PROJECT
FOR THE CHILDREN

This toy by Michael Askham is based on the popular 'piggy-back' type of recovery vehicle. It is simple to make using readily available parts and materials

The piggy-back recovery vehicle can be used with a wide variety of toy cars or with the car described in this article. It is equipped with a self locking winch which prevents a car from slipping backwards whilst it is being loaded.

The lorry

Stage 1

Begin by marking out a side onto a piece of 6mm birch plywood. Temporarily fix this to a second piece of ply so that both sides can be cut together. Drill a 3mm hole for the tailgate locking pegs.

Stage 2

Mark the centre line of the chassis and on the sides and drill two holes 3.5mm diameter between the two wheel arches. These will be used to screw the sides to the chassis using ¾ inch x No. 6 screws.

Stage 3

Countersink the two holes, from both sides, deeply enough to allow the heads of the screws to be covered with woodfiller.

Stage 4

Remove the wheel arches and the window apertures with a fretsaw and then cut round the profile and separate the two sides.

Since most parts fit between the sides it is a good idea to cut sufficient 9mm and 6mm ply to the required width at the same time to ensure that all parts fit snugly.

Stage 5

Glue and pin the cab front into position between the sides. Check for squareness and leave to dry. The chassis should be cut from 9mm ply and the winch access hole removed with a fretsaw.

Stage 6

Place the chassis into position between the sides and check that the wheel cut-outs align with the chassis apertures. If it is necessary to remove any material, remove it from the chassis.

Stage 7

With the chassis located in its correct position, 12mm up from the bottom of the sides, mark the position of the screw holes on the edge of the chassis with a sharp point.

Stage 8

Remove the chassis and drill pilot holes of 2.5mm at the places marked to accommodate the ¾ inch x No. 6 screws.

Stage 9

Glue the chassis into place and fit and tighten the screws. Cover their heads with woodfiller and sand this smooth when dry.

TIP

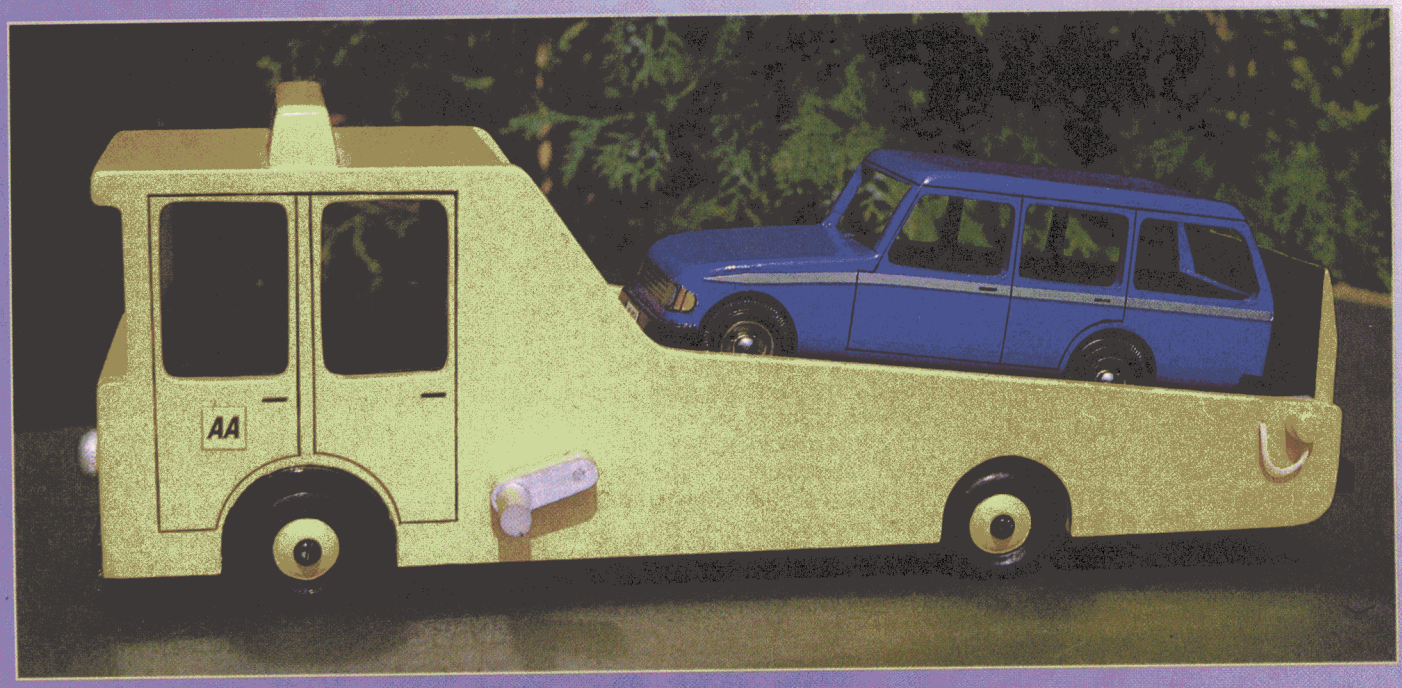
It is a good idea to cut sufficient 9mm and 6mm ply to the required width at the same time to ensure that all parts fit snugly

Stage 10

Pin and glue the cab rear panel into place, followed by the seats and steering column.

