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(see page 6)

## Editor's Notes

Many thanks to George Soodt, Jeff Duntemann, Don Redmond, Bill Bardutz, Colin Hoare and others for supplying articles for this issue.
I still have a relative surplus of material for the next issue but l'll be needing more before too long. I'm keeping some gems from Jerry Dubois and Don Redmond in reserve for future issues. Next month: ships!
Feedback on the December issue: I mistakenly attributed the Menorah (Candleabra) model - it was actually built by Dany Friedman of Willowdale.
More feedback on the September issue: Alan John Dickerson of England (a Meccano Guild member since 5th August 1952) kindly sent me more examples of Meccano postcards "London's First Routemaster", "Liverpool and Manchester Railway", "Motor Car Constructor" and "Hornby Book of Trains"
As well M. Perraut of CAM France sent an interesting letter re my Klaxon motor. He also posseses the motor in question, except his plaque is smaller with slightly different details. He confirms that Meccano Ltd. used this silent motor in display models for many years. A similar motor is metalized grey in colour.
Perfect motor-one attribute of a perfect Meccano motor is a $5 / 32^{\prime \prime}$ shaft. Browsing in our local surplus store, Princess Automtotive, I recently came across one that fit the bill perfectly (\#0750228 24V DC @ \$6.99). Unfortunately,

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this motor posessed no power whatsoever and is useless. In contrast, \#0751966, a small DC electric motor also has a $5 / 32$ " output shaft and is very powerfull (only \$3.99).
I needed some large areas filled in on a model I'm slowly constructing so I decided to make some custom sized "flexible plates" out of red plastic
"Snow Karpets" (from Superstore). Holes were punched using 1/4" Eyelet Pliers (from Canadian Tire). The holes are larger than they should be but are mostly hidden beneath strips and girders. It's not pure, but it sure looks nice.

I have just learnt that there won't be a Red Deer Hobby Show this year. This is where Alberta Meccanomen have been meeting annually for a get-together. There's always the Moose Jaw Hobby Show March 31 - April 1 instead but it's a looong drive (Bill Bardutz will likely exhibit).
As always, the newletter is only as good as the contributors. Your articles, photos, model plans, short news items, want, sales and swap ads are wanted. Items in machine readable form (e-mail, diskette) are prefered but everything is acceptable, including good old HB. It's a great idea to document photos on the back using post-it notes. If you'd like any part of your submissions returned, please say so; otherwise I will keep everything.
Your mailing label now indicates when your subscription expires - Exp. 1999 means that your subscription has expired and you won't receive any more issues until you renew. Please note that I plan to publish the June 2000 issue around June 1, 2000.

David Williams

## Toonerville Train

Bill Bardutz of Regina reports that he's had his "Toonerville Train" for over 10 years. There's a motor underneath that runs the drive wheels with the piston rods.

Great minds obviously think alike!


## President's Report

First of all, I want to extend my sincere thanks to everyonewho has renewed his or her subscription for 2000. What we still need, however, is contributions to the magazine from as many subscribers as possible, so that the workload can be shared more evenly. I realize that it is not easy to write up a model, but we would certainly welcome any contributions, be they big or small.

The events of the past few months concerning the hobby that we all enjoy, have not been encouraging, sad to say. In Europe, two major
 events have happened: first of all, Marklin, which was probably the most serious rival to Meccano, has decided to cease manufacturing metal construction kits, and secondly, Meccano France has entered into the French equivalent of Chapter 11 Bankruptcy Protection. Not good omens.

Here in Canada, our relationship with Irwin Toys, the company that handles Meccano in North America, has also taken a backwards step. The toy company has not had too much success in the past few years in the business of marketing toys, and Meccano would appear to be one of the items that has been assigned a low profile. Our regular contact, Michelle Amis, is now on an extended leave of absence, and we have not been able to establish as strong a relationship with her replacement. We will, however, try to get things on a firmer footing over the next few months. As always, the difficulty we have is convincing the management at Irwin that we could work together, if they wanted us to do so.
Despite all this, there are some good reasons to be optimistic. Geoff Wright sent out a report to many of his customers on the visit he made to this year's Olympia Toy Fair in London. Naturally, he visited the "Meccano Toys" Stand, where he and his wife were given the usual very warm welcome by Richard Macey (Managing Director) and his team. He then went on to describe the latest sets that were being marketed - far too many to list here!

Even if the so-called worst-case scenario does come about i.e. Meccano France ceases operation, there will still be Meccano available. Geoff Wright arranges for the manufacture quite a few parts, both old and new, and Senor Richini in Argentina is still going strong. For the newest
source, however, one has to go to India. Ashok Banerjee is fairly well known in the Meccano fraternity, and he has started supplying parts, as has another source from that part of the world, Aries Incorporated. If anyone wants to follow up on either of these two sources, either David Williams or I can be contacted. Both have e-mail addresses, so it is easy to get in touch with them. Although I have yet to see any samples of the products they manufacture, the feedback from others who have received their orders has been pretty positive.
For those of you who subscribe to 'Spanner,' the Internet chat line for Meccano, you will be aware of the discussion concerning the famous Blocksetting Crane that the late Bert Love built. The model itself is still extant, albeit in poor shape. Tim Gant, a British Meccanoman, has acquired it, and, I understand, plans to restore it to its former glory. I have fond memories of this model: in 1974, there was a (non-Meccano) conference in Stratford-upon-Avon that I attended, and I contacted Bert Love prior to my trip overseas to ask if we could meet. This he agreed to do, and I travelled by train from Stratford to Birmingham one Wednesday afternoon. Unfortunately, British Rail messed me around, and told me that I could travel on a train that did not exist! As a result, I arrived an hour after I had originally advised Bert. The major loss, as far as I was concerned, was the time I could spend with Bert, as I had to be back at my hotel for a dinner that evening.
On reaching Bert's house, he and I went round to the second house that he owned in which he kept all his Meccano. The Blocksetter was there in the front room, and he demonstrated its capabilities quite happily. There was, as I recall, an interesting failsafe feature, which prevented the crane traveller from going beyond certain limits. Bert said at the time that it was scheduled to be the fifth ModelPlan to be distributed by the Midlands Meccano Guild, of which he was the Honorary Secretary. The plans were, however, never published, and it was only recently that I learned why. Apparently, Bert's son, Colin, had been a little overenthusiastic about seeing the photographs of the model, and he had exposed the film before it had been properly developed. Bert was so upset that he never rephotographed the model. Hopefully, if someone takes the time to write them up, these plans will see the light of day.

In Britain, it was announced recently that Lego,
or L* G* $^{*}$, as it is referred to by Spanner subscribers, has been declared the Toy of the Century. People clearly have short memories, as far as I am concerned. Meccano lead the way in the 1920's and 1930's, was still going strong after the Second World War, and is still appreciated today, even if the numbers are smaller. A strong interest in Meccano, which usually developed at an early age, has enabled many engineers to become the leaders in their field over the past eighty years or so: I doubt that L* g* $^{*}$ has been anywhere near as successful.

The Meccano literature from England is always interesting, and one of the most impressive modelbuilders at the moment is Jeffrey Boswell. He specializes in building models of older vehicles, and it was his ModelPlan 111, a London County Council E1 Tram, that required over 200 3.5" Narrow Strips in order to complete it. As a result, I am sure that it will not be rebuilt very frequently. His latest ModelPlan, however, is a classic, and one of the best of the MW ModelPlan series. It is a veteran Rolls Royce, and is one that should be easily within the range of anyone who has around the equivalent of two No. 10 sets.
For most of us, we are now approaching the end of the Canadian winter. Even here in Toronto it has been a bit more wearing than usual, but spring is just around the corner!


## Colin Hoare



## Norm LaCroix Award

Shown is a new annual award created in memory of Norm LaCroix, founder of the Canadian Meccano newsletter.

