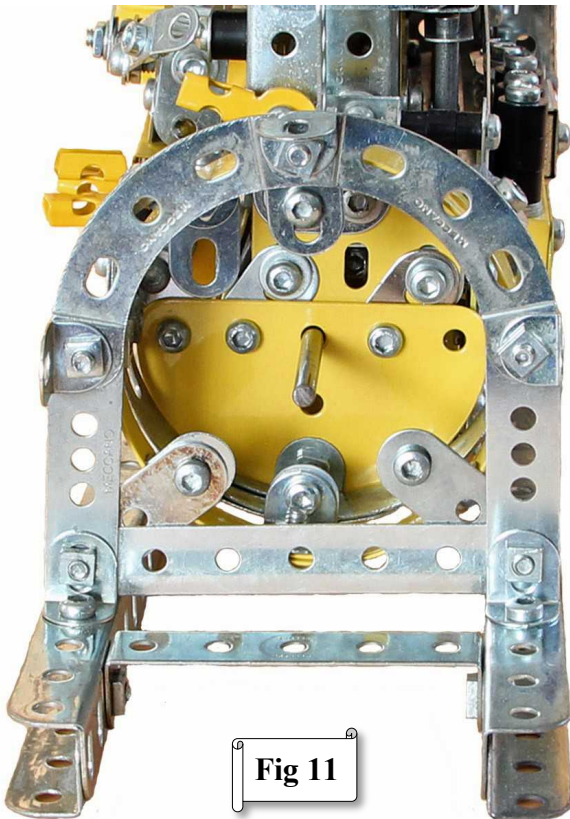
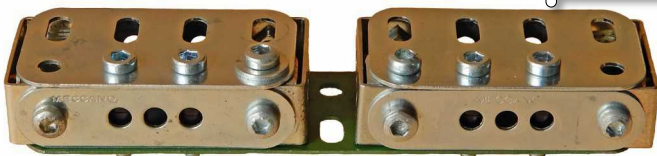


Fig 11

The right side of the engine has the valve pushrod covers (*fig 6, previous page*) represented with $1\frac{1}{2}$ " Axle Rods. These fit into two $4\frac{1}{2}$ " 17 hole Narrow Strips and are fitted in pairs. Plastic Grips hold axle rods from the front in holes 1, 5, 7, 11, 13 and 17. Fit these axles first and bolt the narrow strip in place with the mini spacer. Fit all axles in place including the top strip and fix in place with the second mini spacer. The white $4\frac{1}{2}$ " Narrow Strip is the water feed line to the engine and mounts at an angle spaced with Plastic Spacers in holes four and eight (not as shown). The front hole carries a 7 hole 2" Narrow Strip fixed in hole four. To the front hole bolt a $1\frac{1}{2}$ " Flanged Plate with an Angle Bracket with a $1\frac{1}{2}$ " Angle bracket to the other hole. Bolt a threaded Rod End Eye (C863) to the top opposite hole facing up and tighten to the position required.

Fig 12



Make the tappet covers (*fig 12*) from two 2" Strips bolted either side of $1\frac{1}{2}$ " Double Angle Strips with an Angle Bracket in one corner. Bolt a 2" Flat Girder to each angle bracket. Bolt these by the round holes to the slotted holes on a $4\frac{1}{2}$ " Flat Girder spaced with two Plastic Spacers on each $\frac{3}{4}$ " Bolt. This assembly bolts to the threaded boss on the top of the engine by the slotted hole and spaced with a Washer.

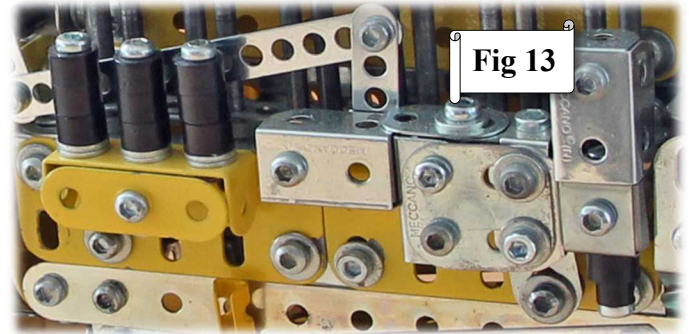


Fig 13

Accessories on the right side are the oil filters and the injector pump (*figs 13 & 14*). For the oil filters use a $1\frac{1}{2}$ " x $\frac{1}{2}$ " Double Angle Strip with the three filters attached each made from three Plastic Spacers and two Washers held in place with a 1" Bolt. The centre filter also has an Angle Bracket fixed below with a $1\frac{1}{2}$ " Strip fixed to the slotted hole using a $\frac{3}{4}$ " Bolt with an extra Nut for securing to the engine side on the rear flat girder in the centre round hole. The injector pump has a 1" Angle Girder bolted by the slotted holes to the round holes on a 1" Flat girder. A $1\frac{1}{2}$ " Double Angle Strip bolts to the top round hole on the AG with a 1" Flange Plate on top. The slotted end hole has a 1" Small Trunnion (C860) bolted with the top hole having a Narrow Angle Bracket fitted at the rear. Two Fishplates fill in the gap at the top. Bolt a Fishplate to the lower hole spaced with a Plastic Spacer. The slotted hole has the same again ready for bolting to the front FG in slotted hole two. The other hole on the 1" TP has a $\frac{1}{2}$ " x $\frac{1}{2}$ " Double Bracket with a second bolted to it making a box. To the lower hole fix a Mini Plastic Spacer and a Plastic Spacer with a $\frac{1}{2}$ " Bolt. A $1\frac{1}{2}$ " Double Angle Strip to the top hole with a 1" Flanged Plate.

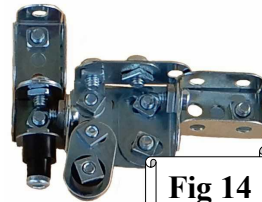


Fig 14

On the left side we have the air cleaner and starting engine with gearbox (*figs 7, 15 & 16*). The water pump has been dealt with. For the air cleaner six 1" Loose Pulleys are held together by a 3" threaded Rod, Threaded Boss and a Nut. To the top add four Plastic Spacers, Fishplate and a Nut. Fix a Plastic Spacer to the other end of the fishplate. Bolt a 1" Narrow Strip to the threaded boss spaced two Washers and extend this with a five hole Narrow Curved Strip. This bolts to the middle hole of the $4\frac{1}{2}$ " narrow strip spaced with a Plastic Spacer. The starter motor crankcase is built around a $1\frac{1}{2}$ " x $1\frac{1}{2}$ " Flanged Plate with a $1\frac{1}{2}$ " Angle Bracket bolted to the front end with a Washer and Plastic Spacer in the lower hole on the AB. The top hole has two $\frac{1}{2}$ " x $\frac{1}{2}$ " Double Brackets with an Angle Bracket on the next hole by the round hole. This is where it

mounts onto the main engine spaced with two Washers and a Plastic Spacer. The other end of the FP has an Angle Bracket fixed by the round hole and spaced with two Washers. A 1" x 1/2" Double Angle Strip bolts here with a 1" Loose Pulley in between. Bolt a Fishplate to the other end of the DAS spaced with a Washer for the second mounting point. Bolt a 1" x 1/2" Flanged Plate to the front of the DAS and fix three Rod and Strip Connectors spaced with Mini Plastic Spacers (fig 15). At the top of the 1" x 1 1/2" FP bolt a 1" Small Trunnion and a Fishplate to the front hole by the slotted hole fixed at an angle. An 1 1/2" five hole Narrow Strip becomes the manifold that is bolted to a 1" x 1 1/2" Narrow Double Angle Strip and spaced with Mini Spacers using 3/8" Bolts. A 1" x 1/2" Narrow Angle Bracket is fixed in between the manifold bolts and has a Plastic Spacer with an Aero Tyre fitted for the air cleaner. Fix this assembly to the fishplate using one of the manifold bolts. Extend the manifold with two Narrow Obtuse Angle Brackets. 1" Narrow Strips extend the sides with a 1" x 1/2" Angle Bracket at the rear end. Two Nuts and Bolts with two Washers on each represent the spark plugs. The front mounting bolts to the third slotted hole from the front spaced with a Plastic Spacer and the fishplate bolts to the semi circular plate at the rear.

