How to build your own Infrared "Rock & Roll Marble Machine"

Pat McMahon— V2—1/8/2015

Background Information- Pictured above is Pat's Version 1 Protype "Infrared Rock & Roll Marble Machine" which took many hours in development to get to the final workable design.

The photos and instructions attached on this document are for the Version 2, in which I modified the Rocking Box design. This was to reduce marble hop out so on the back tilt, there was a 3 mm drop down on the Rock Box segments. Because the 14 segments of the Rock Box only lift the marbles approximately 25 mm, it is imperative that it is built and run on a perfectly flat surface, as I found out. This is so the marbles have a fall over the entire 500mm travelled, hence the need for the bubble levels and adjusting wedges.

Assumptions- My original design worked on the assumption that most marbles are about 16 mm in diameter. Each marble can vary so they will either sit up or down depending on their sizes, in the inside of the 16 mm OD wide Aluminium channel. Even so this variation shouldn't cause the marbles to hit the top lock down nuts or LED's. I have used my Picaxe 14M2 Infrared Microcontroller and a universal remote to run my Marble Machine. As you could use any other microcontroller and a different universal remote, I haven't included my program code, but it is available. A power screw driver, a digital vernier caliper and brading gun, helped greatly in the development stages, although it is possible to build it with just basic handtools in a work shop.

It is a very challenging , visually very pleasing and a rewarding model to enjoy, Pat McMahon.

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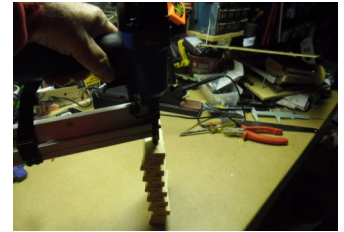
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1 – Design Brief

Design and build your own Infrared "Rock & Roll Marble Machine".

2 – Get some 12 mm wide x 30 mm high Pine, ~2 metres long. Plane approximately a 7 degree bevelled angle.

3 – Cut 14 lengths at 100 mm long. Place the 14 pieces, with the slope down from right to left.

4 – Because of the offsets it takes a bit of care if using brads and a hammer to fasten. If possible fasten using a nail gun with 25mm brads.

5 – Fasten the 14 pieces alternating with one edge up 10mm and the other end down 3 mm .

6 – Using 3 ply, cut the 2 sides, the lower end round hole entry end and the upper square exit end plate, to fit the 14 pieces, to make the Rock Box.

7 – Fasten the sides using eight 12 mm small self tappers .

8 – Cut a piece of 9mm thick, 5 ply, 300 mm x 400 mm wide .

9 – Fasten on 4 Rubber stoppers, 25 mm in from the corners.

10 – Seal both the assembled Rock Box and base with a satin stain finish.
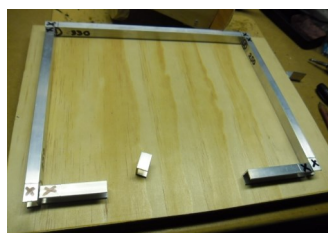

11 – Get a 1 metre length of Aluminium channel, 16 mm wide x 12 mm high x 1.6 mm thick.
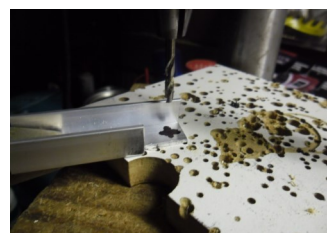
(Bunnings -Metal Mate 7754)

12 – Cut Stage 1– 60 mm, Stage 2 & 3—250 mm, Stage 4—330mm, Stage 5 - 85 mm
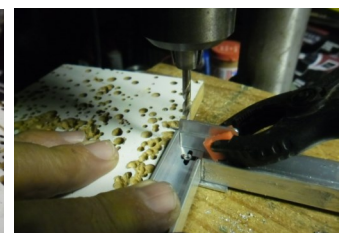

13 – Lay all 5 stages, with the open channel facing outwards. Mark out 13 mm from the end (allows for blade thickness cut)

14 –Carefully, using a hacksaw, cut out the inner face ONLY, cutting horizontally then vertically
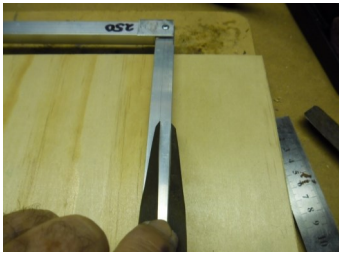

15 – Drill the top channel with a 3.2 mm (1/8th) drill. This will enable riveting the 3 components later with 1 only to allow pivoting, with an 8 mm long Pop rivet (4.4)

16 – Using a small clamp, place the pre drilled top channel on top of the next stage, with a 30 mm wide piece of 30 x 30 mm aluminium angle underneath.

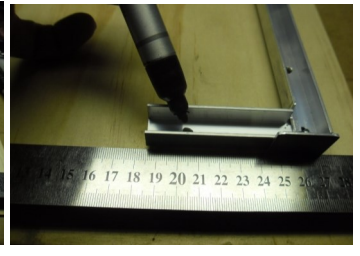# Infrared "Rock & Roll Marble Machine" - page 2

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17 – Place the assembled tracks upside and using a pair of dividers scribe the centre lines.

18 – Drill using a 5 mm drill, in 20mm from the end for stage 1 & 5, 50 mm in for stage 2 & 4, 75 mm in for stage 3

19 – Centrally position the track assembly ensuring ~185mm gap for the Rocking Box.
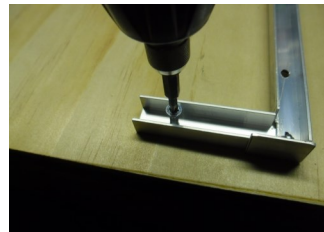

20 – Mark the Rod Support positions with a pen .

