DUMP TRUCK

This toy looks more complicated to make than it is! It's big enough for a small child to sit in — and the tipper really works, so it can be used for moving real materials around the house or garden. But watch out that your garden doesn't get re-landscaped!

SKILL LEVEL 3

Materials

1 x 1000 mm x 300 mm x 22 mm (3 ft 3 in x 12 in x ⅞ in) piece pine
1 x 1250 mm x 1225 mm x 12 mm (4 ft 1 in x 4 ft x ½ in) piece MDF board
1 x 700 mm x 12 mm (2 ft 3 in x ½ in) dowel rod
Scrap of 5 mm (¼ in) thick hardboard OR plywood
8 x 35 mm (1½ in) No. 10 countersunk steel screws
40 x 30 mm (1¼ in) No. 6 countersunk steel screws
16 x 35 mm (1½ in) No. 8 countersunk steel screws
1 x 20 mm (¾ in) mirror screw (with screw-in dome head)
1 x 30 mm (1¼ in) brass ring bolt
2 x 30 mm (1¼ in) steel OR brass butt hinges
Sandpaper
Wood glue
Wood filler
Wax candle
White universal undercoat
Topcoat paint

Diagram 1 will give you a good idea of the sizes of wood involved and the way in whi they are laid out. However, each compone section has a diagram of its own, including measurements. I have suggested that you write the name on the face side or edge o pieces as you cut them out, to avoid confusion during construction.

Main chassis

1. Using a radial-arm or cross-cut saw, cut two chassis sides measuring 610 mm x 26 mm (2 ft x 1 in) (diagram 2) from the pine and mark the face sides (which will always face outwards) and face edges (which will always be the top surfaces).

2. Now cut out four stretchers, each measuring 140 mm x 26 mm (5½ in x 1 in) as shown in diagram 3a. Use a G-clamp tc hold the two chassis sides together in preparation for drilling the holes describec in the following steps. (Important: the fac side marks must be on the outside and the face edge marks on the top.)