An 8" Axle Rod fits through the two triangular plates and the semi circular plate with a Collar and Washer behind the front triangular plate. This axle should turn freely. Two 1" Pulleys are fitted back to back (fig 17 overleaf) at the front of the engine with a Washer. Bolt a Coupling to the top 1" TP using a 1/2" Bolt and Nut. The fan was made from a 2" Axle Rod with a Collar, Aero Tyre and Plastic Spacer, three 2 1/2" Black Narrow Strips, 1" Loose Pulley, 1" Pulley then through the coupling with a Collar on the end. Fit two driving Bands to suit. The sump can be constructed from the pictures (figs 18 & 19) and fitted to the fishplate and threaded bosses.

Fig 15

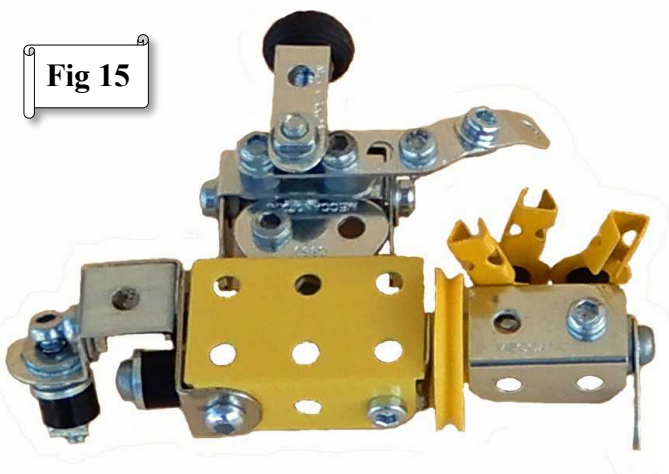


Fig 16

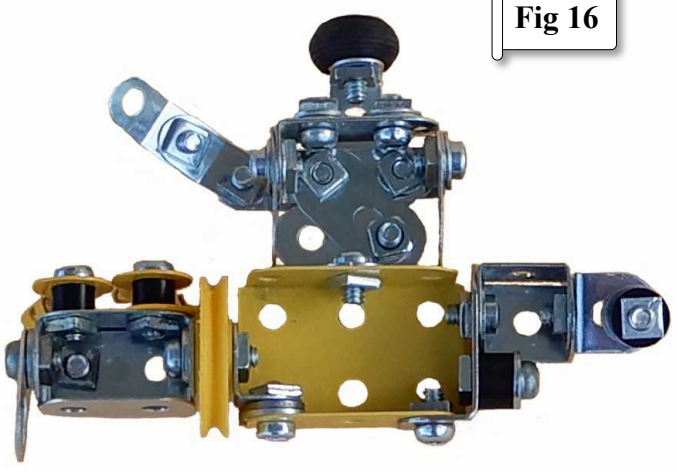


Fig 18

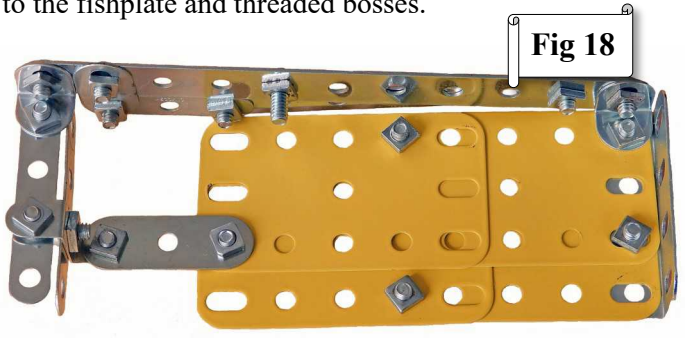
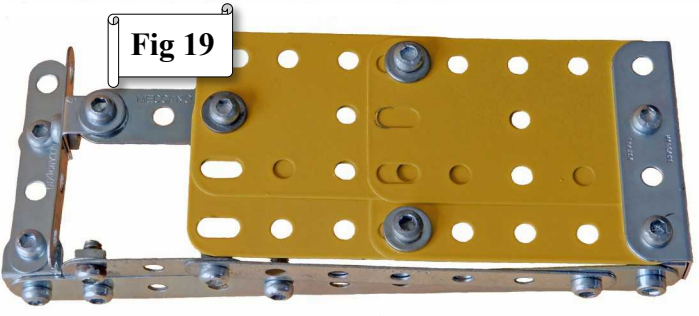


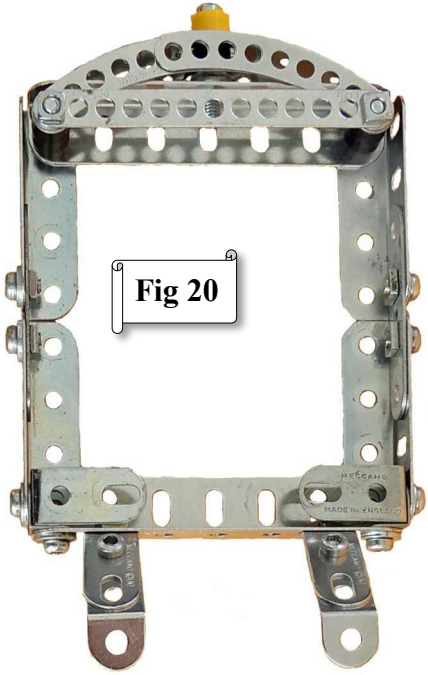
Fig 19



Two 9 1/2" Angle Girders on each side make up the engine mounting frame and spaced apart with two 2 1/2" x 1/2" Double Bent Strips Bolted three holes from each end. The angle brackets on the engine fix at holes two at the front and four holes in from the rear end.

The radiator sides (fig 20) were each made from two 2" Angle Girders joined by the slotted holes with 2" Strips and joined at the base by a 3 1/2" Angle Girder held with Angle Brackets and a 1" x 1/2" Angle Bracket at the rear. Bolt a 1" x 1/2" Obtuse Angle Bracket to the base of the angle girder one hole in from either side by the short end. Add a second Obtuse Angle Bracket to these for

Fig 20



mounting of the radiator. The top part of the radiator has two nine hole Narrow Curved Strips at the front with a $3\frac{1}{2}$ " Angle Girder behind the sides followed by two Plastic Spacers, two nine hole Narrow Curved Strips and a $3\frac{1}{2}$ " thirteen hole Narrow Strip secured with a $\frac{3}{4}$ " Bolt and a Nut. In hole six on the right curved strip fix a 1" Bolt for the top hose with two small Washers, two Mini Plastic Spacers and a threaded Rod Eye End. Two 2" Slotted Strips with a slight curve make the top of the radiator held with a 1" Bolt, Yellow Plastic Spacer, the two strips, Plastic Spacer, three Washers then fixed to the top AG. The fan shroud was made using four $2\frac{1}{2}$ " Curved Stepped Strips Bolted at the top as shown (*fig 21 opposite*).