Unexpectedly, I was the first recipient for 1999. The photo on the right shows Marg LaCroix awarding me the 1999 plaque.
David Williams


## Birth of RAD

In 1997, the idea for an amazing Meccano character for the cast of Key to Imagination© was born. The Head of Research And Development would live on Starshine's home planet, Etheria. After numerous sketches of the idea, RAD was born into the laboratory of Logandy, musical scientist, and things would never be the same. We had long ago learned to appreciate Jeff Duntemann's love of Meccano and knew whatever he had in mind for RAD would be spectacular, and we haven't been disappointed.
Jeff, well-known author and Editor in Chief of Visual Developer Magazine, donated countless hours on RAD's design and assembly. He sent frequent emails on his progress, explaining in great detail which parts he'd ordered for RAD's neck assembly, face, and the inner mechanics. When Jeff mentioned the 142j's or the 23ap's, I wrote them into the script. When RAD complained about some "stiffiness" in his neck, he mentioned those parts as the culprits.
RAD has a wonderful sense of humor and speaks with a British accent, trading quips with his friend TC, a Hero Jr. Robot. He currently appears in the video adaptation of Key To Imagination© that will be distributed throughout Arizona school districts, beginning in the early spring of 2000. The show stresses the importance of reading and the video will also be utilized as a demo tape for a local children's television show.

## The Nuts \& Bolts

(Jeff, this is definitely the place for your Meccano talk) RAD 's base is mounted on a circular track in the middle of a table. Acting as a Meccano puppeteer, Jeff sits in a special chair under an elevated card table, with RAD's controls near his face. He watches RAD's movements on a video monitor at his feet, fed by a video camera. Jeff's creativity, enthusiasm and support during the long hours of live performances, rehearsals, and filming have been incredible. He's part of the magic that brings Etheria to life and I'm delighted to have him as a friend on both Earth and Etheria.

To our knowledge, RAD is the only Meccano actor on the planet and he enjoys that celebrity billing. Key to Imagination© ends with a music video of local celebrities, including the Honorable Jane Hull - Governor of Arizona, David Levy -well-known astronomer, members of the Arizona Cardinals football team, and a host of others that share our belief in the magic of reading.

## The Head of R \& D

## A Meccano Puppet for a Children's TV Show

In the spring of 1997, my friend Sue Thurman asked me if I could create a character for the
 children's TV series she was designing. Sue is a well-known Phoenix-area performer and fervent advocate for student literacy. She had created an elementary level (K3) literacy campaign called "Reading Is Magic!" and it was so well received at local schools that she decided to turn it into a regular TV program for local and eventually national TV distribution.
Sue wanted a sidekick to share a laboratory setting with Logandy, her hard-hatted mad scientist character. Kids love robots, and it occurred to me that any sort of human figure built with Meccano is almost by definition a robot. We initially envisioned something like the old Howdy Doody ventriloquist dummies, but the complexity (and the weight!) of such a device would be daunting. At some point I had a brainstorm, and on the back of a restaurant napkin I sketched out "something completely different," as Monty Python would say: A robot's head with animated features, resting on its neck on a table, and worked from beneath the table by a puppeteer. Sue loved it, and the name was a natural: The Head of R\&D, affectionately known around Logandy's lab and all of Etheria (the magical realm of Starshine \& Company) as RAD.
Figure 1 (on the front cover) shows the finished model. RAD is $13^{\prime \prime}$ high from the table to the top of his head and has four different motions: The head as a whole turns from side to side; the mouth opens and closes; the eyes roll in unison; and the eyebrows move up and down independently. Although controlling all of this at once is a tricky task for the puppeteer, the effect, once mastered, is marvelous. RAD, whose persona is that of an educated, slightly stuffy

Englishman (as befitting his Meccano origins) really comes alive.

## Up Periscope!

The real challenge in designing RAD was controlling several simultaneous mechanical motions from beneath a table. The mechanism as seen by the puppeteer under the table resembles the standard B-movie submarine periscope column. The column consists of four 18 " angle girders (7a) extending downward from a hub disc (118) which forms the base of RAD's neck. At the bottom of the column, two cylinders (216) on 1 1/8" flanged wheels (20) form the "periscope" handles by which the puppeteer moves RAD's head from side to side. (See Figure 2.) The handles do double-duty. The cylinders pivot freely on a shaft, and the inner flanged wheels move rods up and down when the puppeteer rotates the handles. The rods transmit a short (less than $1 / 2^{\prime \prime}$ ) up-down motion up into RAD's head, where a linkage translates this motion into the angular position of RAD's "bushy" (by virtue of bossless pawls) eyebrows. More on this later.


To get RAD's eyes to roll, I ran a loop of sprocket chain from the bottom of the control column all the way up to the center of the head. A $1 / 2^{\prime \prime}$ sprocket wheel (96a) is mounted behind the 1 $1 / 2^{\prime \prime}$ pulley (21) and tire shown in Figure 2. Unlike the eyebrows, which may be moved independently, the eyes move together.
Getting the correct linkage to move RAD's jaw up and down was more of a challenge. Mouth motions needed to be coordinated with RAD's spoken lines, so the jaw had to be nimble and
easily seen. It was also pretty heavy. After much fiddling and trying of things, I settled on two long perforated strips running down from the jaw, through the hub disc at a slight angle, and down to the base of the control column. These strips were moved up and down by a pair of $4^{1 / 2 \prime \prime}$ angle girders (9a) mounted on a pivot at the rear of the control column. I made "thumb holes" at the ends of the angle girders to give the puppeteer's thumbs some purchase moving the jaw up and down.


Figure 3 shows the whole mechanism from the front. Note that the puppeteer faces in the same
direction as the head, and toward the audience, so the view here is of the "rear" of the control column. During filming, the table is covered by a futuristic silver skirt to hide the puppeteer.

## "A Little Stiffiness In My Neck..."

One of RAD's signature lines is that he complains of "stiffiness" in his neck. Apart from some good laughs concerning the type of oil to be used there, this was an inside joke commemorating the difficulty I had making RAD's neck "work." I had never created a centerless pivot before, and had not expected it to be as difficult as it turned out to be-particularly one that would not squeak or clatter!
I built, dismantled, and rebuilt RAD's neck pivot about ten times. In the process, I acquired and tried every single one of Meccano's large circular parts in various combinations. (This was all done before I built RAD's head, which made the dismantling much easier!)


The final neck pivot mechanism is shown in Figure 4. I need to point out here, to those who haven't caught on already, that I am no "single system" fanatic and use whatever I can find. I'm very fond of Exacto parts and used a lot of them in RAD. RAD's track, which is bolted to the table, is based on a flange ring (167b) atop which is an Exacto 8 3/8" flat ring (145d). The flat ring (here, in red) is the track upon which the horizontal wheels ride. The horizontal wheels are four $1 / 2^{\prime \prime}$ red plastic pulleys (23ap) with $1 / 2^{\prime \prime}$ tires (142j).
Keeping RAD's neck from wandering from side to side required vertical wheels bearing upon a vertical track. The wheels are again $1 / 2^{\prime \prime}$ plastic pulleys, and the track is a circular girder (143)
mounted in the center of the Exacto flat ring, and biased downward so that the pulleys would bear on the continuous metal above the slots running around the rim of the circular girder. The circular girder is bolted to the points of four flat trunions (126a) attached to the underside of the Exacto flat ring.

Try as I might with Meccano tires and rubber rings, I could not get the spacing of the vertical wheels right. So the sole non-Meccano (or compatible) artifacts in the whole model are small hardware-store O-rings placed on the vertical plastic pulleys. The result is nearly perfect: RAD's head turns easily and silently, with almost no side-to-side travel.


## It's All In Your Head

The real fun in this project was building RAD's head. My pencil sketches all worked out pretty much as designed. (The only "tight spot" I got into-requiring a nonexistent 13 -hole angle girder-was resolved by taking a hacksaw to a zinc $71 / 2^{\prime \prime}$ angle girder. This was the only such "persuading" required for the whole project.)