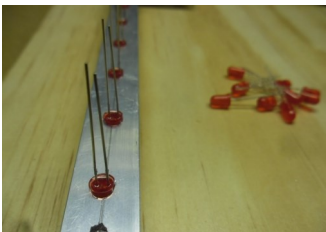21 – Continue marking the 8 marked holes.

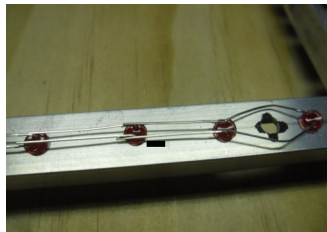

22 – Drill the 8 holes using a 4.5 mm drill.

23 – Using a 3/16th inch metal thread, using a driver, tap a thread in the wooden base.

24 – If installing 5 mm LED's, now is the easiest time to the drill holes, using a jobber drill of 5.1mm, using 24 mm centres with dividers.
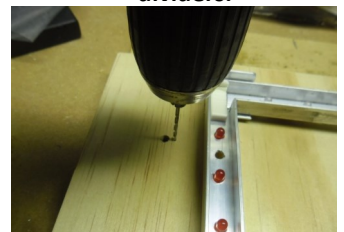

25 – Push the LED's into the 5.1 mm holes, ensuring the shortest or negative legs are all facing inwards.

26 – Bend the legs so they touch each other and then carefully solder.

27 – Solder on black wire for the negatives and coloured wires for the positives to get around the all thread supports and corners.
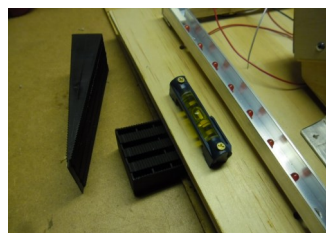

28 – Use a 2 mm drill to drill holes in the base, to later insert underneath the wires to the microcontroller.

29 –Cut a piece of 30 mm x 30 mm Aluminium Angle to make the hinge brackets.

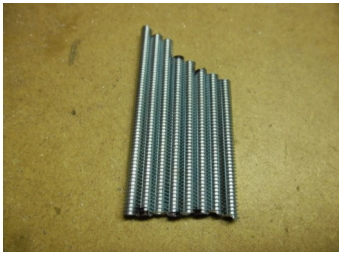30 –Drill and attach to the bottom of the Rocking Box, using a metal thread as the hinge pin.

31–Attach 2 bubble levels on the width and depth sides. Also later use building wedges to get the base perfectly level .
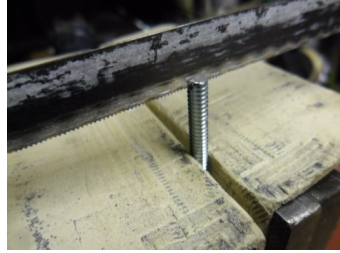

32 –Get a piece of 3/16th all thread, approx. 500mm long.

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33 – Cut the following for the sloping tracks - 70 mm, 66 mm, 59 mm, 55 mm, 53 mm, 50mm, 49 mm & 45mm. File & debur.

34 – Carefully holding using soft jaws in a vice, centrally, hacksaw blade cut a groove slot approx. 2 mm deep on one end only.

35 – Screw a 3/16 th nyloc lock nut up about 10mm from the bottom .

36 – Screw a normal adjusting nut down approx. 6 mm from slot end.

37 – Insert the allthread support legs, with the screw driver slot up, into the pre threaded wooden base.

38 – Insert all the 8 allthread support legs, in the correct order. (nuts 10 mm up from the bottom & 6 mm down from top)

39 – Before positioning the tracks on the legs, use a vernier caliper to get the following heights above the base– 60,56,59, 55,53,50 49,45mm.

40 – Place assembled track assembly on the support legs, screwing another nyloc nut as a locknut on the top, in the channel & adjust to ensure smooth marble roll.

41 – Place the Rocking Box in the 185mm gap, test and adjust securing it to the base plate, ensuring marble roll.

42 – Cut a connecting arm, a piece of 12 x 3 mm flat Aluminium, drill and attach it to the lower end of the Rocking Box.
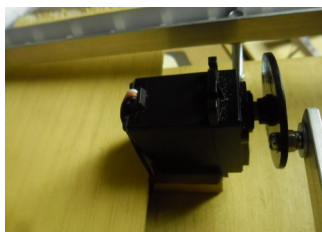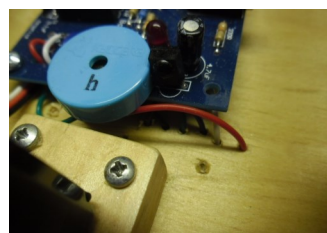
43 – Connect it to the servo arm, test and finally fix the servo motor housing to the base ensuring alignment for smooth and friction free rocking operation.

44 – Mount the Picaxe 14M2 microcontroller and battery pack to the base plate.

45 –Drill a series of 2 mm diameter holes to neatly locate underneath the connection of the LED wires.

46 –Insert wires in the base plate and solder the wires to the microcontroller.

47 –Using the Picaxe "Programming Editor" software, program your desired outcome to the LED's and servo, to suit your Universal Remote buttons.

48 –Test, modify and make any adjustments to ensure the continuous and smooth operation of your "Rock & Roll Marble Machine". ENJOY!