The sides of the oil cooler (*fig 22*) consist of two $3\frac{1}{2}$ "thirteen hole and two eleven hole Narrow Strips joined at the corners with Narrow Obtuse Double Brackets. The front consists of six $3\frac{1}{2}$ " thirteen hole Narrow Strips and three eleven hole Narrow Strips Bolted as shown with a $2\frac{1}{2}$ " x $2\frac{1}{2}$ " Flat Plate fixed to the centre hole and spaced with two Washers using a $\frac{3}{8}$ " Bolt. Fix an Angle Bracket to the top centre hole by the round hole and bolt this unit to the top slotted hole on the radiator. Two $\frac{3}{4}$ " Bolts hold the lower end secured four holes from each end. The radiator can be fixed to the $\frac{3}{8}$ " bolts at the front of the engine with the two rod eye ends at the top bolted together and spaced with two Mini Plastic Spacers. The 2" threaded rod has four Mini Plastic Spacers either side of the nuts with a threaded Rod Eye End at the pump end with a 23mm Pivot Bolt and three Mini Plastic Spacers fix to the rod eye end.

For the generator (*fig 23*) bolt Angle Brackets in the end holes on the frame facing the rear and in the second hole facing out by the round holes. The casing consists of two $5\frac{1}{2}$ " x $1\frac{1}{2}$ " Flexible Plates for the top and two $2\frac{1}{2}$ " x $1\frac{1}{2}$ " Flexible Plates each side all overlapped two holes then bolted to the front angle brackets and the two at the base. A 2" Strip fixes across the top. The generator end has two $2\frac{1}{2}$ " Curved Stepped Strips, two 2" Strips with three Fishplates, Angle Bracket and $1\frac{1}{2}$ " Flat Girder at the top bolted together. Bolt two Semi Circular Plates to the fishplates lined up for the axle rod extension. Use a $\frac{3}{4}$ " Bolt in the top fishplate hole for mounting the belt cover. Place a $3\frac{1}{2}$ " Strip at the end of the 2" strips and bolt to the angle brackets. Fix a Universal Coupling to the 8" axle rod and extend with a $1\frac{1}{2}$ " Axle Rod and fit a 1" Pulley. Bolt a 6 volt Meccano Motor to the flat girder and fit a $\frac{1}{2}$ " Pulley with a driving band. Run the cable inside the generator housing. The belt cover is seen in (*fig 24*).

Bolt a $2\frac{1}{2}$ " Angle Girder by the round holes to the end of a $4\frac{1}{2}$ " x $2\frac{1}{2}$ " Flexible Plate and a $2\frac{1}{2}$ " x $\frac{1}{2}$ " Double Angle Strip bolted to the slotted holes on the AG. This assembly bolts to the main frame seven holes from the front resembling the top of the fuel tank. Bolt a second $2\frac{1}{2}$ " x $\frac{1}{2}$ " Double Angle Strip to the frames for the AAA battery holders to fit in. If a speed control is fitted a supply of six volts is required

and if no speed control is used three volts will be plenty with possibly a smaller pulley on the motor (*fig 25*).