I built it from the inside out, perfecting the control linkages before adding the "skin." The entire back of the head (See Figure 5) is a removable carapace of red Exacto flexible plates, mounted to the head proper at several points using threaded bosses (64). RAD's forehead is hinged and flips up to allow easy axis to the linkages inside.

Figure 6

shafts with a $2^{\prime \prime}$ sprocket wheel (95) in the center. So rotating the control wheel relatively little makes the eyes roll through a considerable angle.

The sprocket linkage still needs a little tinkering; every so often the sprocket chain in the head skips a link if the puppeteer moves them too quickly and the eyes get out of alignment.

## Seeing What He's Doing

There's one problem with RAD that Meccano can't solve: The puppeteer can't see what RAD is doing up there on the table. It's important for RAD to interact with Logandy, Starshine, and the other human characters in the series, so the puppeteer must be able to see the stage action. I rigged a wireless video link from a small video camera on the front edge of the set to a small color TV under the table. This works very well, and allows a skillful puppeteer to make RAD's facial expressions and speech very realistic and convincing.

RAD has so far appeared in the series pilot and a live stage presentation. After the live stage presentation, a class of second graders came up on stage to

These linkages look complex and impressive (which is another reason I made his forehead flip up) but were remarkably easy to get right, if not all that easy to photograph. Figure 6 shows the view down into RAD's head from above, and all the various linkages.
RAD's eyebrows are moved independently by pushrods in the control column. At their upper ends of the pushrods, small fork pieces (116a) pivot on couplings (63) fixed tightly to rods through one end. The push rods thus cause these rods to rotate through a modest angle. This angle is "amplified" by gearing up with two Marklin 2" gear wheels (Marklin part 59) driving two Meccano 1" gear wheels (31). The eyebrows are limited in their travel by a pair of cranks (62) that strike 1" bolts at the highest extremes. At their lower extremes the eyebrows strike the 1 $1 / 2^{\prime \prime}$ tires (142d) rimming the eyes.
Similarly, modest angular rotation of the eye control wheel by the puppeteer's hand is transferred to the head through a long loop of sprocket chain with $1 / 2^{\prime \prime}$ sprocket wheels
(96a) at each end. This angle is amplified by driving additional $1 / 2^{\prime \prime}$ sprocket wheels on the eye
meet the cast. One small boywas in awe of RAD, and his question made me wince: "What number Erector set would I need to build that!"
I have a number of improvements on paper to install on RAD as time allows. One is an additional lever on the control column that will allow the puppeteer to flip up RAD's forehead and raise an electric light bulb from the inside of his head, to indicate when RAD gets an idea. The others are mostly improvements to the controls beneath the table, to make it easier for the puppeteer (usually me) to work all of RAD's facial machinery at one time.

The three months it took to get RAD from the back of a napkin to star's billing on stage was a marvelous education in mechanics. RAD remains the largest and most complex Meccano model I have ever designed or built. I wasn't sure I could do it, but the results "speak" (in an appropriate British accent) for themselves. So hey-maybe that giant blocksetter ain't so tough after all!
By Jeff Duntemann K7JPD

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## Toy and Train Show, Nepean (Ottawa) Sept. 18-19, 1999

Fine weather, and a host of competing attractions, reduced the public attendance at the semiannual show, but not the enthusiasm of the Meccano group. Mike Shaw and Jerry Dubois were the key Ottawa members; Mike showed a Sopwith


Camel biplane in yellow, a design off the Internet; an Octopus fairground ride, a Meccano Ltd. display model, this one driven by a 24 V motor; Keith Cameron's Krazy Klock, and the popular Aerial Cyclist Pedaling steadily. Jerry also had a Cameron model, the Wizzy Dizzy; a Giant Beam Engine, a Brian Rowe design attractively set off by a white and red beam and white trim on the blue pillars; a Roundabout (Merry-go-round) with cloth canopy and a cloth Meccano flag, a 1928 No-8 set model using the Geared Roller Bearing; a circular shield of sector plates with Frank Hornby's likeness in the centre; and a heavy semi-trailer with bright Allen-head bolts in all the holes, giving it unusual brightness and attractiveness.

The Montreal members stayed only for one of the two days: Larry Yates with an "Expo '67" Ferris wheel, the wheel structure copied from the Expo "Humanity" logo, unusual and striking in green, with 16 cards on a $36-\mathrm{in}$. wheel, the whole structure 42 in . high. It used a $3 / 8-\mathrm{in}$. axle, with bushes and collars made by Bernard Champoux, and a synchronous 110 V motor operating at 10 rpm (a Japanese computer motor). Larry had a special wood frame for carrying the wheel in the back seat of his car!

Normand St-Aubin had a live-steam traction engine using a horizontal Meccano/Mamod engine, the rear wheels based on rings of \#90 curved strips, the front wheels of \#90a strips; attractive repaint in black added to the appearance. The steering was unusual, an Ackermann pattern (using an Erector crank!). Erector $3 \times 11$-hole plates formed the wheel treads and running boards. As the Mamod flywheel on the engine was hidden by the bodywork, an extra dummy Mamod flywheel was mounted on the side.

Doug Armstrong arrived for the Sunday, with an articulated truck with second semi-trailer; a display of small kit models; and a steam-powered drop hammer.

George Turner had a fine example of the Konkoly horse and chariot, which impressed the Meccano group and onlookers with its smooth action.

Don Redmond had the Stephenson "Rocket" locomotive of 1829 modeled in nickel parts mostly more than 70 years old, and because of its 120 V motor running hot, even the smell of the real thing; a model of a 1911 Seagrave chemical fire engine owned by the Toronto Fire Department; a model of Timothy Hackworth's 1837 "Samson", the first locomotive in Nova Scotia; and a windmill built of Structomode, the Canadian construction system manufactured in Hamilton in the 1920's. He also had a Meccano X1 outfit, including some parts of the same system sold as British Model Builder in the 1930's.



Top: "Structomode" manufactured in Hamilton, Ontario, in the 1920's model windmill by Don Redmond.

Left: Tractor by S.S. (Jerry) Dubois; note Ackermann steering, reverse and differential.

Hubert Hogle fascinated old and young with his Mobius strip model, more than six feet above tabletop level, and Martha III, his robot whose favorite tipple appeared to be a can of lubricating oil. He also had half a dozen Erector sets he had found on the way to the show, and a Mechanic construction set which is evidently an import from China. Don Redmond also had a display made from truss-pattern girders from an unknown construction set, and a batch of "unknown" flanged wheels. Normand St-Aubin showed a box of automobile parts of early vintage, a Matador wooden construction set and a group of Tecnico sets from Switzerland, attractive and unused.
Don Redmond



## Kids, Young and Old, at Toronto 1999

These photos, and the one at the bottom of page 5, were taken by Eric Eisen. Does the kid on the left have X-ray vision?


## Meccano Ltd. Motors for Display Models

In late 1998, Bill Derksen of Winnipeg sent in this photo of his version of Bert Love's Grandfather Clock. He used purple and black plating with gold highlighting to give it an imperial magnificence. The model makes such a strong bid for belonging in the room that it reduced his wife to admitting that he will simply have to buy more Meccano!

Note: In a past issue, Don Redmond asked if the removal of red vinyl from his 10-set Double Decker Bus (his previous model) damaged the finish. It wreaked havoc with parts that he had finished without priming or sealing. However, it left original factory finishes intact. Bert Love's Grandfather Clock

Meccano Ltd. equipped its display models with heavy-duty mains-volt motors with gearheads, to withstand days of long operation. For the UK of course these were 240 V motors; for some of the "colonies" like Canada, they were the same motors but wound for 120V. Klaxon and Framco were two names likely to be found on the nameplates; these were commercial makes (early motor horns were often called "klaxons"). A year or two ago a dealer at a Canadian Toy Collectors Society show had a selection of such motors, but most of them were of 240V rating. Whether Meccano Ltd. sent $240 V$ motors to Canada (presumably with accompanying 2:1 stepdown transformers, I cannot suggest.