Stage 11

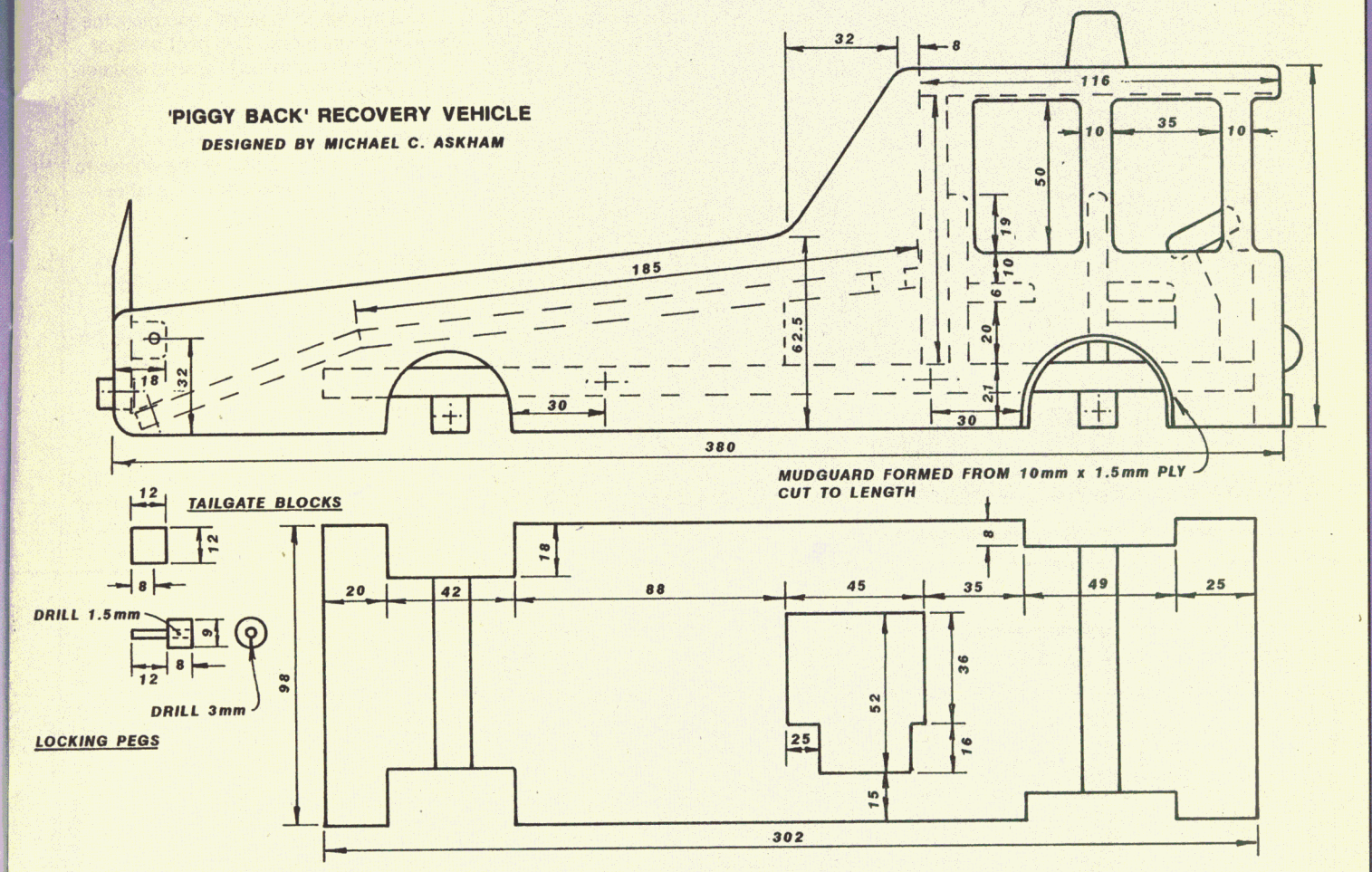
Paint the interior of the cab, the seats and steering column and wheels now.



Piggy-back rec

'PIGGY BACK' RECOVERY VEHICLE

DESIGNED BY MICHAEL C. ASKHAM



Remember to leave a strip 6mm deep along the two top edges unpainted. This is where the roof is to be pinned and glued, which can be done when the paint has dried. Make sure that the roof is fixed flush with the top edge of the sides.

Stage 12

Glue the head lamps into place; these are small wooden buttons, or they can be painted on later if you wish. The front bumper, a piece of 3 x 10 x 110mm hardwood or pine, can also be glued on flush with the bottom edge.

Stage 13

Six 1½ inch wooden wheels are used for the road wheels and the axles are cut from 12 x 12mm ramin. The single front wheels are retained with 1¼ inch x No. 8 roundhead screws and the twin rear wheels are 1½ inch x No. 8 roundhead screws.

Fig. 1 Quarter rear view of vehicle and car

covery vehicle

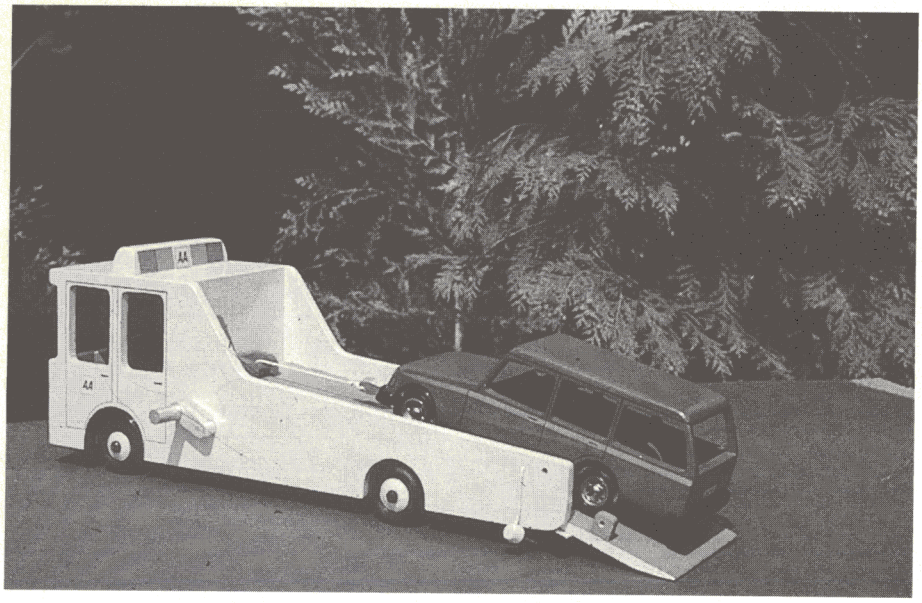


Fig. 2 Rear nearside view of vehicle with ramp lowered and car half way onto lorry back

Stage 14

Cut the ramin to length and mark the centres of each end. Drill pilot holes of 3.5mm for the retaining screws squarely in the ends.