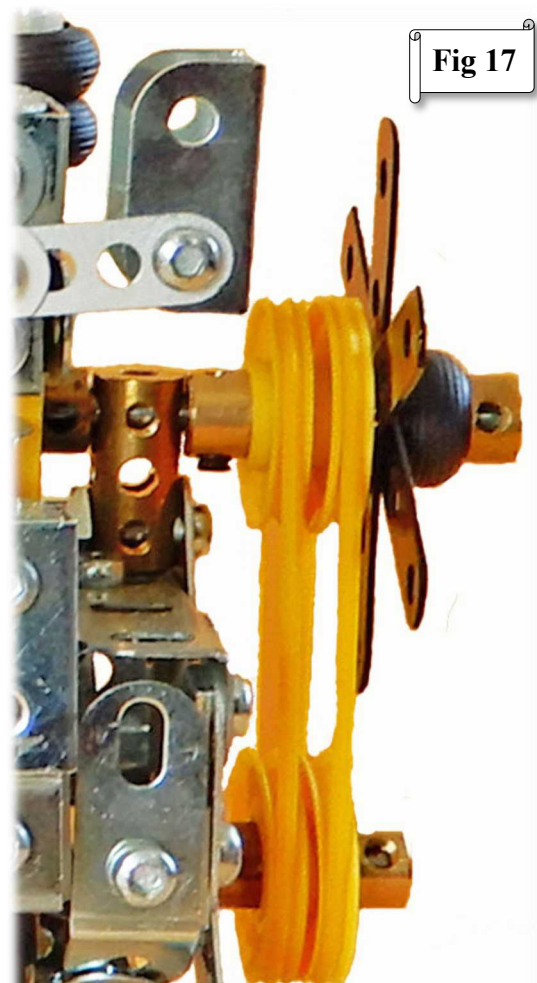


Fig 17

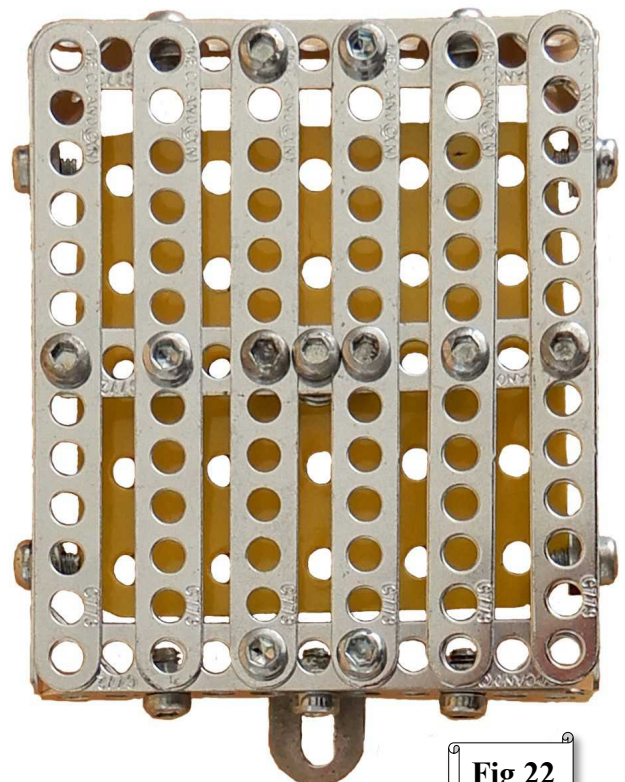


Fig 22

Fig 21

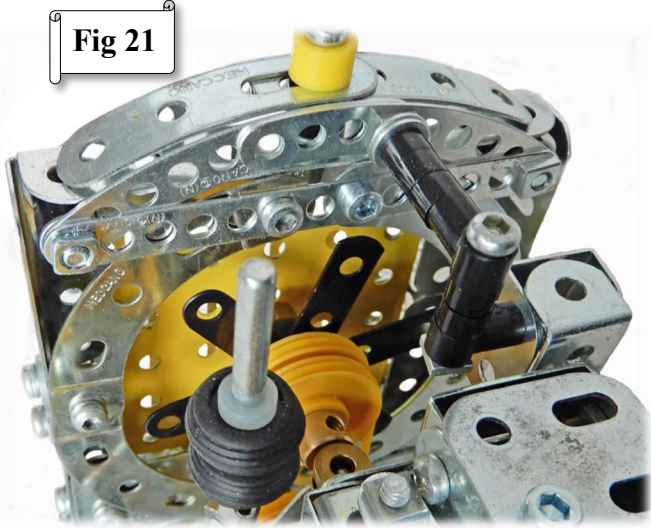


Fig 23

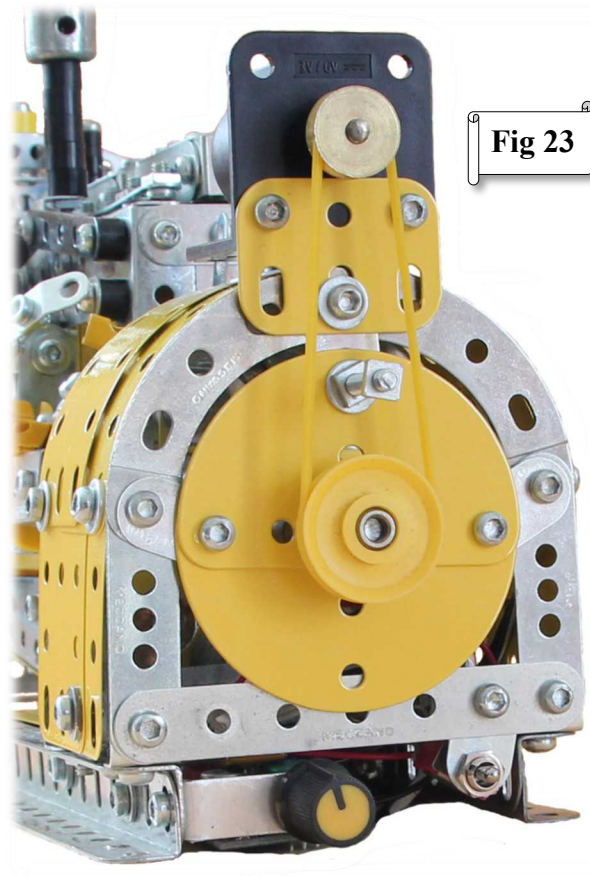


Fig 24

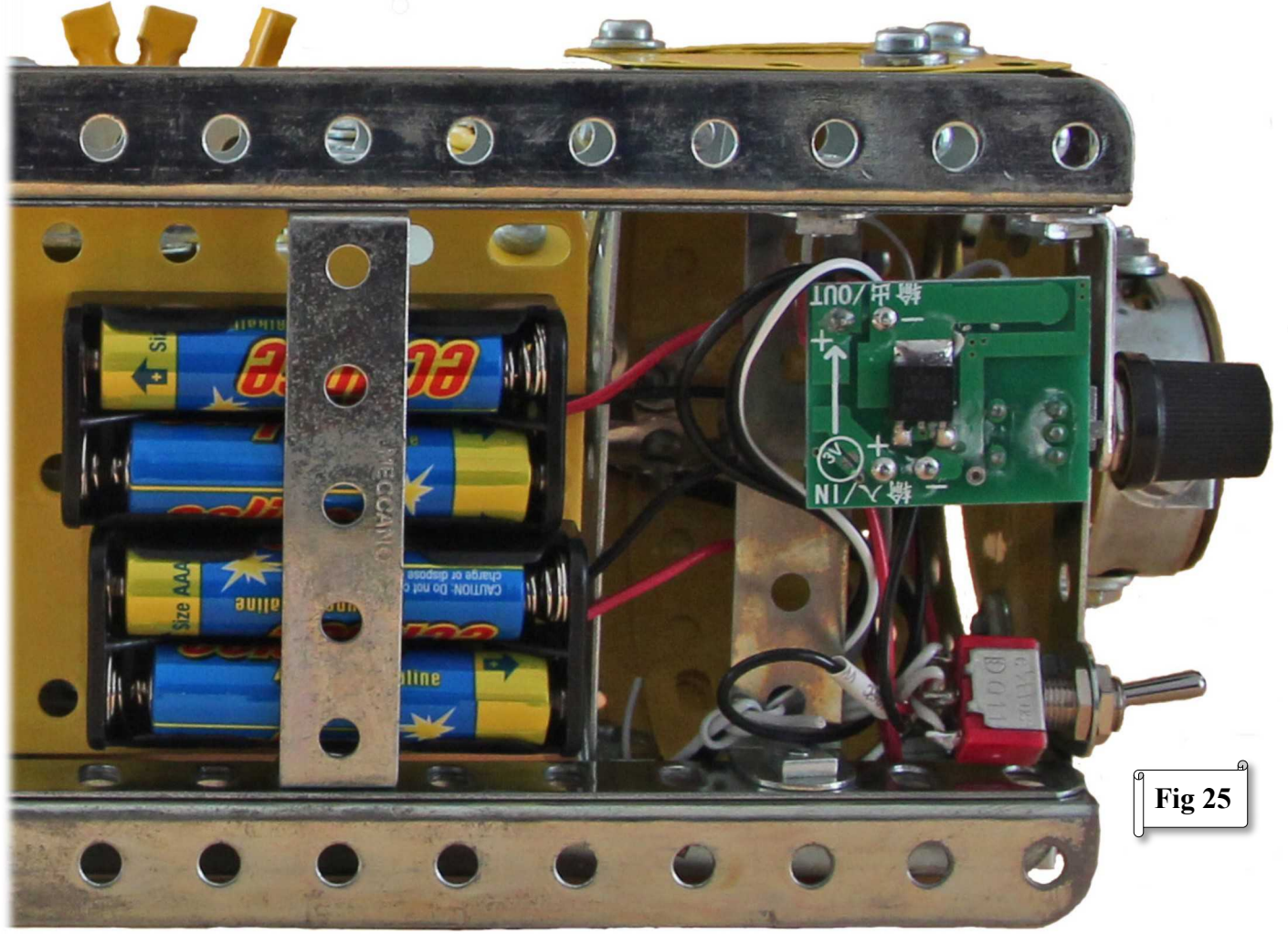
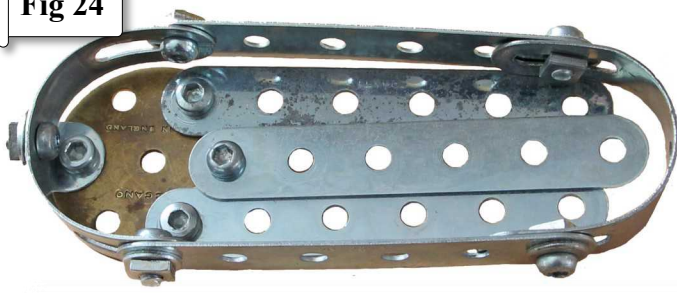


Fig 25



Greater Waikato Meccano Club

Meeting Report 2nd November 2019

Our November meeting was held at **Graeme Wrightson's** place in Matamata on 2nd November 2019.

Five members were present and there were four apologies.