Don Redmond

## Autmotive Chassis Remake

Editor's Note: This remake of the 1950's "Sports Motor Car" Chassis (Meccano Leaflet No. 2) was constructed by George Soodt of Illinois, USA. It is a car chassis with a double differential, a slightly altered 3-speed gearbox and drive system. There are a remarkable set of 51 photographs.
If you'd like a set of photos in colour, please see the CMAMAS website under "Special Features". Because of it's length, this model plan will be divided among 2 or more issues.

## ASSEMBLY OF MAIN FRAME (FRONT SECTION)



Parts required:



3 Nr.: 52A; Flat Plate, 7×11-Holes.
2 Nr.: 59 ; Set Collar.
2 Nr.: 126 ; Trunnion.
2 Nr.: 126A; Flat Trunnion.
This quantity depends on the desire to protect all parts from being scratched by nuts or bolts.

See Pictures 1 and 2.
Bolt two 37-Hole Angle Girders (1) together thru their Round Holes for each Main Beam.
A 15-Hole Perf.Strip (1S) is mounted on the inside of the Left Main Beam. This (red) strip will function as a spacer to allow free rotation of a 50-T.Crown Gear, later used in the Steering mechanism.
Connect two Angle Brackets with a Set Collar (2) in between on top of each Main Beam. See Picture 2.
Install a $1 \times 7 \times 1$-Hole Dbl.Angle Strip (3), complete with an Angle Bracket at each end to both Main Beams to prevent rotating of this Dbl.Angle Strip. See Picture 2. Connect a 7-Hole Angle Girder (4) on each Beam, but do not tighten any bolts yet. Then install seven 7-Hole Perf.Strips (5) to the Left Main Beam and a Dbl.Bent Strip (6) inside this Left Beam.

Mount a $7 \times 11$-Hole Flat Plate (7) and a 7-Hole Angle Girder (8) thru the Elongated Holes on top of this Left Beam. Move the Angle Girder (8) as much forward as possible.


Attach a 25-Hole Angle Girder (9) to all Perf.Strips (5), Flat Plate (7) and both Angle Girders (4) and (8).

After all parts are properly seated and not overlapping, all bolts and nuts can now be tightened.

Next, install two 7x11-Hole Flat Plates (11) with a 7-Hole Angle Girder (12) on top of the Right Beam. See Picture 2.
Again this Angle Girder (12) to be connected thru the Elongated Holes and pushed forward as much as possible.
Do not tighten any bolts yet, until instructed to do so.
Fasten a 25 -Hole Angle Girder (13) to the two Flat Plates (11) and the 7-Hole Angle Girders (4) and (12). Now, after all parts are nicely positioned and not overlapping, tighten all bolts.
Connect a 19 -Hole Angle Girder (14) thru its Elongated Hole to the two Angle Girders (8) and (12).
At the front end install a 11-Hole Angle Girder (15) on both Main Beams and bolt a 3-Hole Angle Girder (16) to the Dbl. Bent Strip (3).

Install two Flat Trunnions (17) and two Trunnions (18) as shown in Pictures 1,2 and 5 on the bottom side of this part of the Chassis.
Connect a Fishplate (19) thru its Elongated Hole to each Trunnion (18) and adjust with a single long shaft for the proper alignment of all holes. See Picture 2.
Finally, install two Obtuse Angle Brackets (20) on top of Flat Plate (7) as is seen in Picture 1.

Check all bolts and nuts for a tight connection.
This completes the Front Section of the Chassis.

## ASSEMBLY OF MAIN FRAME (REAR SECTION)

## Parts Required:

8 Nr.: 6A; Perforated Strip, 3-Holes.
4 Nr.: 8 ; Angle Girder, 25-Holes.
2 Nr.: 9A; ,, ,, , 9-Holes.
? Nr.: 38; Washer. See Page 1 under Nr.:38
4 Nr.: 38A; Black Plastic Washer.
4 Nr.: 111 ; Bolt, 19 mm.long.
2 Nr.: 111C; ,, 9.5 mm .long.
2 Nr.: 133 ; Large Corner Bracket.
2 Nr.: 133A; Small
6 Nr.: 136 ; Handrail Coupling.
2 Nr.: 147B; Stud Bolt, 14.7 mm.long.

See Pictures 3,4 and 6 .
Two 25-Hole Angle Girders (21) - for each Beam - are bolted together thru the Round Holes.
A 9-Hole Angle Girder (22) is installed as shown in Picture 3 and another 9-Hole Girder (23) at the rear end on top of a Large Corner Bracket (24) with a 9.5 mm .long bolt at the corner hole and regular bolts at the remaining holes. Two Small Corner Brackets (25) are connected to each inner
 25-Hole Girder as is shown in Pictures 3 and 6. Move these parts out (down) in their holes as far as possible.

A freely rotating Handrail Coupling (27) is installed on a 14.7 mm.long Stud Bolt (26), which is mounted in Bracket (25) In the next steps, four units for the Leafspring Supports will be made as follows.
Two 3-Hole Perf.Strips (28) are connected at one end with regular bolts and washers to the threaded holes of a Handrail Coupling (29), so that the Handrail Coupling can rotate freely.
The other end of these 3-Hole Strips is installed in between the 25 -Hole Girders with a Black Plastic Spacer (30) on a 19 mm . long bolt to allow free movement of each unit.
Following suggestion is made to ease the installation of a unit in between the Angle Girders.
After installing the Black Spacer (30) and the washers on both sides of it, put a 19 mm .long

bolt in and then tighten this assembly. Then put a 19 mm .long bolt in the middle hole and tighten this. Remove the 19 mm .long bolt holding the Black Spacer and gently insert this unit in between the Angle Girders at the proper location and secure it with another 19 mm . long bolt and


## ASSEMBLING FRONT AND REAR SECTION

Parts required:
4 Nr.: 2 ; Perforated Strip, 11-Holes. (Springleaf).
4 Nr.: 2A; ,, ,, 9-Holes.
4 Nr.: 3; ,, ,, 7-Holes. .,
4 Nr.: 5; ,, ,, 5-Holes. ,,
8 Nr.: 6A; ,, ,, , 3-Holes.
2 Nr.: 103D; Flat Girder, 7-Holes.
2 Nr.: 103G; ,, ,, , 4-Holes.
8 Nr.: 111E; Bolt, 25.4 mm.long.
2 Nr.: 136 ; Handrail Coupling.
2 Nr.: 147B; Stud Bolt, 14.7 mm.long.


See Pictures 5 and 6.
Install a 7-Hole Flat Girder (35) to the inside of each 25-Hole Girder assembly (21) of the Rear Section.
Then connect a 4-Hole Flat Girder (36) to each outside 25-Hole Girder (21) of both Rear Section Beams (21).

Next, connect the Front Section to these Flat Girders (35) and (36) after checking the perfect straight line of both Sections. Secure all bolts involved.
On each 7-Hole Flat Girder (35) a Handrail Coupling (37) is installed on a 14.7 mm .long Stud Bolt (38) allowing this Coupling to rotate freely on it.
In the next step four Leafspring Assemblies are constructed for the two Differentials.
After nicely bending a 11-Hole, a 9-Hole, a 7-Hole and a 5- Hole Perf.Strip, all are assembled together with two 25.4 mm . long bolts thru a 3-Hole Perf.Strip, a 1/2" Nylon Spacer
and another 3-Hole Perf.Strip. See Pictures 24 and 25 for more detail.
These Springs will be later installed with both Differentials.
Check all bolts and nuts for tightness.
This completes the construction of the Main Frame.