3. In the chassis sides drill three 14 mm (½ diameter axle holes in the positions marke by crosses (diagram 2).

DIAGRAM 1

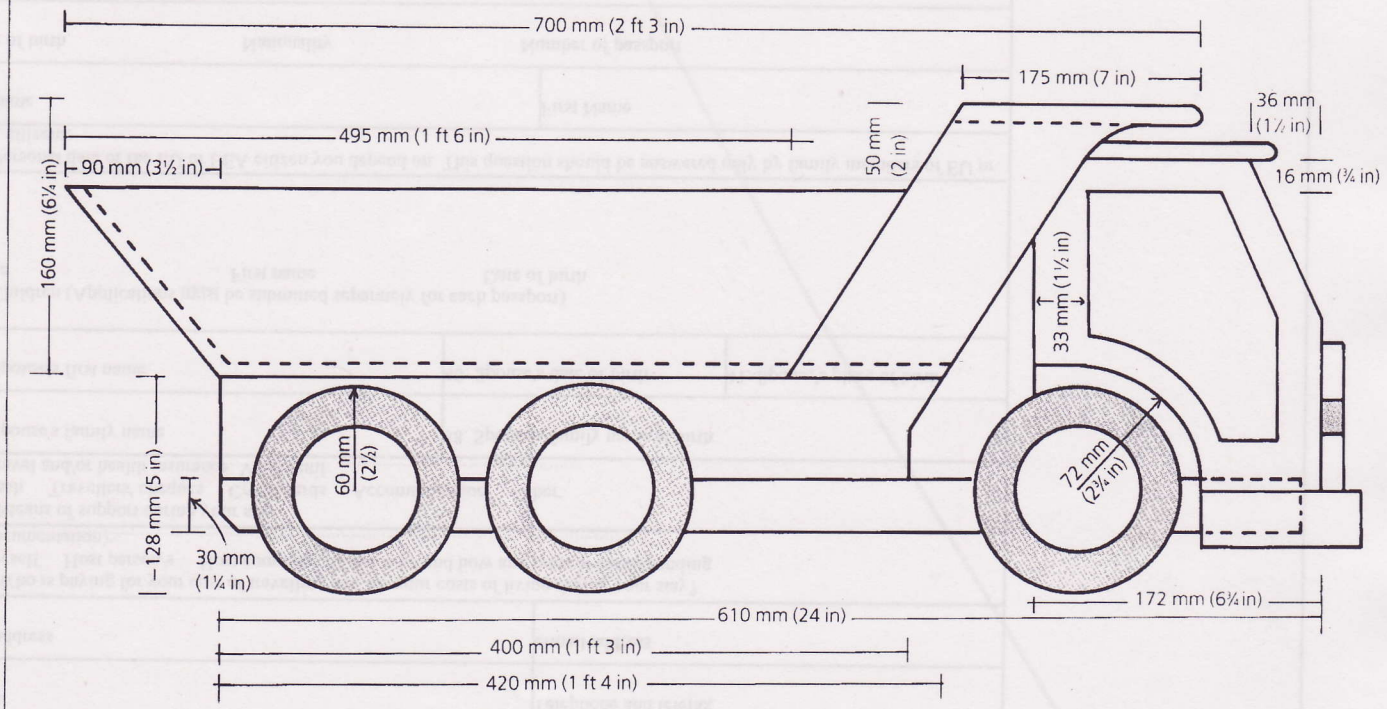


DIAGRAM 2

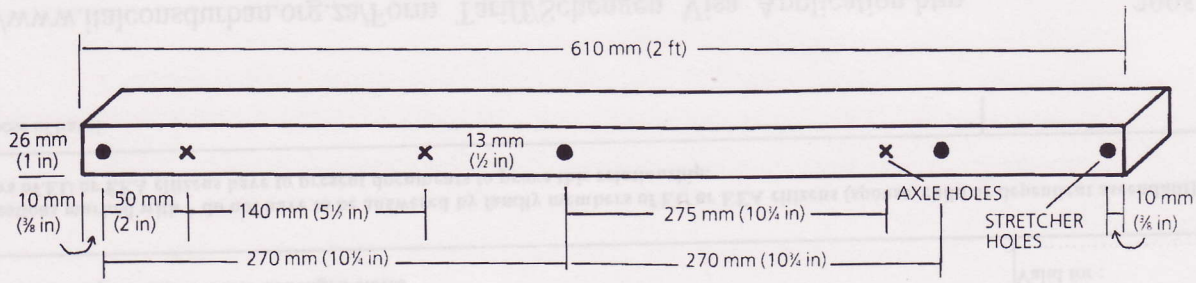
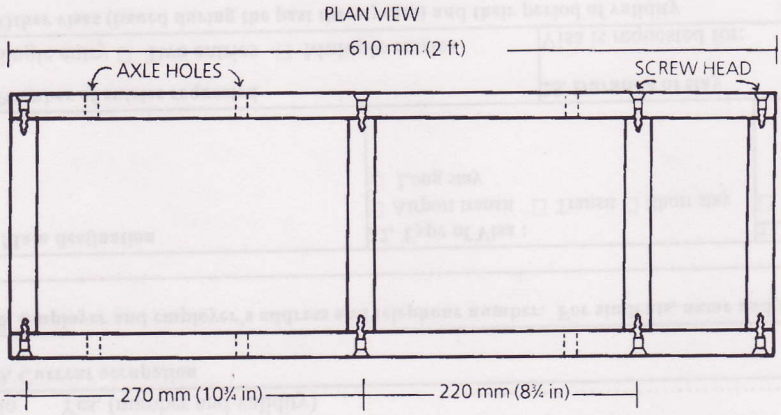
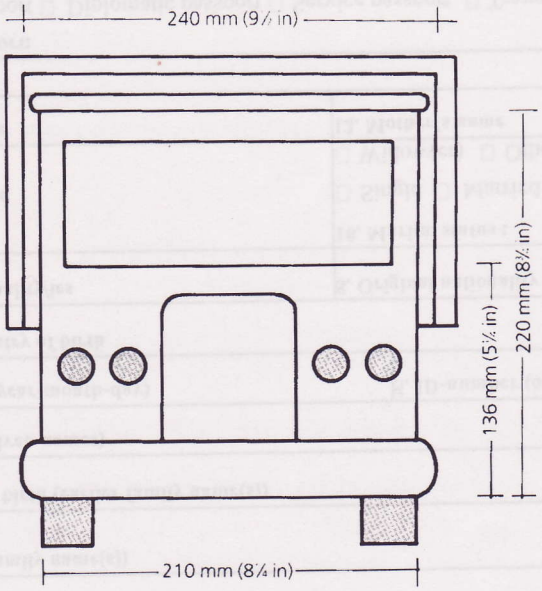


DIAGRAM 3





4. Also in the chassis sides, drill four 5 mm (¼ in) diameter stretcher holes in the positions marked (diagram 2). The screws that will secure the stretchers to the sides will pass through these holes.

5. On the outside face sides, countersink only the stretcher holes to accommodate the screw heads.

6. Assemble these six pieces as shown in the plan view illustrated in diagram 3, using 35 mm (1½ in) No. 8 countersunk steel screws and wood glue to butt-join the pieces together.

Bin chassis

7. From the pine, cut two 420 mm x 60 mm (1 ft 4 in x 2½ in) rectangles and shape them according to diagram 4a, cutting away any scrap. Drill four 5 mm (¼ in) holes through the points marked by crosses.

8. Cut two 140 mm x 60 mm (5½ in x 2½ in) stretchers from the same pine.

9. Using the same method as in step 2, construct the bin chassis frame (diagram 4). Set aside.

Bin

Bin base

10. Before you start cutting out any of the components from the sheet of MDF board, draw the pieces on the wood, utilising as many of the straight sides of the sheet as possible. In other words, do not draw the component in the middle of the sheet and then cut into the sheet!

It makes sense to use the edges as the longest side of each component. Check the measurements and angles a second time before cutting. The first three components are each 240 mm (9½ in) wide, so you might well cut one long strip of 880 mm (2 ft 9 in), making sure that you include allowance for saw cuts, out of which you will cut three pieces. Where possible, use a radial-arm or circular saw for the cutting.

11. Cut out the base of the bin (diagram 5a) from the MDF board. Mark the face side — this will always be the top.

12. On each end mark the angles (diagram 5b shows a side view). To achieve an angle cut, draw the angle on the edge of a piece of paper using a protractor (diagram 5c). Set this angle on a bevel gauge (diagram 5d). Transfer the bevel gauge to the wood and draw in the angle on each end of the wood (diagram 5e). On the underside of the wood, draw in a line connecting these two lines (diagram 5f). Cut the angles you have just marked by setting the blade angle on your radial-arm or circular saw, or by setting the wood in your bench vice and planing down the angle using a jack plane.