On show was **Graeme Wrightson's** absolutely lovely *Electrikit* from 1963. This was totally unused, and obviously complete. Thus a very rare specimen; but not to remain rare for long, given Graeme's intentions for it. (*see overleaf*)

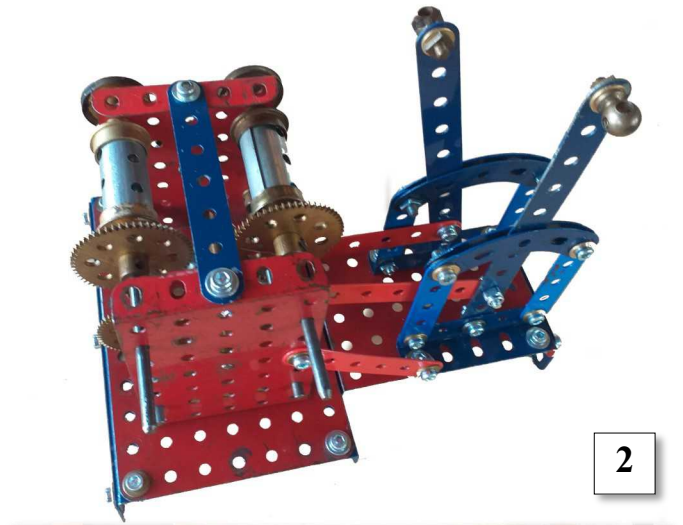
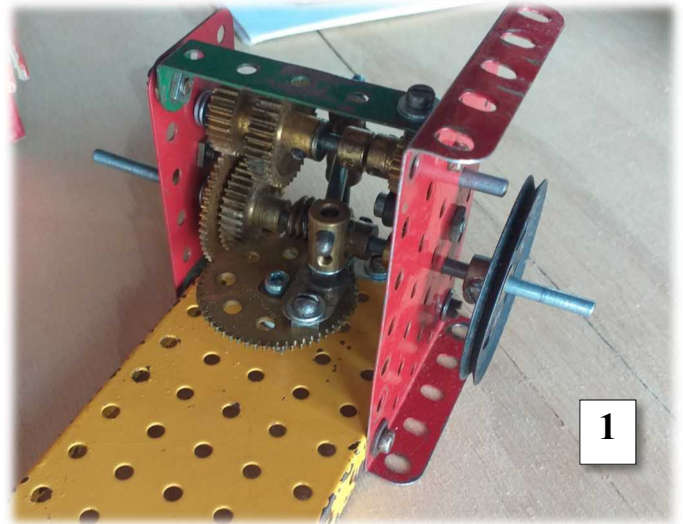
Graham Stuart presented a very clever (manually operated) tower crane built from his L set (!). This was a demonstration model showing the various movements, including the mechanism by which the counter-weight moves in or out depending on the position of the trolley. Graham also presented two small models of both a Mustang and a Spitfire, about 40:1. Despite a paucity of parts, both these models quite obviously represented their originals. (*fig 3 and overleaf*)

Hamish Campbell presented us with his 6-wheel radio-controlled truck. A marvellous accomplishment for a 10 year old. (*top opposite*)

The core rubric of the meeting was the "Among the Model-Builders" gearbox / mechanism challenge, whereby entrants were required to choose a gearbox from Meccano magazines from the 50s and 60s. Graeme showed a very nifty and smooth-running automatic reversing mechanism from November 1960.

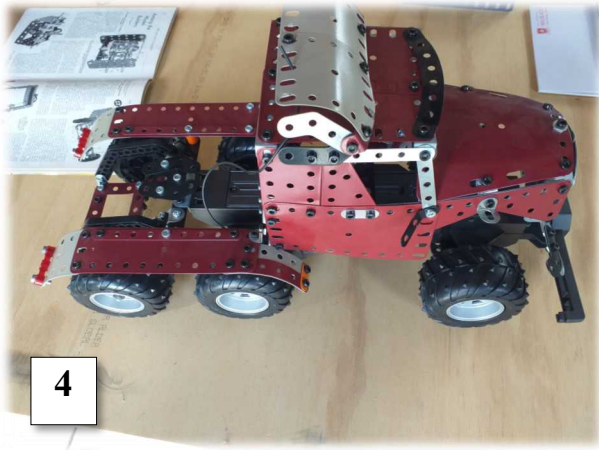
Mike Walmsley displayed a 4-movement crane gearbox from September 1957. (*fig 2 opposite*)

The challenge has been held over to the March 2020 meeting. So if you were unable to attend our November meeting you can bring your mechanism along then. You may even wish to build another one to add to our fun. To clarify the rules; your gearbox / mechanism must contain a minimum of 4 gears (note that this includes gear wheels, spur gears, pinions, contrate wheels, helicals, bevels, gear rings, worms etc.).



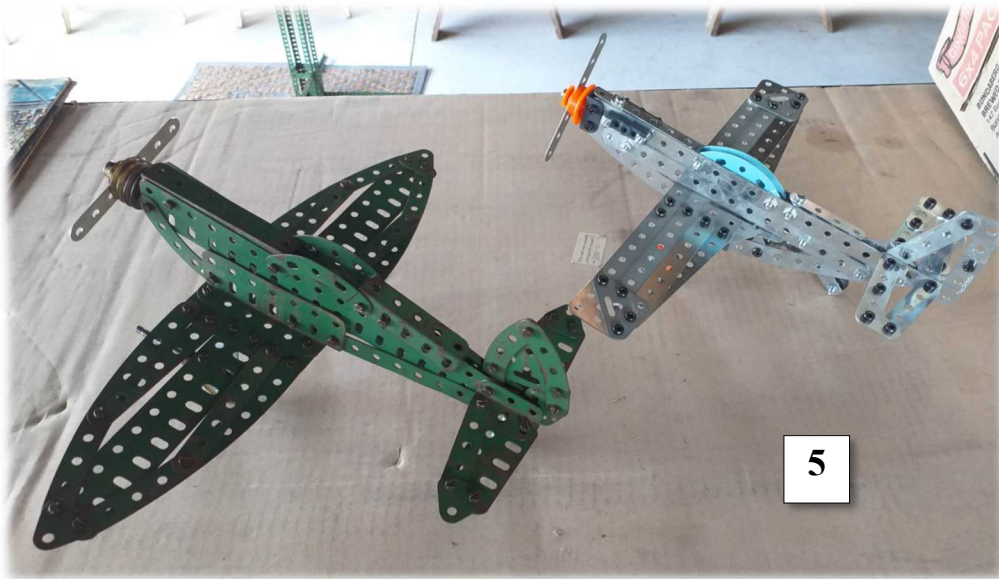
Important Events coming up:

- Summer BBQ February 2020 at Dave Shand's place in Tauranga. Date to be advised.
- Next meeting **Greater Waikato Meccano Club** - Saturday 7th March 2020



4

- 1. Automatic Reversing mechanism: **Graham Wrightson**
- 2. 4 axis crane movement: **Mike Walmsley**
- 3. Tower Crane: **Graham Stuart**
- 4. 6 Wheel RC truck: **Hamish Campbell**
- 5. Spitfire and P51 Mustang: **Graham Stuart**
- 6. 1963 Elektrikit: **Graham Wrightson**



5



6

CHRISTCHURCH MECCANO CLUB

Report for November and December.

The challenge for the November Meeting was to include at least 6 part #214 in your model. **Hillary Satterthwaite's** fairground favourite, the octopus, ticked all the boxes. December was an open competition, and again Hillary rose to the occasion with Santa in his sleigh — a delightful wee model with minimal parts conveying the essence of Christmas. Not to be outdone husband **Peter** fought back with his own octopus and a Mechanical Compass. Newest Junior member **William Storer** impressed with his “Novelty Card Case”.



William Storer: 'Novelty Card Case'



The Satterthwaites scoop the prize pool for 2019

COMPETITION AND PUZZLE PAGE

Puzzle No 3.

Background:

Dazza was frustrated. All he lacked to finish his masterpiece, an autonomous toaster, was a suitable length of **part 94**; 15 links to be exact. In desperation at 2 am he scabbled through his Rusty and Broken parts bin, and to his unbridled delight came up with the missing links. However, they were joined in **five separate** lengths comprising **three** links each. It was the work of but a few more hours to reconnect them with the existing length until he had his completed chain.