## CONSTRUCTION OF ENGINE BLOCK

Parts Required:
2 Nr.: 5; 5-Hole Perforated Strip.
1 Nr.: 6A; 3-Hole Perforated Strip.
4 Nr.: 9; 11-Hole Angle Girder.
4 Nr.: 9B; 7-Hole Angle Girder.
2 Nr.: 10; 2-Hole Fish Plate.
4 Nr.: 12; Angle Bracket.
1 Nr.: 15; 130 mm . long Shaft.
1 Nr.: 16B; 75 mm . long Shaft.
1 Nr.: 17; 50 mm . long Shaft.
1 Nr.: 18A; 40 mm . long Shaft.
1 Nr.: 18C; 32 mm . long Shaft.
1 Nr.: 20B; 19 mm . Flanged Wheel.
1 Nr.: 22; 25 mm . diam. Pulley with boss.
2 Nr.: 23A; 13 mm . diam. Pulley w/boss.
1 Nr.: 23B; 13 mm . diam. Pulley w/o.boss.
1 Nr.: 26A; 19-T., 13 mm .L. Pinion.
1 Nr.: 27A; 57-T. Gear Wheel.
1 Nr.: 28; 50-T. Contrate Wheel.
2 Nr.: 30; 26-T. Bevel Gear.
? Nr.: 38; Washer.*
1 Nr.: 47; 3×5×3-Hole Dbl. Angle Strip.(Motor mounting)
3 Nr.: 48A; $1 \times 5 \times 1$-Hole Dbl. Angle Strip.
2 Nr.: 48B; $1 \times 7 \times 1$-Hole Dbl. Angle Strip.
1 Nr.: 48C; $1 \times 9 \times 1$-Hole Dbl. Angle Strip.
1 Nr.: 53; Flanged Plate.
4 Nr.: 59; Set Collar.
1 Nr.: 62B; Dbl.Arm Crank.
2 Nr.: 70; $5 \times 11$-Hole Flat Plate.
1 Nr.: 72; $5 \times 5$-Hole Flat Plate.
2 Nr.: 111; 19 mm.L. Bolt.
4 Nr.:111C; 9.5 mm.L. Bolt.
2 Nr.: 115; 15 mm.L. Threaded Peg.
1 Nr.:142C; Rubber Tire for Nr. 22 Pulley.
1 Nr.:147B; 23 mm . long Stud Bolt.
1 Nr.: 157; 50 mm. diam. Fan.
1 Nr.: 163; Sleeve Piece.
1 Nr.: 171; Socket Coupling.
1 Nr.:186A; 150 mm. long Driving Band.
5 Nylon spacers, 5/32" I.D., 9/32" O.D., 1/4" H. purchased
from any hardware store.
See Pictures 7-12.
The number of washers depends on the builders decision to protect all parts from marks made by nuts and boltheads.

NOTE: In this project a different motor was used

as main drive, however other motors can be used as long as the motor speed is close to 5200 RPM. to get the output speed with the gears used in this project.

## IN THE FOLLOWING STEPS IT IS ADVISED NOT TO TIGHTEN ANY BOLTS AND NUTS UNTIL SO INSTRUCTED. (Proper alignment!)

Assemble a 5-Hole Strip (1) with two Angle Brackets P/N.: 12 thru the elongated holes.
The front section of the Motor Housing is made out of a $5 \times 7$ - Hole Flanged Plate (2), bolted to two 7-Hole Angle Girders (3) thru the elongated holes. See Picture 9 only.
A Dbl.Angle Strip (15) is mounted on the front part. Pict. 8. NOTE: In Picture 9 this part is shown in the wrong position!A $5 \times 11$-Hole Flat Plate (4) is connected to one of these Angle Girders to form one side of the Housing.
On the bottom of this Flat Plate is a 11-Hole Angle Girder (5) mounted thru its elongated holes.
The rear section is made out of two 7-Hole Angle Girders (6),
connected thru the elongated holes to a $5 \times 5$-Hole Flat Plate (7),
a

$1 \times 7 \times 1$-Hole Angle Strip (8) and a 5 -Hole Perforated Strip (9). Again, part (8) is shown incorrectly mounted in Picture 9,10 \& 11.
A Dbl.Arm Crank (10) is mounted on the Flat Plate (7) with two 19 mm .L. bolts and two 1/2" spacers to form the support later for the Shaft (23).

Three Dbl.Angle Strips (11) and the Assy. (1) are installed in the locations as shown in Pictures 7, 8 and 9. All these Dbl.Angle Strips can be tightened for now.
Install the assembled rear section to the side (4). A 38-T. Gear (12) is mounted on a 40 mm .L.Shaft (13) with washers on the inside of the front section, while a washer and a pulley $\mathrm{W} / \mathrm{boss} \mathrm{P} / \mathrm{N}$.: 23A (14) is installed on the outside on this shaft. The Fan Blade Nr.: 157 will be installed almost at the end to protect it from possible damage.
Mount the Electric Motor with the $3 \times 5 \times 3$-Hole Dbl.Angle Bracket and a Pinion P/N.:26. It may require to use washers for proper spacing of this motor bracket between the sides.
Now install the two top 11-Hole Angle Girders (17) thru the elongated holes. The corner bolts and nuts will be hard to install; use magnetic equipment or other aids to hold all parts in place. Next the other side, a $5 \times 11$-Hole Flat Plate (18) is bolted to all Dbl. Angle Brackets (11), the Motor Bracket (washers?), the two 7-Hole Angle Brackets (3 and 6) and Assy (1).
Fasten all nuts and bolts of the Assy. (1), after the 40 mm . L.shaft with Gear (12) can freely rotate in its place.
A 3-Hole Perforated Strip (19) is connected with a Fishplate at each end to the two top 11-Hole Angle Girders (17) as is shown in Picture 12.
A 50 mm .L.Shaft (20) is mounted in this 3-Hole Strip (19) and Dbl.Angle Strip (11) together with a 50-T. Contrate Gear (21) on top and a bevel Gear (22) on the bottom with a Set Collar + washers.

In the next step a 200 mm . L.Shaft Nr.: 13A was used to align the Dbl.Arm Crank (10) and Dbl.Angle Bracket with the proper hole in the front Plate (2). After this alignment is done all remaining screws \& nuts can now be tightened. A 130 mm .L.Shaft (23) is now installed in place of the 200 mm .L. Shaft with another 38 -T. Gear (24), a 26-T. Bevel Gear (25) and a $19-\mathrm{T} .13 \mathrm{~mm}$. Long Pinion (26) with adequate washers and spacers as shown. All Gears and shafts should be free in rotation and without any binding spots. The remaining 11-Hole Angle Girder can now be mounted on the bottom and secured to the lower Dbl.Angle Bracket (11). A 75 mm.L. Shaft
(28) is now installed with the following parts: two Set Collars (29) with washers, a freely rotating 57-T. Gear (30), a freely rotating pulley $\mathbf{w} /$ boss and Rubber Tire (31), a Socket Coupling (32), a small spring inside this Coupling and a Set Collar (33). A regular screw in the pulley (34) fits in the cut-out of the Socket Coupling. The spring in this coupling forces the Rubber Tire on Pulley firmly against the 57-T. Gear Wheel. Picture 10 and 12 shows the "generator" on the side, made out of a Sleeve Piece Nr. 163 (35), a 32 mm .L.Shaft, fitted with a Set Collar (inside) and a Flanged Wheel (36) + Pulley w/boss (37) on the outside.
Two 9.5. mm L. Bolts are used to install this assembly on the motorhousing side; with adequate washers to space the Flanged wheel (36) away from the Engine Housing Side Plate. Two Angle Brackets (40) are installed on the bottom of the bottom Angle Girders to support the shaft for the clutch control later. On the lower front side of the Engine Block a 14.7 mm.L. Stud bolt holds a Pulley w/o.boss (38) and spacers. See Pict. 12.
Finally a Rubber Driveband (39) is put on all three 13 mm . Pulleys (14), (37) and (38).
Check and tighten all bolts and nuts.
This completes the assembly of the Engine Housing.
NOTE: An alternate assembly description with a 6-Speed TEMSI Electric Motor will follow next.