DIAGRAM 4a

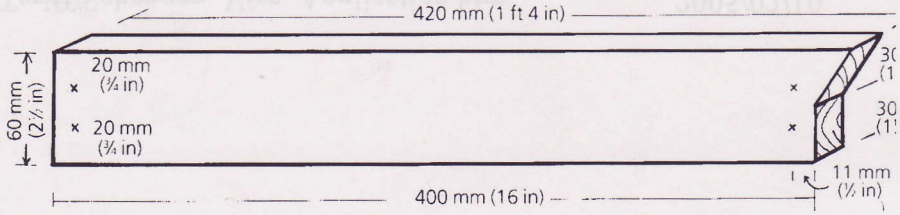


DIAGRAM 4b

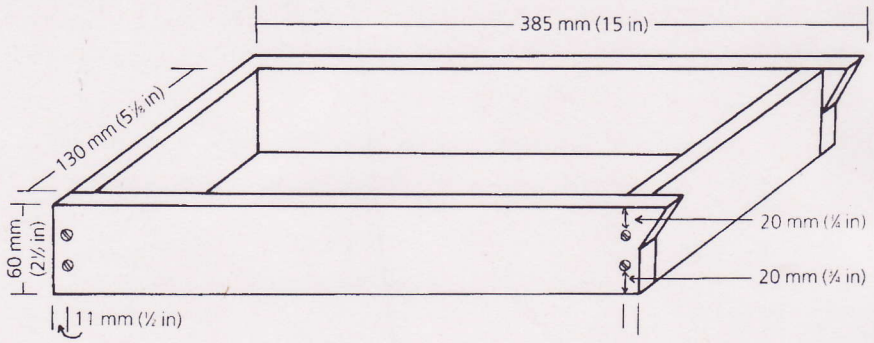


DIAGRAM 5b

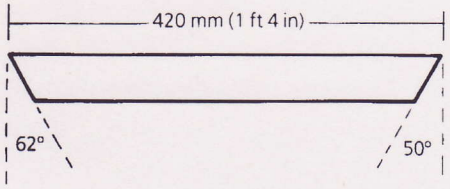


DIAGRAM 5a

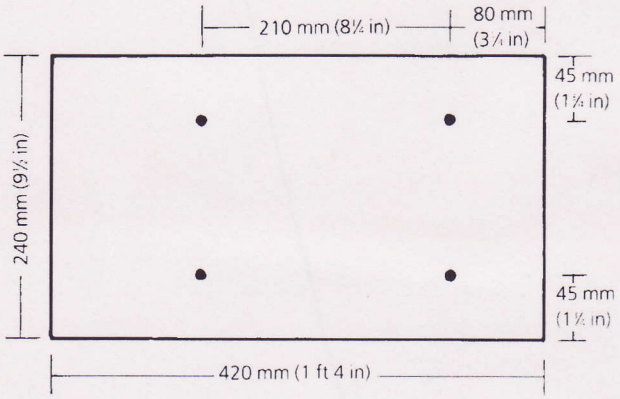


DIAGRAM 5c

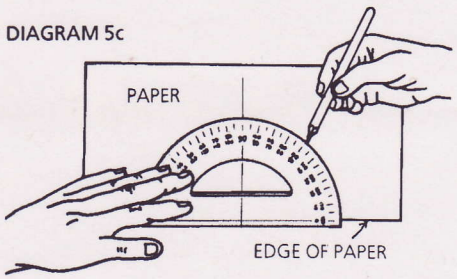


DIAGRAM 5d

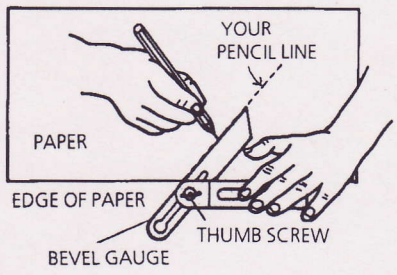


DIAGRAM 5f

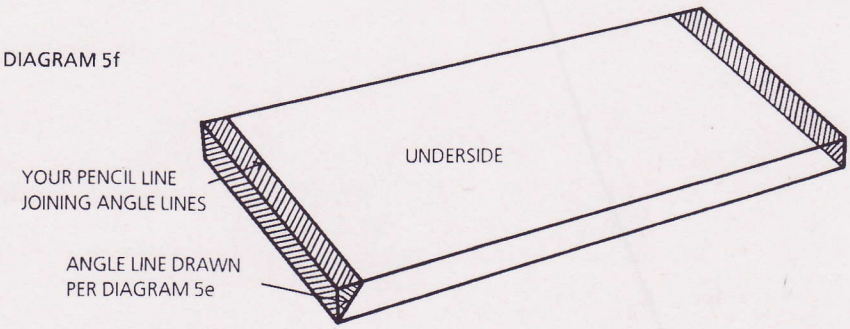
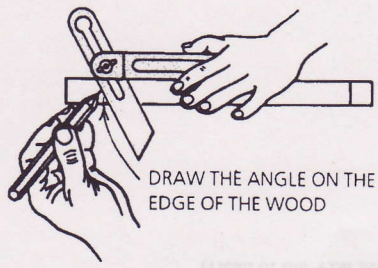


DIAGRAM 5e

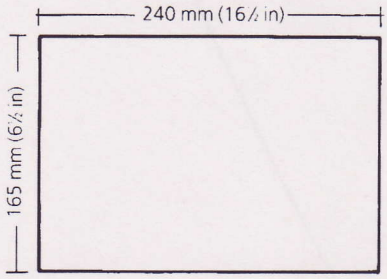


13. Drill four 5 mm (¼ in) diameter holes at the positions marked (diagram 5a), and countersink them. Write the name of this piece clearly on the face side and set it aside for later.