Question:

What was his most efficient strategy to minimise the number of openings and closings of the links, and how many distinct manipulations with the pliers did it take Dazza to reconstitute the complete chain?

Conditions:

This competition is open to all financial NZFMM members. The prize will be awarded to the most correct answer received by the Editor. If no reasonably correct entry is forthcoming the prize will be held over to the next competition. In the event of multiple correct entries being received the winner will be decided by random draw. The Editor’s decision is final and no correspondence will be entered into; (unless it is witty and/or only mildly abusive.) The solution and winning answer will be published in the May 2020 issue. Closing date for entries is 20/4/20

Solution to Puzzle #2

Readers were asked to describe a spur gear train of **factory Meccano gears** that gave a ratio of **1: π** to a minimum of two decimal places (3.14).

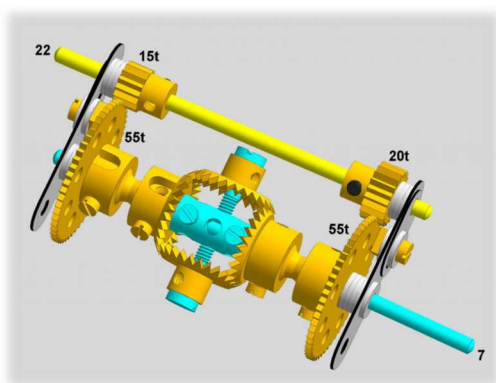
The tooth counts available are: 19, 25, 50, 56, 57, 60, 95, 133. Obviously there is a trade-off between precision and the number of gears. Invoking Occam’s Razor fewer is deemed to be better for any given precision.

Two people provided solutions out to four (4) places of decimals — **Paul Hale** (8 gears) and **Stephen Westmoreland** (12 gears). The official solution was a piffling 3.14 with four gears. (133/95 * 56/25) **Les Megget** offered 3.14 with 8 gears

A	95	50	25	95	95	50
B	60	25	57	133	60	25
Ratio A/B	1.583333	2	0.438596	0.714286	1.583333	2
Cumulative		3.166667	1.388889	0.992063	1.570767	3.141534

A	95	95	95	95
B	133	60	57	57
Ratio A/B	0.714286	1.583333	1.666667	1.666667
Cumulative		1.130952	1.884921	3.141534

Stephen Westmoreland (above) and **Paul Hale** (left) both provided precise solutions to the problem.



Special mention of **Georg Eiermann** in Germany, who with the assistance of **Wilbert Swinkels** in the Netherlands approached the problem by searching for the fraction of 22/7. This excellent CAD image shows their solution.

Unfortunately the use of non-standard gears is invalid.

Congratulations to winner **Paul Hale** for his delightful solution.

A profound ‘thank you’ to everyone who took the time to enter.



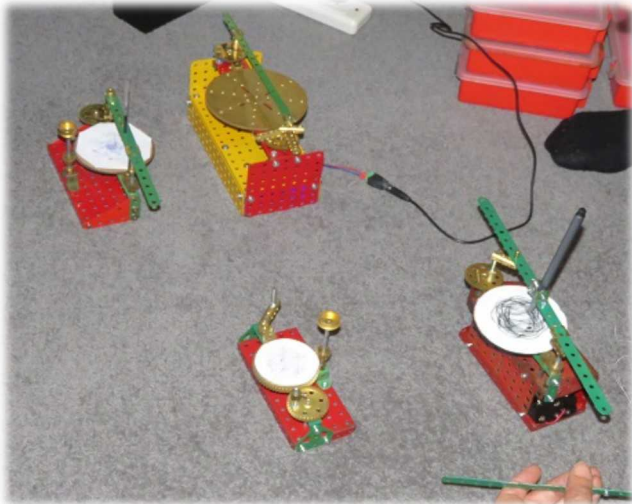
The Wellington Meccano Club Minutes

Secretary / Reporter – Max George

Meeting Date: Friday 1st November 2019 at 7:30pm
at Max George's place, Tawa.

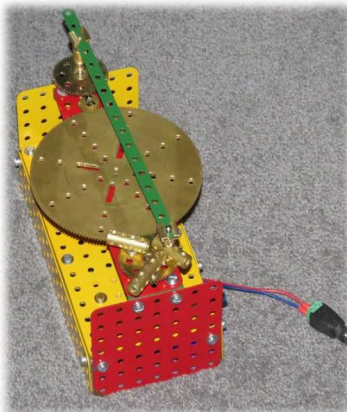
Model Building: The theme for the meeting was to build the simple Meccanograph that Stephen had previously built.

Display of Meccanographs: The following are the Meccanographs brought to the meeting.



Stephen's on the *left*, Stan's in the *top middle*, Ross's are the *two bottom ones*.

Stephen Westmoreland: Again displayed the two Meccanographs he had previously brought along to meetings. He had constructed a Double Decker Bus from the 1950-1960 Set 7 manual model #7.18. It is great to see so many models being built from old instruction manuals. (*Top right*)



Stan Baker: Went further than others with his Meccanograph in that he used a giant gear wheel as the turntable. Unfortunately he hasn't completed the model so we are not sure what patterns it can make. He uses a motor to drive it rather than it being hand driven.

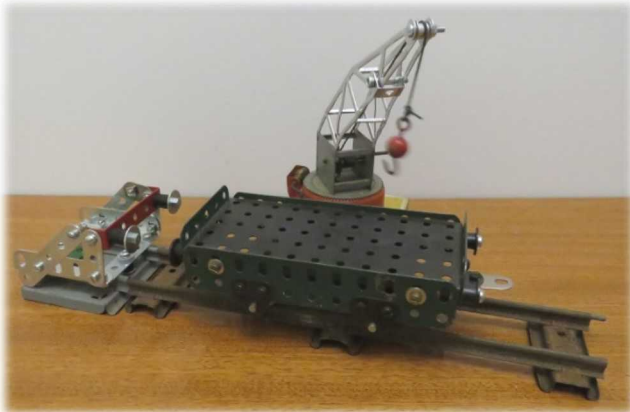


Ross Quayle: Decided he would make a couple of Meccanographs. His first model was a very simple hand controlled Meccanograph but using helical gears. Unfortunately, the pattern made was not very good. Note the strip holding the pen is not shown. The second model (*right*) was much better and produces some interesting patterns. Another pattern from the above Meccanograph, shown below.

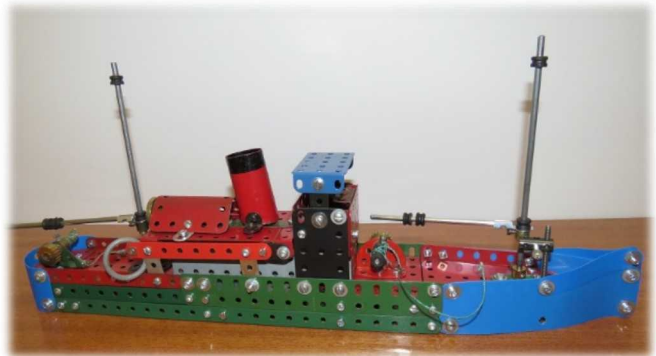


Keith McCallum: Had made the Eiffel Tower (*left*) from the Special edition Set model #0509. This set has enough parts to individually build the Eiffel Tower, the Tower Bridge, or the Empire State Building. The first two models have also been produced as individual sets but

the instructions for the Empire State Building is only supplied in this set.