Stage 15

Drill the centre holes of the wheels to clear the screws and attach the wheels to the axles.

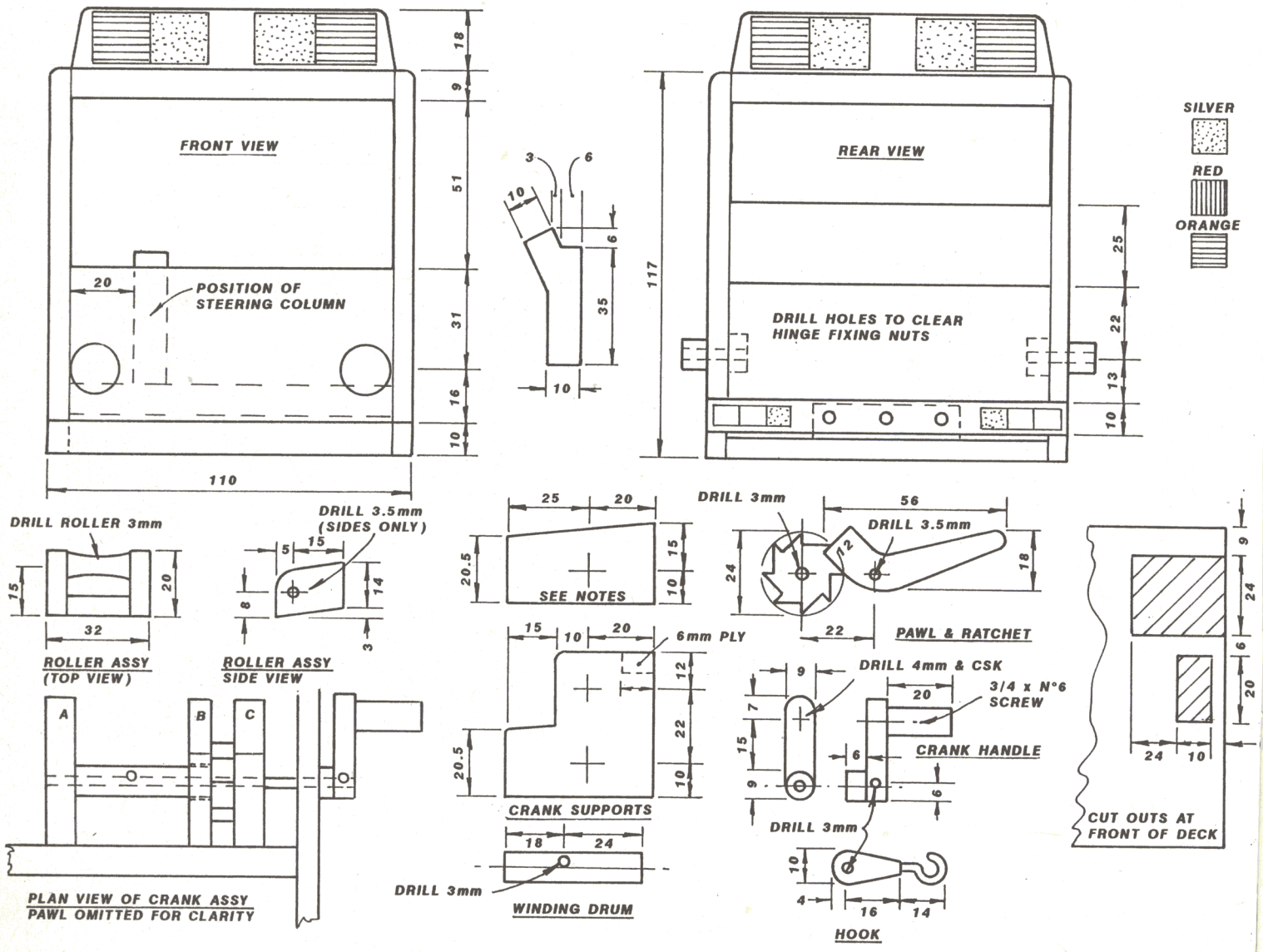
Stage 16

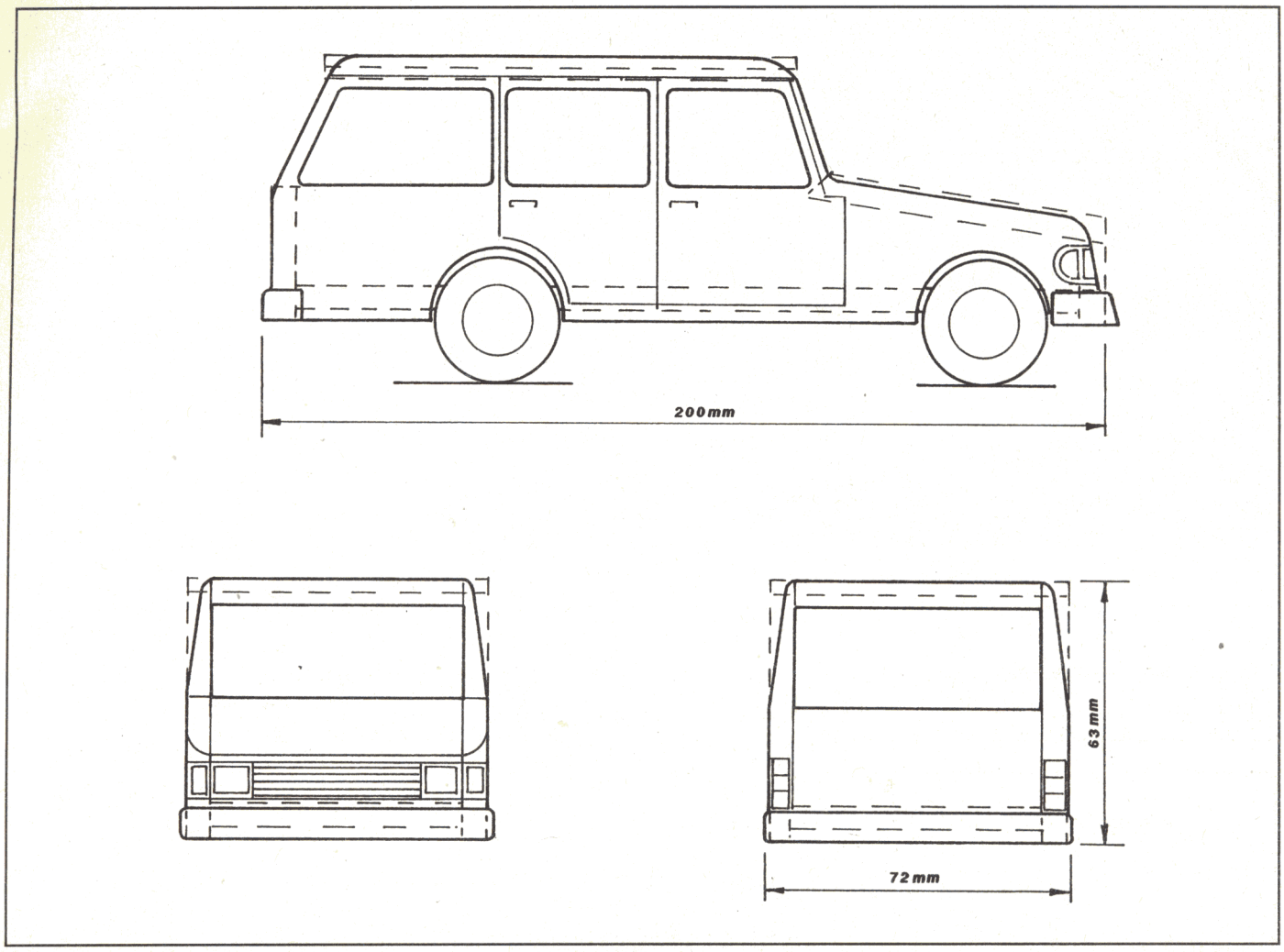
Glue the axles into position on the chassis checking that the wheels are central in the wheel arches and that the axles are square to the chassis sides.

Winch assembly

Stage 17

Turn now to the winch assembly. Cut the supports A, B and C. A and C are cut from 9mm ply and B from 6mm ply. In order to ensure that all holes for the





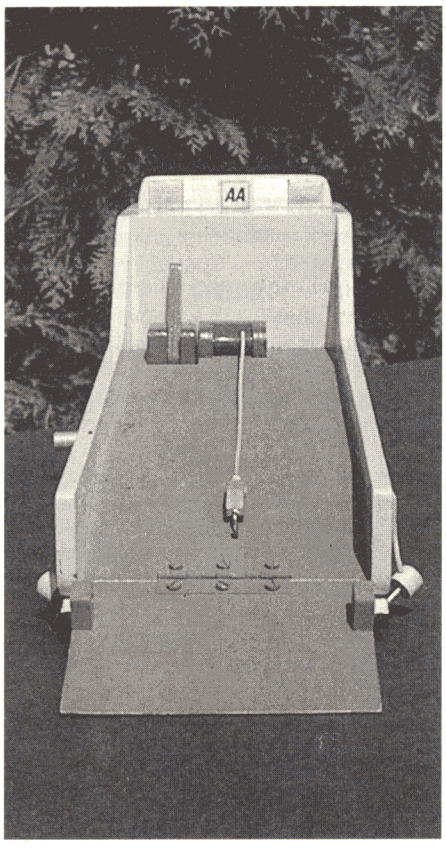


Fig. 3 Rear view of vehicle with ramp lowered