Bin front wall

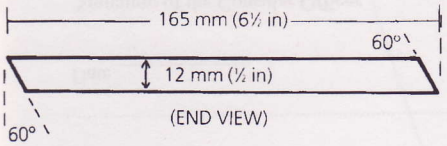
14. Cut out the front wall from the MDF board (diagram 6a) and mark the face side — this will always be the top.

DIAGRAM 6a



15. On each end, mark the angles (diagram 6b is an end view) and cut these angles in the same way you cut those for the bin base in step 12 above. Write the name of this piece clearly on the face side to avoid confusion at a later stage, and set it aside for the moment.

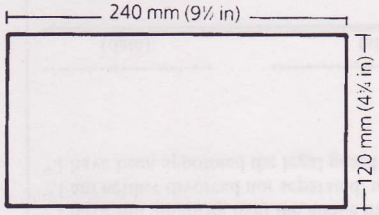
DIAGRAM 6b



Bin tail gate

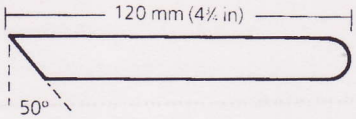
16. Cut out the tail gate from the MDF board to the dimensions given in diagram 7a, and mark the face side — this will always be the top.

DIAGRAM 7a



17. Following diagram 7b, which is an end view, cut one end at the given angle and round the other end using a plane or a router. Write the name of this piece on the face side to avoid confusion at a later stage, and set it aside for the moment.

DIAGRAM 7b



Bin lid

18. Cut out the bin lid from the MDF board (diagram 8a) and mark the face side — this will always be the top. As with the tail gate, cut an angle at one end, and round the other (diagram 8b). Write the name of this component on the face side; set aside.

DIAGRAM 8a

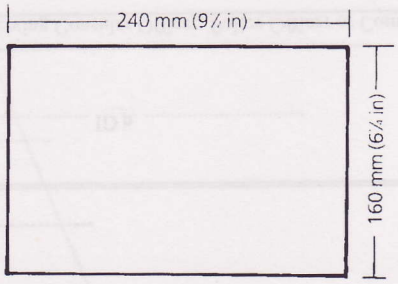
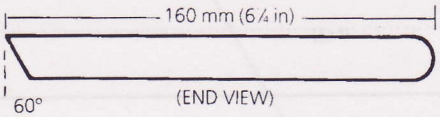


DIAGRAM 8b



Bin sides

19. Cut out one piece from the MDF board (diagram 9). The curve can be drawn freehand to your satisfaction, but make sure that it is a smooth, flowing curve. (Draw and check carefully before cutting.)

20. Place this completed piece on the MDF board and draw carefully round the outline to make a duplicate. Cut out.

21. Hold the two pieces together so that they match each other, and mark the face side on the outside of each piece.

22. Mark the screw holes (diagram 9), all of which — with the exception of those on the dotted line — are 6 mm (¼ in) from the respective edges. Drill all the holes using a 4 mm (⅛ in) drill.

23. On the face side of each of these pieces, countersink these holes sufficiently to accommodate the screw head of a 30 mm (1¼ in) No. 6 countersunk steel screw.

24. Using a rasp, round off all the edges. Set these pieces aside for later.

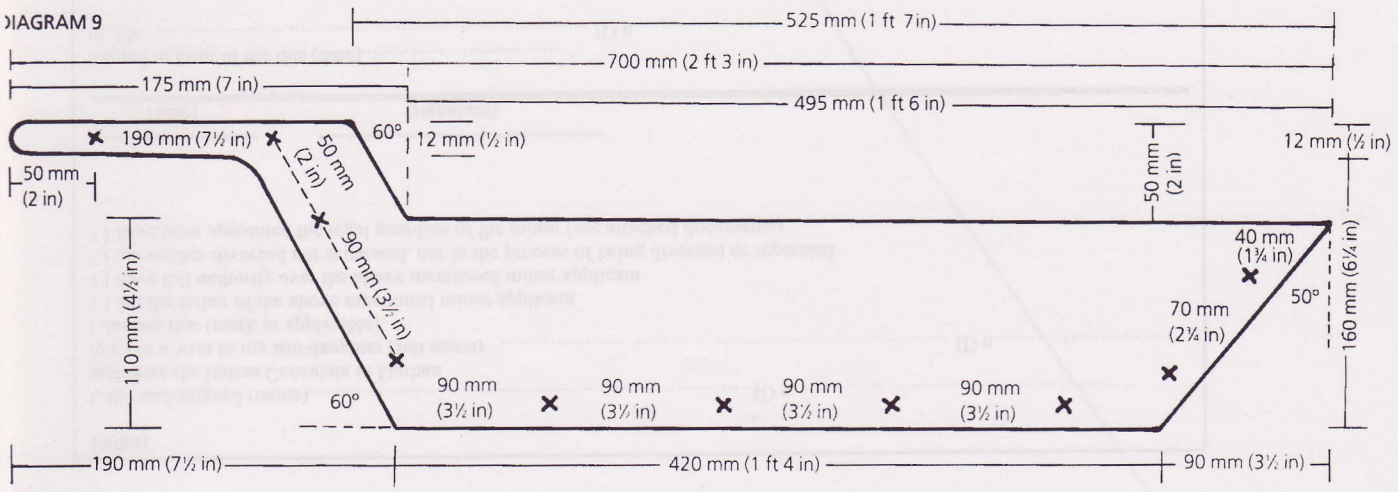
Driver's cab

Cab sides

25. Cut out one piece from the MDF board (diagram 10).

26. For the door space, drill a 12 mm (½ in) lead hole inside the cutting line at each edge (marked by black dots on diagram 10), then commence cutting, using a jig saw or hand coping saw. Work from each lead hole towards each corner. These edges will need finishing off with a rasp or coarse file.