## CONSTRUCTION OF ENGINE WITH ALTERNATE ELECTRIC MOTOR

Parts required:
1 Nr.: 5 ; Perforated Strip, 5-Holes.
2 Nr.: 9 ; Angle Girder, 11-Holes.
4 Nr.: 9B; ,, ,, , 7-Holes.
2 Nr.: 12 ; Angle Bracket. Axle Rod,

1 Nr.: 22 ; Pulley w/boss, 25 mm.
2 Nr.: 23A; Pulley w/boss, 13 mm .
1 Nr.: 23B; ,, without boss, 13 mm .
2 Nr.: 26 ; Pinion, 19-T.,6-mm.
3 Nr.: 31 ; Gear Wheel, 38-T.
1 Nr.: 43 ; Spring.
Nr.: 48A; Dbl.Angle Strip, $1 \times 5 \times 1$-Holes.
2 Nr.: 51 ; Flanged Plate, $40 \times 60 \mathrm{~mm}$.
1 Nr.: 53 ; ,, ,, $90 \times 60 \mathrm{~mm}$.
Nr.: 59 ; Set Collar.

1 Nr.: 62B; Double Arm Crank.
2 Nr.: 70 ; Flat Plate, $5 \times 11$-Holes.
1 Nr.: 72 ; ,, ,, , $5 \times 5$-Holes.
3 Nr.: 111C; Bolt, 9.5 mm.
1 Nr.: 142C; Tire (for \#22 Pulley)
1 Nr.: 147B; Stud Bolt, 23 mm.. 7 mm .
1 Nr.: 163 ; Sleeve Pice.
1 Nr.: 164 ; Chimney Adaptor.
1 Nr.: 171 ; Socket Coupling.
1 Nr.: 186?; Heavy Driving Band,-----
1 Nr.; 300, TEMSI 6-Speed Electric Motor (or identical Meccano Motor).

## CONSTRUCTION OF GEAR-BOX

Parts required:
2 Nr.: 3; 7-Hole Perforated strip.(Used as Spacers)
2 Nr.: 9B; 7-Hole Angle Girder.
1 Nr.: 10; Fishplate.
6 Nr.: 12; Angle Bracket.
4 Nr.: 12A; $2 \times 2$-Hole Angle Bracket.
1 Nr.: 12B; 1×2-Hole Angle Bracket.
2 Nr.: 15A; Axle Rod, 115 mm.L.
1 Nr.: 15B; Axle Rod, 100 mm.L.
3 Nr.: 16B; Axle Rod, 75 mm.L.
1 Nr.: 18A; Axle Rod, 40 mm.L.
4 Nr.: 25; 25-T. Pinion, 6 mm.L.
3 Nr.: 26; 19-T. Pinion, 6 mm.L. *
1 Nr.: 26A; 19-T. Pinion, 13 mm.L.
1 Nr.: 26B; 19-T. Pinion, 19 mm.L.
1 Nr.: 31; Gear,38-T.
52 Nr.: 38; Washer.
1 Nr.: 46; $2 \times 5 \times 2$-Hole Angle Bracket.
1 Nr.: 46A; $2 \times 3 \times 2$-Hole Angle Bracket.
2 Nr.: 55; Perforated-Slotted Strip.
5 Nr.: 59; Set Collar.
3 Nr.: 63; Coupling.
2 Nr.: 73; Flat Plate, $3 \times 6$ Holes.
2 Nr.:103D; Flat Girder, 7-Hole.
4 Nr.:111A; Bolt, 12 mm.L.
16 Nr.:111C; Bolt, 9.5 mm.L.
1 Nr.:147B; Stud Bolt, 14.7 mm.L.
2 Nr.: 161; Girder brackets.
1 Nr.: 165; Single Coupling.
1 Nr.: 214; Semi-Circular Plate.
2 Nr.:235G; 3-Hole Narrow Perf. Strip.
In some cases, more washers may be needed for proper spacing or to protect material from nuts and bolts.
Additional \# 6 nylon washers (Any Sears Hardware Store) $1 / 8^{\prime \prime}$ and $1 / 4^{\prime \prime}$, thick $3 / 16^{\prime \prime}$ I.D. were
used in this project.
Improved operation can be made by replacing one Pinion P/N.: 26 with a P/N.: 26A (13 mm. L.) as will be explained later.

Also it is advised NOT to use the Yellow Plastic Pinions since three of this type have failed in previous projects and it will be a major job to replace these in this Gear-Box, if one would break open on the teeth.
Use only all metal gears in this project I
See Pictures 13-20.
The top of the Gearbox housing is made out of two (yellow) 7-Hole Flat Girders (1) bolted together thru the round holes. A $2 \times 2$-Hole Angle Bracket (2) is mounted on


top. On the inside a (green) 7-Hole Perf.Strip (4) is added on the center line to get the cor$r e c t$ height of all shafts used in t h i s Gear-Box. See Pict.
13 and 14. On top of

this "green spacer" a $2 \times 1$-Hole Angle bracket (5) and P/N.:10 Fishplate for adjustable hole position, is installed at the Output side, while a $2 \times 3 \times 2$-Hole Dbl.Angle Strip (3) is in-
stalled at the Input side. See Pictures 13 and 14. Use a long shaft for proper alignment of brackets (3) \& (5).
Two 7-Hole Angle Girders (6) are now installed
on the left and right side thru the elongated holes of the Flat Girders (1) and these Angle Girders. One needs a 7-Hole Perf.Strip for spacing between one Angle Girder and the Flat Girder to get the same height of all shafts. On top of one Angle Girder is a $2 \times 5 \times 2$ - Hole Dbl.Angle Bracket (7) mounted, while the other side has two $2 \times 2$-Hole Angle Brackets (8). See Picture 13 and 14.

In some locations 9.5 mm .L.bolts are used to allow sufficient threads for washers and nuts; regular bolts may not be long enough.
Both 7-Hole Angle Girders (6) have to be moved out as far as possible to prevent any gears later touching the inside of side plates P/N.:73.
In order to obtain the proper mesh of all gears without any difficulty, it helps to move the outer brackets (7) and (8) a little more away from the center of the gearbox.
At the Infeed end a 9.5 mm .L.bolt is installed with at the end a rubber washer or disc.(9) This prevents both Selector-Shafts from sliding too freely. Then remove this piece temporarily for the following step.
Check whether a long Shaft can slide freely in the outer brackets thru the holes closest to the Top Plates (1) and that boltheads do not obstruct any movement.
Reinstall both rubber friction-discs.
Two 115 mm .L.Shafts (10 \& 11) are now mounted in the outer Brackets with a Coupling (12) on the Output end, a $1 / 4$ " spacer and a Set Collar (13) with 9.5 mm .Bolt. Due to inaccessibility later it is recommended that both Side plates Nr. 73 are now installed as shown in Picture 14, 15 and 16 with just one bolt and turned away for now.
At the center brackets at the Infeed end a 75 mm.L.Shaft (14), complete with a Set Collar (15), a 19-T. Pinion (16) a 25-T.
Pinion (17) and another 19-T.Pinion (18) is installed. This shaft protrudes about $1 / 4^{\prime \prime}$ beyond this last Pinion (18).
From the other end (Output side) a $75 \mathrm{~mm} . \mathrm{L}$. Shaft (19) is installed with a 19-T.Pinion (20), halfway on Shaft (14), a 25-T. Pinion (21) and at the end a Universal coupling (22).
The Shaft (23) for 1st. and Reverse speeds is 100 mm . long,
with a 19-T., $19 \mathrm{~mm} . \mathrm{L}$. Pinion (24) (See Note above), a washer, a Set Collar (25), another washer and a 25-T. Pinion (26).
This Shaft rotates freely in Coupling (12).
The Shaft for 2 nd. and 3rd. Speeds is a 115 mm.L. Shaft (27), fitted with 25-T. Pinion (28), a
washer, a Set Collar (29), another washer and 19-T. Pinion (30) and another Set Collar (30-C) at the end.
This shaft will also freely rotate in the other Coupling (12).
The heads of the 9.5 mm .L.Bolts in the Set Collars (13) have to be positioned in between the washers on Shafts (23) and (27).
Spacing or precise location of all gears is important prior to securing these bolts and their Set Collars on the Shafts.
Now swing the two Side Plates P/N.:73 in place and secure with bolts and nuts. Two slotted-perforated Strips (31), complete with three angle brackets, each thru their slotted holes, are installed between the side plates. A 40 mm .L.Shaft with a Set Collar (32) and a 19-T. Pinion (33) with a number of spacers is inserted in two of the angle brackets as a part of the Reverse gearing. This Pinion (33) is permanently engaged with a small part of 25-T.Pinion (17) on the Input Shaft (14).
Location of all gears is critical for proper operation.
Next a 38-T.Gear (34) is fastened to the Infeed Shaft (14) on the front end.
On top of the gearbox a Half-Circle Plate (35) is connected to the $2 \times 2$-Hole Angle Bracket (2).
Also a Small Fork Piece with Set Collar (36) pivots on a 14.7 mm . Stud Bolt installed in the same Angle Bracket (2) and Half- Circle Plate (35).
The Set Collar in this Small Fork Piece carries a $40 \mathrm{~mm} . \mathrm{L}$. Shaft (37) with at the lower end a Coupling (38) complete with two 3-Hole Narrow Strips.
These two Narrow Strips will engage a 19 mm .L.Bolt in each Coupling (12) and will force the two Selector shafts (10) or (11) to slide back and forth to engage or disengage different gears in this unit for the various speeds. Finally, two (grey) 4 -Hole Girder Brackets (40) are attached to the sides of the Gearbox for support later on the chassis. (See Picture 20).
NOTE: In some cases the original 2 mm . long grub screw P/N.: 69-C, - if available - is recommended in some gears and set- collars to prevent binding or even stopping of rotation.
Check all screws, nuts and especially grub screws for tightness.
This completes the construction of the Gear-Box.