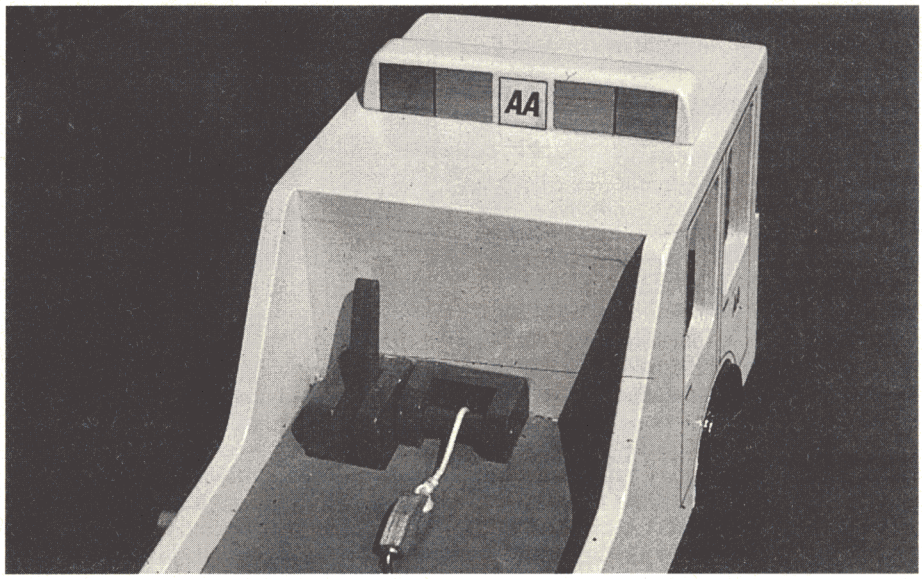


Fig. 4 Close up of winch and roller assembly

crank axle rod are in line, adopt the following procedure: mark the position of the hole on the nearside of the lorry.

Stage 18

Place the three support pieces against the inside of the side ensuring that they are all butted up to the cab rear. Clamp them in this position against the side.

Stage 19

Drill a 3.5mm hole through all four pieces. Remove the parts and open the hole in part B to 10mm. Drill a 3mm hole through parts B and C 22 mm above the previous hole for the pawl pivot pin.