DIAGRAM 9



27. Repeat these steps to produce a second cab side for the driver's cab.

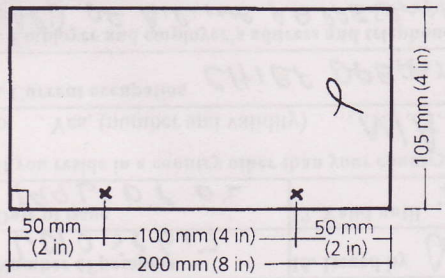
28. Hold the two pieces together so that they match each other and mark the face side on the outside of each piece. Mark the screw holes (diagram 10), all of which, with the exception of those on the dotted line, are 6 mm (¼ in) from the respective edges.

29. Drill all the holes using a 4 mm (⅛ in) drill. On the face side of each of these pieces, countersink these holes sufficiently to accommodate the screw head of a 30 mm (1¼ in) No. 6 countersunk steel screw.

Cab front

30. Cut this out from the MDF board (diagram 11). Mark the face side; this will always be the outside.

DIAGRAM 11



31. Drill the two screw holes (diagram 11), 6 mm (¼ in) from the edge, and countersink them from the face side. Write the name of this piece on the face side; set aside.

DIAGRAM 10

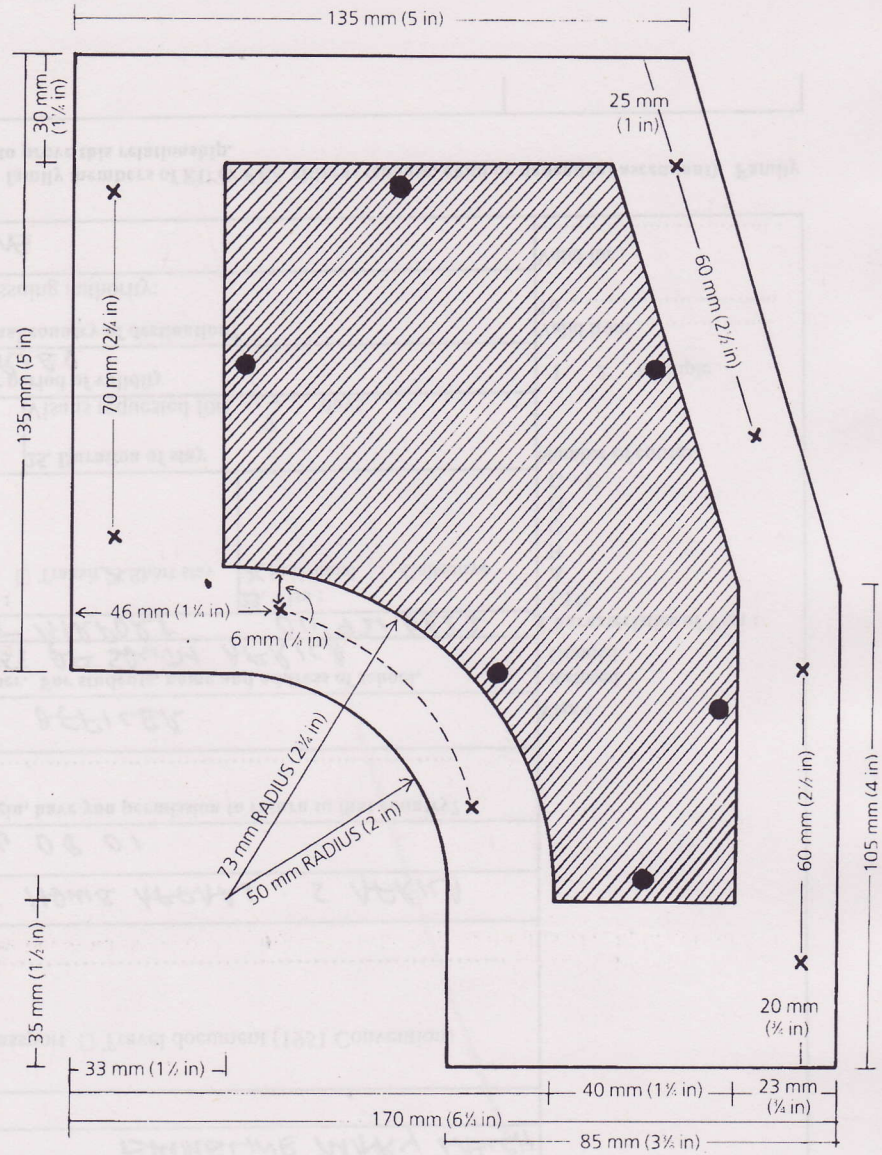


DIAGRAM 12a

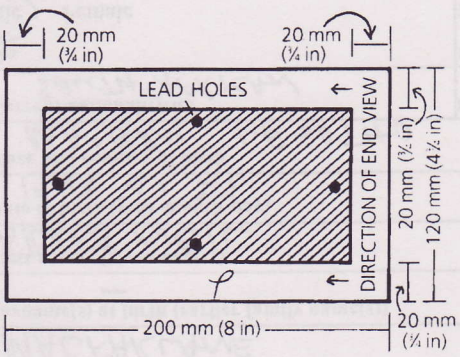


DIAGRAM 12b

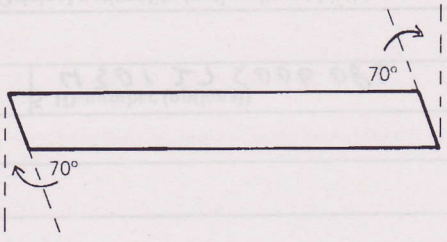
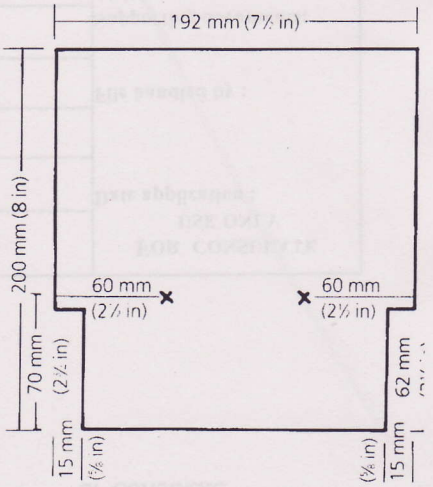


DIAGRAM 13



Cab windscreen

32. Cut out the cab windscreen from the MDF board (diagram 12a) using the same method as described for making the door space in the cab sides (steps 26 & 27), and cut the angles (diagram 12b).

Cab back

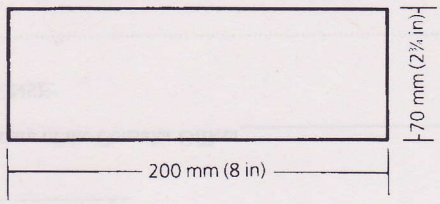
33. Cut out the cab back as illustrated in diagram 13.

34. Mark and drill two 4 mm (⅛ in) holes as marked on the diagram, and countersink these two holes.

Cab seat support

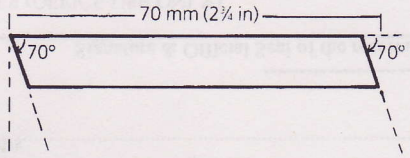
35. Cut out this piece from the MDF board following diagram 14a.

DIAGRAM 14a