Brian Petersen: Was very energetic and built several models for this meeting. He has continued building structures for his '0' Gauge railway. This time he brought along a buffer and a flat deck wagon. (above) For this display he has a genuine Meccano crane.



A scaled down version of a Tugboat built from the Techno series of 1991 (French). (Bottom left)

A Trawler (above) built from the 1950's set 5 model #10 but it has been scaled down to match his model of the *Queen Elizabeth I*. Brian intends setting up a diorama with all the vessels he has recently made.



Max George: Again brought along models built by members of his U3A Meccano building group. The first model is a very realistic Boeing F/A Super Hornet set #17303. (above) Most of the parts are plastic and even little studs are used instead of bolts and nuts. This is going away from traditional Meccano.



A very difficult motor car was finally finished after it being worked on for almost a year. This being from the Special edition

Mechanical Workshop set #0532 Another model completed was a forklift made from the 25 Multimodels Set #7550

Gazza's eBay Column

Hi all, a new year and time for another column.

Things have changed a little since my last letter. GST is now being charged on all eBay items no matter how small but only on the goods price not the postage portion which is great. Firms such as Pitney Bowes who on post items to overseas destinations are making a killing with their rates usually more than the item cost. I recommend trying to contact the eBay sellers own online page, if they have one and buying from there. Usually there will be no GST and actual postage prices will be far more realistic. So what do we have on sale this year ?

A Meccano shop display card in original condition from France selling at \$878.20 plus 53.03pp described as in excellent condition # **143501889642**



Meccano set 2000 vintage made in France. Described as battered and not complete \$19.91 plus 37.44pp # **264599062012**

Six assorted red ¾" 1" and 3" sprocket wheels plus 40" of chain. Selling at \$13.93 plus 38.44pp # **372918978210**

Four Meccano loaded sacks in good condition part # 122 selling at \$17.25 with a note from the seller to disregard shipping costs of \$62.68 as apparently this keeps eBay happy. Actual postage will be calculated on check out. # **114074591612**



Four Meccano 1918 3" pulleys with the cut outs, these are quite sought after as a 3" variation all have Meccano stamps x3 \$11.48 plus 62.88 pp see previous note re postage as it is the same seller. # **114074597927**

Next up is described as a 1960s to 70s lot of mixed Meccano in a wooden box \$29.86 43.57pp # **184135703248** (see overleaf)

How about an Erector pirate ship 6024595 boxed as new for \$50.80 and 61.26pp # **352908822806**

Next up is a 1994 Meccano dragster in box, these are somewhat unusual to find selling at \$22.74 plus 18.45 pp # **322621667752**

One of the newer sets is a Meccano dump truck from the Spinmaster Engineering and Robotics series (new) \$43.58 plus 11.38 pp # **263965390876**

How about a Meccano clock Kit no1 still boxed with instructions but missing a paper and plastic disc, adhesive pads and one pendulum rod yours for \$139.34 plus 48.27pp # **164040867951** (see overleaf)

A Meccano Meccanoids G15 robot 2' tall with voice recognition. This is in excellent condition and has been tested and works including a charging cable. No box or literature \$53.09 plus 107.10pp # **312919594053**

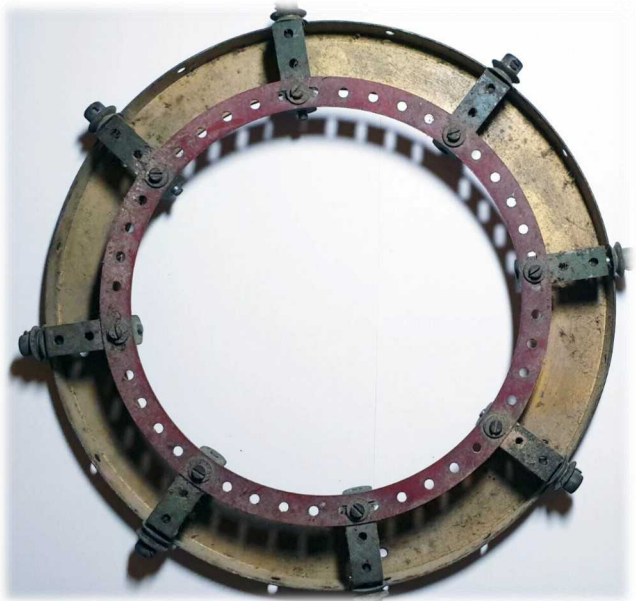
A vintage Meccano roller bearing for \$26.78 plus 37.54 the main parts are two gold 167b 9 7/8 flanged rings and the obsolete version of part 145 circular strip. # **184141213994** (see overleaf)

Here is a rarity, mind you the seller has had it on eBay for a few years. A Bartram Dan Dare spaceship builder No. 1 described as a boxed example of this hard to find set. The box lid and base are original with the backing card and small parts box copies. All major parts are there. \$786.25 plus 69.09pp # **333424820971** (see overleaf)



Next is a 1930s-40s tanker truck made up model in red and nickel \$36.96 plus 31.87 pp # 303429175502

A vintage Meccano spitfire / mustang aircraft in red and green \$99.51 plus 36.80pp # 29340497674



Here is one of the newer Meccano innovation sets advanced machines 19603 \$114.27 # 183980823640

Finally a Meccano set no 1 from the 1930's restrung into the original box with manual \$348.34 plus 58.52pp # 293408784394

All the best for now hope the new year has been good to you. Cheers Gary





**MWT Meccano Club Model Tour,
Meeting 12 October 2019**
By Robin Rye

The Model Challenge was to do with an artistic adaptation of a free subject.

Robin Rye: A not-to-scale International Harvester corporate "man on a tractor" symbol.

Richard Feltham: A Len Lye like wind chime.

Stuart Lindsay: A transporter bridge for Oreo biscuits.

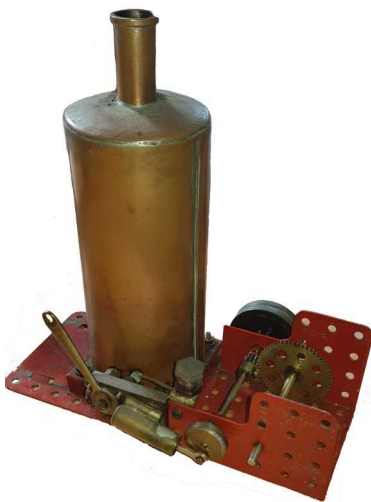
Mikayla Lindsay: Meccano for school—kinetic art.

Mikayla Lindsay won the Model Challenge. Other presentations. Included:

John Freer: His Dinky Toy German 88 millimetre gun of the previous meeting had turned into a Meccano model this time complete with a captured Allies half track truck to pull it. The ingenious model created much interest and discussion among members.

Robin Rye: Another truck and trailer set made by Charlie Cross. The truck had been seen at MWT before but not the trailer.

Chris Morton: Lead a discussion on Meccano zinc oxidation as seen on his Big Ben and Tower Bridge models and elsewhere. Parts of a vertical steam engine had come into his possession but were not pure Meccano. (left)



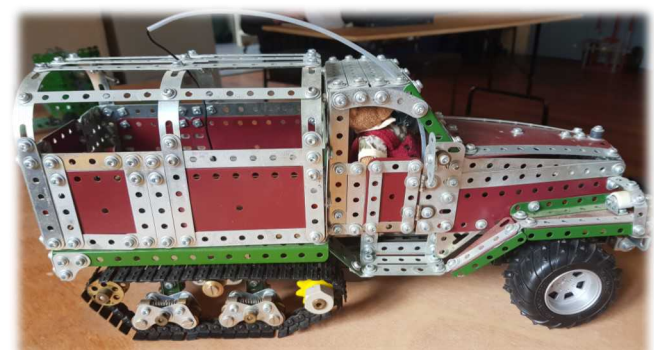
Richard Feltham: His model challenge gong set off a conversation about harmonics. There was a empty Meccano box for the taking. 2742 positions was the answer to his parts 48a and 52 competition in the Federation Magazine.