Parts required:

| 8 Nr.: | 6; Perforated Strip, 5-Holes -50 mm. |
| :---: | :---: |
| 4 Nr.: | 12; Angle Bracket.(Optional). |
| 2 Nr.: | 15; Shaft, $130 \mathrm{~mm} . \mathrm{L}$. |
| 2 Nr.: | 15A; Shaft, 115 mm .L. |
| 1 Nr.: | 18A; Shaft, $40 \mathrm{~mm} . \mathrm{L}$. |
| 2 Nr.: | 18C; Shaft, 32 mm .L. |
| 2 Nr.: | 28; Contrate Gear, 50-T. |
| 2 Nr.: | 29; Contrate Gear, 25-T. |
| 6 Nr.: | 30; Bevel Gear, 36-T. |
| ? Nr.: | 38; Washer. |
| 16 Nr.: | 48A; Dbl.Angle Strip. |
| 4 Nr.: | 59; Set Collar. |
| 3 Nr . | 62B; Dbl.Arm Crank. |
| 2 Nr.: | 63; Coupling. |
| 4 Nr.: | 109; Face Plate. |

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4 Nr.: 111; Bolt, 19 mm.L.
8 Nr.: 111C; Bolt, 9.5 mm.L.(4 Optional).
4 Nr.: 111 D ; Bolt, 28 mm .L.
8 Nr.: 111E; Bolt, 25.4. mm.L.
4 Nr.: 120D; Shock Absorber Set.(Optional).
3 Nr.: 140; Universal Coupling.
4 Nr.: 162A; Boiler End.
1 Nr.: 230; Rod with Keyway.(To be cut for correct length)


1 Nr.: 231; Key Bolt.
See for quantity under previous assemblies. Due to the closeness of both differentials, Marklin Universal Couplings (P/N.: 11793 ) were used.

See Pictures 21-25 and 44-46.
[A] Connect one end of four Dbl.Bent Strips (1) to a Face Plate (2) thru the elongated holes. Be sure the boss of this Face Plate is facing to the center of the Differential.
The other end of these four strips - after bending these slightly - are bolted to a Boiler End (3). REPEAT THE ABOVE INSTRUCTION UNDER [A] FOUR TIMES.
In the next steps only the rear differential will be assembled first.
[B] Mount four 5-Hole Strips (4) - one with a Dbl. Arm Crank (5) and spacers on one Boiler End (3) and move all these except the one with the Dbl. Arm Crank out of the way. See Picture 21.

The 5-Hole Strip + Dbl.Arm Crank requires 9.5 mm .L.Bolts with spacers and extra nuts when connecting to the Boiler Ends.
A 130 mm .L. Shaft is rotating freely in a Coupling (6) and a 50-T.Contrate Gear (7), while a 25-T.Contrate Gear (8) is secured on it between Contrate Wheel (7) and Coupling (6).
The large Contrate Wheel (7) has two 28 mm.L.Bolts on it, holding a Set Collar (9) at the end. See Picture 21.
When installing these two bolts, make sure that no washer is used under the nut to avoid interference with the Pinion (12) or (19) later.
A 40 mm .L. Shaft (10) is inserted in both Set Collars (9) and thru coupling (6). Secure this shaft with set screws in the Set Collars (9) after proper alignment.
Install two Bevel Gears (11) on 19 mm.L. Bolts. These should mesh up with the small Contrate Gear (8). Spacers between these Bevel Gears (11) and Coupling (6) is recommended.
Insert this section complete with a few washers in one of the four units assembled under [A].
Mount a 19-T.Pinion (12) on a 32 mm.L. Shaft (13) and insert same thru the Dbl.Bent Strip + 5-Hole Perforated Strip (4) and swing this assembly now in position.
Now decide the number of wash-
ers or spacers required between the Boiler End and the Contrate Gear (7) to have a smooth rotating operation of this assembly before continuing with the rest of the differential. When the above is obtained, temporarily install a Set Collar at the other end outside the Face Plate (2).
The Pinion (12) may need a spacer between it and the 5 -Hole Perf.Strip, however, be sure the teeth just cover the teeth of the Contrate Wheel. Too far in may cause it to run over the nuts of the 28 mm .L.bolts and create a small binding effect. Install a Marklin Universal Coupling (15) at the other end of Shaft (13). A regular Meccano Universal unit P/ N.: 140 is too long at this location, since both Differentials are too close together.
A 115 mm .L. shaft (16) is fitted with another Bevel Gear (17) and pushed in another unit made under [A].
A number of washers or spacers may be used for proper spacing and engagement of all gears.
The entire unit is now bolted together with all four 5-Hole Perf.Strips and secured after alignment. Remove the temporary Set Collar outside the Face Plate (2).
This completes the Rear Differential unit.
The Front Differential is made exactly the same way, with the exception of an added Dbl. Arm Crank (18), a second Pinion (19) and regular Meccano Universal Coupling (20) mounted on a 32 mm .L.Shaft (21). These additional parts are necessary to drive the Rear Differential. See Pictures 22 and 23.
Check and tighten all nuts and bolts.
This concludes the assembly of both differentials.

To install both Differentials, start by mounting the Front Differential by connecting two Leaf-Spring Assemblies, as made on Page 4. See Picture 5 and 6.
For installing both Differentials, refer to Picture 24 \& 25.


If the use of a newly type Shock Absorber P/N.: 120 D is selected, it is suggested to install an Angle Bracket P/N.: 12 on each of the four Spring assemblies as is shown in Picture 24, 25, and 46.

Each Shock Absorber unit rotates freely on two 9.5 mm .L.Bolts one to the Main Chassis beam and the other to the Angle Bracket.
Now mount this Front Differential to the rear section of the Main Frame. Pictures 44, 45 and 46 may be more helpfull.
Install the two remaining Spring Assemblies on the Rear Differential as was done by the Front Differential. When installing the Rear Differen-


## MOUNTING OF ENGINE BLOCK AND GEARBOX

Parts required:
1 Nr.: 16A: Shaft, 60 mm .long. 4 Nr.: 111C; Bolt, 9.5 mm .long.