Stage 20

The pawl and ratchet can be marked out together on a piece of 6mm ply. First ➡

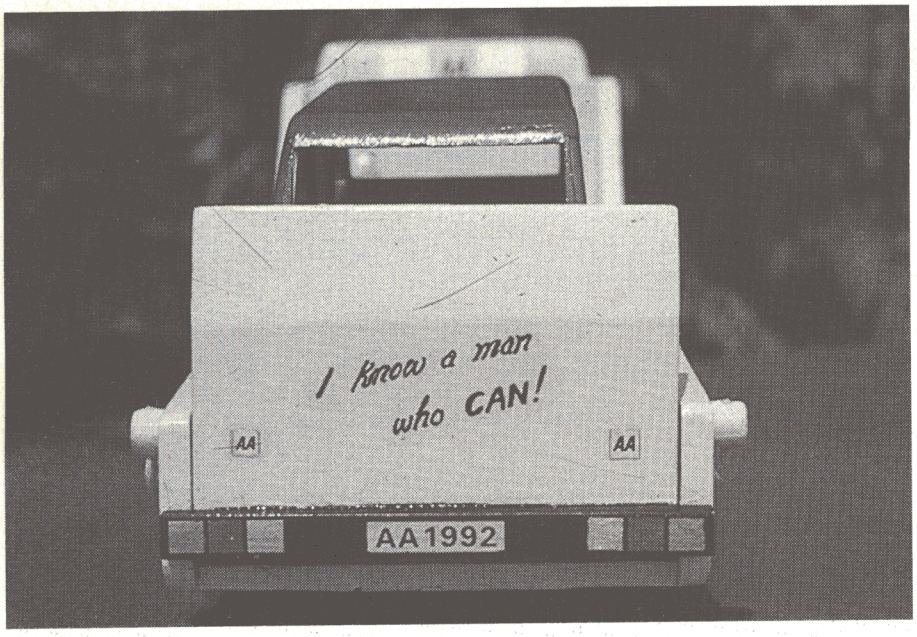


Fig. 5 Rear view of vehicle with ramp raised

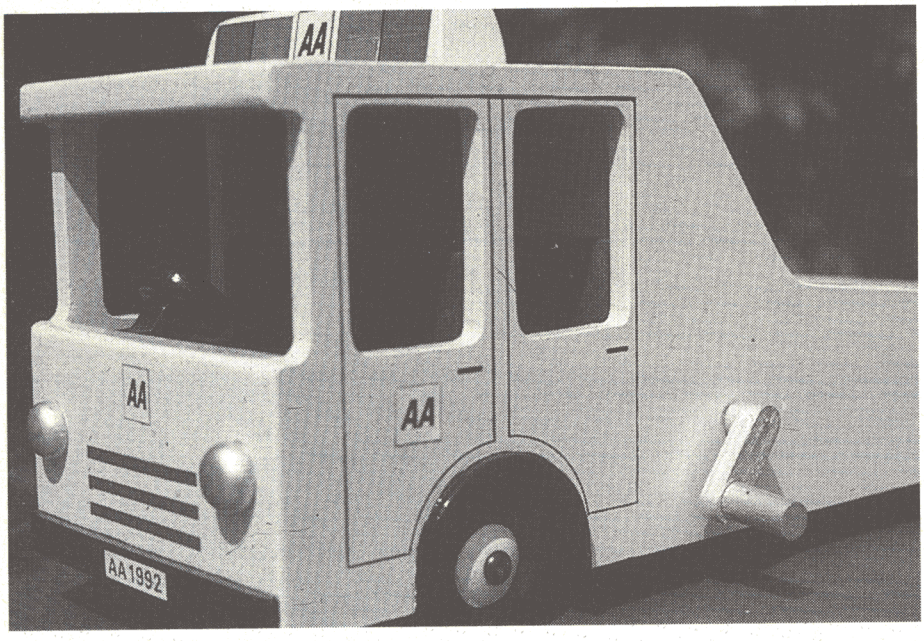


Fig. 6 Nearside three quarter view of cab

draw a circle 24mm diameter and divide this into eight equal parts. Draw a line between alternate intersections of the circumference.

Stage 21

You can now mark out the teeth of the ratchet. Now drill a 3mm hole in the centre of the ratchet and another of 3.5mm in the pawl, 22mm from that in the ratchet wheel.

Stage 22

Cut out the two parts with a fretsaw using a fine blade. Cut a piece of 9mm dowel to a length of 42mm for the winding drum. Mark the centres of the ends and drill through the length of the dowel with a 3mm drill. Drill a second 3mm hole, 18mm from one end and 1.5mm off the centre line.

Stage 23

Glue the winding drum to the ratchet wheel, aligning both with a piece of 3mm rod and making sure that both parts are the correct way round. Remember that the ratchet has to lock against the pawl when a load is attached to the hook. Glue support C in place on the chassis, 9mm from the left hand side and against the cab rear panel.

Stage 24

Cut a length of 3mm axle rod 195mm long. Feed this through the hole in the side and through part C. Push the ratchet and winding drum onto the shaft until the ratchet is against part C. 12mm of shaft should protrude from the outside of the nearside of the lorry. Slide support B over the drum and up to the ratchet wheel. Glue into place, ensuring that there is sufficient clearance for the ratchet to revolve freely.

Stage 25

Glue part A into place, ensuring that the drum can revolve freely.

Stage 26

Mark the shaft at this point by inserting a round needle file into the hole. Pull the shaft out from the drum and using the needle file, file a half round shape into the shaft where you had previously marked it. Refit the shaft through the supports and winding drum, aligning the cut-out in the shaft with the hole in the drum.

Stage 27

Cut a piece of 3mm axle rod 9mm long and press this through the hole. This will effectively lock the drum to the shaft.

Stage 28

Make up the handle as shown from 6mm ply and 9mm dowel. Glue a 6mm length of dowel to one end of the lever and drill a 3mm hole centrally through both. Drill another 3mm hole centrally through the edge of the lever 1.5mm above the centre line of the previous hole for the locking pin. The handle is attached to the lever with a 3/4 inchx No. 6 countersunk screw. Drill a clearance hole and countersink in the lever and a pilot hole down the centre of the dowel handle. Press the lever onto the shaft aligning the locking pin hole with the recess in the shaft. Cut a locking pin from 3mm axle rod 9mm long and press this through the hole. File the pin flush with the lever. Check that the crank turns freely.