36. Cut the angle on the edge as shown in diagram 14b (an end view).

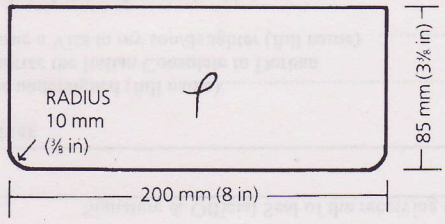
DIAGRAM 14b



Cab seat

37. Cut out the cab seat from the MDF board (diagram 14c) and round the front corners to a radius of 10 mm (⅜ in).

DIAGRAM 14c

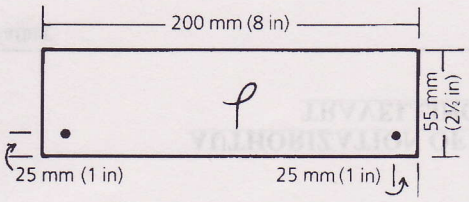


38. Mark the face side on the top surface of the wood — this will always be the top of the cab seat. With a rasp or router, round off the front edges and the ends. Set this aside for later.

Cab floor

39. Cut out the cab floor from the MDF board (diagram 15a), and mark the face side on the top surface — this will always be the top.

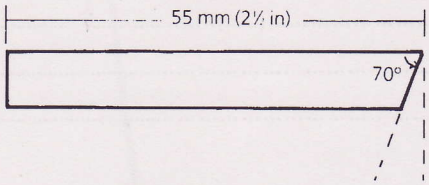
DIAGRAM 15a



40. Cut the angle on one of the edges, as shown in diagram 15b — an end view.

41. Mark and drill two 4 mm (⅛ in) holes on the face side, as marked (diagram 15a). These holes are measured in from the angled edge. Countersink these holes on the face side. Write the name of this piece on the face side and set it aside for later.

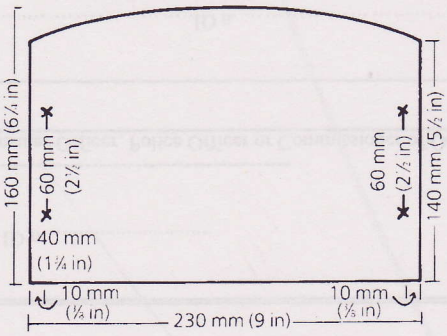
DIAGRAM 15b



Cab roof

42. Cut out the cab roof from the MDF board (diagram 16) with a radial-arm saw and then cut out the curved front with a band saw or jig saw. Note that the curved front edge of the cab, which will jut out over the windscreen slightly, can be drawn freehand. Mark the face side on the top surface — this will always be the top.

DIAGRAM 16



43. Mark and drill four 4 mm (⅛ in) holes on the face side (diagram 16). Countersink these holes on the face side. Round off all the edges on the face side using a rasp, or a router fitted with a half-round cutter. Write the name on the face side; set aside.