Tom Pittams: A Star Wars toy.

Stuart Lindsay: His model challenge Transporter Bridge created discussion on those and flying fox mechanisms. (top right)



John Freer's 88mm mechanism detail (above) and Bren gun Carrier (below)



**MWT Meccano Club
Model Report, Fellowship Meeting
September 14, 2019**

By Robin Rye

The theme for the day was Dinky Toys and Dinky Supertoys.

Peter Winter: Had examples of the 2 sizes of Meccano Ring part 145, 7 inch and 7.5 inch. He had built the earliest he could find model plan from a Meccano manual of a railway breakdown crane.... 1913 . A mysterious medallion he displayed turned out to be a gaming piece from around the 1800's

Bruce Geange: Displayed a selection of Dinky Toys and Dinky Supertoys. A small Meccano made steam engine model had been completed and had an internal electric motor to drive the mechanism.

Bruce Durdle: Sort of the Meccano of electronics he proclaimed for the plug and play electronic pieces to be powered by computer that he showed.

Chris Morton: Dublo Dinky Toys also featured among his offering of larger Dinky's. The Hornby Companion Series Dinky Compendium was there for all to peruse.

Hugh Ramage: A smaller version of his quick return toggle mechanism for a sewing machine had been perfected.

Paul Vodanovich: 2 models made with 1925 Nickel period parts along with a clockwork car that ran along the floor really well and another coloured model of a military tank.

Robin Rye: 1960's Meccano production of military Dinky Toys and Supertoys featured in his display. John Freer gave some insight into the vehicle brands represented.

Mikayla Lindsay: Sat playing with Meccano during the afternoon during which she made a table with pieces selected from a well stocked tool box. A robot had been previously constructed.

Stuart Lindsay: Described some issues of Meccano building solved with his daughter.

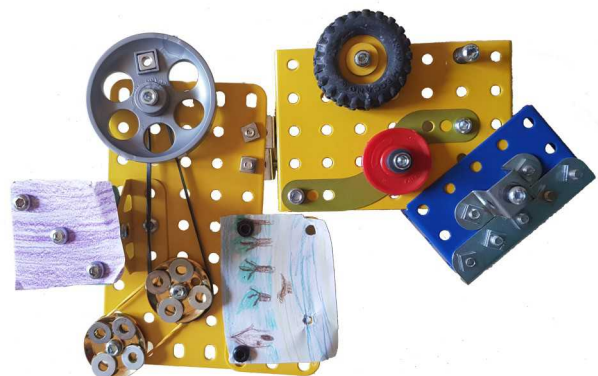
Tom Pittams: Standard Meccano mechanisms featured in Tom's display, 3 conventional differentials, 3 epicyclic differentials and a gearbox. His mainly made with Meccano strip and plate rolling or straightening tool completed his display.

Daryl Anderson: Dinky Toy advertising and catalogues and a Bunkers price list took pride of place. A Dinky Fire Engine and a Service Station Set, both pre WW II, and 2 Dinky Builder sets completed his display.

John Freer: Spoke of his NZ military career (1964 - 1972) during which he was with an Engineers Division. Photos and memorabilia accompanied his road and air-field building adventures presentation. His Dinky was a German 88 millimetre anti-aircraft gun.



Mikayla Lindsay (above) and her Challenge winning work of kinetic art (below)





Combined Wellington Meccano Club & Manawatu-Wanganui-Taranaki Meccano Club 2019 Christmas Function



Twenty plus members came to the lunch, held at Murrayfield restaurant north of Levin.

There was a prize for the best Christmas themed meccano model, won by **Brian Peterson**. Conversation was lively in the tables, the meal was excellent with many hungry members going back for seconds (*see below*). Overall a great way to end the Meccano Year.



Brian Peterson (right)
celebrates his win



New Zealand Club Diary 2019

Auckland Meccano Club

President: David Wall, Tel. (09) 426 1965
Secretary: Gary Higgins, Tel. (09) 832 4292
Meetings: Begin 2pm on second Saturday every third month. The May meeting will be hosted by Neil Carey.

MWT Meccano Club

Chairman: Chris Morton, Tel. (06) 323 8001
Secretary: Robin Rye, Tel. (06) 764 8670
Meetings: Second Saturday of every second month, at 2pm. Next meeting: Saturday 8th April at St. Luke's Church Hall, Corner Cornfoot and Manuka Streets, Castlecliff, Wanganui.

Wellington Meccano Club

President: Reg Barlow, Mob. 021 955 488
Secretary: Max George, Tel. (04) 232 4200
Contact: Lou Nichols, Tel. (04) 297 1515
Meetings: Begin 7:30pm on first Friday every second month.

Christchurch Meccano Club

President: Neil Pluck, Tel. (03) 382 0411
Secretary: Roland Jaspers, Tel. (03) 351 4389
Meetings: Start at 7:30pm on first Friday every month (except January) at Papanui RSA Club, 55 Bellevue Ave or No. 1 Harewood Road, Christchurch.

Greater Waikato Meccano Club

Contact: Graeme Wrightson, (Mob) 027 671 6004
Meetings: These are held on the first Saturday of every second month, except January. Most meetings are held in the Central Waikato area starting at 2 pm. Contact Graeme Wrightson on 027 671 6004, Matamata.

Other Meccano Contacts

Hamilton: Don McClelland, Tel. (07) 843 4198
Tauranga: Barry McKey, Tel. (07) 576-1623
Hawera: Daryl Anderson, Tel. (06) 278 7666
Napier: Trevor Adam, Tel. (06) 843 4837
Palmerston North: Bruce Geange, Tel. (06) 357 0566
Nelson: John Stark, Tel. (03) 545 1025

Articles, etc. for the May 2020 issue of NZFMM Magazine should be sent to Richard Feltham before the 30th April 2020. at: richard.feltham174@gmail.com

Back Numbers: NZFMM Magazines from April 2001 are available. Please contact Bruce Geange.

Meccano Exhibition Tinwald War Memorial Hall Easter Weekend 2020

Friday 10th
 Saturday 11th
 Sunday 12th April
 Christchurch Meccano Club

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- Parts fitted with miniature roller bearings.
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Contact Stan Baker nzmeccanoman@gmail.com
 Phone +64 4 566 7150 Evenings or +64 21 421 750 mobile

2021 Convention Waikanae Memorial Hall 19th, 20th, 21st March 2021

Christchurch Meccano Club

Meccano Display

Models - Trains - Toys

Tinwald War Memorial Hall
Cnr Graham & McMurdo Streets

Easter Weekend

Fri. 10th April - Sat. 11th April - Sun. 12th April
10am to 5pm

Entry: Adult \$6 / Child \$3 / Family \$15

Meccano Models - Hornby Trains

Lego Trains - Dinky Toys

Historical Meccano Sets

Build & Play Tables For Young Model Builders

Ticket Sales At Door - Eftpos Available - Free Parking

**EASTER WEEKEND
2020!**

The Wellington Meccano Club at play— Christmas 2019.