See Pictures 29 and 30.
The mounting of the Engine block needs very nimble fingers and a lot of patience.
Tools with small magnets with a magnetic end may be very helpful.
Position the Engine in the right location and use 9.5 mm . long bolts. Move the unit up as high as possible in the slotted holes of the Chassis Beams and fasten both $1 \times 7 \times 1$ Dbl Bent Perf.Strips to the Main Chassis Beams.
The selection of the gears on the Output shaft of the Engine and the Input shaft of the Gear Box depends on the builders desired speed of driven wheels. In this case a 1:1 ratio was made by the use of two identical 38-Teeth gears as shown in Pict. 31. However, with a set of one 19-Teeth Pinion P/N.: 26 and a 57-Teeth Gear P/N.: 27-A, a ra-
tial, notice that the 50-T. Contrate Wheel in the Front Differential is on the RIGHT side while the same Contrate Wheel in the Rear Differential is on the LEFT side.
Measure the proper length of a Rod-w/keyway to connect the Front and Rear Differentials by the two Marklin Universal couplings. Make it slightly longer to allow safe operation of it. Install this Shaft-with-Keyway with a regular Grub Screw in one Marklin Universal Coupling (15) and a Key Bolt in the other Universal Coupling. This allows the shaft to slide back and forth by the normal action of all springs.
Again, check all bolts, nuts and grub screws for tight fit. This completes the mounting of both Differentials.
tio of 3:1 or 1:3 can be achieved.
After the Engine is in place, the Gear Box can now be put in the Chassis and secured in place. The L-Shaped girders on the side of the Gear Box allows proper height for correct mesh of both gears. Again Picture 29 and 30 show the precise location on the Chassis.
Finally, the Universal Coupling on the Gear Box Output Shaft is connected with a 60 mm .long shaft to the Universal Coupling of the Forward Differential unit.
At this point all moving parts in the " drive train" should be freely rotating and no binding should be felt in its operation. If not, correct the problem before advancing to the next step.
This completes the mounting of both the Engine and Gear Box.

## John Overeem - New Parts Manufacturer

John Overeem of Picture Butte, Alberta has recently started manufacturing parts.

This price list is effective January 2000. Please note that all parts are unpainted by default. John is in the process of setting up his manufacturing facilities and plans to offer a wider variety of parts in the future (e.g. trunions and single-


## PRICE LIST


braced girders). Upon request, he can produce custom sizes of many parts. I have some samples of his parts and they are very good with the following caveats:
o Early samples of his $1 / 2^{\prime \prime}$ solid brass pulley and collar were only single-tapped. I told John about this - he'll likely start producing double-tapped versions in the future.
o The paint job was mediocre on early samples of painted parts. John indicated that he is still refining his painting techniques.

- The metal used to make angle girders appears to be ever so slightly thicker than standard Meccano angle girders (this is good).
For more information please contact John directly.


## John Overeem

P.O. Box 542, Picture Butte Alberta, CANADA TOK 1 VO
phone: (403) 732-4974
fax: (403) 732-4974, no e-mail

23B -- Solid brass pulley (no boss)-
51G -- Flanged plate $21 / 2 \times 11 / 2$ (no oblong holes or ends)




59 - Brass collar (no grub screw) -_
90A -- 5 hole curved strip ( 4 to a circle) ----------------------------- 0.45

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## *ALL SHEET METAL PARTS ARE MADE FROM COLD ROLLED UNPAINTED STEEL

## QUANTITY DISCOUNT

50 or more of any one item --10\% discount
100 or more of any one item -- 20\% discount
ALI PRICES ARE IN CANADIAN FUNDS F.O.B. PICTURE BUTTE, AB, CANADA

7\% G.S.T. APPLIES

PAINTED EITHER GREEN OR RED ADD $15 \%$.

## JOHN OUEREEM

POO. BOX 542 , PICTURE BUTE, AB.
TOK IVO, Ph.732-4974.
FAX 732-4974.

PERFORATED STRIPS (will be avialbale in October '99)

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ANGLE GIRDERS (will be available in October '99)
7 -- 49 holes -.......................... 7.50

7A - 37 holes

6.50
8-25 holes ..... $-5.00$
8A -- 19 holes ..... 4.75
$8 B$-- 15 holes ..... $-3.00$
9-11 holes. ..... 2.00
9A -. 9 holes ..... 1.85
9B - 7 holes ..... 1.55
9 C - 6 holes ..... 1.40
9D -- 5 holes ..... 1.35
9E -- 4 holes ..... 0.90
9F - 3 holes ..... 0.75
9L - 2 holes ..... 0.60
10 -- Fish plate- ..... $-0.40$

## Mutilator's Corner

## (Part 215)

If don't know if all collectors have an abundance of part no. 215, the "Formed Slotted Strip". In any case I have quite a wad of them and I came up with this mutilation to use up at least part of the surplus.
First I flattened the strip and then with a pair of tinsnips I cut each side of the centre hole. Then one can clamp a 3 hole strip and drill a hole on the cut end. It can then be ground off round and you have a part that is very similar to part $12 b$, the $1 \times 1 / 2^{\prime \prime}$ angle bracket. It can be used as is or be given a right angle bend as the 12b.
Bill Bardutz


## Model Building Tip

The brass hub or boss from broken or stripped plastic gears and pulleys can be recycled into other usefull parts. Simply press it out and use it for a decorative knob on shifting levers, flagpoles, etc.. If you have access to a lathe, the serrated section may be cut off, leaving a perfect replica of the \#59 collar.
Lou Boselli
Note: A copy of Lou Boselli's January 2000 price list is now available on the web:
http://www.edmc.net/cmamas/meccano/ Lou_Boselli/



Wanted: Erector 12 1/2 set box or set in good shape - vital parts there or reasonable price. Prefer 40's or 50's box or any mostly complete set. Mike Schlumpberger, 5125 Abbott Ave. So., Minneapolis, MN, USA 55410-2144.
Wanted: any meccano spare parts in their original packaging such as yellow boxes, brown paper wrapping, etc. Also need 1929/30 outfit 4-7 manual w/cover, 00-3 manual w/cover, 1965 mechanisms set, Oak 6 drawer dealer's cabinet, advertising literature, 1960 outfit \#9, \#7-8 and \#6 manuals. contact Greg Rahn, 211 Riverview Green, Cochrane, AB TOL OW4 or Email: gsrahn@home.com


## MW Models

4 Greys Road, Henley-on-Thames, Oxton, England RG9 1RY, phone: 0491 572436, FAX: 0491 571175, geoff@mwmodels.telme.com
http://www.btinternet.com/
~mwmodels.meccano/
Credit cards are accepted!


Greasby Junior School - Pupils (Left to Right): James Marshland, Kathryn Sibthorp, William Shepherd, Heather Byrne, Jack Magin, Beth Barrett
Winners of the Northern region

## Moving Into the Millenium School Competition

Geoff Wright of MW Models kindly sent us photos of the winners of this U.K. contest. It was open to 7-9 year olds who were to design a "Vehicle of the Future".

Pictured above is the National Winner "An electric powered all-terrain rescue vehicle" (RES-Q).

## Model Plans and Canadian MeccaNotes Back Issues

Can be obtained from:
o within North America: Colin Hoare (address on page 2), Money Order or Cheque.
o elsewhere: MW Models (4 Greys Road, Henley-on-Thames, Oxton, England RG9 1RY, phone: 0491 572436, FAX: 0491 571175, geoff@mwmodels.telme.com, http://www.btinternet.com/ $\sim$ mwmodels.meccano/). Credit cards are accepted!


[^0]:    Note: All RAD photos were taken by Matthew A. Thurman.