Wheels

44. Using a compass, draw six circles with a radius of 60 mm (2½ in) on the pine; the centre points should be clearly visible (diagram 17a).

45. Using the smallest drill bit you have, d a hole right through each wheel at the centre point. If you have a lathe, set a wh in your lathe and turn the wheel so that th finished product looks like that in diagram 17b. The internal measurements are not critical and are more for decoration than any practical purpose. If you don't have a lathe, round the edges of the wheels with rasp or sandpaper.

DIAGRAM 17a

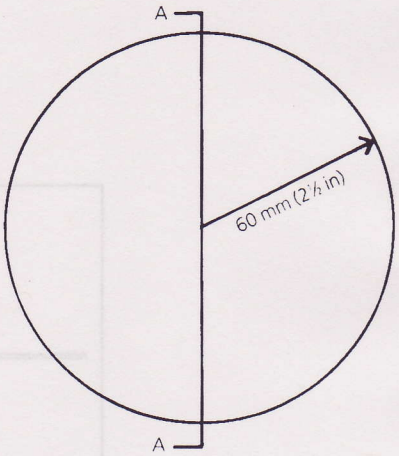
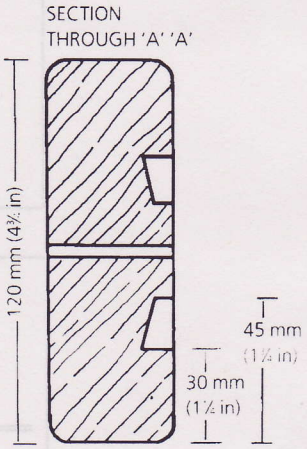


DIAGRAM 17b



46. Using a 12 mm (½ in) drill bit, drill a hc in the dead centre of each wheel, on the inside, to no more than half the thickness the wheel. This will form the housing for t axle. Finish the wheels off by hand with sandpaper and set aside.

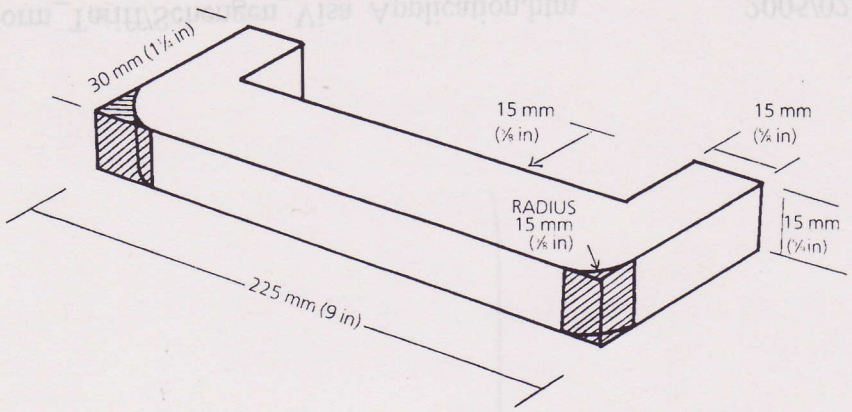
Axles

47. Cut three 200 mm (8 in) lengths from the 12 mm (½ in) dowel. Check that the axles fit snugly into the holes that you hav drilled in the wheels. (The wheels are eventually glued on to the axles — but no yet.) Set aside for later.

Spacers

48. For the wheels to move freely, it will be necessary to make some spacers, or washers. Using a compass, draw six circles with a radius of 20 mm (¾ in) on the scrap piece of hardboard or plywood. Make sure that the centre is clearly visible. (Do not cut them out yet.) Through the centre point of each circle, drill a 14 mm (½ in) hole (through which the axle will pass). Now cut the six circles out of the board. A band saw blade might be a bit too wide for cutting these tight circles, so a hand-held fret saw will probably be better. Finish off these six discs with sandpaper and set aside.

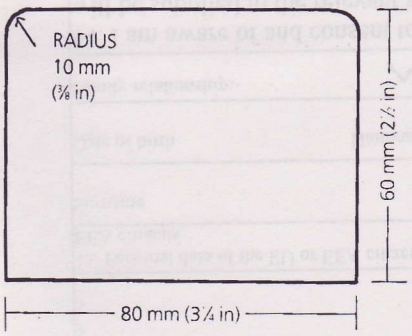
DIAGRAM 19



Radiator

49. To make the radiator, cut a rectangle measuring 80 mm x 60 mm (3¼ in x 2⅓ in) from the MDF board and round off the corners (diagram 18). Round off the front leading edges, except the bottom edge, using a rasp and sandpaper, or your router. To make the radiator look more realistic cut some 'fins' in it. This can be achieved by drawing them at 10 mm (⅜ in) intervals and cutting with a tenon saw, or even your radial-arm saw. *Always be extremely careful when using electrical tools on such small pieces of wood.*

DIAGRAM 18



Bumper

50. For the bumper, cut out a basic rectangular shape measuring 225 mm x 30 mm (9 in x 1¼ in) from the 22 mm (⅞ in) thick pine (diagram 19). Using a tenon saw and finishing off with a rasp, round off the two front corners to a radius of 15 mm (⅜ in). Carefully cut out the scrap at the back edge of the piece (hatched on diagram 19). Shape the edges of the bumper with a rasp, or router, so that it looks more interesting and realistic than a squared piece of wood.