Stage 29

Now position the pawl between the support block extensions of parts B and C, checking that it is the right way round and secure it with a 3mm pin 21mm long. Check that the pawl moves freely on its pivot. It should lock automatically when the vehicle is standing on the level and should release the drum when moved towards the rear of the lorry.

Stage 30

Glue the piece of 6mm ply between parts B and C. The larger part of the decking should now be prepared. Remove the indicated cut-outs from the front end of the decking. Form a slight angle to allow the decking to fit flush against the cab rear. Lay the front end on top of the winch supports and set the decking parallel to the top edge of the sides. Mark this position on the sides. Glue and pin the decking into place.

Stage 31

The roller assembly is the next item. The roller is a 20mm length of 9mm

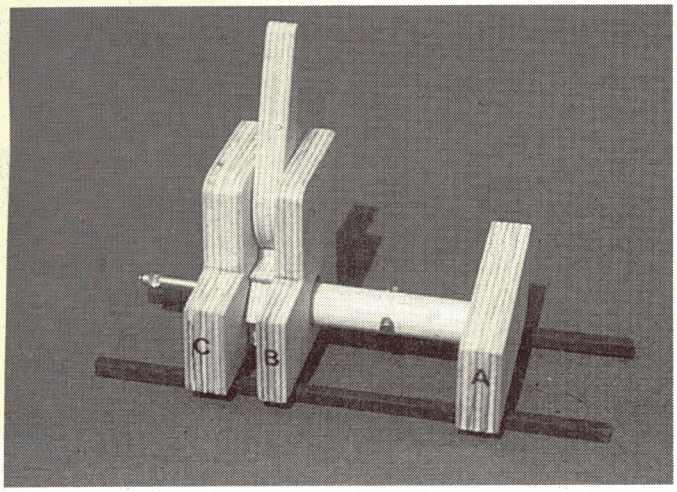


Fig. 7 Winch components from front

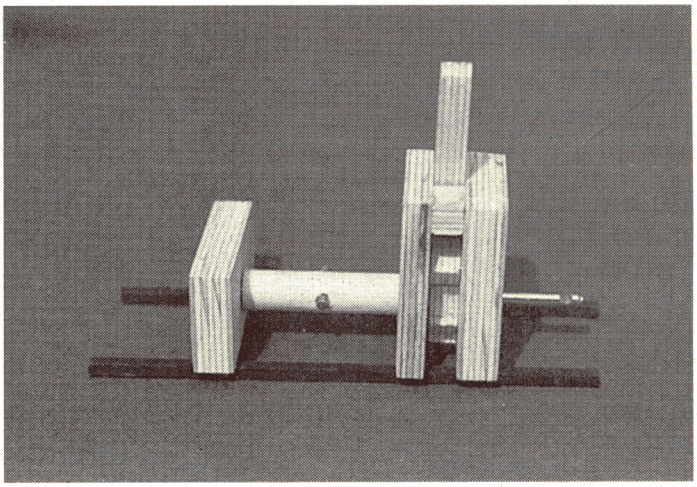


Fig. 8 Winch components from rear

dowel. Drill a 3mm hole through the centre and shape as shown. The holes in the side pieces are drilled 3.5mm.

Stage 32

Push a 32mm length of 3mm axle rod through the lever so that 6mm protrude from each end. Place the side pieces onto these and glue in the back pieces. Make sure that the roller turns freely.

Stage 33

Glue the roller assembly into position over the centre cut-out in the decking.

Stage 34

Make up the hook from a piece of 6mm ply and piano wire. Thin nylon cord is used as the cable. You will need a length of approximately 500mm. Tie one end to the hook. The end of the cord can be sealed by applying a small amount of heat to melt the nylon.

Stage 35

Thread the cord over the roller and through the deck. Tie the other end around the winding drum. This can be glued to prevent slippage.

Stage 36

Wind the cord onto the drum. Check the correct operation of the pawl and ratchet.

Stage 37

Cut a piece of 6mm ply to length for the tailgate. Form the bevel and round off the sharp edge. Sand the edges until the piece fits comfortably between the side.

Stage 38

The gate is hinged to the decking with a 1¾ inch brass hinge, bolted in place with 6BA nuts and bolts instead of screws. Position the hinge centrally on the bottom inner face of the tailgate and mark the fixing hole centres. Drill the holes 3.5mm and bolt the hinge into position.

Stage 39

The rear part of the decking should be cut to suit your model. It should be angled to mate with the main deck and be long enough for the rear of the tailgate to be flush with the sides when the hinge is bolted in place. When this has been determined pin and glue the rear decking into place and bolt the hinge to it. Cut off any surplus from the bolts and file smooth.

Stage 40

The rear bumper is a piece of 10 x 6 x 110mm pine or hardwood glued to the bottom of the tailgate. Drill holes to clear the hinge nuts. After gluing into position these holes can be filled with woodfiller and sanded smooth when dry.

Stage 41

Cut the two tailgate blocks from 6mm ply and glue them into place on the inside of the gate. Their centres should line up with the 3mm holes already drilled in the sides. When the glue has dried the blocks can be drilled 3mm, using the holes in the sides as a guide. Ensure that the tailgate is in the vertical position before drilling.

Stage 42

Make the two locking pegs from 9mm dowel and 3mm axle rod. To avoid these being lost they can be attached to the sides with short lengths of nylon cord.

Stage 43

Thread the cord through the 1.5mm holes in the pegs and secure with glue. Drill a 1.5mm hole through the sides about 15mm from the 3mm holes and thread the cord through the sides and glue. Remove any surplus from the inside of the sides. The cord only needs to be long enough to permit the pegs to be inserted and removed comfortably.

Stage 44

You can now, if you wish, fit mudguards to the front wheel arches. Cut a strip of 1.5mm ply, 10mm wide, with the grain across the width. Carefully bend the ply and glue into place leaving 1mm protruding on the outside of the body. An instant glue is useful here. Trim off any surplus after the glue has set.