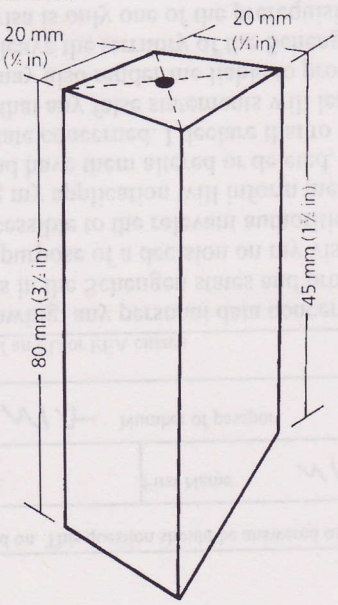
Headlights

51. Cut four discs with a radius of 10 mm (⅜ in) from the hardboard or plywood. Finish off with sandpaper; set aside.

Steering column

52. Cut out the shape (diagram 20) from the remaining pine, and finish off with sandpaper. Mark the centre point of the top. This marks the position of the hole for the spindle of the steering wheel.

DIAGRAM 20



Steering wheel

53. For the steering wheel, use a small piece of scrap wood about 7 mm (¼ in) thick (or reduce a small piece of pine or MDF board to this thickness), and cut a disc with a radius of 25 mm (1 in), ensuring that the centre point of the disc is clearly visible. Through the centre, drill a 4 mm (⅜ in) hole and countersink on one side. Round off the edges thoroughly, so that the disc looks realistic, without sacrificing the thickness of the wood. This will ensure that it will stand a fair amount of rough handling.

Construction

First assemble the whole truck without glue, as detailed below, to ensure that all the pieces fit together well. If you find that there are a few minor problems with the fit, you can make adjustments at this stage.

Construction of bin

54. Place the base of the bin (diagram 5a) in a bench vice and hold one of the bin sides in place, ensuring that the face side of the side wall is on the outside, and the face side of the base is on the inside of the bin.

55. Still holding the bin side in position and using a 2 mm (5/64 in) drill bit, drill lead holes for the screw shafts through the centre of each of the screw holes on the bin side.

56. Using the 30 mm (1¼ in) No. 6 screws, screw the bin side to the base.

57. Repeat this exercise with the other side, the front wall (diagrams 6a & 6b), the tail gate (diagrams 7a & 7b) and the bin lid (diagrams 8a & 8b) until all are in the correct position. You should now have a well-constructed bin resembling the one in the photograph.

58. Fix the bin to the bin chassis, ensuring that the front edge of the chassis is level with the leading edge of the bin bottom.

Construction of driver's cab

59. Fix one side wall (diagram 10) to the cab front (diagram 11).

60. To the same side wall fix the cab windscreen (diagrams 12a & 12b). To this structure, fix the other side wall.

61. Fix the cab back in position (diagram 13); fix this structure to the front end of the main chassis, using the screw holes marked in diagram 11.

62. Fix the cab floor in place (diagrams 15a & 15b), then the seat support (diagrams 14a & 14b), the seat (diagram 14c) and the roof (diagram 16).

Fixing the wheels in place

63. Place one end of each axle into a wheel and tap on gently but firmly with a hammer.

64. Drop one of the spacers on to the axle against the wheel.

65. Place each of the axles through the appropriate axle holes on the main chassis and place one of the remaining three spacers on each axle.

66. Tap the other three wheels in place.

Placing the bin on the body

67. The bin with its chassis should fit neatly on to the main chassis, so that the back edges of the chassis are flush with each other. When the truck is finally assembled, two hinges will be secured to these edges so that the bin of the truck can be elevated. Check that the bin is clear of the cab. You now have a vehicle that looks like the one in the photograph, except for the paint.

Painting

68. If you are happy that everything fits together well, take the whole thing apart.

69. Using glue this time, reconstruct the cab and fix it to the main chassis as before.

70. At this stage, screw the steering wheel on to the steering column, leaving enough 'play' to allow the wheel to turn. Don't glue the steering column into position in the driver's side until the last stage of construction, otherwise painting the wheel, steering column and the inside of the cab will be a very tricky job.

71. First glue the bumper, then the radiator, and finally the four headlights, into position on the front of the cab.

72. Using glue, reconstruct the bin and fix it to its chassis as before.

73. Use wood filler to fill all the screw holes (and any unsightly gaps that may have appeared). When the filler has dried, use sandpaper to sand the filled holes flush with the surface of the wood.

74. Paint all the components (except the axles) with white undercoat. When the paint is thoroughly dry, lightly sand down every component.

75. Using topcoat, paint each part in the colour of your choice. You may need two topcoats to get a really good finish. Remember to sand down between each application. This will ensure that there are no unsightly bumps or irregularities on the finished product.

Final construction

76. When all the paint is thoroughly dry, give the axles and the spacers a light rub with the candle wax, making sure that you don't get any wax on the ends of the axles. This candle wax will ensure that the wheels turn smoothly.

77. Now fix the wheels and axles in place before, this time using a little glue on the end of each axle, ensuring that the wheels turn smoothly and are parallel to the chassis. In other words, when they turn there shouldn't be any 'wobble'.

78. Glue the steering column into position on the driver's side of the cab.

79. Place the bin on the main chassis and hinge them together at the back end with steel or brass butt hinges so that the bin can be tipped up.

80. In the centre of the bumper, screw in an attractive brass ring bolt, through which a light, brightly-coloured rope for pulling the truck along can be tied.