Stage 45

The lighting bar is shaped from a piece of 20 x 18 x 98mm timber and glued to the roof in the position shown.

Stage 46

Finally a cover plate, made from 3mm ply, 75 x 75mm square, can be screwed to the base to cover the winch access hole.

The car

I will describe the making of this in a general, rather than a particular way, since the principles involved can be adapted to a wide range of profiles. If you are making this toy for a very young child it is preferable to make the car from solid wood cut to profile and shaped to suit. Any shape can be adopted, the only criteria being the overall length and width, which should not exceed those shown on the drawing. For the car depicted 6mm hardwood is used throughout.

Stage 1

First draw your chosen profile onto the wood. Cutting both sides together remove the wheel arches and windows before cutting around the profile. Mark out the floor, remembering the spaces necessary to accommodate the width of the wheels that you have chosen.

Stage 2

Glue the floor between the sides, its height being regulated by the method you choose to fix the wheels and axles. ➡

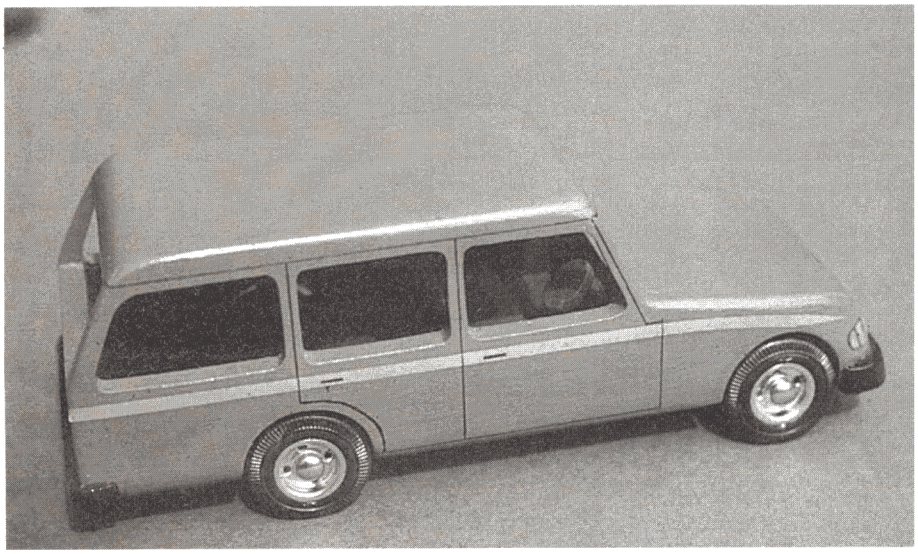


Fig. 9 Car - off side view

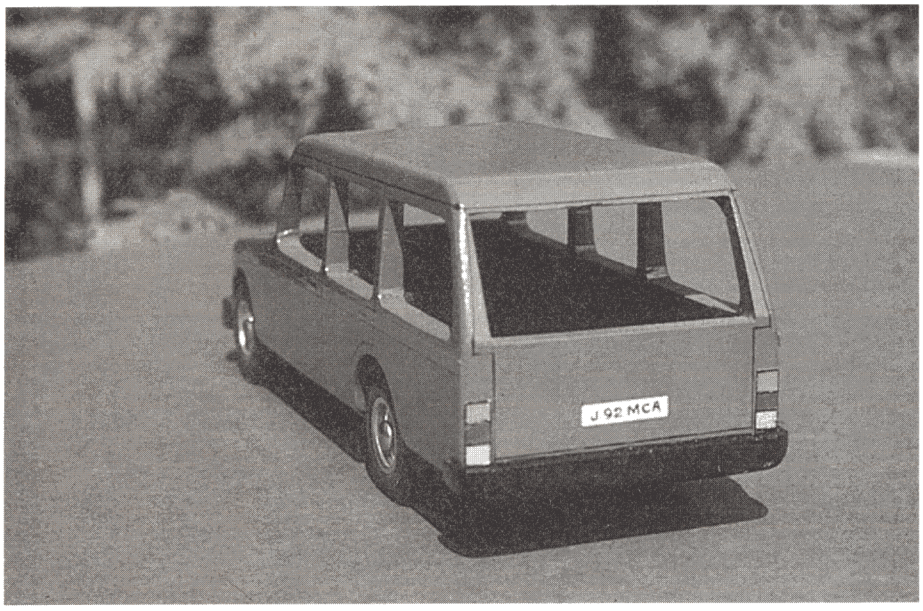


Fig. 10 Car - rear view

Stage 3

Glue in pieces for the back, or boot, the front and the bonnet. The bonnet piece can be angled at the rear to represent the dashboard.

Stage 4

At this stage you can, if you wish, add seats and a steering wheel. Paint the interior matt black.

Stage 5

The roof is rebated to a depth of 3mm along its edges so that it fits between and on top of the sides. You can use two pieces of 3mm material to achieve the same thing. You now have a slab sided vehicle which can be improved by sanding the sides, front, back and edges to a shape which pleases you. I find the Minicraft sander is an ideal tool for this job.

Stage 6

For my car I chose to use Hobby's wheels, part no. WHL-2, but 1 inch wooden wheels can be used. Strips of wood glued to the front and rear form the bumpers and these are also sanded to shape.

Stage 7

Bend a piece of wire to a suitable shape and fix under the front for the hook to be attached to, or screw a small screw eye into the front bumper.

Finishing

Stage 8

Drive any pins below the surface and fill holes with woodfiller.

Stage 9

Sand smooth when dry. Sand all parts with a medium sandpaper and then apply a coat of sanding sealer. When dry sand again with a fine sandpaper. If necessary, apply a second coat of sanding sealer and sand again.

Stage 10

Give all parts two coats of non-toxic enamel or acrylic paint. The lorry can be painted in a colour scheme of your choice; the local garage or the R.A.C. perhaps. I chose to finish mine in A.A. colours because it is nice and bright.

Stage 11

When the main colour is completely dry the doors can be drawn in using Indian ink and a fine pen against a straight edge. These can be protected by covering them with a gloss polyurethane varnish, applied with a '000' brush. The details on the car can be added in the same way. I cut the 'AA' decals from some A.A. publicity material, glued them in place and covered them with gloss varnish when the glue had dried.

Stage 12

Self adhesive silver tape was used for the radiator stripes.

Procedure for making waterslide transfers

For other details such as rear lights or wording I suggest a simple method for making your own waterslide transfers. It is not new, but carried out with care almost any transfer can be made up.

Stage 1

First, take a gummed address label. Self adhesive types are of no use for this job.

Stage 2

Pin the label to a board, gummed side uppermost.

Stage 3

Brush a thin coat of clear cellulose dope over the gummed surface and leave to dry thoroughly.

Stage 4

Now apply your artwork to this surface. For lettering the rub down type of lettering system is ideal. If you wish to write your own lettering do so with a pen and ink or fine brush and thinned enamel paints. When using a pen make sure that the nib does not piece the thin cellulose film.

Lights

Stage 13

Paint on a thin film of silver paint. I find the silver/aluminium paint sold by car accessory shops is ideal, but it is more economical to spray a little paint into the cap and apply this by brush. You can achieve a thinner coat doing it this way.

Stage 14

When it is fully dry the shape of the lights can be drawn on with Indian ink and a pen.

Cutting list

- 9mm Birch plywood
- chassis
- cab front
- back and roof
- winch supports A and C
- steering column
- 6mm Birch plywood
- lorry sides
- seats
- decking
- tailgate
- tailgate blocks
- winch support B
- crank lever
- roller frame
- pawl and ratchet
- hook
- 6mm hardwood
- car sides
- roof
- floor
- back
- front
- bonnet
- lorry rear bumper
- 3mm hardwood
- lorry front bumper
- car bumpers
- 9mm dowel
- crank handle and bush
- winding drum
- roller
- locking pegs
- 3mm axle rod
- crank
- roller shaft
- winding drum and crank handle locking pins
- locking pegs
- pawl pivot pin

Other

- 6 x 1½ inch wooden wheels

wheels of choice for car

- 2 x 1¼ inch No. 8 round head screws
- 2 x 1½ inch No. 8 round head screws
- 5 x ¾ inch x No. 6 countersunk. screws
- 1 x 1¾ inch brass hinge fretpins
- 6BA nuts and bolts
- 1 inch wooden wheel
- glue
- Hardwood for lighting bar

Stage 15

The lenses can be coloured in using glass paints. These are transparent when dry, allowing the silver background to reflect light through them. Whatever artwork you apply it should be left overnight to dry. Then you brush a thin coat of clear polyurethane varnish over the lot and again leave it to dry.

Stage 16

Now comes the moment you have been waiting for! Carefully cut around the transfer and immerse it in a bowl of warm water. Because the backing material is quite a lot thicker than that of a normal waterslide transfer it does take a little bit longer for it to release. Be patient - it does not take that long! Slide your transfer slightly over the edge of the backing paper and position it where required. Holding the edge slide out the backing paper from underneath. Check that the transfer is exactly where you want it and gently press down with a clean, dry, dust free cloth. Leave it to dry thoroughly before covering it with a thin coat of varnish, extending the varnish a little beyond the edges of the transfer.

I used this system for the light bank and rear lights and wording on the lorry as well as the front grill and head lamps and the rear light on the car. The number plates on both vehicles were applied in the same way. ❑

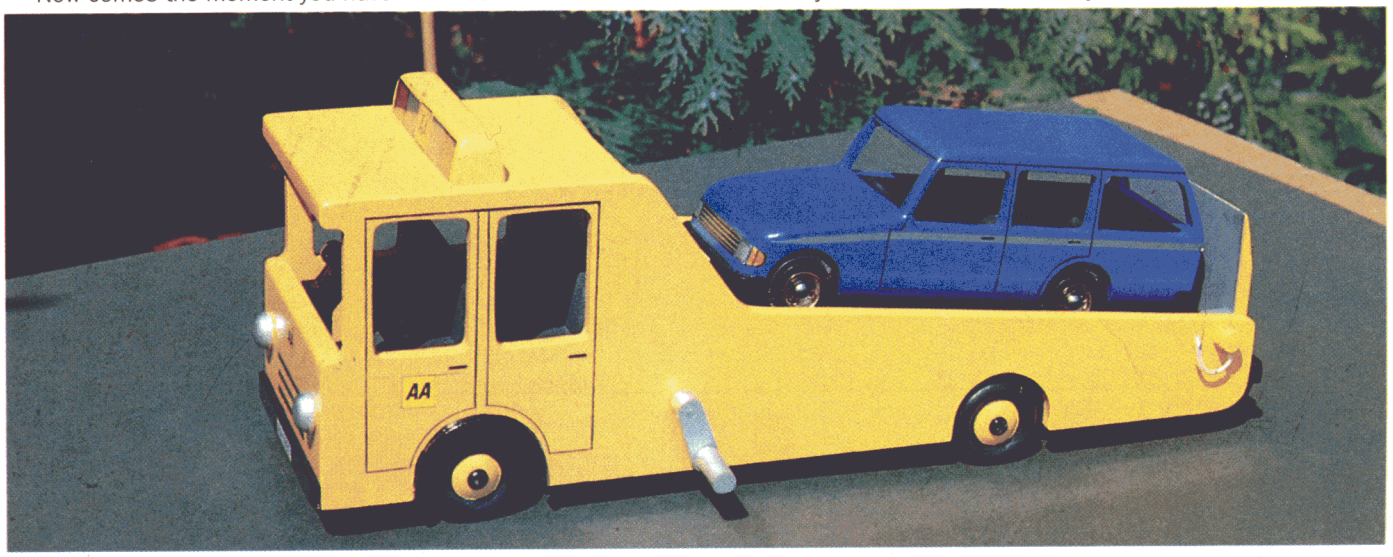


Fig. 11 Nearside view of vehicle with car.